RESEARCH ARTICLE

Fertigation of Sugar Wash for the Growth of *Raphanus sativus*

Thamaraiselvi.C*, Ancy Jenifer, A. and Nithya, B.

Department of Biotechnology, Mother Teresa Women's University, Kodaikanal- 624 101.TamilNadu, India.

*Address for correspondence
Dr.C.ThamaraiSelvi
Assistant Professor,
Department of Biotechnology,
Mother Teresa Women's University,
Kodaikanal-624 101,Tamil Nadu, India.
E.mail: ckthamarai@yahoo.com

ABSTRACT

Most of the natural water resources are polluted by a wide range of anthropogenic activities, whereas pure water is life. Water pollution is mainly caused by the discharge of industrial waste water. Distilleries, one among the several other industries consume large quantity of water and generate more volume of effluent (spent wash). The spent wash is dark brown in color with objectionable odor, higher amount of suspended solids, dissolved solids, BOD and COD. Hence, a study on the physico-chemical characterization of the spent wash and its positive utilization for the growth of edible plant was made. Sugar effluent and spent wash were collected from a typical sugar-cum distillery industry. The physico-chemical parameters of the spent wash, sugar effluent, sugar wash were characterized using standard analytical methods. Higher level of TDS, BOD, COD, sulphate, nitrate, chloride and phosphate were recorded. The sugar effluent has very less pollutant while compared with spent wash. Therefore, an attempt was made to dilute the spent wash using sugar effluent as diluents. The resulting sugar wash (50%) was brown color due to presence of melanoidin pigments. The amount of TDS, BOD and COD was 32,200 mg/L; 36, 300 mg/L and 62,075 mg/L respectively. Above results confirm that the spent wash in dilution with sugar effluent, reduce the pollution load and gives a remedy for spent wash treatment. The diluted (spent wash with the sugar effluent) sugar wash, 1%, 5%, 10% and 15% were used for the growth of radish plants. And the growth parameter such as shoot length, root length, fresh and dry weight and biochemical characters like chlorophyll content was determined. The test plant irrigated with 5% of sugar wash has shown the highest developmental character. It was attributed by the presence of optimum level of nutrients for the plant growth. The results confirm that the effluent dilution reduces the toxicity level pointing out the fact that the suitably diluted effluent can be used for the growth of *Raphanus sativus*.

Key words: Seed germination, sugar wash, dilution, chlorophyll, BOD, COD.

INTRODUCTION

Waste Management is a global environmental crisis. Waste water from industries contains different pollutants which are difficult to treat and require cost effective technologies. To convert the industrial waste into an eco-friendly product is creating attention towards the society. Hence, waste water generated from industries can be alternatively used for irrigating crops [8]. India's economic development is mainly due to the production of sugar and it is the leading sugar producer. Sugar factory produces economically valuable by products such as bagasses and molasses. Distilleries use the molasses as a raw source for the production of alcohol by fermentation method [12].Spent wash is generated during alcohol production in distilleries are dark colored, acidic in nature with higher Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). When, untreated spent wash is discharged into water and land cause severe toxicity to all organisms. Several researchers have been reported the same. Hence, an alternative remedial measure should be taken for the disposal of spent wash. It can be used for land application like irrigating crops as fertigation [19] because it has higher amount of potassium, organic nitrogen and other nutrients [15]. Increase in salt concentration due to continuous irrigation of spent wash for crop cultivation has been reported as a problem. Hence, suitable dilution is almost essential [6]. Lack of rain fall leads to decrease of ground water and water scarcity. Hence, the use of sugar effluent is suitable diluents for spent wash-fertigation. Also, distillery industry is an ancillary industry for sugar industry.

Bio-remedial treatment using microorganisms to degrade and decolorize the spent wash is more acceptable method than chemical method but it has low efficiency [11]. Spent wash is toxic due to the recalcitrant compound found in the melanoidin pigment [1]. Other chemical constituents include dioxins, phenols, lignin along with carcinogenic and mutagenic compounds [22]. Healthy seed germination and crop productivity [15] is achieved by using diluted spent wash for irrigation without affecting the fertility of the soil [8, 17] .Plant growth parameters like shoot length, leaf number, leaf area and chlorophyll content per plant were found to increase in pea plant using diluted spent wash for irrigation [16, 18]. Reduction in the amount of chlorophyll content and lower percentage of seed germination and seedling growth in sunflower (*Helianthus annus*) were observed due to high concentration of diluted spent wash irrigation. Therefore low concentration of spent wash could be used for irrigation purpose [15].Distillery spent wash is an organic renewable source of energy. As it is a bio-waste the toxic heavy metals are found to be absent. It constitute rich source of micronutrients and macronutrients such as nitrogen, phosphorous, potassium and sulfur [18]. It is also reported that direct application of spent wash to land as irrigation water restores and maintains the soil fertility, soil micro flora, increase in physical and chemical properties of soil and good water holding capacity. The spent wash is ideal for the growth and production of rape seed, sugar cane, maize and wheat [5]. Hence, an attempt was made to use sugar effluent as diluents for spent wash and its fertigation effects on *Raphanus sativus*.

MATERIALS AND METHODS

Sampling site

The raw sugar effluent and spent wash were collected from a typical sugar cum distillery industry. The seeds for the plant bio-assay studies were procured from agricultural research institute, TNAU, Coimbatore, Tamil Nadu, India.

Physico-chemical characterization of spent wash, sugar effluent and sugar wash

The various physico – chemical characters of the raw effluent such as color, odor, pH, EC, TDS, acidity, alkalinity, chloride, calcium, phosphorous, sodium, potassium, BOD and COD were estimated according to standard analytical method [2].

Dilution of spent wash

The spent wash after the examination of physico – chemical characters was diluted with the sugar effluent at a ratio of 1:1 to obtain sugar wash. The physico – chemical characterization of the sugar wash was analyzed as per standard analytical method [2].

Preparations of various dilution of sugar wash for fertigation of spent wash

Spent wash was diluted with sugar effluent to get 1%, 5%, 10% and 15% of sugar wash. All the diluted sugar wash were used for the irrigation.

Sterilization of seeds

The seeds of **Raphanus sativus** were procured from Tamil Nadu Agricultural University (TNAU) Coimbatore. The selected healthy seeds were divided into lots of 5 each. Prior to irrigation with sugar wash, the seeds were surface sterilized with 0.1% mercuric chloride for 1-2 minutes followed by repeated rinsing with distilled water.

Effect of diluted sugar washes on the seed germination and growth parameters of *Raphanus sativus*

The experiments were conducted under uniform condition of light and equal amount of soil was placed in five containers. About 5 seeds were evenly placed in each container. First container was maintained as control and tap water was used for irrigation. The second one was irrigated with the 1% of sugar wash and third container was irrigated with 5% of diluted sugar wash. Fourth and fifth containers were irrigated with 10% and 15% diluted sugar wash respectively. The Percentage of seed germination was recorded daily at 11.00 am for a time period of 10 days. The length of the root and shoot of the 25 days old seedlings was measured and the mean length was calculated. Chlorophyll content was measured by Arnon method.

RESULTS AND DISCUSSION

Physico – Chemical characterization of effluents

Table 1 shows the physico – chemical characterization of sugar effluent, spent wash and sugar wash. The color of spent wash was dark color with acidic pH. The formation of color is due to the melanoidin pigment which constitutes the caramelized sugar produced during distillation process of fermented wash [14]. These melanoidin pigments have been reported as natural polymers, highly resistant to biodegradation [7]. The acidic pH was caused by the presence of organic acids during the fermentation process of molasses [20]. The ionic species and acid are present within the spent wash produce low pH [10]. The Total dissolved solids were 1,650 mg/L, 72,090 mg/L, and 32,200 mg/L, for sugar effluent, spent wash and sugar wash respectively. Similar results have been reported by [20; 4] have reported that 10% of acids such as aconitic, citric, malic, glutamic, succinic, acetic, lactic acid are produced during the fermentation of molasses. This may be the reason for the acidic pH. They have also reported that higher solids, BOD and COD could be attributed to 40-50% of total reducing sugars and unfermentable sugars like pentoses and polysaccharides, sterols, wax, proteins along with organic acids, nitrogenous compounds and minerals too [3].The amount of BOD was in sugar effluent, spent wash and sugar wash were 3089 mg/L, 51,023 mg/L, and 36,300 mg/L respectively. And the COD of the samples were 6498 mg/L in sugar effluent, 90179 mg/L in spent wash and 62075 mg/L in sugar wash. Due to the dilution of spent wash with sugar effluent, the pollution load was reduced.

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Effect of diluted sugar washes on the seed germination and growth parameters of *Raphanus sativus*

The percentage of seed germination varied from 40- 100% (Table-2). About 100% of seed germination was observed in 5% of diluted sugar wash irrigation. Similar results have been reported by [21]. They have stated that the germination percentage of the seed irrigated with the diluted effluent has shown a gradual reduction with an increase in the effluent concentration. Seed germination percentage was reduced at 10% and 15% of sugar wash irrigation. High concentrations of sugar wash irrigation showed poor seed germination rate and seedling growth. The growth parameters and seed germination rate are depicted in table 2. The percentage of low seed germination in 10% and 15% is due to the osmotic pressure caused by the higher salt concentration of the effluent. Similar results have been reported by [20].The chlorophyll content and other growth parameters of the seed were found to be very high in the 5% diluted irrigation. The plant when irrigated with 5% sugar wash has shown higher growth of root length, shoot length, fresh weight, dry weight and chlorophyll content. It may be an optimum nutrient present in the 5% diluted sugar wash. Similar results have been reported by [21]. They have stated that the germination percentage of the seed irrigated with the diluted treated effluent has shown a gradual reduction with an increase in the effluent concentration.

CONCLUSION

From the investigation, it was concluded that sugar effluent may be used as suitable diluent for spent wash to reduce the pollution load and fertigation for the growth of *Raphanus sativus.*

ACKNOWLEDGEMENTS

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Table 1: Physico-chemical characterization of sugar effluent, spent wash and sugar wash.

S.No.	Parameters	Sugar effluent mg/L	Spent wash mg/L	Sugar wash mg/L
1	Colour	Pale yellow	Dark brown	Dark brown
2	Odour	Sweet smell	Objectionable	Objectionable
3	Temperature	90ºC	90ºC	-
4	pH	4	4	4.5
5	TS	2050	83,500	40,100
6	TDS	1650	72,090	32,200
7	TSS	400	11,410	8,100
8	DO	0.5	-	Nil
9	BOD	3089	51,023	36,300
10	COD	6498	90,179	62,075
11	Chloride	81	5,350	2,288
12	Nitrate	75	2140	1,020

13	Phosphate	142	165	135
14	Potassium	112	6010	3,015
15	Sodium	395	122	285
16	Sulphate	115	5100	2,666

Table 2: Effect of diluted sugar wash on the growth parameters of Raphanus *sativus*.

S. No.	Parameters	1% dilution	5% dilution	10% dilution	15% dilution
1	**Germination rate**	80	100	60	40
2	**Root length (cm)**	$9.1 \pm 2cm$	$10.3 \pm 2cm$	$9.7 \pm 2cm$	$7.0 \pm 2cm$
3	**Shoot length(cm)**	10.2 ± 2	12.5 ± 2	11.0 ± 2	10.1 ± 2
4	**Fresh weight(gm)**	1.981	2.934	1.498	1.321
5	**Dry weight(gm)**	0.652	1.009	0.609	0.576

Table 3: Estimation of chlorophyll content in different irrigation of *Raphanus sativus*.

S.No.	Test pots	Chlorophyll content (mg/g)
1	1% dilution	0.892
2	5% dilution	1.480
3	10% dilution	0.839
4	15% dilution	0.761

RESEARCH ARTICLE

Evaluation and Estimation of Mass Transfer Parameters Influencing Salmon Liver Oil Extraction.

Fatemeh Zare kazem abadi*, Aboalhasan Alavi and Amir Heydari nasab

Department of Chemical Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran.

*Address for correspondence
Fatemeh Zare kazem abadi
Department of Chemical Engineering,
Science and Research Branch,
Islamic Azad University,
Tehran, Iran
E.mail : fatemeh.zare.kb@chmail.ir

ABSTRACT

Salmon liver is one of wastes of salmon fish, but it can be referred to as a valuable and useful part of fish in terms of nutritive and pharmacological matters due to presence of essential non-saturated fatty acids in its oil as well as presence of useful vitamins A and D. thus, it is attempted to extract salmon liver oil in this work by Soxhlet system and normal hexane solvent. Oil extraction process was evaluated in three operational temperatures, 50, 60, and 68 °C, and effective mass transfer parameters were investigated. In the current study, following conducting experiments in optimal temperature and time conditions (temperature 68 °C and time 4 hours), mass transfer parameters influencing oil extraction content, such as penetration rate (D_{AB}), mass transfer coefficient (K_c), and Sherwood number were estimated. Results suggest direct impact of temperature on mentioned mass transfer parameters, so that in highest operational temperature (68 °C), D_{AB} was calculated as $3.1403 \times 10^{-9} (\frac{m^2}{sec})$ and K_c was obtained as $3.1523 \times 10^{-3} (\frac{m}{sec})$

Keywords: Soxhlet system, salmon liver oil, temperature, penetration rate, mass transfer coefficient.

INTRODUCTION

Salmon liver is considered as a waste resulting from fish processing in fishery and dependent industries. Salmon liver contains high levels of moisture, fat, protein, fat and water soluble vitamins and low levels of minerals. On the other hand, salmon liver contains high levels of essential non-saturated fatty acids which are not synthesized by the body and should be supplied by nutritive sources for the body organs (Abrumand, 2006). Fatty acids EPA (eicosapentaenoic acid), DHA (docosahexaenoic acid), oleic acid, linoleic acid and etc. are considered as essential polyunsaturated fatty acids which play a useful role in human health (Robbers, 1996). In addition, omega-3 fatty acids are found in fish liver and oil. These fatty acids can reduce risk of heart disease such as coronary artery stenosis and inflammatory diseases such as arthritis artery stenosis (arthritis) and inflammation of the gastrointestinal tract (Saberi Kouchesfahani et al., 2011). They are also useful for the health of nervous system and prevention of diseases such as Alzheimer's, schizophrenia and dementia (Mishra et al., 1993). In addition to all benefits in the oil extracted from fish liver, it can be mentioned that fish liver is a valuable and accessible source with low collection and processing cost. Added value of this residual material can be increased through implementing oil extraction operation and practical use of extracted oil in food and pharmacological industries (Zakiadeh Nei Nei et al., 2008). There are various methods for oil extraction. One of the common methods for oil extraction is extraction with solvent which is done by Soxhlet system and normal hexane solvent (McClements, 2003). It is a simple, cheap and high efficiency method and it can be referred to as one of the best extraction methods in this regards due to possibility to recycle of solvent up to 85 percent and reusing it, which reduces operational cost (Shahid madani et al., 2011). Different parameters influence fish liver oil extraction content, one of which is temperature parameter (Kumoro et al., 2010), that affects oil penetration rate in the solvent. This parameter creates changes in penetration rate (D_{AB}) and other mass transfer parameters affecting extraction process including mass transfer coefficient (K_c) and Sherwood number which determines mass transfer rate changes (Jawade and Chattopadhyay, 2011). It is attempted to implement oil extraction in this work using Soxhlet system and normal hexane solvent in operational temperatures 50, 60, and 68 °C in fixed time 4 hours, and estimate changes in mass transfer parameters with temperature change, and their impact on salmon liver oil extraction content is examined.

MATERIALS AND METHODS

Materials used in this research include normal hexane solvent owned by Merck of Germany, nitrogen gas or N_2, liquid paraffin and preparing salmon liver. The equipment used include Soxhlet system equipped with a condenser and water inlet and outlet, 100 ml extraction tank, 1000 ml two-span balloon, mercury thermometer, oil bath, scale calibrated by Company Kern, Germany, Electric Heater Manufactured by Heidolph Company, Germany, Rotary Manufactured by Heidolph Company, Germany, Freeze-Dryer machine Manufactured by CHRist Company, Model 1-4LD with a working range of 0.05 mbar under vacuum and cooling rate of -55 °C (all equipment used are related to laboratory complex of Islamic Azad University, Science and Research Branch).

In order to implement salmon liver oil extraction operation by Soxhlet system, initial pretreatment of samples is required using Freezer-Dryer device. Salmon liver samples were prepared and collected among a specific statistical population of fish with average weight and length of 800 g and 31 cm respectively. Samples were dried for exclusion of free moisture in fish liver by Freezer-Dryer machine. The lost moisture in 1,500 g of salmon liver samples was estimated, and the moisture content of 86.66% was reported, indicating high level of moisture in fish liver tissue. Following preparing the sample and its pretreatment, oil extraction operation was initiated by Soxhlet system and normal hexane solvent. Experiments were conducted in three operational temperatures 50, 60, and 68 °C during fixed time of 4 hours. Purpose for this was investigating temperature parameter impact on mass transfer parameters influencing oil extraction process. The solvent used was considered as 150 ml during extraction operation. Following extraction operation in the mentioned operational temperatures, the solvent containing the oil was separated by

rotary machine under vapor Pressure 350 mbar and the resulting oil was weighted using calibrated scale. Results are given in Table 1. Mass transfer parameters influencing salmon liver oil extraction include, penetration rate (D_{AB}), mass transfer coefficient (K_c) and Sherwood number (N_{Sh}). In order to calculate penetration rate, Wilke-Chang relation is used shown in Eq. (1) (Wilke and Chang, 1955):

$$D_{AB} = 7.4 \times 10^{-8} \left[\frac{(\varphi . M_B)^{0.5} . T}{\mu_B V_A^{0.6}} \right]$$ (1)

Where D_{AB} is perpetration rate of solute A (oil) in solvent B ($\frac{m^2}{sec}$), M_B is molecular weight of the solvent ($\frac{gr}{mol}$), T is temperature (K °), φ is correlation coefficient for solvent (this coefficient is 1 for non-polar solvents such as normal hexane), μ is viscosity of solvent (cp), and V_A molar volume of solute at normal boiling point ($\frac{cm^3}{mol}$). In order to determine V_A, Tin- Callus relation is used which is given in Eq. (2) (Joback and Reid, 1987):

$$V_A = 0.285 \left(V_c \right)^{1.048}$$ (2)

V_c is critical volume in terms of ($\frac{cm^3}{mol}$), value of which is estimated using tables related to critical properties of some fatty acids available in salmon liver oil for determining solute molecular volume (V_A) (Sales-Cruz et al., 2010). Viscosity of the solvent is calculated in temperatures 50, 60, and 68 °C by Eq. (3) and (4) (Dymond, 1993):

$$Ln \frac{\mu}{\mu_{298.15}} = A \mid \frac{B}{T^*} \mid \frac{c}{T^{*2}} \mid \frac{D}{T^{*3}}$$ (3)

$$T^* = \frac{T}{298.15}$$ (4)

Using tables related to physical and chemical properties of normal hexane, its density in operational temperatures was obtained (Aleskerov, 1975). Experimental relation reported by Vakav was used in order to calculate temperatures (Ghoreishi and Gholami, 2009):

$$Sh = 2 + 1.1 Sc^{1/3} . Re^{0.6}$$ (5)

In Vakav Eq., Sh is Sherwood dimensionless number, Sc is Schmidt dimensionless number ($Sc = \frac{\mu_B}{D_{AB}}$), and Re is Reynolds dimensionless number which are calculated by Relations (6) and (7) showing Lapple- Shepherd Equations for spherical particles (Tosun, 2002):

$$f . Re_p^2 = \frac{4}{3} Ar$$ (6)

$$f = \frac{24}{Re_p} \quad ; \quad if : \quad Re_p < 2$$ (7)

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On the other hand, the spherical particle's diameter of fish liver powder is needed for calculations for Reynolds number. Particle size was determined by passing fish liver dry powder through filter with 2 mm mesh and then imaging with SEM microscope. Fig 1 indicates spherical particle image.

Mass transfer coefficient as one of effective parameters in mass transfer was calculated by Eq. (8) (Triball, 2010):

$$K_c = \frac{Sh \cdot D_{AB}}{D_F} \qquad (8)$$

RESULTS AND DISCUSSION

Results obtained from experiments in varying temperatures 50, 60, and 68 °C during fixed time 4 hours are reported in Table 1. Results suggest direct impact of temperature increase on oil extraction content.Table 2 gives results taken from estimation and measurement of mass transfer parameters influencing oil extraction content in varying temperature conditions. According to the results it can be concluded that increasing temperature of oil extraction operation from 50 °C to 68 °C leads to increased oil penetration in normal hexane solvent and thus increased penetration rate (D_{AB}). Thus, oil extraction content was increased to 2.9711 from 1.5072. Fig 2 indicates diagram for changes of mass transfer coefficient in terms of temperature, which denotes increasing perpetration rate by temperature increase. On the other hand, temperature increase leads to increased mass transfer coefficient, which is in proportionate with penetration rate. It indicates direct impact of temperature on mass transfer coefficient and thus increases of oil extraction from salmon liver. Sherwood number, which reflects changes in the mass transfer rate increased with increasing temperature and reached a maximum value of 2.007667 at 68 °C.On the other hand, activation energy needed for implementing salmon liver oil extraction process was calculated from Arrhenius law and using the equations given in Eq. 9 and 10 (Jawade and Chattopadhyay, 2011):

$$D = D_0 \exp\left(\frac{-E_a}{RT}\right) \qquad (9)$$

$$\ln D = \ln D_0 - \frac{E_a}{R} \cdot \frac{1}{T} \qquad (10)$$

In above equations, R is universal constant of gases ($\frac{J}{mol.°k}$) as 8.314. ln D diagram can be drawn in terms of $\frac{1}{T}$ through linearization of the equation. The diagram's slope and intercept can be obtained by linear regression or using equation development by computer software. Using the equation obtained through drawing linear diagram (Fig 3) by the software, slope and intercept can be determined. The equation is as follows: y = -1267.9x-15.863, through which it is possible to find numerical values of E_a and D_0 as follows: $1.29 \times 10^{-7} \frac{m^2}{sec}$ and 10.5413 $\frac{KJ}{mol}$.

CONCLUSION

Overall it can be concluded that temperature is considered as a very effective operational parameter in oil extraction process by Soxhlet system, temperature increase changes are directly related to increasing value of parameters of mass transfer such as D_{AB}, K_C, and N_{sh}. By increasing temperature in fish liver oil extraction process by Soxhlet system, oil perpetration rate in normal hexane solvent increased according to relation by Wilke and Chang, and perpetration rate was reported as 3.1403 $\times 10^{-9} \frac{m^2}{sec}$ in highest temperature (68 °C). On the other hand, similar result was reported from impact of temperature on penetration coefficient (K_C) and increasing temperature led to increase mass transfer coefficient, so that it was reported as $3.1523 \times 10^{-9} \frac{m}{sec}$ in 68 °C. Also, temperature increase led

to Sherwood number. Increase in Sherwood number led to increase in mass transfer rate and finally oil extraction content. Highest Sherwood number was 2.007667 in 68 °C according to Vakav equation. Results obtained for Re number indicate the hypothesis Re < 2 is true in equations related to Lapple and Shepherd, and current range is within laminar range, and the current required for mass transfer process in Soxhlet system is in quiet range. On the other hand, activation energy for implementing extraction process is about $10.5413 \frac{KJ}{mol}$.

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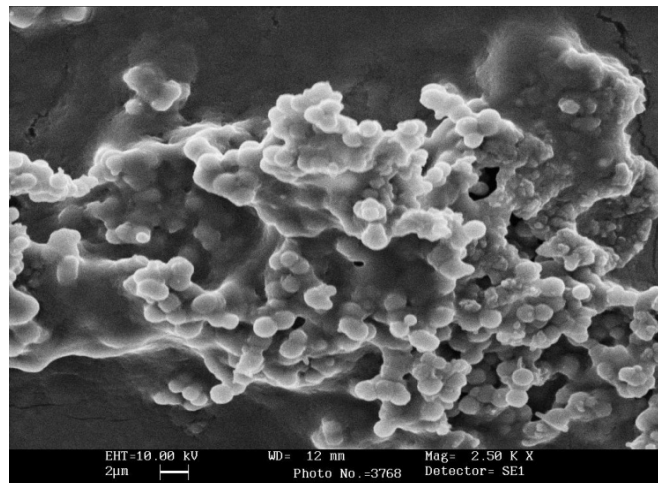
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Table 1: Results obtained from salmon liver oil extraction during fixed time (4 h) and varying temperature conditions.

Percent of fish liver oil extraction	Average fish liver oil extraction (g)	Temperature (°C)	Time (h)
30.145%	1.5072	50	4
40.488 %	2.0244	60	4
59.423%	2.9711	68	4

Table 2: Results obtained from estimation of mass transfer parameters

T (°K)	323.15	333.15	341.15
D_{AB} ($\frac{m^2}{sec}$)	2.5538×10^{-9}	2.8688×10^{-9}	3.1403×10^{-9}
Sc	144.651	120.074	104.123
Ar	2.46093×10^{-4}	2.98192×10^{-4}	3.46580×10^{-4}
Re	1.36718×10^{-6}	1.65662×10^{-6}	1.92544×10^{-6}
Sh	2.006966	2.007346	2.007667
Kc ($\frac{m}{sec}$)	2.5627×10^{-3}	2.8793×10^{-3}	3.1523×10^{-3}

Fig 1. Salmon liver powder image by SEM microscope
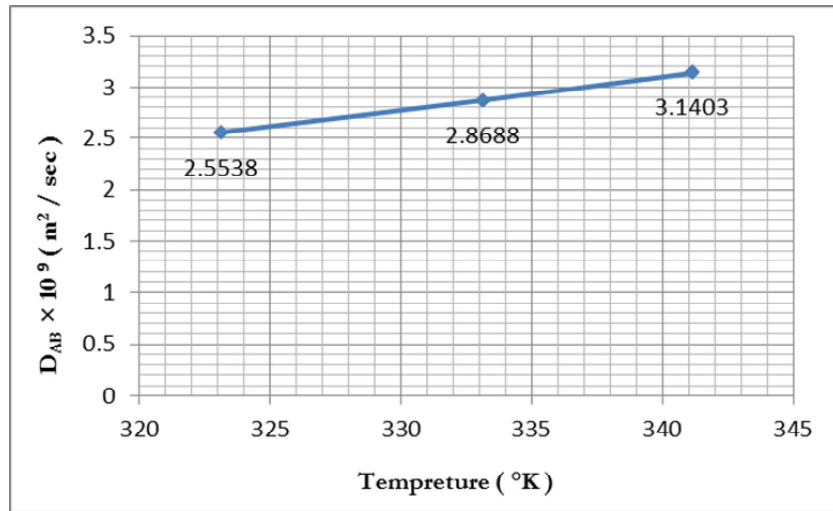
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Fig 2. Diagram for changes of penetration rate vs. temperatures used in salmon liver oil extraction process
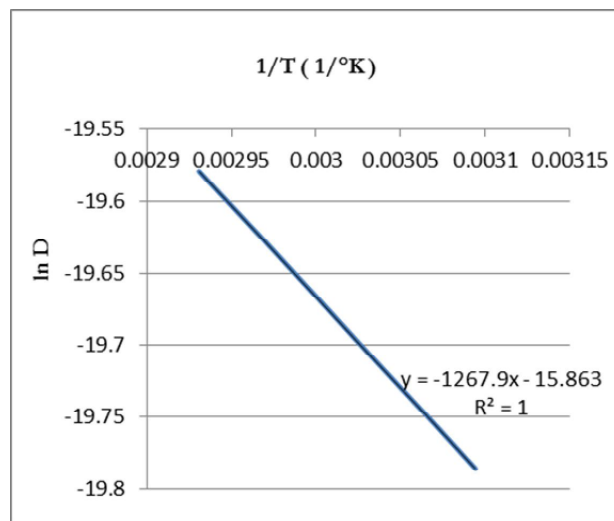

Fig 3. Diagram determining activation energy (Ea)

Retrieval of Source Documents using Keyword Based Clustering with Mahout and Hadoop.

Jenifer.X* and S.Sophia Rani

Department of Computer Science, Jayaraj Annapackiam College for Women, Periyakulam,Theni District,TamilNadu, India.

*Address for correspondence
Jenifer.X
Department of Computer Science,
Jayaraj Annapackiam College for Women,
Periyakulam,Theni District,
TamilNadu, India.
E.mail: jenifercathrine.jj@gmail.com

ABSTRACT

The term big data has come into use in recent years. It is used to refer to the ever-increasing amount of information that organisations are storing, processing and analysing. Owing to the growing number of information sources big data based file systems are necessary. Due to the explosion growth of digital information, automatic document clustering or categorization has become more important. Document management and clustering is more important for content management systems. It is a necessary to mine and store web documents in CMS. In this study online document based content management with automatic URL indexing is dealt with. It's highly possible that the content in CMS will be redundant over the web as most of the time the content will be gathered from already existing websites. Back tracking the source of such content will become obsolete and also changes to the source are difficult to be tracked. So to solve this problem document based content management (DCMS) is very much essential. Stored documents in DCMS comprises of huge amount of data so there is need for document clustering. Previous works on clustering documents have no consideration for the semantic information as they consider only the structural information. In this study, a novel semantic and similarity measure based technique is proposed that concurrently considers both structural and semantic information of document. Semantic analysis based clustering is applied to the text documents and then similarity measure is devised among the documents based on machine learning algorithms using Apache hadoop. In order to achieve accurate clustering and efficient retrieval, initially the documents are stored in hadoop distributed file system and they are clustered using K-means algorithm. The files are retrieved using based on keyword given by user query and results are plotted as per the retrieval.
Key words: Semantic, Semantic document clustering, Document Clustering, Hadoop, Cloud

INTRODUCTION

Due to the enormous growth of digital information, automatic document clustering or categorization has become more important. Document management is most essential in the content management systems. There are numerous types of web based Content Management Systems available. This kind of CMS compensates the explosion of web content in blogs, social networks etc. The problem in web is that it is very difficult to find relevant information in World Wide Web. To address this problem "semantic web" has been proposed as the extension of current web [11]. In the proposed study semantic similarity technique is used in document management which will aid in quick and easy document retrieval. Clustering is a key concept in document mining. A clustering process aims to analyze the similarities between data objects and build groups of them. The grouped objects can then be used to browse easily through a very large list of data sets. Document clustering aims to automatically segregate documents into groups based on similarities of their contents. Each group consists of documents that are similar between themselves and dissimilar to documents of other groups. Those documents are categorized as document cluster having high inter-cluster similarity and low inter cluster similarity respectively [8]. This task is accomplished by unsupervised learning. Unsupervised learning is one of the machines learning technique which is a type of artificial intelligence that provides computers with the ability to learn without being explicitly programmed. This technique focuses on the development of programs that can teach themselves to grow and change when exposed to new data. It concerns the development of systems that can learn from data. For example, a machine learning system could be trained on email messages to learn to distinguish between spam and non-spam messages. After learning, it can then be used to classify new email messages into spam and non-spam folders.

In traditional document clustering methods, Vector Space Model (VSM) is used. This technique uses linear-algebra operations to compare textual data (bag-of-word approach).Existing clustering algorithms suffer from dimensionality problem [13]. In the proposed system the clustering is done by using occurrence of keyword and by customizing K-means clustering algorithm. Further the clustering is improved by semantic similarity which demands semantic relatedness, On one hand, semantic similarity states how taxonomically near two terms are, because they share some aspects of their meaning (e.g., dogs and cats are similar to the extend they are mammals). On the other hand, the more general concept of semantic relatedness does not necessary rely on a taxonomic relation (e.g., car and wheel or pencil and paper); other non taxonomic relationships (e.g., meronymy, antonymy, functionality, cause-effect, etc.) are also considered [12].

Clustering

Clustering is a key concept in document mining. A clustering process aims to analyze the similarities between data objects and build groups of them. The grouped objects can then be used to navigate easily through a verylarge list of data sets. For instance, based on the output of the clustering process, a further reading recommender component can analyze the currently viewed documents, and suggest similar documents (possibly within the same cluster) to the user as related materials.

Document Clustering

Document clustering aims to automatically divide documents into groups based on similarities of their contents. Each group (or cluster) consists of documents that are similar between themselves (have high intra-cluster similarity) and dissimilar to documents of other groups (have low inter-cluster similarity). Clustering documents can be considered as an unsupervised task that attempts to classify documents by discovering underlying patterns, i.e., the learning process is unsupervised, which means that no need to define the correct output (i.e., the actual cluster into which the input should be mapped to) for an input.

Machine Learning Algorithms

Machine learning is a type of artificial intelligence that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of computer programs that can teach themselves to grow and change when exposed to new data. It concerns the construction and study of systems that can learn from data. For example, a machine learning system could be trained on email messages to learn to distinguish between spam and non-spam messages. After learning, it can then be used to classify new email messages into spam and non-spam folders.

Previous Related Work

Xiping Liu, Changxuan Wan, and Lei Chen [1] Clustering XML documents by matching the given xml query has been implemented. There are two main approaches in this paper: Conventional approach - It clusters results after search results are retrieved. Clusters search results actively, which has characteristics of clustering on the fly. The generated clusters are organized into a cluster hierarchy with different granularities to enable users to locate the results of interest easily. Experimental results demonstrate the meaningfulness of the proposed semantics as well as the efficiency of the proposed methods.Rui Máximo Esteves , Chunming Rong [2] This paper compares k-means and fuzzy c-means for clustering a noisy realistic and big dataset. In a huge dataset, the execution times of both algorithms have high variances according to the initial seeding. Generally, k-means is slower than the fuzzy version. They made the comparison using a free cloud computing solution Apache Mahout/Hadoop and Wikipedia's latest articles. They found that in a noisy dataset, fuzzy c-means can lead to worse cluster quality than k-means. The convergence speed of k-means is not always faster.

Chien-Liang Liua,∗, Tao-HsingChangb, Hsuan-HsunLic [3] This paper focuses on semi-supervised clustering and proposes a novel algorithm called fuzzy semi-Kmeans to perform document clustering with a small amount of labeled documents. *K-means clustering* model and uses the seeds to bias clustering toward a good region of the search space. Fuzzysemi-Kmeans provides the flexibility to employ different fuzzy membership function to measure the distance between data. This work conducts experiments on three datasets and compares fuzzy semi-Kmeans with several methods. Results are efficient. The experimental results indicate that fuzzy semi-Kmeans can generally outperform the other methods.

Khaled B. Shaban [4] In this paper, semantic understanding based approach to cluster documents is presented. The approach is based on semantic notions to represent text, and to measure similarity between text documents. The representation scheme reflects existing relations between concepts and facilitates accurate similarity measurements that result in better mining performance. They tested the system against different standard clustering techniques and different data sets. The semantic approach has enabled more effective document clustering than what conventional techniques would provide.

Jeong Hee Hwang a, Keun Ho Ryu b [5] Proposed a tree decomposition method for efficiently clustering XML documents. It clusters XML documents by a global criterion function, by considering the weight of common structures. It initially extracts representative structures of frequent patterns from XML documents using a sequential pattern mining algorithm. The experimental results compare to previous work show the effectiveness of this approach.From the above findings of existing work, it is clear that semantic analysis of any document or system yields effective results. There is no clustering technique based on semantic analysis and similarity measures. In our proposed work clustering will be done initially by keyword occurrence and customizing K-Means algorithm. Further it is improvised by semantic clustering in hadoop file system using machine learning algorithms.

System Architecture

The proposed framework is classified in to two main phases. Figure 1 shows the first phase of the proposed system. The framework consists of five main modules such as 1.Creation of user interface, 2.Collection and storage of documents, 3.Clustering of documents using K-Means algorithm, 4.Enhancement of clustering algorithm based on

occurrence of keyword, 5.Improved clustering by similarity measures 6. Retrieval of source documents accurately. Figure 1 depicts that user upload collections of text documents from local system to Hadoop Distributed File System with the help of user interface. Before clustering, the stored documents are converted into sequence files and given to mahout component of hadoop as inputs.The user interface is used to create virtual documents and it is stored in Hadoop distributed file system as shown in the figure 1. It will cluster the text documents based on K-Means clustering and the algorithm is customized based on keyword occurrence for easy retrieval of documents. After clustering the documents the results are moved to the NoSQL database for generating graph and searching documents through user interface.

METHODOLOGY

Creation of user interface

The user interface is created for to store documents from local systems to Hadoop Distributed File System (HDFS) and retrieval of documents from clusters by the user query. Functions available in user interface are Login page , Upload files option along with the search option.

Storing files into HDFS

Text documents are collected from local system and it is stored in the Hadoop Distributed File System with the help of user interface automatically. By specifying path we can store the documents where ever in the HDFS.

Clustering of documents based on keyword

Clustering documents using K-Means clustering algorithm and clustered resultant documents are moved to the database for generating graph and searching documents. The following algorithm illustrates that with the frequency of occurrence of keywords in a document the documents are clustered by means of cluster vectors and the clusters are recomputed again based on the weights assigned to the keywords.

K-Means is a rather simple but well known algorithm for grouping objects, clustering. Again all objects need to be represented as a set of numerical features. In addition the user has to specify the number of groups (referred to as k) he wishes to identify. Each object can be thought of as being represented by some feature vector in an n dimensional space, n being the number of all features used to describe the objects to cluster.The algorithm then randomly chooses k points in that vector space, these point serve as the initial centers of the clusters. Afterwards all objects are each assigned to the center they are closest to. Usually the distance measure is chosen by the user and determined by the learning task. After that task is computed, for each cluster a new center is computed by averaging the feature vectors of all objects assigned to it. The process of assigning objects and recomputing centers is repeated until the process converges. The algorithm can be proven to converge after a finite number of iterations.Several tweaks concerning distance measure, initial center choice and computation of new average centers have been explored, as well as the estimation of the number of clusters k.

Frequency calculation for keywords

The frequency of occurrence of the keyword is calculated in each document using word count algorithm, and weight is assigned to the keyword according to the formula.

$$Weight (t,d) = tf * idf \text{ -------------- (1)}$$

tf = No. of terms t in (d) / total no. of terms in (d) ----(i)

idf = log_10(No. documents in Corpus / df (t)) = log_10(N/dft) --(ii)

The term frequency of term (t) in document (d) is defined as the number of times that (t) occurs in (d). We want to use tf when computing query-document match scores. Raw term frequency is not what we want: A document with 10 occurrences of the term is more relevant than a document with one occurrence of the term. But not 10 times more relevant. Relevance does not increase proportionally with term frequency.

Document frequency is related to number of times a term appeared in a document. Rare terms are more informative than frequent terms, on the contrary to stop words. Consider a query term that is frequent in the collection (e.g., high, increase, line) A document containing such a term is more likely to be relevant than a document that doesn't, but it's not a sure indicator of relevance. We used document frequency (df) to capture this in the score. For frequent terms, we want positive weights for words like high, increase, and line, but lower weights than for rare terms. df (=N) is the number of documents that contain the term.

idf (inverse document frequency) of (t) is use log(N/dft) instead of N/dft to "dampen" the effect of idf. The tf-idf weight of a term is the product of its tf weight and its idf weight. Best known weighting scheme in information retrieval. Note: the "-" in tf-idf is a hyphen, not a minus sign! tf-idf weighting increases with the number of occurrences within a document and increases with the rarity of the term in the collection.

Retrieval of documents from cluster based on keyword

 Retrieval of text documents are extracted parallely from categorized clusters. Whenever user given query in the user interface it will search the NoSQL database (MongoDB) and return appropriate documents from the clusters as result.

GRAPHICAL ANALYSIS

Four text documents of 2 MB each is tested in the mahout component of hadoop, and the resultant graph shows the clusters based on K-Means clustering. K-Means is a rather simple but well known algorithm for grouping objects, clustering. The graph shown in figure 3 is generated from the NOSQL database.The frequency of occurrence of the keyword is calculated in each document using word count algorithm, and weight is assigned to the keyword. Based on occurrence of the terms in the document the cluster is recomputed and the following graph shown in Figure 2 is generated.

The number of times of a certain keyword occurrence in the specified vector space for a particular document is identified. The count of the occurrence is indicated in the graph generated by NOSQL shown in Figure 3.Figure 4 indicates the number of cluster generated for keyword search.Indicates the time taken to cluster formation based on keyword search. The count of the occurrence is indicated in the graph generated by NOSQL shown in Figure 5.

CONCLUSION

In this paper, Text documents have been uploaded in the Hadoop Distributed File System and the input documents are converted into sequence files and stored in HDFS. Keyword based clustering based on K-Means algorithm is implemented in mahout component of hadoop.The files are retrieved using the user query through user interface and finally the graph is generated to display the clustered documents from MongoDB. Semantic document analysis will be performed based on similarity measures and concept matching. An algorithm will have to be proposed to cluster documents in a meaningful way. In the future semantic based clustering in hadoop will be compared with keyword based clustering and performance will be analyzed.

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Table 1.Algorithm for K-Means clustering based on keyword frequency

```
Assumptions:
Let variable n be number of features (Documents)used to describe objects to clusters.
Let S be the set of feature vectors (|S| is the size of the set)
Let A be the set of associated clusters for each feature vector
Let freq(x,y) be the frequency calculation function
Let c[n] be the vectors for our clusters.
Init :
Set intial cluster in the specified path.
Algorithm randomly chooses the center points in the vector space.
K-Points serves as intial centers of the clusters.
three images.
Let S' = S
  //choose n random vectors to start our clusters
  for i= 1 to n
   j = rand(|S|)
   c[n] = S'[j]
   S' = S - {c[n]} //remove that vector from S so we can't choose it again
end
//assign initial clusters
for i=1 to |S|
A[i] = argmax(j = 1 to n) {freqS[i], c[j]) }
End
Run :
Let change = true
while change = false //assume there is no change
//reassign feature vectors to clusters)
  for i = 1 to |S|
  a = argmax(j = 1 to n)  {freq(S[i], c[j]) }
  if a != A[i]
  A[i] = a
   change = true //a vector changed affiliations
              //recompute our cluster vectors and run again
   end
   end
//recalculate cluster locations if a change occurred
if change
  for i = 1 to n
   mean  count = 0
     for j = 1 to |S|
       if A[j] == i
         mean = mean + S[j]
         count = count + 1
     end
    end
    c[i] = mean/count
   end
   end
```
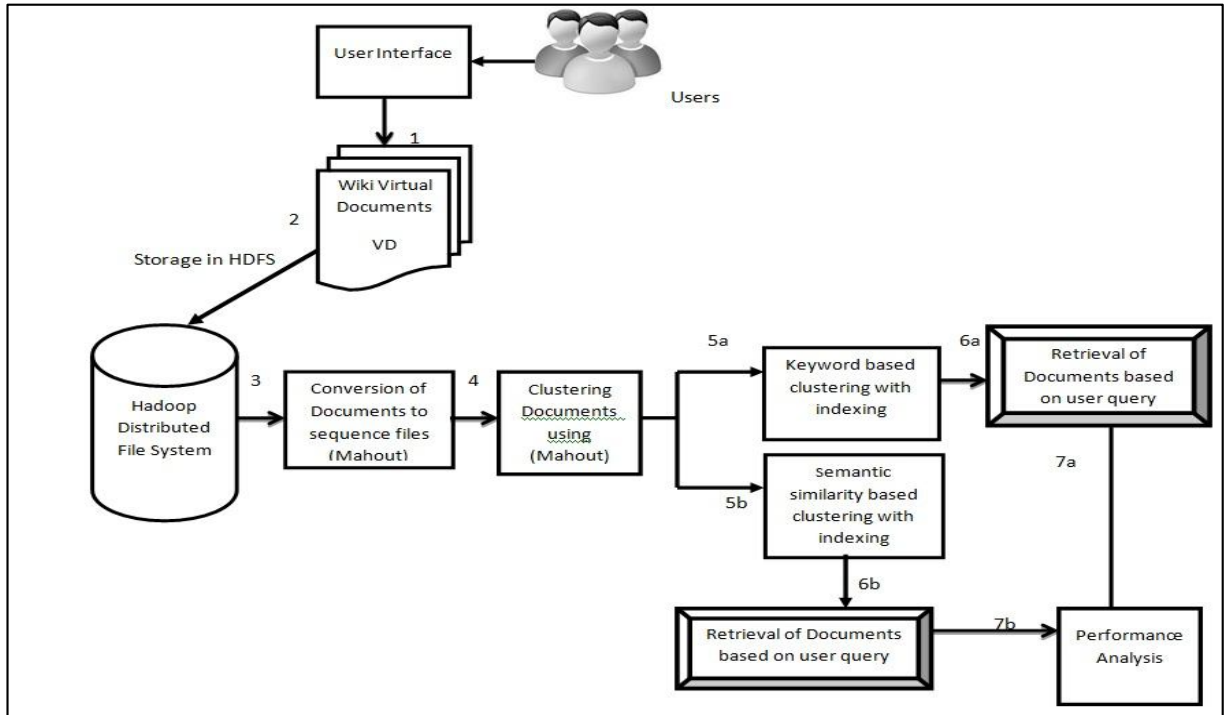
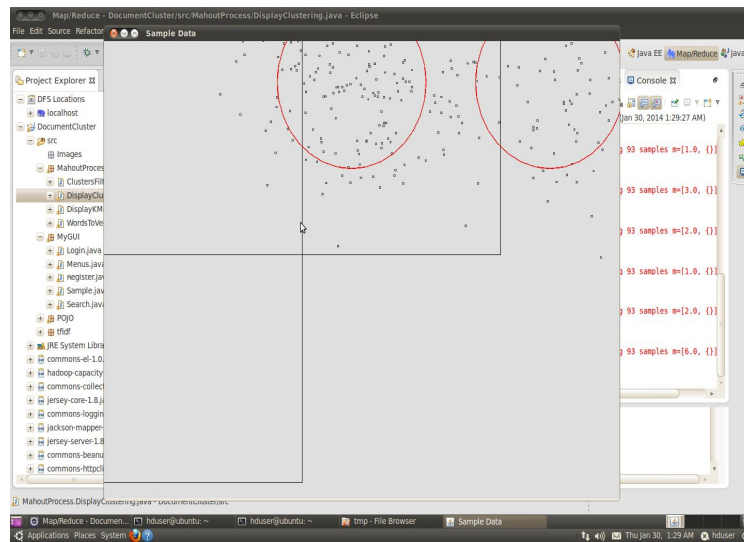**Jenifer and Sophia Rani**

Figure.1: System Architecture

Figure 2: Graph based on clustering documents
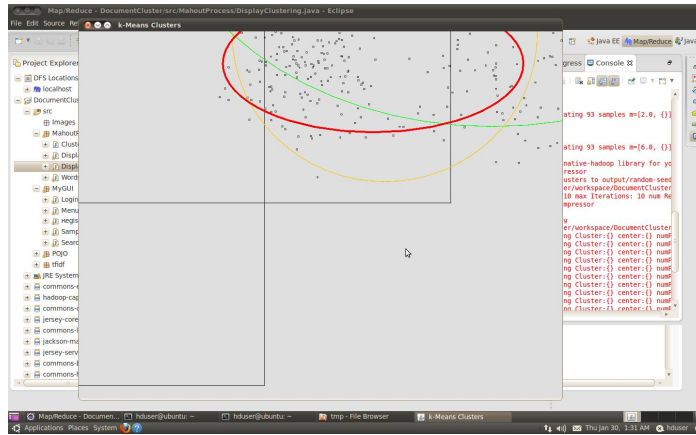
Jenifer and Sophia Rani

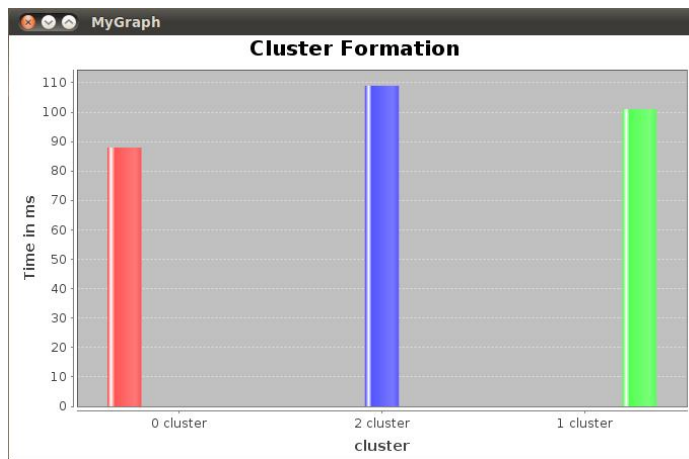**Figure 3: Graph based on occurrence of keyword**
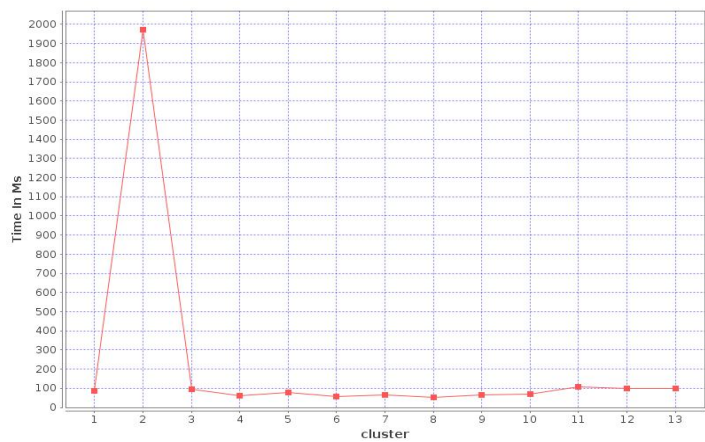

Figure 4: Cluster formation

Figure 5: Time taken to cluster formation

RESEARCH ARTICLE

Improved Human Face Detection in Low-resolution Images using Cascade Adaboost and Histogram of Oriented Gradients.

Farhad Navabifar[1]*, Rubiyah Yusof[2] and Mohammed Bennamoun[3]

[1]Department of Computer Engineering, Mobarakeh Branch-Islamic Azad University, Mobarakeh, Esfahan, Iran.
[1,2]Centre for Artificial Intelligence and Robotics,Universiti Teknologi Malaysia, International Campus, Jalan Semarak, 54100, Kuala Lumpur, Malaysia.
[3] School of Computer Science and Software Engineering, University of Western Australia, Crawley, Australia.

*Address for correspondence
Farhad Navabifar
Department of Computer Engineering,
Mobarakeh Branch-Islamic Azad University,
Mobarakeh,Esfahan, Iran.
E.mail: farhad.navabifar@chmail.ir.

ABSTRACT

Detecting human faces in low-resolution images is more difficult than high quality images because people appear smaller and facial features are not as clear as high resolution face images. Furthermore, the regions of interest are often impoverished or blurred due to the large distance between the camera and the objects which can decrease detection rate and increase false alarms. As a result, the performance of face detection (detection rate and the number of false positives) in low-resolution images can affect directly subsequent applications such as face recognition or face tracking. In this paper, a novel method, based on cascade Adaboost and Histogram of Oriented Gradients (HOG), is proposed to improve face detection performance. The focus of this work is to improve the performance of face detection by increasing the detection rate and at the same time decreasing the number of false alarms. The concept behind the proposed combination is based on the a-priori rejection of false positives for a more accurate detection. In other words in order to increase human face detection performance, the first stage (cascade Adaboost) removes the majority of the false alarms while keeping the detection rate high, however many false alarms still exist in the final output. To remove existing false alarms, a stage (HOG+SVM) is added to the first stage to act as a verification module for more accurate detection. The method has been

extensively tested on the Carnegie Melon University (CMU) database and the low-resolution images database. The results show better performance compared with existing techniques.

Keywords: Face Detection, Low-resolution images, Performance, Cascade Adaboost, Histogram of Oriented Gradients.

INTRODUCTION

The goal of a face detection system is to accurately localise human faces in images or videos. The system needs to be robust and faces need to be accurately detected even under facial occlusion, as well as pose and illumination variations. Face detection is an essential pre-processing module in various systems including biometrics, Human-Computer Interaction (HCI) and multimedia. Clearly, the performance of the face detection module affects the performance of the subsequent modules and the performance of the overall system. To this end, many different approaches of face detection have been presented and have been divided into four categories: Template-Based, Feature-Based, Appearance-Based and knowledge-Based methods[1]. Appearance-Based methods have shown to be amongst the most effective approaches due to their high accuracy rate and their capability of handling variations such as pose, illumination, and partial occlusion of the face [1-3]. Amongst the most popular approaches in this category is the work proposed by Viola and Jones[4], which used Haar-like features and the Adaboost algorithm to detect faces in images**.** It is considered as one of the most popular method to date. The advantage of using Haar-like features does not only rely on the flexibility of extracting features with a variety of types and scales, but also on the high speed of their extraction through the use of the integral image. The boosted cascade features as applied in Viola-Jones [4] is capable of rejecting non-face samples rapidly.

Many face detection methods suffer from the problem of high false alarms whereby non-face images are falsely detected as face images. The importance in the reduction of false positives at the final detection stage of any face detection system can be illustrated with an example related to the tracking module of a surveillance system (i.e. where the person being tracked is not cooperating). If the face detection module detects a false positive, the tracking module will keep tracking a non-face, failing as a result to track and recognize a potential suspect.In low-resolution images the number of false positives increases because the quality of the images is not as clear as high quality images and as a result the performance of the detection decreases dramatically. There are a huge number of studies in face detection field but detecting human faces in low-resolution images has not been explicitly studied [5, 6].The first work in low-resolution face detection has been done by Torralba et al.[6]. They focus on the task of face detection under impoverished conditions to show the effects of image resolution, local context, contrast polarity and face orientation on detection performance. In their method, ten subjects of MIT students were selected and presented with randomly interleaved face and non-face patterns and, in a 'yes-no' paradigm, were asked to classify them as such. Then the same sets of patterns with different resolutions were grouped in blocks. The presentation order of the blocks proceeded from the lowest resolution to highest. Their results showed that facial features were not effective enough for predicting face or non-face patterns; therefore, they used upper-body images to enhance face detection in low-resolution images.

Hayashi and Hasegava [7] proposed a new method to improve face detection rate using upper-body images, frequency-band limitation, expansion of input image and combination of two detectors. They showed that the detection rate of the standard Adaboost-based detector decreases from 88% to 39% with 100 false positives when the size of the face changes from 24 ×24 pixels to 6 ×6. Their proposed detector consisted of two detectors, integrated by neural networks that improved detection rate to 71% with 100 false positives when tested on 112 images of the CMU+MIT frontal face database.HSU et al. [8] improved face detection with a method consisted of cascade Adaboost and GMM to decrease the effect of motion blurred on low-resolution videos. Motion blurred usually existed in the moving objects in video sequences and can influence the detection of the objects. In their method, the cascade face detector is applied to the input image to capture the face rectangle candidates. Then the motion detection based on GMM is used to decrease the number of false positives. The candidate rectangle determined face, if the momentum of

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the face rectangle candidate becomes larger than a threshold. Their proposed detector achieved better performance in detecting faces of size 24×24.Zheng et al. [5] presented a method based on a three-stage cascade Adaboost classifier using Modified Census Transform (MCT) for face detection on low-resolution color images. For the training set, they used 6000 face and 6000 cropped non-face images which were down-sampled 24×24, 16×16, 8×8, 6×6 pixels for different resolutions. To test the detector, they used the Georgia Tech face database, containing frontal and tilted images of 50 people at resolution of 640×480 pixels. Their experimental results showed that as the resolution of faces reduced in the test images, the number of false positives increased and the detection rate decreased. Furthermore, a 12-bit MCT could get a better performance than a 9-bit one.

The influence of low-resolution images on reliability of face detection and recognition was analyzed by Marciniak et al.[9]. They studied three approaches in face detection including human face skin color, geometric models and Haar-like features of Viola-Jones [4] face detector over Yale database [10] in five resolutions ranging from 640×480 to 50×40 pixels. Their experiments on skin color method showed that the algorithm generally detects faces properly, but the neck and sometimes blond hair could also be detected. Furthermore, face detection in this technique was extremely sensitive to image illumination. In the second method, they applied the knowledge of geometry which was based on the use of Hausdorff distance [11] to find the location of the face in images. Their results demonstrated that this method could not deal with changes in rotation and also did not work properly in case of intensive side illumination. The third approach was based on using Haar-like features in Viola-Jones face detector to localize faces in images and also applying the histogram equalization resistant to changes in lighting. Their results represented that Haar-like method had the best detection rate and was robust against lighting and rotation of the head in low-resolution images. They got 90 percent detection rate on frontal and semi profile images without any information about the number of false positives.

MATERIALS AND METHODS

Cascade Adaboost Classifier

Adaboost was proposed by Freaud and Schapire [12] as an efficient algorithm of the ensemble learning fields. It is an iterative algorithm which obtains an ensemble of weak classifiers by evolving a distribution of weights over the training data. In each iteration of the Adaboost algorithm, the classifier h_t with the lowest weighted error is added to the ensemble. The decision of the ensemble after T iterations is defined as:

$$H(x) = \begin{cases} 1 & \sum_{t=1}^{T} \alpha_t h_t(x) \ge \theta \\ \\ 0 & Otherwise \end{cases}$$

(2.1)

Where α_t is the Adaboost ensemble weight and θ is the threshold of the ensemble which is adjusted to meet the detection rate and false positive goals. More features are added to the ensemble when necessary to reach the expected performance.Viola-Jones [4] Adaboost-based face detection algorithm is considered to be the state of the art of face detection due to its high speed and accuracy. The Adaboost algorithm selects the best weak classifiers, which are able to distinguish face from non-face features in an easy way. To construct each weak classifier, Viola and Jones applied a set of Haar-like features, each with a simple threshold on one of the extracted features. The Adaboost algorithm then selects a small set of the best classifiers (the ones with a low error rate). For a more accurate classification, weak classifiers are combined together to form a strong classifier. A set of Haar-like features are shown in Fig.1. The ability of creating a variety of these features, in terms of shape and size, made them popular for various detection problems including face detection, and 3D ear detection[13].The cascade structure consists of several stages of trained

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classifiers using Adaboost algorithm. This structure reflects the fact that the majority of the image area covered by non-face windows. As such the cascade attempts to rejects as many of the negative sub-windows as possible at the earliest stage, while positive sub-windows are passed to the next stage for further processing. To achieve a high detection rate with low false alarms and minimum computation time, the number of stages and the size of the stages should be adjusted during the training task. The false positive rate of the cascade is defined as:

$$F = \prod_{i=1}^{k} f_i \qquad (2.2)$$

Where F is the overall false positive rate of the cascade classifier, k is the number of classifiers, and f_i is the false positive rate of the i th classifier. The detection rate is:

$$D = \prod_{i=1}^{k} d_i \qquad (2.3)$$

Where D is the overall detection rate of the cascade classifier, k is the number of classifiers and di is the detection rate of the i th classifier. To construct a high performance cascade structure, the maximum acceptable rate for di and minimum acceptable rate of f_i are selected by the user. The cascade is trained by the Adaboost until the target detection rate and false alarms are met for each layer. If the overall target false positive is not yet met, then another layer is added to the cascade.In order to increase the speed and improve the detection performance, many of the negative sub-windows are rapidly rejected by the cascade classifier at the earlier stage, while positive sub-windows are passed to the next stage for further processing as shown in Fig.2. This process is repeated at each stage of the cascade, and the current samples are forwarded to the next stage, for a more accurate classification. However some hard examples which have not been correctly classified by the previous stages still remain. These hard examples appear in the final output as false alarms. The type of features, the number of training samples and the choice of the training algorithm affect the detection performance. For further details the reader is referred to the work in[4].

HOG Feature Extraction and SVM classification
Feature Extraction using Histogram of Oriented Gradients (HOG)

The basic concept behind the Histogram of Oriented Gradient approach is to describe the shape of an object based on the distribution of the local intensity gradients. This approach has recently attracted attention particularly with applications in the areas of object recognition, detection and pose estimation [14]. This is due to two main reasons. First, this gradients structure has the capability to satisfactorily characterize the local shape and to capture edges. Second this representation is relatively invariant to local geometric and photometric transformations [15]. These characteristics allowed the histogram of oriented gradients (HOG) to provide an excellent performance compared to other existing feature sets such as wavelets [16, 17]. Dalal and Triggs used HOG to detect humans in images for the first time in their work in [15]. An overview of the HOG feature extraction process is depicted in Fig.3. In their first step, for a better clarification of the edge of the input image, a preprocessing of the image is performed to normalize the gamma correction factor of the image. This can simply be done using histogram equalization. After the normalization process and in the second step, the gradients of the windows are computed. Several gradients detectors can be used[15]. Commonly, the [1, 0,-1] detector is utilized due to its simplicity and speed. For color images, each RGB channel is computed separately and the largest value is selected as the gradient for that pixel. In the third step, the image is divided into small sub-windows (cells), and histograms of oriented gradients are accumulated for that cell. To decrease the effect of illumination changes, the cells are grouped into larger windows, called blocks and each block is then normalized to ensure the low contrast regions are stretched. To ensure consistency across the whole image without loss of the local shape variations, the blocks are overlapped. Finally, the histogram of oriented gradients is collected as a feature vector.

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Support Vector Machine Classification

Vapnik[18] proposed support vector machine, which is considered as one of the most appropriate proper machine learning, which is used for patterns classification and regression analysis. SVM is a supervised learning algorithm that applies a set of hyperplanes to classify examples. The best hyperplane is the one that maximizes the margin. In the case of the face detection (binary classification), the linear SVM classifier is used due to its high generalization ability and its ability to minimize the empirical classification error. The idea behind the SVM for face/non-face classification is to create a hyperplane decision surface between positive and negative decision boundaries.

$$\text{Given a set of training data: } D = \left\{ \left(x_i, y_i | x_i \in R^p, y_i \in \{1, -1\} \right\} \right\}_{i-1}^n$$

Each boundary is determined by the location of support vectors that satisfy:

$$y_j \left[W^T X_j + b \right] \equiv 1; j = 1, \ldots N_{sv} \quad (3.1)$$

Where W is the normal vector and N_{sv} is the number of support vectors. During the training process, the optimal hyperplane maximizes the margin selected by the algorithm. More details about SVM classification with application in face detection are indicated in[19].

Proposed Face Detection Method

In this paper, a two-stage face detection system is proposed using a cascade Adaboost and histogram of oriented gradients. Fig.4 shows the overall structure of the proposed method**.**

In the first stage, a strong classifier is constructed from the cascade Adaboost algorithm based on Haar-like facial features during the training phase.During the testing phase, Haar-like features are first extracted from the input image. The faces in the input image are then detected using the cascade Adaboost structure. The Adaboost-based face detection has three major attractive characteristics. The first is the use of the integral image to compute the Haar-like features which makes the process very fast. The second characteristic is the selection of efficient and small number of Haar-like features from a large set of Haar-like features to generate the classifiers. The third characteristic of Adaboost is the combination of weak classifiers in cascade which reduces the computation time and the false positive rate. This method is applied in our proposed face detection approach. It reduces the detection speed and results in a high detection rate. Due to pose and illumination variations, the output image may detect non-face objects resulting in a number of false positives .To ensure that the cascade Adaboost algorithm is robust against partial variations in pose and illumination, the following changes were applied in the algorithm:

I.In addition to the standard basic Haar-like features, several rotated and asymmetrical Haar-like features were added to the feature set in order to increase the ability of the algorithm to handle faces under pose variations[20]. Some of these features are shown in Fig.5.

II.Furthermore, several new face and non-face training samples were generated from the original training set, and used to improve the robustness of the algorithm against changes in lighting and variable pose conditions.The subsequent module of our proposed approach acts as a verification stage, with the goal of decreasing the false alarm rate and improving the overall performance rate. In this stage, as shown in Figure4, the detected faces from the Cascade Adaboost are cropped and rescaled into a 36×36 image size. If the HOG module were used on its own as a shape-based face detector, it would have been computationally expensive (particularly when processing large resolution images). The purpose of the cropping and rescaling is to guarantee that the verification module only

processes reduced-sized sub-windows which have been detected by the previous stage. Then a feature vector is extracted based on the histogram of oriented gradients method following the description of Section 3. Given an image of 36×36 pixels we use the following input parameters (selected after extensive empirical tests):
Cell size=4x4; Block size=8x8; Number of histogram bin=6; Block stride=4x4.

The output parameters are selected as follows:
Total number of histograms in each block=6*4=24;
Total number of block= (36/4-1)*(36/4-1) =64;
Feature vector dimension=64*24=1536.

A linear support vector machine (SVM) is then trained to classify face and non-face images. For the purpose of this paper (i.e. binary classification), SVM is one of the most appropriate proper classification tool due to its high generalization ability and its ability to minimize the empirical classification error[3, 21]. To train the SVM classifier, a database of 36x36 face and non-face samples is used. Finally, each verified detected face is bound into a box, and regions, which are identified as false positives, are removed from the input image. Despite the high capability of the HOG and SVM module to discriminate between face and non-face samples, their combination cannot be used as a unique system for face detection, due to the heavy computational cost caused by the exhaustive search of a large number of sub-windows of the original image.

RESULTS

The proposed method was implemented on a 2.83 GHz quad core processor with 8.00 GB of RAM on a Windows XP operating system. It was coded using OpenCV and Visual studio programming. To evaluate our results, two databases, the CMU+MIT dataset and the manual prepared low-resolution images dataset have been used. The CMU+MIT [22] test database consists of 130 gray scale images with 507 upright face . This subset is called CMU125 (Dataset#3).The images were collected from a wide variety of sources including the internet, newspapers and magazines (with low resolution), analog camera and hand drawing. The manual prepared low-resolution database consists of 102 human faces of 80 images, taken from CCTV footage of the internet and CCTV of CAIRO (Center for Artificial Intelligence and Robotic) Center of UTM (Universiti Teknologi Malaysia).Experimental results show that our proposed method achieves a high detection rate with minimum false alarm compared with existing works.

Table 1, evaluates the operation of the Cascade Adaboost algorithm and our proposed method when tested on the CMU+MIT test database. The results show an improvement in the performance using the rejection of false positives in the verification stage.To evaluate the proposed method on low-resolution images, at first, a rich database was prepared. This database contained 80 images (102 human faces) captured from CCTV footage of CAIRO (Cener for Artificial Intelligence and Robotic) Center of UTM (Universiti Teknologi Malaysia) and CCTV images and videos from the internet. The DPI of all the images was lower than 96.The proposed method obtained an 86.2% detection rate with 42 false positives when tested on low-resolution images database.Table 3 demonstrates the effect of verification module on performance of the proposed method. As shown in this table, 54 percent of the false positives were removed by the verification module.To compare the existing works, Table 4 was prepared. In order to evaluate the proposed method, three different works were applied in prepared low-resolution images database (102 human faces taken from CCTV), which are highlighted in gray in Table 4.

The first three studies made use of common databases to evaluate their works as shown in this table. The images of these databases are high resolution, frontal or semi profile, which cannot measure precisely the performance of the detectors in uncontrolled environments and low-resolution images. For this purpose, the algorithms of three different approaches of face detection were prepared. Then each of these works tested on low-resolution images database. As shown in Table 4, the proposed method achieved higher detection rate compared to other works. Furthermore, the

number of false positives is much lower than others, significantly represented the effect of proposed framework on reduction of false alarms. Fig. 6 shows some samples of low-resolution images. The proposed detector could detect significantly, human faces in these images.

CONCLUSION

In this paper, a high performance face detection method based on a combination of the cascade Adaboost algorithm and a verification module, based on the histogram of oriented gradients and support vector machine, is proposed. The first module detects the existence of faces in the input image with a high detection rate. In order to improve the detection performance, the verification module further removes the majority of the false positives within the input image. Experimental results on two test datasets, the CMU+MIT and the prepared low-resolution images database, show that our proposed method achieves a high detection rate as well as a low false alarm rate compared to existing works.Our future work will aim at utilizing different forms of the boosting algorithm such as Floatboost or Real Adaboost. We will also explore non-linear SVM classifiers to improve face detection performance. We also plan to extend the approach to other more complex face detection scenarios such as multi-view face detection or face detection under illumination and rotation variations.

ACKNOWLEDGMENTS

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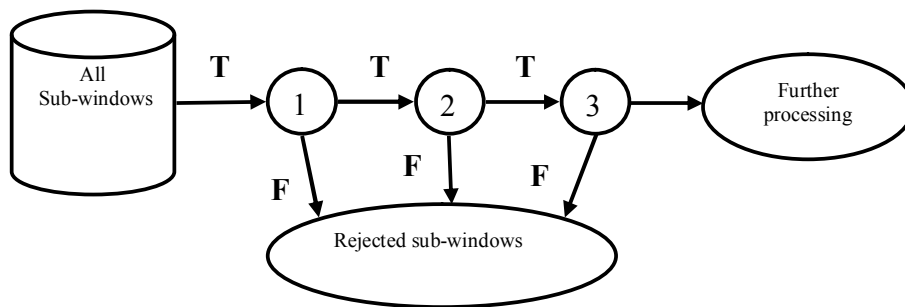
Figure 1. Typical Haar-like features

Figure 2.   Schematic diagram of the cascade structure[4]

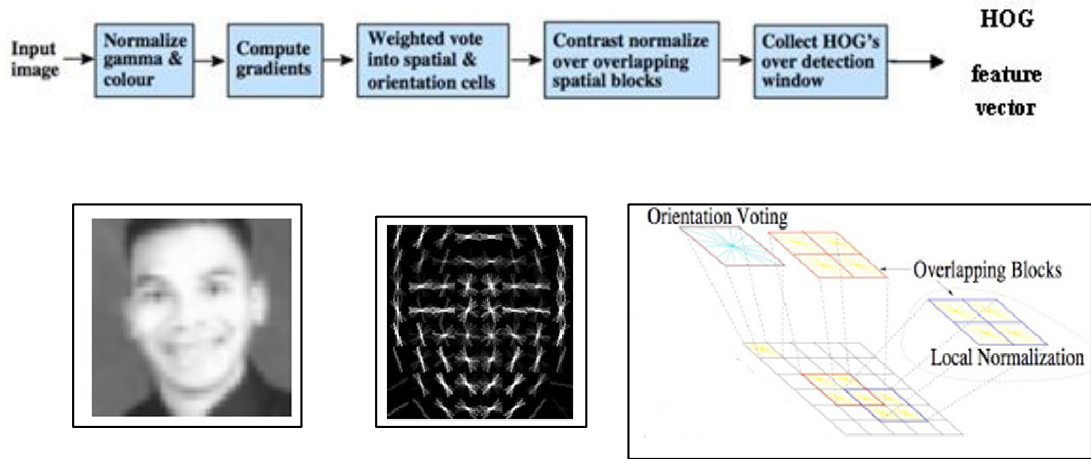Farhad Navabifar *et al.*

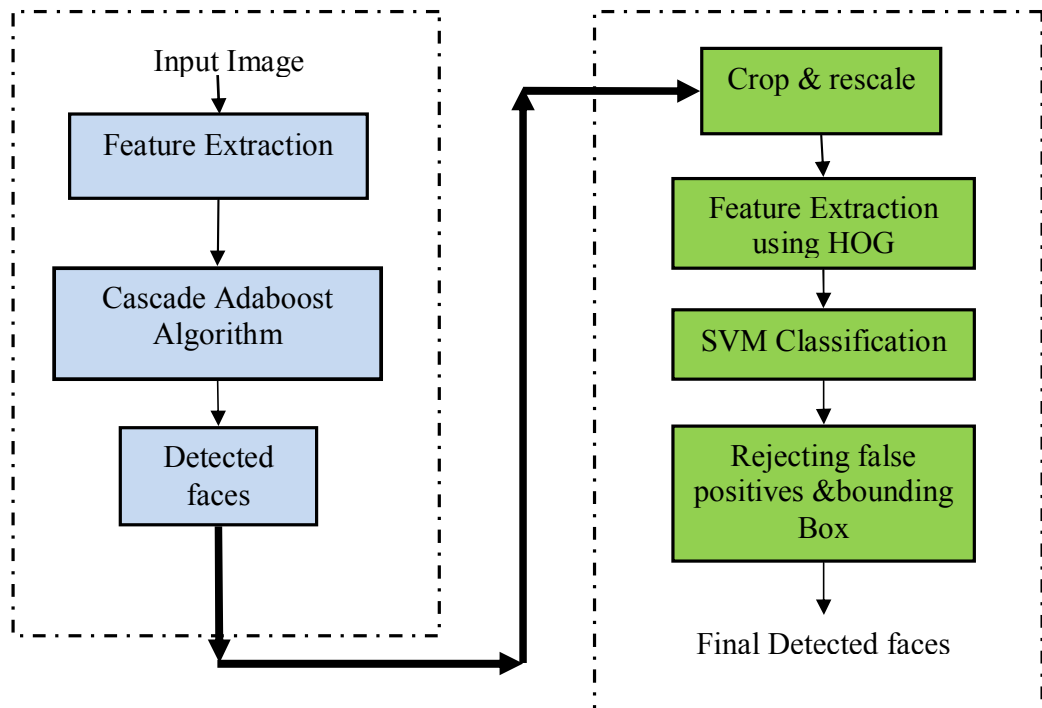**Figure3. Overview of HOG feature extraction[15]**

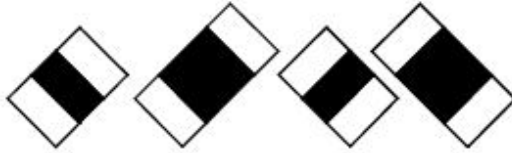**Figure 4. Overall structure of the proposed method**

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Figure 5.Rotated and asymmetrical Haar-like features used in our algorithm to improve the robustness of the face with respect to pose variations.
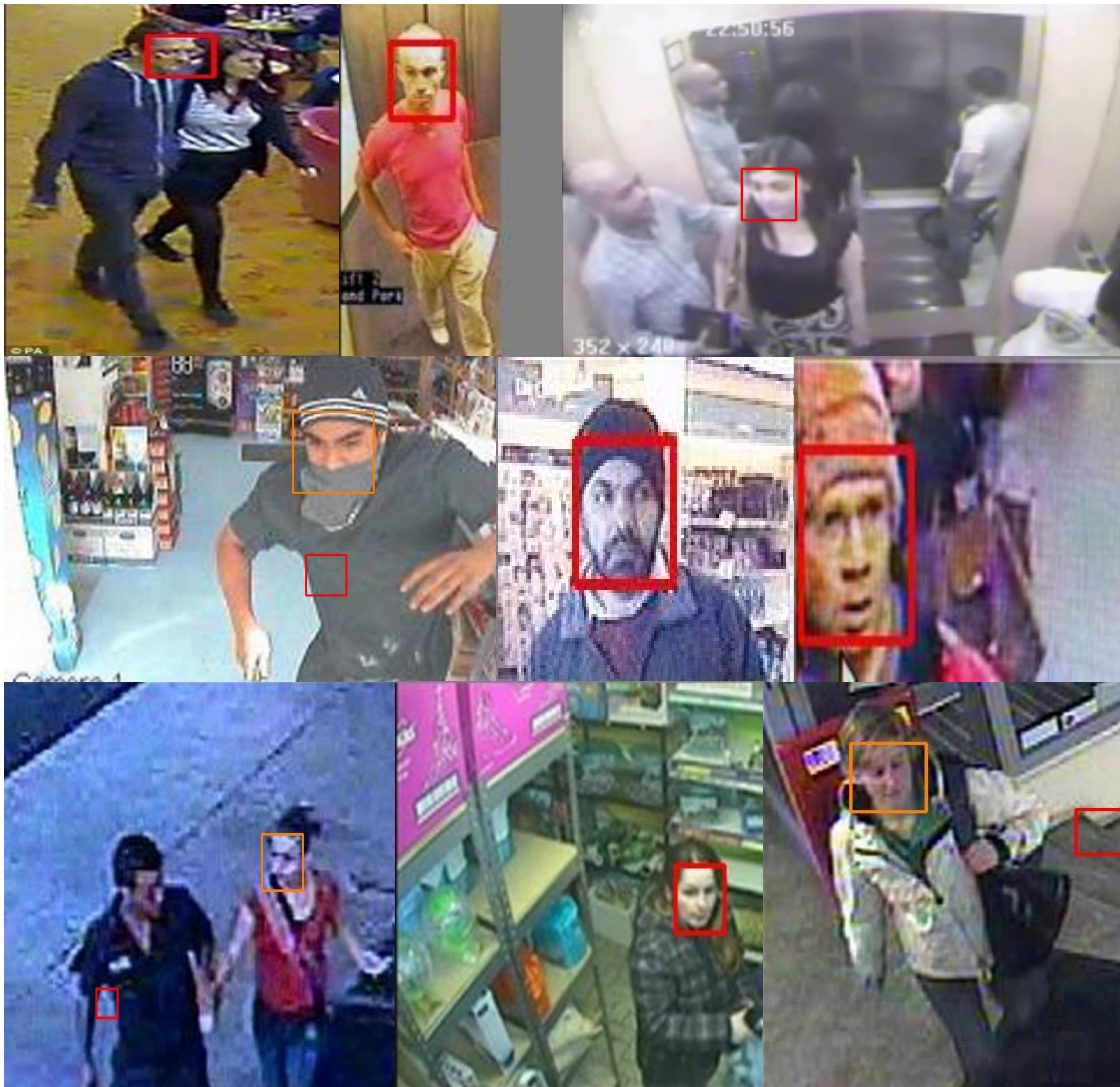

Figure 6. Detected human faces in low-resolution images taken from CCTV.

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Table 1. The Comparison table of the performance of the cascade Adaboost algorithm and the proposed method on the CMU+MIT test database containing 130 grey scale images with 507 faces.

Detection method	Hits	Misses	False positives	Detection rate (%)
Cascade Adaboost	475	32	143	93.5
Proposed method	473	34	88	93.4

Table 2. Evaluation of the proposed method on 80 low-resolution images containing 102 human faces.

HIT	Miss	Detection rate (%)	Number of false positives
88	14	86.2	42

Table 3.The effect of verification module (HOG+SVM) of the proposed method on reduction of false positives.

	Detection rate (%)	Number of false positives
Proposed method without verification module	87	91
Proposed method with verification module	86.2	42

Table 4. The comparison table for low-resolution face detection algorithms.

Works	Test database	DR (%)	FP
Marciniak et al.	Yale (Single face of frontal and rotated up to 45°, from 640×480 to 54×40 pixels)	90	-
Hsu and Chang	Video (320×240 pixels)	65	-
Zhang et al.	Georgia Tech (640×480 pixel, single face and frontal)	80	149
Nilsson et al. (2007) Geometric model	Low-Resolution images database	78.4	69
Marciniak et al.(2013) Skin color model	Low-resolution images database	44.1	51
Marciniak et al. (2013) Haar features	Low-resolution images database	80.3	95
Proposed method	Low-resolution images database	86.2	42

RESEARCH ARTICLE

Numerical Simulation of Baffle Plates of Deflector Wings of Duct Burners

Arash Taravatie*, Qadir Esmaili and Morteza Hosseinzadeh

Department of Mechanic , Faculty of Engineering, Science and Research Ayatollah Amoli Branch, Islamic Azad University, Amol, Iran

*Address for correspondence
Arash Taravatie
Department of Mechanic,
Faculty of Engineering,
Science and Research Ayatollah Amoli Branch,
Islamic Azad University, Amol, Iran.
E.mail: arash.taravati@chmail.ir

ABSTRACT

Baffle plates and deflector wings of recovery boiler are the main section of recovery boiler duct burner and its condition is of great importance for repairing teams. Under various conditions in electricity generation, we faced various damages of deflector wings of duct burner. Our data are provided based on information and testing of repairing forms of ShahidSalimi plant of Neka. In recent years, the upper wings of duct burner are burned and corroded compared to the lower wings and it is not suitable from economic and plant output aspects. The project attempted to have positive effect on reduction of wings burning by changing the distance between the baffle plate and deflector wing. Thus, hot gas (gas turbine outlet) passing the deflector wings and gas flux and combustion in this region are simulated by fluent software. Now, the study applied 2-D model by Non-premixed combustion and PDF model and turbulent flow and P-1 model were applied for radiation in fluent software and non-structured triangular mesh, gas flow around the burner were studied. Standard wall function was used for wall effect. To solve velocity-pressure, segregated network and simple algorithm were applied. Finite volume and upwind were used for equations discretion. The results showed that reduction of distance between deflector wing and baffle plate increased velocity above deflector region and this makes flame and reduces burning in the upper edge.

Keywords: Numerical simulation, Recovery boiler, Duct burner, Baffle plate, Burner, Guiding wings.

INTRODUCTION

In non-burner combined cycle plant, steam section function depends mostly upon gas turbine function. If we need the permanent function of steam section, by installing burner in boiler, if the steam section function is not faced with any problem, independent performance of these two sectors is provided and these combined cycle plants are formed. In combined cycles, hot gas of combustion enters recovery boiler after passing gas turbine and gives its heath to the water of boiler by thermal convertors. The hot steam or water is used for electricity generation in steam turbine or process consumptions in various units [1]. In the past, many researches were conducted regarding the recovery boilers namely recovery boiler fames and their effect on performance of recovery boiler as:Catalano et al., performed extensive numerical analysis for simulation of a standard after-Burner performance and new regulations were also considered. They found that flame stability problem is more in the presence of gas flue than in the presence of fresh air and the wall temperature of the flame holder appears very high when the operating condition reaches the minimum load [2]. Khalili et al., evaluated hydrodynamic analysis of flue gas flow behavior within a heat recovery steam generator. To avoid the important destructive problem in HRSGs, non-uniformity of the gas flow at the upstream ofHRSGs heating surfaces, certain configuration modifications including installing a flowcorrection device (FCD) in the inlet duct, experiencing a huge steepness in height, and doubling the inlet duct were proposed. This paper was aimed at studying the effect ofshortening the HRSG inlet duct length and eliminating the GT swirl effect on the velocityprofile in the inlet duct [3]. Shin et al. investigated and simulated the flow pattern and found suitable alternatives for uniform flow in transition area of vertical recovery boiler. They investigated the features and uniformity of flow of each transition region of a vertical recovery boiler. To perceive flow models in the duct between gas turbine outlet and inlet of recovery boiler and quantitative evaluation of flow non-uniformity conducted cold wind flow tunnel. Various propositions are given to reduce non-uniformity of flow as deformation of duct inlet, installing FC as guiding blade and porous plane and the best one was porous plane for flow uniformity [4]. Catalano et al., evaluated Post-Firing duct burners in combined cycle plants and also evaluated the temperature changes and fuel combination in thermal tensions on burner. They applied CFD code to analyze flow in this system [5]. Petrone et al., investigated reacting flows in industrial ductburners of a heat recovery steam generator. They found that fuel compound had no considerable effect on after-burner and by increasing reactants mass flow, the flame stability is endangered [6].

Statement of problem

Combined cycle plant of Neka has horizontal recovery boiler and the burners in duct burner are circle and combustion is non-premixed. The deflector wings of duct burner of combined cycle in new plants are the main problems of maintenance teams as their burning to the changes of unit load and its time have direct effect on the life of burner and combustion curve and the boiler generated steam and the required megawatt of combined cycle unit. Based on the researches in recovery boiler, some information is presented regarding early destruction of duct burner. These burners are visited during specific periods for some months and they should be changed or repaired if necessary. Based on the researches, these burners are destroyed early and these burners are corroded over time based on the direct contract with the flame of temperature 1500 to 2000. The problem is that the upper edges are corroded earlier than lower edges and this is a problem from work output and economic aspects.

Indeed, using duct burner has important effect on compensating the heat loss and entropy of hot exhaust gas of gas units and generation of steam with high heat and dryness to produce work in combined cycle steam turbine. The present study attempted to create some changes in the distance of baffle plates of duct burner and reduce the burning of its upper edges and modify the form of flame as usefully. Fluent software was used for simulation of gas flow in duct burner (exhaust gas turbine) passing the burners.

METHODOLOGY

At first the model was prepared by Gambit software for simulation and then simulation was done in fluent software. The 2-D model was used in all numerical calculations.Based on the complexity of problem, physical range of the problem is discretized by non-structure triangular mesh. As the flow is including the curves of stability flow line of swirls and boundary layer segregation areas, RNG model was used for turbulence model. Due to the non-premixed flame, non-premixed combustion was used in simulation trend and P-1 model was used for radiation. Mixture fraction/PDF model was used for chemical reaction system. The transfer equations are solved for mixture fraction and its deviation instead of chemical items equations. Standard wall function is used for wall effect. The features of part as density and specific heat are considered after the analysis of part materials and determining them. Suitable boundary conditions are used for system borders. Velocity-inlet boundary condition is used for air and fuel inlet, Pressure-outlet condition for outlet border and wall boundary condition is used for the walls. Based on the explained equations, to solve pressure-velocity, segregated network and simple algorithm were applied [7]. Finite volume method and upwind were used for equations discretization.

Simulation assumptions

To reduce calculation, some simplifications were used and they had no effect on validity of flow: The effects of fluid force are ignored. The pressure changes were ignored and uncompressed flow is assumed. Wall function was used for wall around model and the heat exchange between the gas and surrounding environment of chamber is ignored.

RESULTS AND DISCUSSION

The space for simulation in plant is the region after gas turbine. This region includes some ducts for gas flow and some rows of burnersare in gas flow and fuel splashing is done via the tubes behind the burners. There are some baffle plates beside burner to avoid exhaust gas of turbine around the burner.

For simulation, a burner of lower row was used and the surrounding space was considered as 2-D and they were modeled. Based on duct slope after burners region, in front of burner is considered as steep. The boundary conditions in simulation model include: inlet of exhaust gas of turbine, fuel inlet, heated gas outlet, burner body, baffle plates, system lateral directions and fuel splashing tube shown in Figure 2.

Independence from network

For independency from network, the model was meshed for 4 times and simulation was done and the results were evaluated. The first network has 45000 cells and then the network was smaller and the cells reached 77800 and in the other stage, the cells were 102000. The temperature and velocity results were compared at x=3m, x=1m and they are shown in Figures 4-5 to 4-8. It can be said that temperature and velocity changes are decreased in charts as the network is getting smaller. It can be said the smaller network, improves the solution but based on the problem of computers, this is not possible for author and the number difference is acceptable. The inputs for exhaust gas of turbine and fuel for combustion are shown in Table 1.

At first, the existing system was simulated in ShahidSalimi plant of Neka. The operational state of duct burner in the plant and the simulation are presented in Figure 7. As shown in the figure, the inlet gas is deviated to the above based on the duct slope and it affects the combustion and burner process and deviates it to the above. Thus, hot area and burner get close to the upper wing of burner and this part of burner is burnt after a while.

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Based on the problems, a solution was proposed to eliminate this problem regarding changing baffle distance to burner and by increasing baffle plate length, the distance between burner and baffle plate is reduced.

Validation of simulation

The existing real temperature in DCS plane is used in ShahidSalimi plant of Neka for validation. The outlet temperature in simulation is 831K and outlet temperature in Neka plant is 850. Based on error 0.022, this error is acceptable and the simulation is supported. The outlet temperature of ShahidSalimi plant and outlet temperature by simulation are shown in Table 2.

Velocity evaluation

By changing baffle plate distance to the upper edge of burner, the velocity is changed in this region. By making baffler closer to the upper edge, velocity is increased. These changes increase velocity of outlet. By comparing velocity contour in Figure 8 and outlet results in Table 3, this is observed.

State (a) is used for burner with normal state and the baffle distance to the upper wing is 80cm, factory size. State b) is the first change occurred that is changed as 70cm. As shown in Figure 8, the conditions are improved considerably. In state (c), this distance is 60cm and in state (d), it is 50cm. As observed in velocity contours, when the burner baffle is not changed, the velocity is very low in the region close to the wall over burner (blue color of burner), it means that the gas velocity is low in this region and it forms burner in the region near the upper edge of burner. Other models are called b), c), d) were changed as 10cm and they added the upper baffle length. The results of the vectors and velocity contours showed that by increasing baffle plate length and reducing the distance to the upper wing edges, the gas velocity is increased above the burner and combustion and flame formation are done in a far distance and burner and its upper edge are damaged less. As shown in Table 3, the velocity of outlet is increased.

The temperature evaluation

Temperature diffusion around burner is of great importance and this is evaluated in this section. The temperature for four simulated models is shown in Figure 9. As shown, model a) as the current model of Neka plant due to the distance 80 cm of baffle plate to the upper edge of burner and as in section 4-4-1, the velocity of burner upper section is very low, the flame near the upper edge of burner is formed. In other models, by changing the distance, velocity of the region above burner is increased and in profile (d), distance 50cm of baffle and burner, the velocity is increased and combustion and flame formation are done in a far distance from burner. Producing uniform profile in front of burner and the lack of deviation of burner to the wings, increases the life of the burner. The evaluations of temperature showed that temperature is increased in chamber outlet and this shows useful combustion and higher thermal output for recovery boiler. These results are shown in Table 4. The justification for increasing temperature in output is that by changing distance between baffle plate and upper wing, uniform temperature is formed along gas flow and it increases the outlet temperature. Depending upon the application of the gases of combustion, this temperature increase can be useful or not useful. As increasing temperature, increases recovery boiler output, these changes will be positive.

The evaluation of methane exiting combustion chamber

Methane exit (other fuels) from combustion chamber is not suitable from two aspects:
- It indicates incomplete combustion
- Methane exit from combustion chamber causes financial loss from economic aspects

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We evaluate methane exit from three stages and their profile is observed. The results for all the models are shown in Table 5. There was no methane in the outlet and complete combustion was done and changing the distance of baffle to burner, doesn't cause any problem in complete combustion.

The density evaluation

This section evaluates density diffusion around burner namely its upper edge. The results in this section are shown by density contour. As shown in Figure 10, in state a) the density of existing gases is high in the upper edge of burner. By changing baffle distance, density diffusion was uniform and it is far from burner upper edge. These changes to state d) with 50cm far from burner caused the density contour had better and uniform form.

The evaluation of mixture fraction

Mixture fraction is investigated in four models and their contour is plotted. As shown in Figure 11, in model a) mixture fraction is high in upper wing of burner and high chemical reactions are done in this region. By reducing the distance in models b, c, d, mixture fraction indicating fuel is reduced around upper wing and chemical reactions are reduced in this region.

The Evaluation of temperature in a longitudinal cut

In this section, the temperature of the upper section wing of burner deflector of four models is shown in Figure 12. As shown, making baffle closer to burner reduces temperature in the above of burner deflector. It means that reducing baffle distance from the upper wing of burner increases velocity in this region and it can have considerable effect on reduction of high temperature of burner and avoids early destruction of burner wing.

CONCLUSION

Due to the duct steep, horizontal burner increases more turbulence around the upper wing of burner and temperature profile approaches this region and this destroys this part of burner. One of the solutions of eliminate this problem is increasing upper baffle length and reduction of distance to burner. Based on gradient 28 degree of duct, burner is located in the distances 70, 80, 60, 50 to upper baffle and the required investigations were done as:
- Uniformity of temperature profile in the region after burner and it is better in burner with distance 50cm.
- Increasing outlet temperature and this increases output without the change of boundary conditions (inlet pressure and velocity and TEG)
- Reduction of flow turbulence around burner and chamber outlet and as combustion is complete, it has positive effect on flow guiding and the region after this chamber.
- The little increase of velocity in chamber outlet makes gas exit rapidly
- Uniformity of diffusion of gas mixture fraction in the region in front of burner
- Complete combustion and the lack of non-burnt gas (fuel) in chamber outlet

Recommendation

Numerical simulation of combustion process in recovery boiler is of high potentiality due to the extensive use of gases of combustion. For example, we can refer as future studies as:
- Using burners with various geometries based on the type of flame and gas flow features
- The study of optimization of fuel and for fuel use based on the flow direction
- Simulation of the function of flow uniformity baffles and their geometry change to change flow direction freely
- Simulation of hot gas flow in the total system
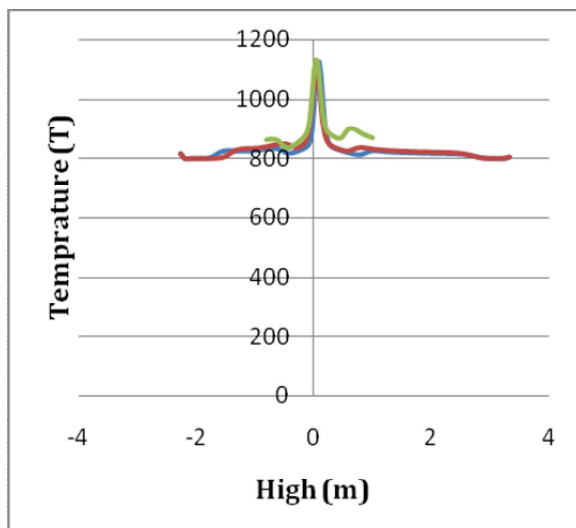
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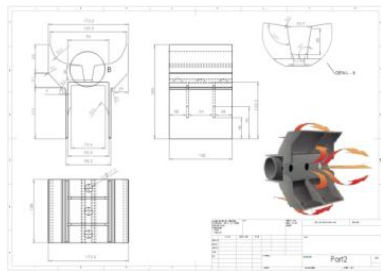
Figure 1.burner map.
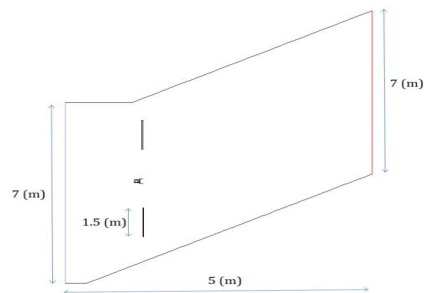
Figure 2. 2-D simulated model.

Figure3.Temperature chart at x=1m in four networks.
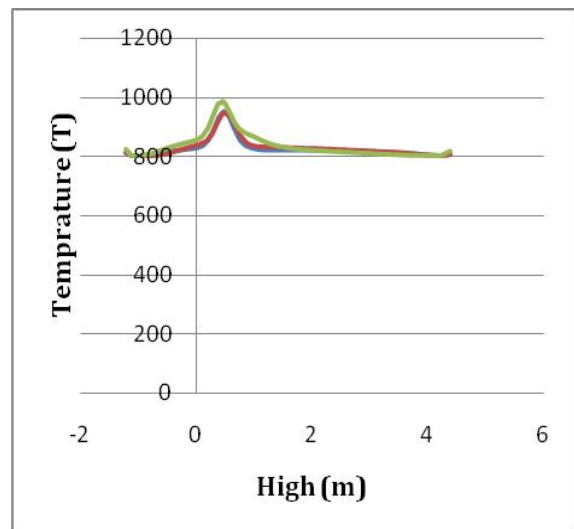
Figure 4.Temperature chart at x=3m in four networks.

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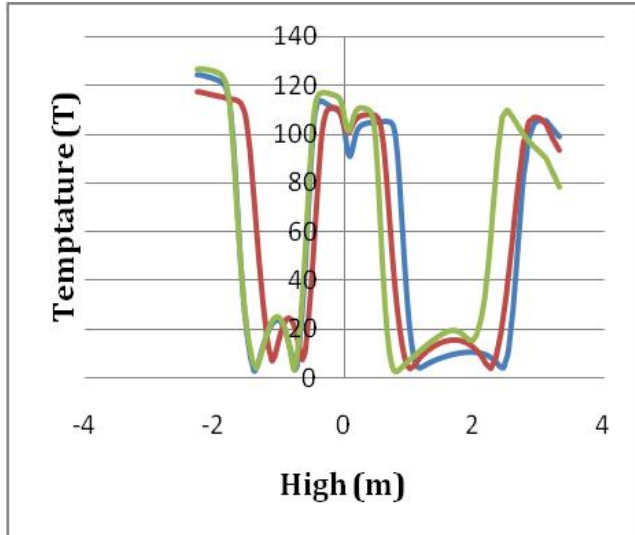
Figure 5. Velocity chart at x=1m in four networks   **Figure 6. Velocity chart at x=3m in four**
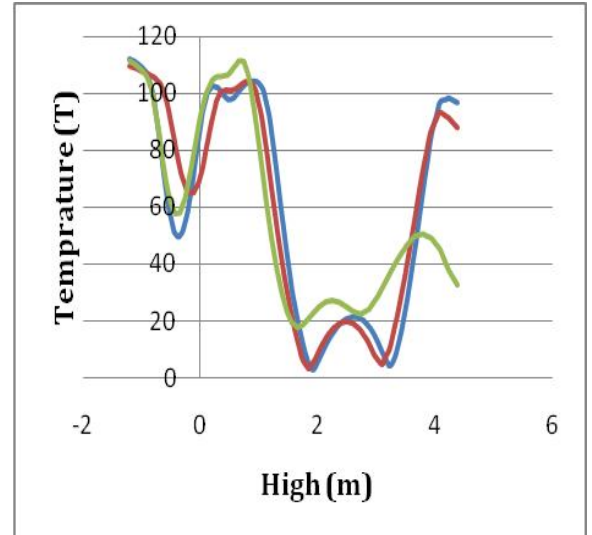
networks.
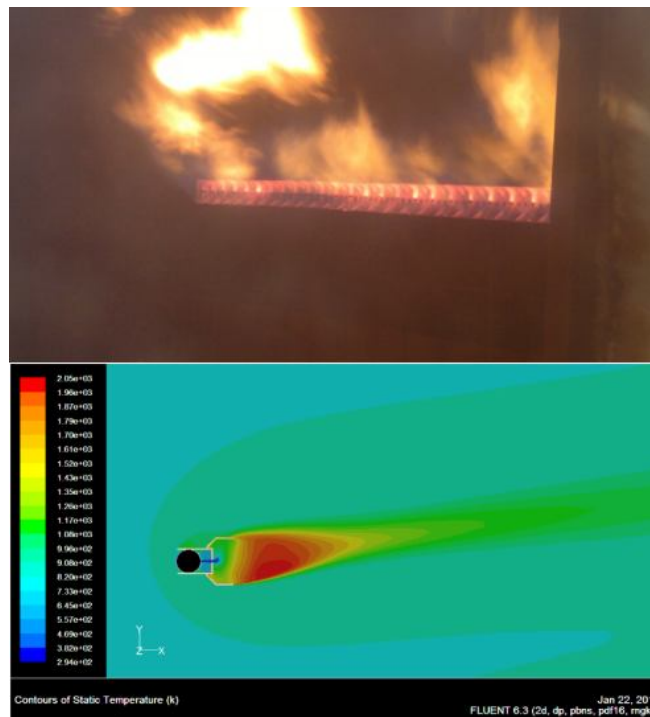
Figure 7. Simulation of duct burner combustion of ShahidSalimi plant of Neka

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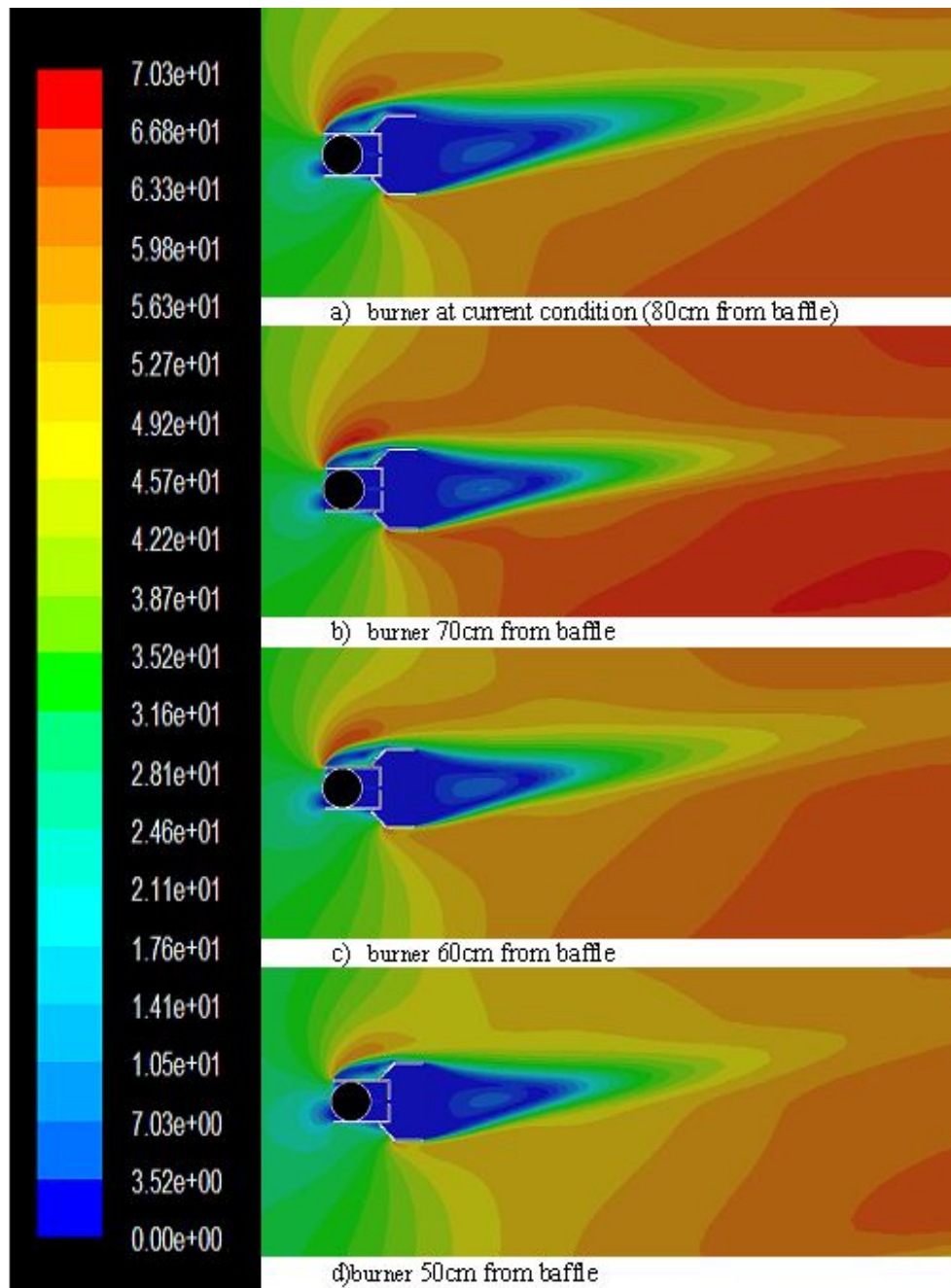
Figure 8. Velocity contour for burner model without change and after reducing distance
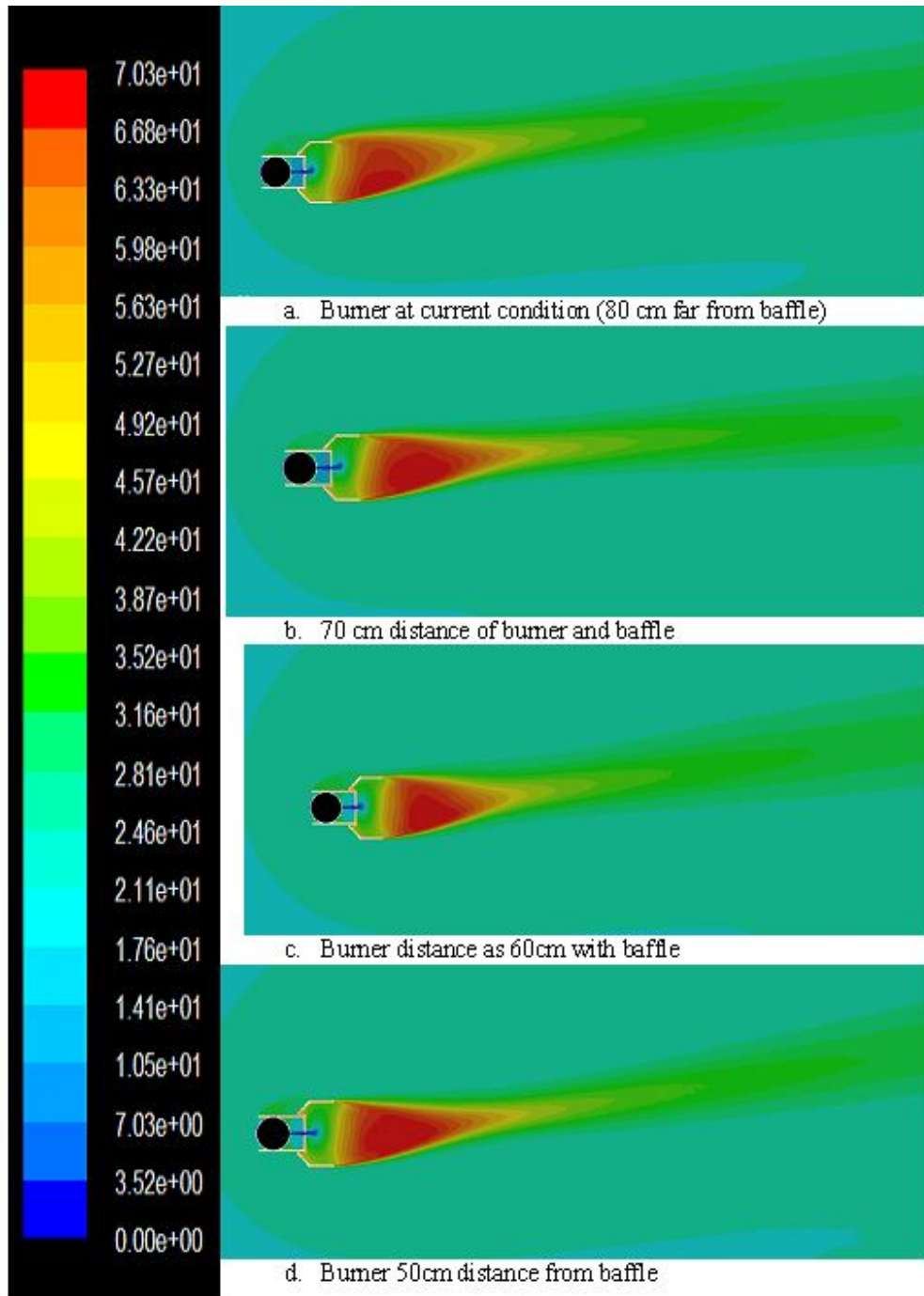
Figure 9- Temperature contour for burner model without change and after reducing distance

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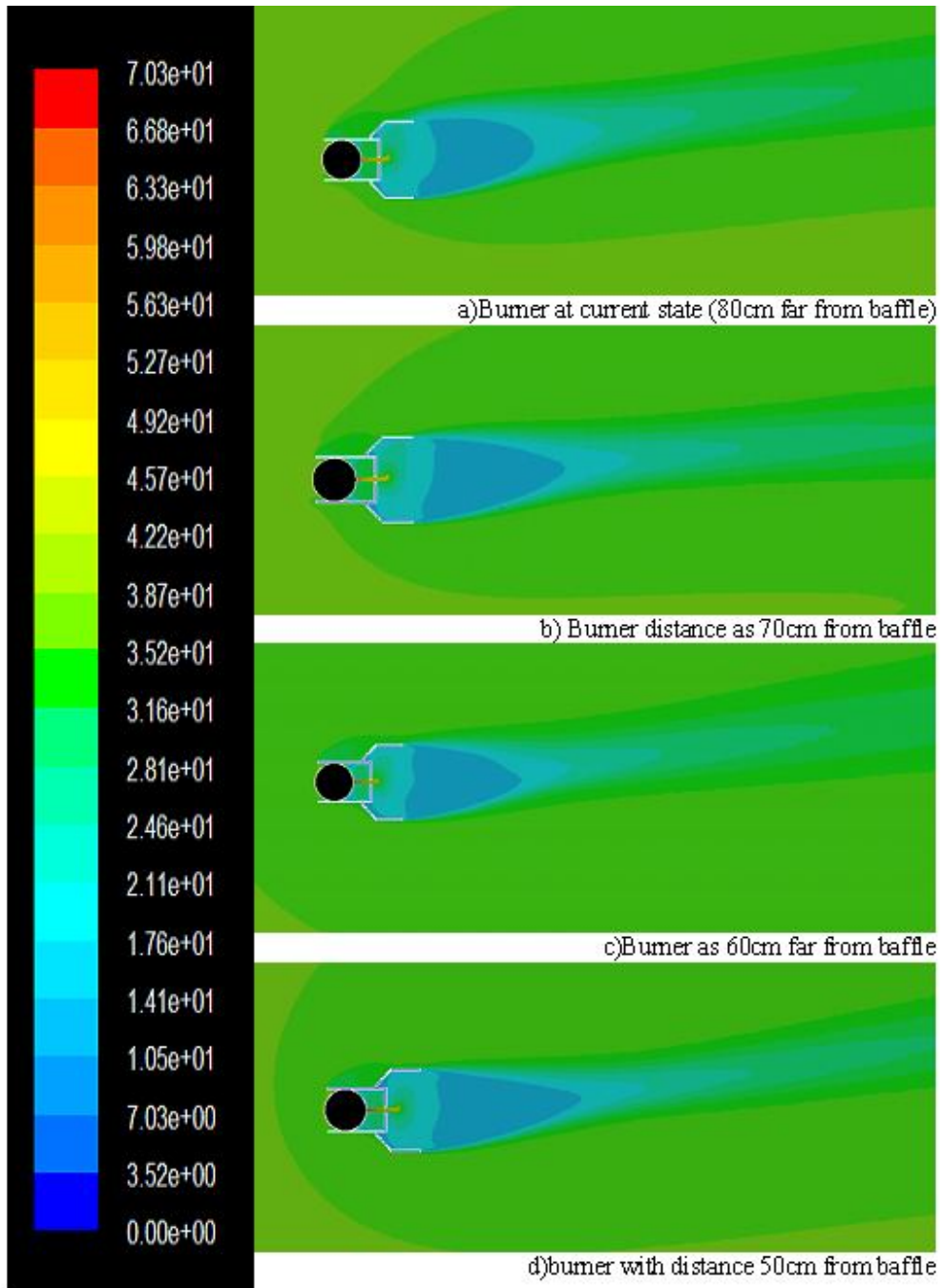
Figure 10- Density contour for burner model without change and after reducing distance

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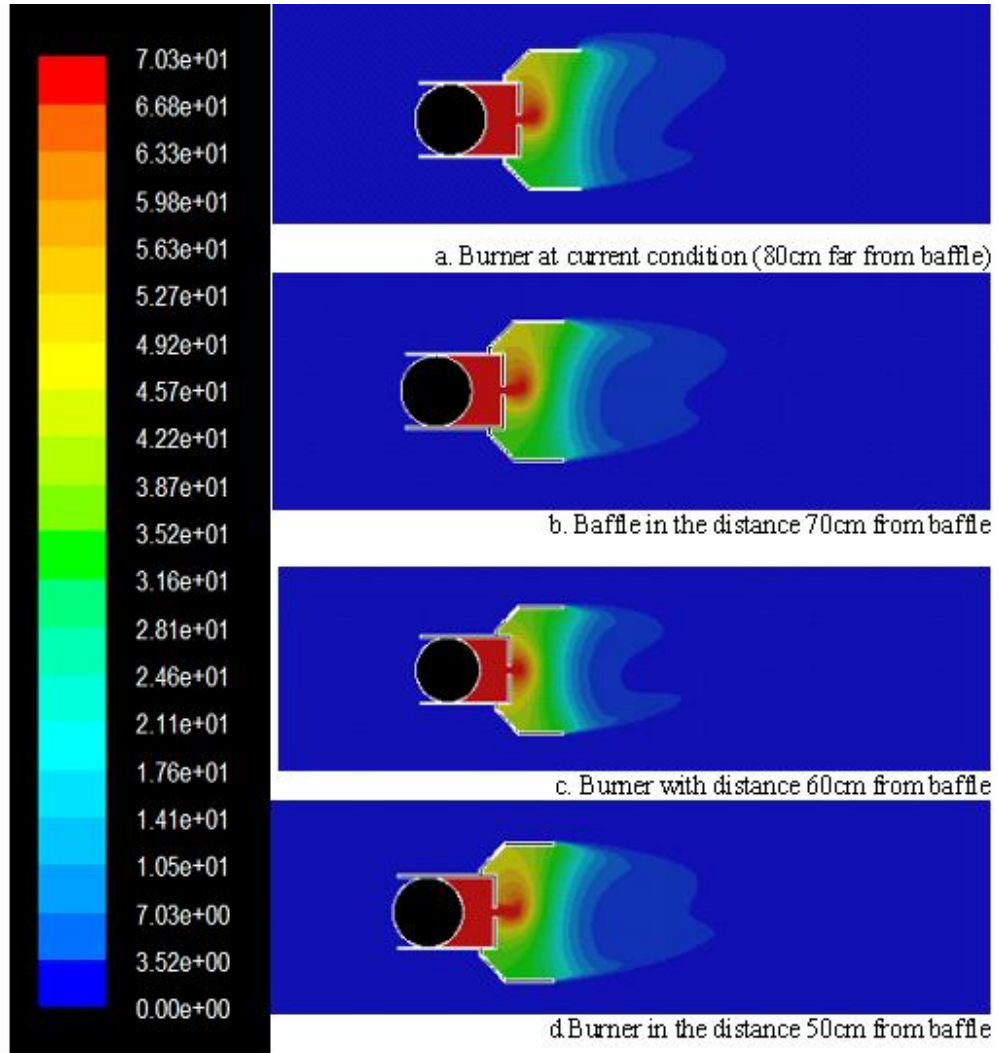
Figure 11. mixture fraction contour for burner model without change and after reducing distance
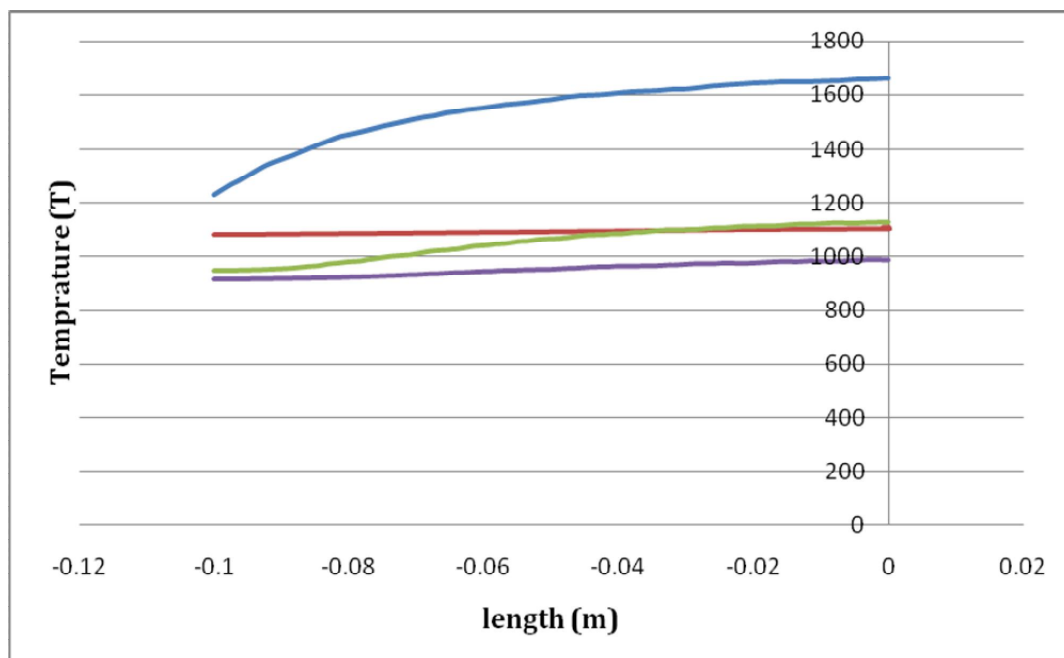
Figure 12. The temperature changes in upper section of burner for four models

Table 1. The entering amount to chamber for fuel and TEG.

Temperature (K)	Inlet velocity (m/s)	Inlet size (m)	Inlet
800	42.23	7	TEG
294	7.635	0.01	Gas fuel

Table 2. The outlet temperature values of duct burner of plant and simulation chamber

The outlet temperature of duct burner (K)	
850	ShahidSalimi plant
865	Simulation

Table 3. Outlet velocity from chamber for four models.

Model d	Model c	Model b	Model a	Feature
69.4262	64.4227	59.12747	58.57474	Mass-Weighted Average Velocity Magnitude (m/s)

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Table 4- Outlet temperature of chamber for four models.

Model d	Model c	Model b	Model a	Feature
842.90	846.3	831.1	831.02	Average temperature (K)

Table 5. The methane exiting the chamber for horizontal burner.

Burner with distance 80cm	Burner with distance 50cm	Horizontal burner	Feature
0	0	0	Mass-Weighted Average Massfraction of ch4

RESEARCH ARTICLE

Studies on the Potent Lipase Producing Bacteria from Agro Wastes

Ravi M, Vivek Kulkarni, Krishna Rayudu, Subhaschandra M Gaddad and Y M Jayaraj*

Department of PG Studies and Research in Microbiology Gulbarga University,Gulbarga- 585106, Karnataka, India.

*Address for correspondence
Dr Y M Jayaraj, Professor,
Department of PG Studies and
Research in Microbiology,
Gulbarga University,
Gulbarga- 585106, Karnataka, India.
E.mail: drjayaraj.ym@gmail.com /Mobile :+91 9845851915

ABSTRACT

A Lipase producing bacterial strain JRK-2 was isolated from agro wastes. It was identified by morphological, cultural and biochemical characters as well by 16s rRNA sequencing as *Geobacillus stearothermophilus*. On Tributyrin Tween agar (Screening Media), isolate JRK-2 showed a zone of 26 mm. In production media for lipase, it produced   0.0060 µmole / min of fatty acids.The lipase productivity was comparable to published data. Hence the isolate has the industrial potential.

Key Words: Lipase, Agro waste, 16s RNA, *Geobacillus stearothermophilus*.

INTRODUCTION

Lipases (triacyl glycerol acyl hydrolases, EC 3.1.1.3), are enzymes that catalyzes the hydrolysis of insoluble triacyl glycerols to generate free fatty acids, mono and di acylglycerols and glycerol at oil water interface [9,12]. Lipases are used in various enzymatic reactions due to their high specificity. The advantage of the enzymatic hydrolysis over the chemical process is less energy requirements and higher quality of the end products [6]. Lipases occur widely in nature, but only microbial lipases are commercially significant. Microbial enzymes are often more useful than enzymes derived from plants or animals because of their greater variety of catalytic activities high yields , ease of genetic manipulation, regular supply due to absence of seasonal fluctuations and rapid growth of micro organisms on inexpensive media [20,24]. Microbial lipases are also more stable than their corresponding plant and animal enzymes and their production is more convenient, safer and can be obtained in bulk at low cost [25,27]. Lipases have wider implication in oil based detergents, dairy products, pharmaceutical, leather industries, cosmetics, pesticides,

and food industry [14,16,22]. With the rapid development of enzyme technology, applications of lipases have also been identified in areas of oleo chemical industry, paper manufacturing, organic chemical processing, bio-surfactant synthesis and agrochemical industry [5,26]. The versatile lipase characteristics play an important role in the manufacture of fine chemicals in chemical industry [15]. Keeping in mind the vast application of lipase in different industries, an attempt has been made to isolate lipase producing novel bacterial strains from agro based wastes.

MATERIALS AND METHODS

All the chemicals used were of analytical grade. Agro wastes like coconut and ground nut oil cakes were collected from oil mills. One gram of the sample was weighed and added to the enrichment media at 120 rpm at 40^0 c in rotary shaker incubator for the enrichment of the sample for 24 hrs. Further Nutrient agar media were inoculated with 0.1 ml of enrichment media and incubated at 40^0 c. The prominent isolates were further streaked on screening media, Tributyrin and Tween Agar containing (0.5% Tributyrin and 0.5% Tween, Beef Extract 0.3% , Nacl 0.5%) [2]. The isolates which showed maximum halo zone around the colony on the plate were selected and subjected to secondary screening on Rhodamine B Agar medium (Peptone- 0.5, Beef extract-0.3g, Nacl -0.5 g, Agar -1.5 g, Olive oil -0.5 ml (w/v)(g/l) 0.0005 g of filter sterilized Rhodamine –B agar, composition as described by Kouker & Jeager 1987 for the screening of lipase) [11].

Identification of the isolates

Isolate producing maximum zone were purified and single colony was selected for further studies. .The isolated bacterial strains were identified by morphological, cultural and biochemical tests. Molecular level of identification (16s rRNA sequencing) was carried out at NCCS Pune.Colony characteristics were recorded. Morphological studies were based on Gram staining, Spore staining and Phase Contrast Microscopy. Biochemical tests include Catalase, IMVIC, Nitrate Reduction, Citrate Utilization, Oxidase and Sugar fermentation as per standard methods using Hicarbo Kit (KB-009). Based on these tests, tentative identification of isolate was recorded.

DNA Extraction and 16S rRNA identification

The genomic DNA was isolated as described by Ausubel *et al* (1987) [1]. The PCR assay was performed using Applied Bio-systems, model 9800. The sample was sequenced using a 96-well Applied Bio-systems sequencing plate as per the manufacturer's instructions. The obtained sequences of bacterial 16SrDNA (using 704F and 907R primers) were analyzed using Sequence Scanner (Applied Bio-systems) software. The 16S rDNA sequence contigs were generated using Chromas Pro and then analyzed using online databases viz. NCBI-BLAST and Ribosomal Database Project (RDP) to find the closest match of the contig sequence [7].

PRODUCTION OF LIPASE

The potential strains selected through screening methods were tested for their lipase production quantitatively in the production medium after enrichment in basal media (Peptone 10 g, Yeast extract 5 g, Nacl 5 g, Olive oil 1 ml in 1000 ml distilled water).The medium with 0.1 ml of fresh bacterial suspension of the selected isolate was maintained at the agitation rate 180 RPM for 24 hr at pH 7.5. From overnight grown culture in basal medium, 0.1 ml of sample was inoculated to 50 ml of production media (Peptone 10 g, Yeast extract 5 g, Nacl 5 g, $CaCl^2$ 0.002 g , Olive oil 1 ml , in 1000 ml distilled water ,pH 7.5). The inoculated production medium was incubated at 40^0 C at 180 RPM for 48 hrs in a rotary shaker incubator. The 48 hr incubated production medium was centrifuged at 10,000 rpm for 15 min at 4^0 C .2 ml of the supernatant was used for testing the lipase activity.

Determination of Enzyme Activity by Emulsified Free System Method by Sadasivam and Manikam 1996 [19]

Erlenmeyer flask containing 2 ml of 0.1 M of Phosphate Buffer, 1 ml of Olive oil and 1 ml of the culture supernatant was incubated at 40º c for 30 minutes. The reaction was stopped by the addition of 5 ml of Ethanol and it was titrated against 0.1 N NaOH, using Phenolphthalein as indicator. The appearance of pale pink color was the end point. The same method was used for all the samples to determine the lipase activity. Lipase activity was calculated using the following formula.

$$\text{Lipase activity} = \frac{\text{Volume of alkali consumed x Normality of NaOH}}{\text{Time of incubation x Volume of enzyme.}}$$

Expressed in = μmole / min fatty acids released

RESULTS AND DISCUSSION

Majority of the Lipase producing microorganisms are isolated from oil mill agro wastes and effluents. Enrichment of the sample using olive oil enhanced the growth of lipase producing microorganism. Olive oil served as a best substrate for the lipase producing microorganism. Screening of lipase producing microorganism was carried out on using Tributyrin and Tween agar [2], where in Tributyrin, an artificial triglyceride is used as a carbon source and Tween as a inducer for lipase production. Secondary screening was carried out on Rhodamine B agar [11]. Lipase producing isolates showed an orange fluorescence where as negative isolates showed pink color. Among many isolates, three bacterial isolates were found to be good lipase enzyme producers as per screening techniques .They were named as JRK-2, JRK-6 and JRK-16. In the present study, isolate JRK-2 produced a highest hydrolytic zone of 26 mm. It also showed an orange fluorescence zone on Rhodamine B agar.

The isolates were identified based on Morphological, Cultural and Biochemical characteristics. 16s r RNA sequencing method was employed for the molecular characterization of the isolates. Phylogenetic tree was constructed using mega 4 software. The genomic sequences were deposited in NCBI gen bank and accession numbers were obtained. In present study, JRK 2 strain identified as *Geobacillus stearothermophilus* exhibited maximum lipase production at 48 h .It was capable of producing 0.0060 μmole / min fatty acid which is in accordance with the trend of many reports. The details are shown in Table 1and Figure 1.

The reviews of literature on lipase production indicate interesting results. Comparative evaluation of the strains as reported by several workers for lipase productivity is given in Table 2. The observation hereby highlights the potential of JRK-2 as a novel strain.

CONCLUSION

The isolate of the present study, especially JRK-2 (*Geobacillus Stearothermophilus* JRMRK-8) appears to be novel and potential strain for the production of lipase.

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Table .1 Details of isolates.

Sl No.	Isolate code	Base pairs	NCBI Accession Number	Organisms identified	Zone of clearance on screening media	Maximum Lipase productivity
1	JRK-2	1206	JF326508	*Geobacillus stearothermophilus*	26 mm	0.0060
2	JRK-6	128	JF326512	*Brevundimonas diminuta strain*	19mm	0.0040
3	JRK-16	92	JF326522	*Brevibacteriumhalotolerans strain*	20mm	0.0045

Table 2: Comparative evaluation of Lipase production by bacterial isolates.

| Author	Organism	Zone of clearance	Incubation time	Lipase productivity
Kanimozi *et al* 2011	*Bacillus subtilis*	16mm	ND	0.0070(μmol/min)
Sasmita Sabat *et al* 2012	*Bacillus stearothermophilus*	ND	36 hrs	28.83(U/g)
Gupta *et al* 2011	LPB 1	ND	72 hr	0.0070(μmol/min)
Selva Mohan *et al* 2008	*Bacillus strain* B-5	ND	24 hr	0.0035((μmol/min)
Vijay Gunshekar *et al* 2006	*Citrobacter freudi* IIT-BT L139	ND	60 hr	8.8 (U/ml)
Senthilkumar and selvakumar 2008	*Bacillus* sp,s	36 mm	72hr	4 (U/ml)
Anjana Sharma *et al* 2009	*Arthrobacter* BCG#490	22 mm	48 hr	13.75 EU/ml
Present study	JRK-2	26mm	48 hr	0.0060
	JRK-6	19mm	48 hr	0.0040
	JRK-16	20mm	48 hr	0.0045
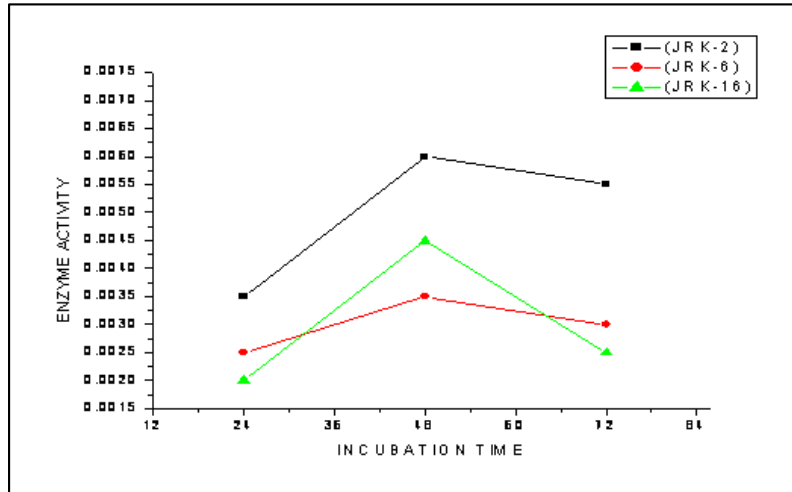
Fig.1: Enzyme activity of Bacterial isolates with respect to incubation time.
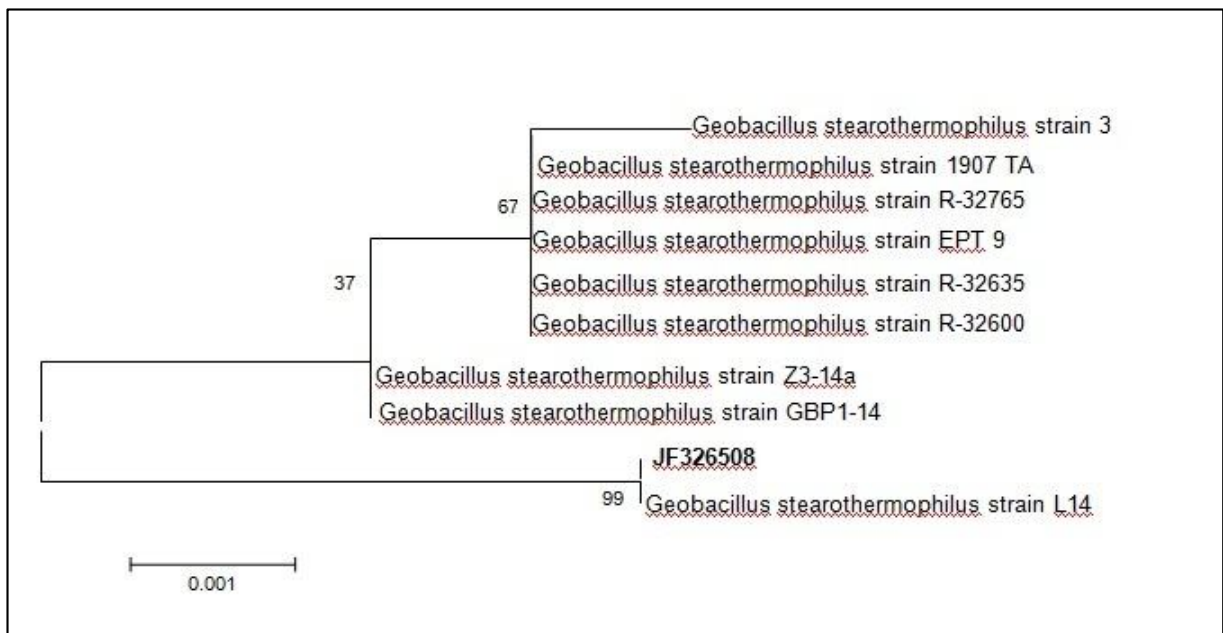
Fig 2: Showing the phylogenetic relationship of *Geobacillus Stearothermophilus* JRMRK-8 with other *Geobacillus* species. Phylogenetic tree was constructed using MEGA 4 software using neighbor joining method.

RESEARCH ARTICLE

Applying New Method for Water Pumping Base on Solar Concentrating Technique

Mohammad Aali Dehchenari[1]*, Ehsan Seyfali[2] and Behroz Shahriari[3]

[1]Department of Mechanical Engineering, Majlesi Branch, Islamic Azad University, Isfahan, Iran.
[2]Tiamparsy Pasargad Co. Isfahan Science and Technology Town, Isfahan, Iran.
[3]Department of Mechanical and Aerospace Engineering, Malek-e-Ashtar University of Technology, Isfahan, Iran.

*Address for correspondence
Mohammad Aali Dehchenari
B.Sc. in Mechanical Engineering,
Department of Mechanical Engineering,
Majlesi Branch, Islamic Azad University,
Isfahan, Iran.
E.mail: aali.dehchenari@chmail.ir

ABSTRACT

Water pumping in many applications is very important. Solar concentrating techniques make an opportunity for Cheaper and more Reliable Pumping water .This paper; propose a new method for water pumping based on solar concentrating technique. This method is more reliable and cheaper in comparison with current solar concentrating techniques like Dish-Stirlling and coupling a steam engine with a solar dish. The main competitive advantage of proposed method is in cases that current methods for pumping water are expensive or impossible to use. For example in long distances that Pumping have troubles like water hammer effect. This system includes three main parts: 1-Solar Collector 2-Compressor apparatus 3-Air Lift Pump. Key innovation in this system is application of a new compressor that directly use heat (that is receive from sun by solar collector)for compressing air, and by means of this design, energy losses and initial and running costs will reduce greatly and efficiency of solar water pumping will increased.

Keywords: Solar Pump, Air Lift Pump, Solar Collector, Thermal Compressor.

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INTRODUCTION

Solar water pump is a pumping device powered by solar energy, mainly used for agriculture, irrigation, desert control, pasture animal husbandry, city waterscape, seawater desalination, living water supply and so on. Solar energy, need no connection to a power grid. It has automatically operation, maintenance free, Easy to install and move high universality, clean and green, have high economic benefits. Usually for running pumps, from source of energy point of view, we have two main categories: 1-Solar, 2-fossile fuels and electrical energy. Most of current solar water pumps are use PV (Photovoltaic) technology as power source. PV solar pumps are very expensive and have low efficiency. Recently engineers have been searching for another alternative for PV solar pumps that are more efficient and cheaper than current solar PV pumps. One of these alternatives is solar thermal water pumps. Fig.1 showed an example schematic of current solar thermal water pumps. Other examples of solar thermal water pumps are Dish-Stirlling and coupling a steam engine with a solar dish. These systems compare with PV solar pumps can reduce costs and increases efficiency, but yet, we could make them cheaper and more reliable and more efficient, which is goal of this paper.

METHODOLOGY

New Solar Pump Setup

In this paper we introduce new solar thermal water pump. This system (as shown in Fig. 2) includes three main parts: 1-solar collector, 2-compressor apparatus, 3-Air Lift pump.

Solar Collector

This system used a Concentrated Solar Collector to heat a heat exchanger fluid (like oil), then this received heat from sun feed an innovated air compressor, which directly use heat to compress air in an Isochoric process.

Compressor Apparatus

To run air lift pump, we need compressed Air. We apply the innovative compressor use heat coming   from sun by means of solar collector to increase gas pressure in a closed chamber. A method for compressing a gas by using energy produced from sun. A boiler is provided.The boiler is segregated into an upper chamber and a lower chamber by a barrier such as a piston, a bellows, or a diaphragm. The lower chamber is filled with a liquid having a suitable boiling point and other properties. The upper chamber is filled with a gas to be compressed (here Air). Heat from sun is applied to the liquid in the lower chamber in order to bring the liquid to a boil, and thereby produce pressurized vapour in the lower chamber. The rising pressure in the lower chamber moves the barrier in the direction of the upper chamber, thereby compressing the air in the upper chamber.

Fig.3 is a schematic view of phase change compressor apparatus. Assumed air is an ideal gas here. According to ideal gas law; temperature and pressure are directly related (see equation 1) it means that by increasing air temperature in closed chamber gas pressure will increase.

$PV = nRT = NKT$ [1].

n: number of moles

R: universal gas constant = 8.3145 J/mol.K

N: number of molecules

k = Boltzmann constant = $1.38066 \times 10\text{-}23$ J/K

k = R/NA

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NA = Avogadro's number = 6.0221 x 1023 /mol

Actually, the design of this compressor is based on an Isochoric process. An isochoric process is exemplified by heating or the cooling the content of sealed; inelastic container.The thermodynamic process is the addition   or removal of heat; the isolation of the contents of the container establishes the closed system; and the inability of container to deform imposes the constant-volume condition (Atkins, 1997).This design for air compressor was chosen to reduce greatly energy loses in conventional air compressors and directly uses heat which earn from sun to increase air pressure. This method for compressing air causing reduction of energy conversion times in regular systems for example in the current systems for gain an amount of compressed air at first we convert solar energy into electrical energy and then use this electricity to run an air compressor. But in this proposed method by reduction of energy conversion times, energy loses and initial and operating costs of system will greatly decrease (Grant, 2010).

Air Lift Pump

The primary virtue of air lift pumps is that they are extremely simple. A rising main, which is submerged in a well so that more of it is below the water level than above it, has compressed air blown into it at its lowest point (see Fig.5). The compressed air produces a froth of air and water, which has a lower density than water and consequently rises to the surface. The compressed air is usually produced by an engine driven air compressor, but windmill powered air compressors are also used.in this paper we proposed new air compressor as mentioned it in part 2.2 above.The principle of it is that air/water froth, having as little as half the density of water, will rise to a height above the water level in the well approximately equal to the immersed depth of the rising main. The greater the ratio of the submergence of the rising main to the static head, the more froth will be discharged for a given supply of air and hence the more efficient an air lift pump will be. Therefore, when used in a borehole, the borehole needs to be drilled to a depth more than twice the depth of the static water level to allow adequate submergence.

The main advantage of the air lift pump is that there are no mechanical below-ground components, so it is essentially simple and reliable and can easily handle sandy or gritty water. The disadvantages of exciting air lift pumps are rather severe; first, it is inefficient as a pump, probably no better, at best, than 20-30% in terms of compressed air energy to hydraulic output energy, and this is compounded by the fact that air compressors are also generally inefficient. Therefore the running costs of an air lift pump will be very high in energy terms. But in proposed method that is come in this paper we try to overcome efficiency barrier of compressor by innovating in air compressor and design a new model of compressor to generate compressed air by heat that getting from sun, as mentioned in part 2.2 of this paper. Second, disadvantage of air lift pump is that, it usually requires a borehole to be drilled considerably deeper than otherwise would be necessary in order to obtain enough [submergence, and this is generally a costly exercise. This problem is obviously less serious for low head applications where the extra depth [required would be small, or where a borehole needs to be drilled to a considerable depth below the static water level anyway to obtain sufficient inflow of water (Fraenkel, 1986).

Other Possible Plan

The other alternative plan for solar thermal water pump system uses thermal energy of sun to vaporize water and this vapour could raise any water well and have not any moving part. Water that be earned by this manner is pure water. A schematic view of this plan is shown in fig.6.In this proposed method, as you can see in Figure 6, we use a solar concentrating dish for heating a heat exchanger fluid on top of water well and this heated fluid move inside of well pro of gravity, by using a heat exchanger hot heat exchanger fluid, heated water inside of well and vaporized water. This vapor steers into isolated pipe and vapor rise up on top of well and there, vapor turn into water with a condenser and will be ready for use. This method can be used for water and waste water purification and desalting, and pumping water together for agricultural or other uses. Like any other engineering system this one have advantages and weaknesses but it will be the best choice of some special applications like pumping salty or dirty waters.

CONCLUSION

In This Paper, we introduce two new solar thermal water pump systems. Solar energy operated water pumps had attracted considerable attention of engineers, solar technologists and manufacturers since the beginning of twentieth century. Small sized solar water pumps are potentially suited to the needs of millions of small farmers in developing countries. These unconventional pumps can be used particularly in rural areas, which are not electrified for irrigation purposes. In addition methods that are introduced in this study have capability to use as new concepts for solar energy storage in future (Danielle, 2010).

ACKNOWLEDGMENTS

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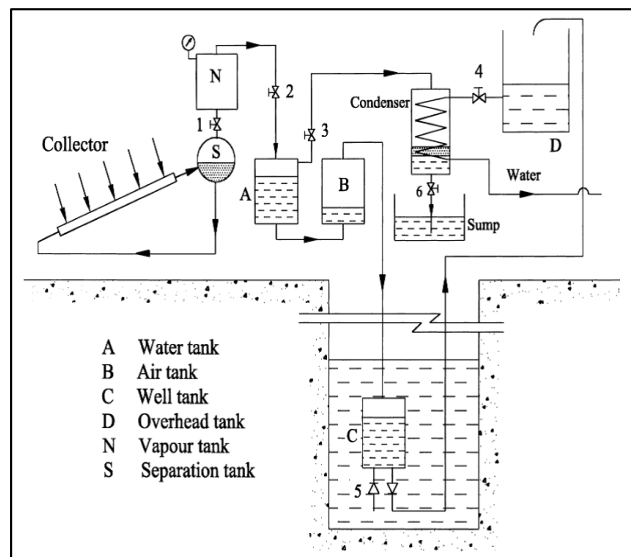
Fig.1 Example Schematic of current solar thermal water pumps (Wong and Sumathy, 2001)

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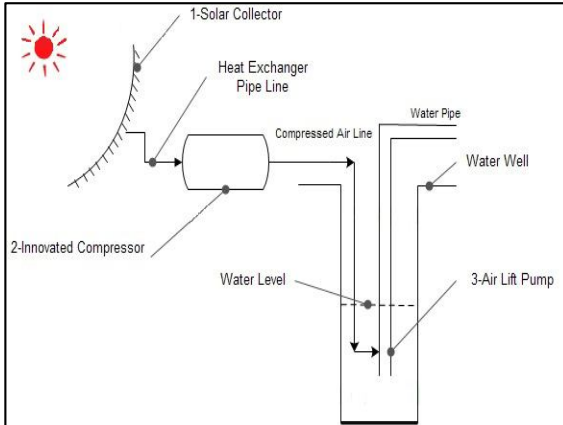
Fig.2 New Solar Thermal Water Pump System (Schematic)
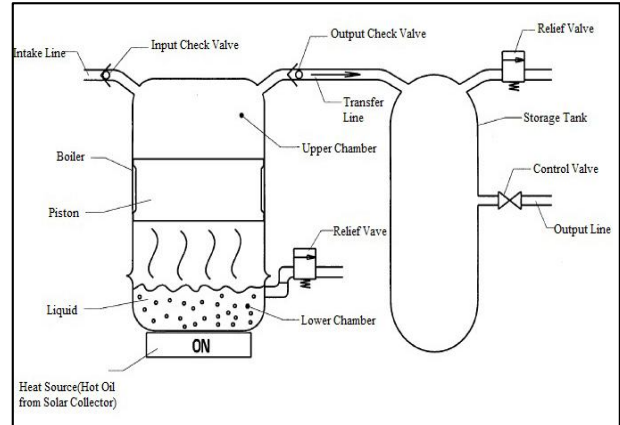
Fig.3 Compressor Apparatus
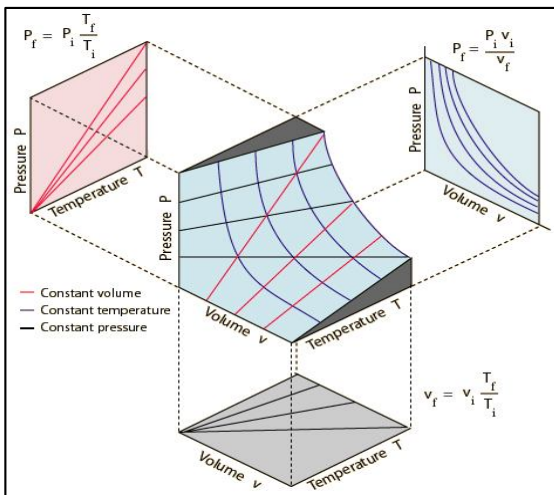
Fig.4 All the possible states of an ideal gas .
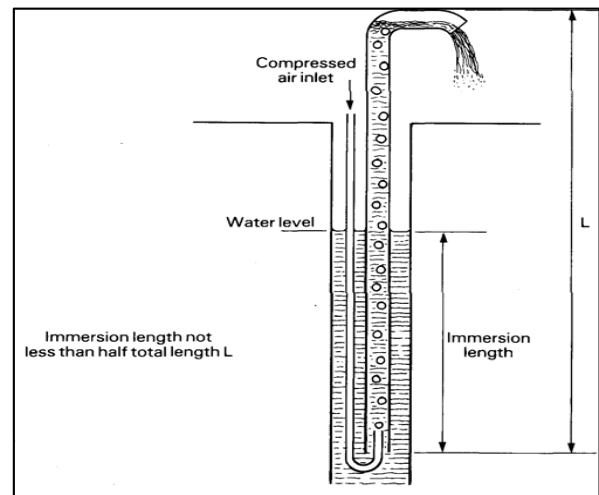
Fig.5 Air Lift Pump (Schematic).
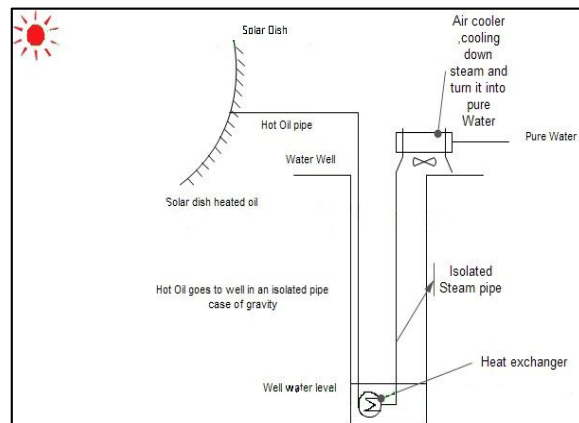
Fig.6 Schematic view of a Solar Water Pump base on Vaporization.

Identification and Comparative Analysis of Tapasin Gene in Rhode Island Red Chicken.

Varuna P. Panicker*, Uma R and Sisilamma George.

Department of Veterinary Biochemistry, College of Veterinary and Animal Sciences Mannuthy, Thrissur, Kerala.

*Address for correspondence
Dr.Varuna P. Panicker
Department of Veterinary Biochemistry,
College of Veterinary and Animal Sciences,
Mannuthy, Thrissur, Kerala,
India.
E.mail: drpanickerpvarunavet@gmail.com.

ABSTRACT

Tapasin molecule is a transmembrane glycoprotein which plays a role in the assembly of major histocompatibility complex (MHC) class I molecules in the endoplasmic reticulum. Tapasin molecule form a bridge between the MHC class I molecules and antigenic peptide loading complexes. This gene is located at the centromeric end between the class II B-LBI and B-LBII genes. The gene has got 8 exons like its human counter part. The aim of the current study was to identify and analyze the highly polymorphic exon 5- partial exon 6 region of this gene. This polymorphism can be later correlated with the immune status of the bird. The level of conservation gene sequence among species is likely to be related to the functional importance of the gene

Key words: Tapasin, Polymerase chain reaction, BLASTn.

INTRODUCTION

Tapasin is an un avoidable component of cell mediated immunity. Normally in the cells the antigenic proteins are degraded by the proteasome. The digested antigenic peptides are then exposed to the cell surface which is bound to MHC class I molecule. These derived peptides are then transported into the endoplasmic reticulum via transporter associated with antigen processing molecules and then loaded into MHC class I molecule. A transporter molecule is assisted by various molecular chaperones[1]. Tapasin is a specific chaperon which assists in antigenic transport. Along with tapasin the chaperone like calreticulin and calnexin also plays an important role in antigenic loading. The interaction of calnexin and TAP is mediated by Tapasin a novel 48-KDa glycoprotein. Hence Tapasin form a bridge

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between MHC class I molecule and TAP[2].Tapasin might have some other functions like stabilizing the TAP heterodimer and to retain MHC class molecules in the ER (endoplasmic reticulum) until optimal binding with antigenic peptide is established.In chicken Tapasin gene is identified in MHC (B complex). This gene is located between class II B- LB1 and B- LBII genes at the centromeric end of the chromosome. The gene composed of 8 exons with significantly reduced intron size compared to its human counter part [3].The present study aimed at identification and single nucleotide polymorphism analysis of the Rhode Island red chicken tapasin gene[4].

METHODOLOGY

Sample collection and genomic DNA extraction

One ml blood samples were collected from the wing vein of 6 different unrelated Rhode Island red birds using disposable syringe with 0.5M EDTA as anticoagulant. Genomic DNA was isolated using DNeasy blood and tissue kit (Qiagen).

Primer design and amplification

Primers for chicken Tapasin gene were designed from Tapasin- specific sequence available in databank (Accession no: AJ004999) using NCBI primer BLAST software and were custom synthesized (Sigma Aldrich Chemicals Pvt. Ltd.,Bangalore. Primers (Forward (F) 5'ACGCTGTCCCCGAAGAACCTGGT 3', Reverse (R) 5' CCAACGGATGAGGCCACAGAGGA 3') were designed to amplify the gene regions spanning from exon 5 and partial exon 6 of Tapasin gene. Polymerase chain reaction conditions were optimized so as to get single amplicons.Polymerase chain reaction reactions were carried out in a total 25 µl of reaction mixture with 50 ng of genomic DNA, Primers (both forward and reverse) 20 pmol each, 10× buffer (with 15mM $MgCl_2$) 2.5µl, dNTP mix) 0.2 mM and Taq Polymerase 0.33µl. Polymerase chain reaction were carried out on an Eppendorf Master gradient (Ependorf Italia, Milano, Italy) thermal cycler. The PCR cycles were 95 °C for 2 min, 35 cycles of 95 °C for 1 min, 67.2 °C for 1 min, 72 °C for 2 min and final extension step of 72 °C for 5 min. The resulting PCR products were visualized after electrophoresis in 2% ethidium bromide-stained 1× Tris- acetate- EDTA agarose gel. PCR products were then gel extracted and purified and cloned in in pTZ57R/T Vector System. Sequencing of the recombinant plasmid was carried out using universal primers at the DNA sequencing facility at Sci genome Pvt. Ltd., Cochin Special Economic Zone, Kakkanad, Cochin by the dideoxynucleotide sequencing method using an automated DNA sequencer (Applied Biosystems, USA).

Sequence analysis

Homology with nucleotide sequence in the public data bank was ascertained by BLASTn tool of NCBI. The nucleotide sequences were aligned using European Bioinformatics Institute (EBI) tool clustalW (http://align.genome.jp/)[5].

RESULTS AND DISCUSSION

Tapasin gene specific primers were designed based on genomic DNA sequences available in GenBank (Accession AJ004999), and polymerase chain reactions were carried out using genomic DNA of high purity as template. Amplicons of 582 bp were obtained and submitted in NCBI data bank. Sequences obtained with Tapasin-specific primers were analyzed with BLASTn. The current sequences obtained showed 98.8 % homologies with public domain Tapasin sequences. All the sequences obtained were aligned and analyzed with Clustal-W multiple sequence alignment tools. Serveral nucleotide substitutions were noticed in this highly polymorphic genomic area (Fig.1). Exon 5 of 325 bp, Intron of 180 bp and 77 bp sequence of partial Exon 6 were obtained as in reference sequence. In

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vertebrates there are several studies indicating a close association between immune response and polymorphism of MHC region of this genomic area. Compared to other mammalian MHC chicken MHC is comparatively smaller[6,7]. In Rhode Island Red which exhibited 98.8 % homology with the database sequence, 6 transitions were found within exon 5 (C/T, C/T, G/A, A/G, T/C, G/A) at 30 bp, 38 bp, 115 bp, 253 bp, 300 bp and 315 bp regions while only 1 transition (A/G) at 382 bp region was found in intron region. Existence of this polymorphism can be likely correlated with the functional importance of this gene[8,9].

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Fig.1 Alignment of the AJ004999-Genbank sequence and RIR- Rhode Island Red nucleotide sequences.

Mismatches are highlighted as bold red letters

RESEARCH ARTICLE

The Effect of Islamic Culture on Economic Growth

Hamideh Jafari

Sama Technical and Vocational Training College, Rudehen Branch, Islamic Azad University, Rudehen, Iran.

***Address for correspondence**
Hamideh Jafari
Sama Technical and Vocational Training College,
Rudehen Branch, Islamic Azad University,
Rudehen, Iran.
E.mail: jafari_hamideh@yahoo.com

ABSTRACT

As an unparalleled ideal in recent decades, economic growth has always brought about a concern for many human societies, especially developing countries, so that all are convinced that countries should not hesitate to push enormous human and material resources to achieve it. Undoubtedly, many factors are involved in different levels to affect the achievement of economic growth; but in the meantime, some factors, which are more important, can impact on the other factors. Culture and cultural factors can play crucial roles in the realization of the growth because of, first, extensive and close connections with human beings as stimulating, mover, pivot and ultimate goal of development, and second, the ability to affect other factors. Recognizing religious communities, traditional values and cultural elements has drawn the attention of sociologist researchers on the one hand and economic theorists on the other hand because they have many effects in other aspects of social life in communities and individuals including the field of economy. The prominent role of beliefs in economic growth will be revealed clearly by contemplating on Islamic teachings in different economic areas, including production, distribution and consumption as well as investigating the importance of knowledge and work in the light of the teachings. The present study tries to offer information to display the role of Islamic culture in economic growth. Research findings indicate that Islamic culture has many suggestions for economic growth. Cultural factors generating economic growth are culture of work and effort, culture of knowledge and education, governance of scientific attitudes, culture of planning and managing the affairs, culture of disregarding lumpens and culture of honesty, integrity and fulfilling a promise. According to three fields of cultural factors, commerce, distribution and consumption, economic growth in Islamic culture has many implications that were inferred separately.
Key words: Islamic culture, Growth, Economy.

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INTRODUCTION

Nowadays "economic growth" and its prominent role in constructing an ideal society are so palpable to all researchers that one can regard economic growth as a priority in modern world, a priority according to which many computations and global equations are formed (Puledko & Neeraj, 2005, p. 76). Investigation in Islamic culture and this area indicate that Islam has surpassed all other religions and schools in addressing issues related to economic growth.Influence of religious beliefs on economic morality is among important issues related to economic growth and is the subject of many economical debates and discussions by many religious scholars, especially Muslim scholars. Among the topics addressing the topic and explaining the subject effectively, one may refer to the social structure of Islamic communities, the formation of government in Medina, the evaluation of methods for production, distribution and consumption, the influence of mood of Islamic worldview on them, the viewpoint of Qur'an and Sunnah in shaping the attitude of believers toward life and the Hereafter as well as the role of science as a vital tool for development, and finally maturing and growth of religion as opposed to deviant behaviors and their effects on the behavior and position against the new rationalism. In any case, Muslim community's failure to establish a civilization based on the above teachings (pervasive development) can be the result of several factors, which need another space and time to be studied; the point is stated to separate this investigation from the similar concerns that assume religion as a barrier to economic development. Religion and economics are interconnected; since the beginning, religions have always plays a positive and effective role in the social and civil identification of human beings. "If this claim that religions have a significant impact on civilization is plausible, it is assumed that religion has a determinant role among all constructive elements of human culture; in other words, religious culture can be vital and stimulant in development and civiliztion" (Mansour Nazhad, 2006, p. 14).

Religious identity may be studied in two levels, first, personal identity, which is equal to individual religiosity, second, collective identity, which is equal to religious community or ummah (Douran, 2004, p. 84). The same as the notion of identity, religious identity is a multidimensional concept; it is a compound concept including several aspects of such matters as faith, rites and rituals, historical, social and cultural issues. Religious beliefs and behaviors, due to the intense mixing with people's life, influence largely on economic behaviors. In this regard, studying their mutual effect in recognition of collective identity reveals an extensive role in the introduction of religious culture.
A short glance at Islamic texts represents the deep and double connection between religion and economics and their mutual effects on each other. The Holy Qur'n introduces economic reform, along with an invitation to monotheism, as one of the most important missions of the Prophets; it recalls the story of Shoaib's efforts to reform economic matters, it says, "O my people! Serve Allah, you have no god other than He, and do not give short measure and weight" (11:84). In addition, Qur'an allows the direct involvement of the prophets in economic plannings and economic reforms (12:47-49, 54-56). It includes many verses about the importance of economic reform; of course, sometimes the deescriptions are mentioned in detail (2: 188, 282; 4:5-6).

On the one hand, legitimate economic behaviors are regarded as worship in Islam (Hur Ameli, Vol. 12, 2-13). On the other hand, Islam focuses on the inextricable link between religion and economics and their mutual influence on each other; performing the religious duties and worshipping depends highly on economic affairs directly (such as Khums and Zakat) and indirectly (the impacts of legality of incomes on prayer and fast) (Qur'an 22: 28; Hur Ameli, Vol. 8, p. 9)In general, economic doctrines of Islam are divided in three groups:

1. The doctrines refer to philosophy of Islamic Economics and issues relating to Islamic worldview. They are the intellectual support and infrastructure of school of Islamic economic, for example, belief in God and His real ownership.
2. Outlines and basic rules for solving problems and achieving economic goals governing the plans and economic policies; it is called "School of economics", for example, "mixed ownership" and "the need for government intervention."

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3. Moral and legal provisions to regulate economic relations and appropriate behavioral patterns to present a unified and organized system to achieve favorable economic conditions. It seems this kind of doctrine is very important for economic and educational status; thus, Islam offers best practices in the framework of the doctrine to provide material and spiritual welfare of human beings. Such teachings can get two-way interaction between religion and economics.

Surely, in the Islamic perspective of economy, economy and economic behaviors are completely influenced by religious beliefs and values, and generally, all programs and economic behaviors should be performed with religious purposes (Hakimi et. al, vol 6, p 249). The Holy Qur'an announces the philosophy of Prophets as purification and education, as well it emphasizes on moral and religious philosophy of economic behaviors. It says about Zakat and charity, "Take alms out of their property, you would cleanse them and purify them thereby, and pray for them; surely your prayer is a relief to them; and Allah is Hearing, Knowing" (9: 103).Thus, religion and economic impact mutually on each other, just as religion and morality improve the fair economic, optimal economic behaviors have an important role in strengthening the religious beliefs and purifying spiritual and moral.

Economic Growth in Islam

In Islamic view, the economic growth of a community is the result of Islamic strategies in the performance of the divine laws and implementation of divine teachings. Muhammad the Prophet called his friends every day after the Morning Prayer and in addition to praying for the reformation of religion and the afterlife, three times said these words: "Oh my God, Organize my world; that which is the base of my life."
Along these lines, Muslim society will meet economic prosperity- more than what he aspires- whenever it takes the opportunity to fulfill the religion of Allah in proper ways. Islam considers wealth as a blessing phenomenon in earth for human beings and motivates people to pray for these blessing; beyond, it asks people to spend their wealth in a path that leads to their evolution. Imam Ali has repeatedly pointed to the blessings of wealth: which means, "Abundant wealth is the sign of blessing" (Nahjul Balagha, Wisdom 388).

According to above definitions of economic growth, it can be said that the tendency to growth is an innate issue because the aim of growth is the achievement of a desirable condition, which is a restatement of the concept of human evolution. While human beings are naturally seeking perfection in all aspects of life. Islam believes that economic growth might be an introduction to this perfection. Therefore, a Muslim person believes inevitable in a development as a condition including the grounds for prosperity. From the perspective of Islam, individuals have freedom in their affairs, and freedom is the first essential step in their belief for moving toward development, reform and creation of a deliberate change (Muhammadi Rey Shahri, 2003, p. 58). If people believe in determinism and disregard all their authorities for changing the world, they will never bring innovations and growth. Consequently, since individuals are seeking perfection and liberty, they have confirmed the Islam's belif about development and perfection because perfection and liberty have a direct relationship with growth.

The Economic Outcomes of Islamic Culture

Production is an activity resulted in the creation of goods and services by using and organizing series of factors and inputs such as labor, capital and natural resources (Tausch, 2005, p. 51). Thess products include both goods (physical productions) and services (nonphysical productions) (Mojtabavi Naini, p. 118 and Dadgar Rahmani, p. 142).Labor has different concepts in different fields (Mesbah Yazdi, pp. 12-4); and, economists have offered various definitions for the term (Tavassoli, pp. 8-12; Moayedfar, p. 3). However, the following definition is more comprehensive: "Labor is a set of actions that by the help of human brain, human hands, tools and machinery in the production or creation of wealth, **and** this, in turn, affects the people and changes their life "(Tavassoli, p. 10).Labor can be defined in religious term as follows: Any activity for presenting required goods and services or developing the general level of social welfare and authority in within the law and religious values.

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Now, the position of labor and production in Islamic teachings will be explained. The study will uncover whether economic labor is essential for poverty reduction and wealth of others, or it is has an intrinsic value. If the latter hypothesis is true, is it absolute or conditional?In Islamic value system, labor and production is not a mere physical and anti-value endeavor, but they are considered as a great worship and have a great spiritual position. Islamic traditions hae given a significant position and value to economic work and effort, and they are regarded as jihad in Allah's way, groundwork for forgiveness, love of God and the greatest prayer(Koleini, vol. 5, p. 78; Sadouq, p. 289; Suyuti, Vol. 1, p. 287; Koleini, vol. 5, p. 78). Moreover, has described the worker's hand as a temple (Ibn Athir, Vol. 2, p. 269).

Labor, along with and production, has intrinsic value in Islam. It means that it not only is an introduction to income and profit or an essential for removing of poverty but also it is favorable in itself because it offers positive outcomes for spiritual and moral issues (moral perfection of man and society and prevention of social evils), joy of life and the social character in addition to positive effects on economy (the key role in economic growth and removing poverty). Thus, in spite of all his properties and wealth, an individual should work; as it is manifested in the life of the infallibles.

Manufacturing activities in life of the greatest religious teachers are very extensive and impressive. Many productive works mentioned in Qur'an had been carried out by the prophets. Labor and production is fully visible in Life of the Messenger of God and his infallible successors; the Prophet (PBUH) had engaged in economic activities before and after the mission (Iravani, p. 73). Having been freed from the affair relating to jihad, people's education and judgement, Commander of the faithful (AS) were occupied by agriculture, horticulture and digging canals, and Islamic society takes their advantages for long years. However, the the job value is not absolute and unconditional, but is subject to respect for the customs and morality. It can be concluded that productive labor has a reciprocal relationship with religion and morality. Labor is an appropriate ground for the growth of religious behavior and moral virtues; in turn, religious doctrines and moral teachings encourage labor.

Elements of Islamic culture in Economic Growth

Ideal culture of all countries, despite of variety in rituals, is realizable by studying recorded and non- recorded history of the country. In this manner, Islamic culture is attainable with reference to scripture, tradition, and the history. Considering the holy verses ad Islamic tradition, which are the first hand sources for studying the culture), reveals abundant elements describing ideal and favorable condition. This section concentrates on some of them that have a prominent role in economic development:

Culture of Work and Effort

Man makes his living and fixes his role in the most prominent place on earth by work and effort. The most important activity of human beings is working that gives their lives meaning and clears the way for their emotional, spiritual and physical growth. If people fufil their needs easily without effort, and spend their time in unemployment and leisure, they would be led to corruption and waste (Hakimi, 2005, vol. 5, p. 293). With reference to the verses and narratives, one realizes that labor and job are religious essentials, and God will be satisfied by his servants' decision to engage a job. The holy Qur'an, which has explained the evolution and legislating system, claims, "Certainly we have created man to be in distress" (90:4). In addition, as the result of general rules in the universe, such cause and effect, occurence of difficulties is an inevitable fact.

Culture of Knowledge and Education and the Governance of Scientific Attitudes

Science, from the perspective of Islam, is the base of faith and provides knowledge of God, and lack of knowledge and education is the sign of depression and decline and the cause of humiliation. Doubtless, gaining knowledge is

considered as social and cultural value in the ideal society described by Islam. Various verses and sayings emphasize the the virtue of knowledge and dignity of scientist, "you who believe! When it is said to you, Make room in [your] assemblies, then make ample room, Allah will give you ample, and when it is said: Rise up, then rise up. Allah will exalt those of you who believe, and those who are given knowledge, in high degrees; and Allah is Aware of what you do" (58:11).

Culture of Planning and Managing the Affairs

Individual and social planning is an essential for economic development. The purposes a person, or a government, is not attainable without formulating and implementing a regular schedule in micro and macro fields. As it is obvious, the countries have met many difficulties in the path of develpment, and the difficulties would not be removed except by all aspect planning and widespread management and supervision. Meeting the goals of development has never been a sudden and unplanned event for countries like Japan.

Culture of Disregarding Lumpens

No one is allowed to reject the burden of his life and substances. The Prophet said, "For faults of of a man, being a burden on others is enough" (Zeid Ibn Ali, 1966, p. 388). Therefore, in a Muslim community, everyone must take the responsibility of his own economic affairs, and should not rely on the others' tasks. Of course, the people who are in charge of a position as well as the riches are responsible for fulfilling the needs of poor people through procedures such as Takaful and other liabilities.

The Culture of Honesty, Integrity and fulfilling Promises

Islamic culture orders honesty, integrity and fulfilling promises. According to Islamic teachings, right thinking and truthfulness are the most sublime traits of a man; the truthful men are equal to the prophets (4:69) because truthfulness and honesty is a characteristic of prophets (19: 54). The narratives stipulate that God has chosen the prophets only due to their righteousness and honesty (Majlesi, 1992, Vol. 81, p. 116).While the cultural elements in the perspective of Islam have been explained, this paper focuses on distribution and trade, consumption and economic development as the major indices of economic growth in following:

Distribution and Trade

Since distribution issues are divided in two categories of "distribution of wealth" and "distribution of goods and services (trade)", this section is divided in two parts.

Distribution of Wealth

The realization of religious teachings in the fair distribution of wealth is grounded on a set of principles, doctrines and epistemic infrastructures that must be considered more carefully. The most important principles include:

Ownership of the Lord

In Islamic viewpoint, God is the real owner of universe and human beings are his successors and divine trustees on the earth. Thus, wealth and underground facilities and resourcesare not man's property, they are presented for him as a loan touse them. The opinion has a significant role in the fair distribution of wealth because on the one hand, it rejects unlimited liberty in private ownership that is the source of inequality, and on the other hand, it leads spiritual and moral educations in such way that a man gives most of his unnecessary facilities to the needy people (57: 7).

Justice

Economic justice is the most important principles and the highest goal for Islam. Explanation of justice in distribution of wealth, which is emphasized by Islam, follows two goals:

First, to deny going to financial extremes and to eliminate poverty and multiplicity. It id clear that justice plays an important role in distribution of wealth, prevention of wealth accumulation among specific persons and removal of poverty. Imam Kazim asserts, "If justice was performed between people, indeed, they were not poor" (Koleini, Vol. 1, P. 542).
Second, people's utilization of benefit from all material resources. In this regard, welfare does not devoted to wealthy minority; as the Holy Qur'an says addresses all people to use the blessings and considers wealth and resources in the service of humankind (2: 22; 7: 10; 14: 32).

Brotherhood

One of the most comprehensive and useful suggestions of Islam for creation of an integrated society enjoying social justice is creating bonds of brotherhood and fraternity among people. In this manner, the Muslim community is viewed as a single somatic that the pains and sufferings of an individual cause the reaction and sympathy of the others, and fellowship will never be removed.

Distribution of Goods and Services (Trade)

Infrastructures and principle governing economic behaviors in commercial fields are presented in Islamic sources in this way:

Regarding Spirituality

Market symbolizes the glamor world that provides fertile ground for human ignorance. Thus, Islam has drawn attentions to spiritual issues thin all trades; the focus is manifested in terms such as remembrance of Allah, regarding prayer, remembering the Resurrection.

Justice

One of the most important factors in Islamic trade is justice. Explaining this doctrine, Imam Ali says, "Buying and selling should be easy and done with a balanced criterion" (Nahjul Balagha, letter 53).
Justic that is a highlighted feature in commercial efforts manifests n various titles such as fair remuneration.

Fair Remuneration

Islam believes that the rate of remuneration must be determined with respect to law of supply and demand as well as the costs of producing and distributing goods and actions that have been done. In other words, fair remuneration is the amount of money that will not harm none of the parties to the transaction, as Imam Ali said, "Trade with rates that do not resulted in the loss of the seller and buyer" (ibid).With these lines, the Prophet and Imam Ali reject people's suggestion for determining the price of goods (Koleini, p. 164; Toosi, Vol. 7, p. 161). Some prophet's sayings imply that rate-hanging refusal is a good decision in normal behavior of a market to prevent the loss of sellers in the process of supply and demand (Iravani, p. 204).

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Benevolence and Denying Fraud (Deception)

Deception in a trade refers to the hidden aspects of all features of an object that is necessary for buyer and affects his judgment about the object. In Islamic narratives, fraud and deception are blamed many times, and such persons have been identified as people away from the school of Muhammad and Ali (Koleini, Vol. 2, p. 160). Lack of expansion and enjoyment is an unfortunate result of this practice; this kind of men does not take the advantages of God's help and attention (Majlesi, Vol. 37, p. 365).One can count the instances of deception in trade as fraud in the sale of goods, supplying inferior goods instead of high quality goods, non-standard products, mixing items to other things and using false evidence. Beyond, concealing goods' disadvantages and refusing to tell the customer about the disadvantages are considered as deception.

Beneficence

With all its importance and effects, justice has not the needed flexibility and efficiency -especially in specific and critical situations- without beneficence. Accordingly, Qur'an comments, "Surely Allah enjoins the doing of justice and the doing of good [to others] and the giving to the kindred" (16: 90).

Consumption

Islamic doctrines have a special attention to consumption in both the field of economy and the field of ethic; they determine principles, criteria and limits for consumption based on monotheistic worldview organized to achieve the ultimate goal of human evolution.

Consumption in Religious Teachings

Material and spiritual dimensions of human are the source of needs considering by realistic and natural doctrines of Islam. Material needs such as food, clothing and housing are the general aspects with no exceptions, even the divine prophets and authorities who have been at the pinnacle of spiritual and heavenly, have naturally the material needs. The Holy Qur'an recals this aspect in many verses, " And We have not sent before you any messengers but they most surely ate food and went about in the markets; and We have made some of you a trial for others; will you bear patiently? And your Lord is ever seeing" (25: 20).

Accordingly, not only Qur'an, directly or indirectly, prescribes and encourages consumption but also it reprehends economic or practical prohibition of awful blessings. On the one hand, many verses introduce all blessings and facilities at the service of people and permit using them, except in some special cases, it regards freedom and permission of consumption as the basic rule (2: 168; 6: 45; 7: 157). On the other hand, Qur'an encourages the lawful use of facilities, abandons the heretical rejections and blames prohibition of food, "Say: Who has prohibited the embellishment of Allah which He has brought forth for His servants and the good provisions? Say: These are for the believers in the life of this world, purely [theirs] on the resurrection day; thus do we make the communications clear for a people who know." (7:32).

In consequence, human appropriation of natural resources and the use of blessings of God are fully confirmed by Islamic doctrines because his creation and emphatic statements about the necessity of trade and production are presented to provide a ground for consumption. However, unlike the common schools of economics, from Islamic Viewpoint, consumption is not the ultimate goal, but it is to introduce an intermediate satge to provide higher objectives, which must be done within the framework of values and in compliance with certain restrictions.

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Goals and Objectives of Consumption

In capitalist economy, the final goal of consumption is the increase of utility. Utility means the acquired profit and liability of an individual by using goods or services (Moridi, p. 680). In this view, human welfare depends on gaining maximum pleasure and further enjoyment is limited to material pleasures. In that way, human being has only one goal and objective in his life, which is searching for the maximum possible pleasure. Then, the ultimate ideal of all plans and economic behavior is attaining the maximum pleasure.While Islam seeks for preparing the grounds for individual and social prosperity and relief, it does not consider prosperity as the increase of utility and the pleasure of using goods and services. The idea focuses on two aspects of men, physical and spiritual aspects, resulting in physical and spiritual needs; the spiritual dimension is extended to immortality, and man's ultimate goal and real prosperity is meting God. This kind of prosperity is cited in the text of Qur'an by terms like "opulence", "salvation" and "affluence."

In order to meet the ultimate goal, Qur'an presents some intermediate stages, which are strategies to attain the ultimate goal or desirable perfection. Along with orders to consume and collecting properties, it gives some commands to show the objectives of consumption. It offers possession with righteous and leave the guilt, consumption with good deeds, consumption with thanksgiving, consumption with respecting others' rights, they are mentioned in the following verses, respectively, "Therefore Allah rewarded them on account of what they said, with gardens in which rivers flow to abide in them; and this is the reward of those who do good [to others]." (5:88)
"O messengers! Eat of the good things and do well; surely I know what you do." (23:51)
"O you who believe! Eat of the good things that we have provided you with, and give thanks to Allah if Him it is that you serve." (2:172)
"And He it is Who produces gardens [of vine], trellised and untrellised, and palms and seed-produce of which the fruits are of various sorts, and olives and pomegranates, like and unlike; eat of its fruit when it bears fruit, and pay the due of it on the day of its reaping, and do not act extravagantly; surely He does not love the extravagant." (6: 141)
Islam has provided high-value targets for consumption that induce the formation of positive incentives in the Muslim consumer so that the consumption of any type of good or service leads to God's satisfaction and his closeness. On the contrary, negative incentives of consumption such as show off, boaster and passion are blamed and against the religious values (7:167; 12: 52; 45:23).

Economic Growth

According to Islamic worldview and religious doctrines, fulfilling the process of development is not the ultimate goal of humankind. While developing is a valuable and nice goal, and of course essential in current status of the world, it is an intermediate stage in comparison with the ultimate goal of creation that is meeting the closeness of God.The noble culture of Islam, which is enriched by the Holy Spirit and sayings of infallible leaders, is full of propitious and predisposing elements for development. Obviously, Muslim can move toward desired development by Islam if they are consistent with the doctrines of Islam in terms of psychological, mental, social and behavioral issues (Khalilian, p. 54). One of the influential factors in this regard is the position and value of knowledge and education.

Value and Supreme Position of Knowledge and Education in Islam

The first verses were sent to the Holy Prophet (PBUH) are openining with reading and writing (96:1-5). Various verses of Qur'an apply knowledge and its derivatives and invite to people learn. In sayings of the infallible leaders science is described as a light guiding the reason (Muhammadi Rey Shahri, Vol.7, n. 13340), most useful treasure (ibid. Hadith 13352), the best guide (ibid. Hadith 13343), the source of all good (ibid, Hadith 13376), source of life of Islam (ibid), a means for obedience of God and knowledge to know Him (Majlesi, Vol.1, p. 166) and a task and duty for all people (ibid, p. 177) in all life (Nahjul Fesaha, p. 64). It has been elaborated in different dimensions so that one hour of discussion is better than spending the night in prayer and worship (Muhammadi Rey Shahri, Vol.7, n. 13414),

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pen and ink of scholars and scientists, is superior to the blood of martyrs (ibid. n. 13402), scholar who Islam and community benefit from his knowledge is superior to seven thousands worshipers (ibid. 13180) and superiority of a scholar over a worshiper is like the superiority of the full moon over other stars (ibid/ 13141).To fight against ignorance, Islam does not contended itself by personal moral orders, motivations and encouragements, but also it assigns the government to educate people and lead them to acquire science and knowledge. Imam Ali announces, "You have some rights in front of me… since I like you not to remain illiterate and ignorant, I should try to educate you" (Majlesi, Vol.27, p. 251). Therefore, providing all facilities for cultural development and fighting against ignorance are the duties of Islamic government, and the Prophet and the infallibles were the pioneers.

The use of scientific approaches to achieve developement is essential because one of the most important factors in economic development is increasing social welfare with respect to increased production and improved technology. To access this, we need to improve production methods and efficiency; in other words, due to scientific and industrial developments, the best and low cost methods must be discovered to make possible the efficient production of goods and services increasing production potential of society (Khalilian, p. 71). Achiveing the goal is possible only through governance of scientific spirit and mood in community.Islam has always provides great psychological opportunities for fulfilling the scientific spirit and attitude in members of society by emphasis and dedication on knowledge and by assigning a supreme position to education, thinking and contemplation.

CONCLUSION

Economic growth can never be manifested independent of culture in its goals, regulations, plans, policies and strategies. Therefore, one cannot copy the goals regulations, etc, of developed countries in a non-developed country to achieve development; but the politicians must work on the non-developed country to find a particular scheme consistent with its particular culture, and they can present an appropriate direction due to their full understanding of constructive cultural elements. This leads to a suitable plan, policymaking and modeling.Analysis of effective factors on the growth of communities and determining its essential elements is a pivotal concern and subject of research for communities of non-developed or developing countries because choosing the development strategies without understanding the components is impossible.

One of the most important influencing factors on development, which preoccupies the concern of many sociologists and economists, is studying the role and impact of religious identity and religious culture on economic behaviors of its followers. According to this study, a short glance at teachings of Islam shows that the religion can play an an essential role in the development of Islamic countries by emphasis on scientific learning as an essential introduction to growth and labor as the driving engine of investment, production, distribution and consumption. Above all, emphasis on utilization of lawful and divine blessings and considering the world as a place for maturing to live in Hereafter play major roles in the development of Islamic countries. Therefore, in order to find reasons for the state of non-development in these countries, the researchers must investigate non-religious factors (which have affect the religious factors in a large-scale); the study might focus on real sources of non-development such as colonialism, oppression and so on.

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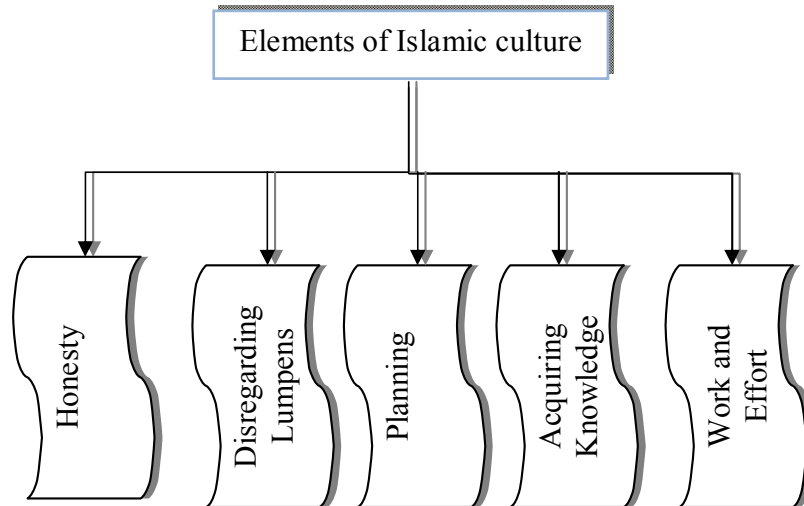
Figure 1. The Elements of Islamic Culture
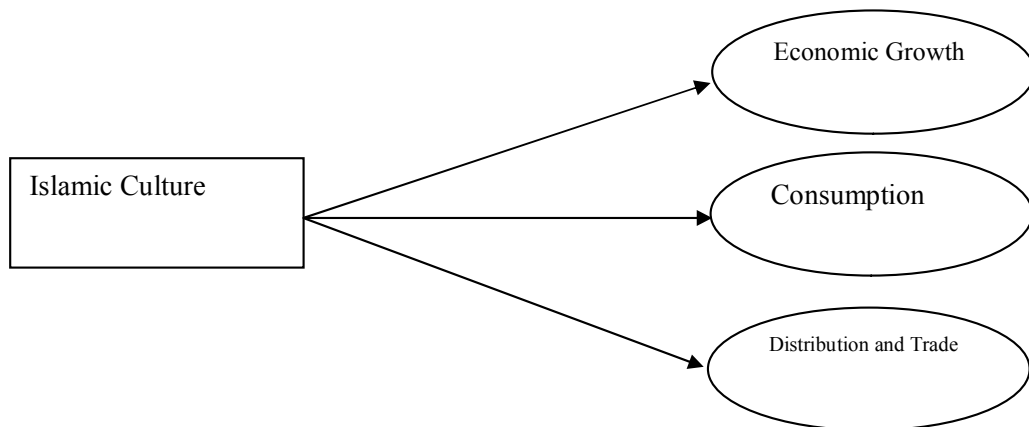
Figure 2. The Impact of Islamic Culture on Economic

RESEARCH ARTICLE

PCR Based Identification of Duck Virus Enteritis in Waterfowls in Kerala.

Manju Soman*, Sreeja R. Nair and M.Mini

Department of Veterinary Microbiology,College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala – 680 651, India.

*Address for correspondence
Dr.Manju Soman
Ph.D Scholar,
Department of Veterinary Microbiology,
College of Veterinary and Animal Sciences,
Mannuthy, Thrissur, Kerala – 680 651, India.
E.mail: manjuso1993@gmail.com , soman_manju@yahoo.com

ABSTRACT

A study was carried out to identify Duck Virus Enteritis (DVE) infection in ducks, in Kerala, by Polymerase Chain Reaction (PCR). Liver tissues of two ducks, showing characteristic symptoms and postmortem lesions of DVE were subjected to bacteriological culture and PCR assay for detection of the viral DNA polymerase gene. PCR revealed the presence of DVE infection in one of the ducks while Pasteurella organisms was isolated from the other. The present study reports that DVE specific PCR is a reliable and rapid method for the identification of DVE infection directly from clinical samples. It also documents the occurrence of concurrent infection of DVE and duck pasteurellosis in a duck farm in Kerala .

Key words: Duck Virus Enteritis, Polymerase Chain Reaction, DNA polymerase gene.

INTRODUCTION

Duck Plague or Duck Virus Enteritis (DVE) is the most common cause of heavy mortality in waterfowls in Kerala. It is characterized by sudden and persistent mortality with characteristic lesions of haemorrhage and necrosis in internal organs. Adult ducks are the most affected ones by the disease thereby causing severe economic loss to the duck farmers. Duck Plague is caused by the virus *Anatid herpes Virus 1* coming under the genus *Mardivirus* of the *Herpesviridae* family. The virus induces vascular damage leading to the characteristic lesions of haemorrhage and degenerative changes in parenchymatic organs. Transmission of infection occurs through direct contact with infected

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ducks or contaminated environment [1].Infections with *Pasteurella multocida* and *Riemerella anatipestifer* are also causes of concern to duck farmers in Kerala. The present study reports the identification of the DVE virus in the liver tissues of infected ducks by Polymerase Chain Reaction (PCR) and the occurrence of concurrent infections of DVE and duck pasteurellosis in a duck farm in Kerala.

MATERIALS AND METHODS

Heavy mortality in ducks were reported from different districts of Kerala during the period from April to June 2013. The ducks were reportedly showing characteristic symptoms of Duck Plague, Pasteurellosis and *Riemerella anatipestifer* infections.Two ducks, showing inappetence, extreme thirst, photophobia and bloody diarrhea, were presented at the College of Veterinary and Animal sciences, Mannuthy, in the month of June 2013, from a duck farm in Thrissur district with sudden and heavy mortality. These were designated as D_4 and D_5.

The ducks were sacrificed and subjected to post mortem examination. Heart blood smears and impression smears from liver and spleen were stained by Leishman's staining and examined for the presence of bipolar stained organisms. Samples of heart, liver and spleen were collected aseptically from the sacrificed birds for virus and bacterial isolation and PCR. The samples were streaked on to MacConkey Agar, Brain Heart Infusion Agar (BHIA), and 10 per cent bovine blood agar. The agar plates were incubated at 37 ° C under aerobic conditions for 24 hours. The samples were also inoculated on Sabouraud's Dextrose Agar (SDA) and incubated at room temperature for 7 days.Characterization of the isolate was done based on morphological and cultural characters and biochemical tests such as catalase, oxidase, IMViC, nitrate reduction test, urease test and TSI test as per [2].

Liver tissues were subjected to PCR assay for detection of viral DNA polymerase gene. Template viral DNA was extracted from 25 milligram of liver tissues using QIAamp DNA Mini Kit (50), Qiagen. The PCR assay was carried out as per [3].

 The PCR primers for the DNA polymerase gene of DVE virus, was used for amplification of the template DNA.

> Forward primer sequence: 5'-GAAGGCGGGTATGTAATGTA-3'
> Reverse primer sequences: 5'-CAAGGCTCTATTCGGTAATG-3'

PCR was performed in a 25 µl reaction mixture. To each PCR tube, 20 µl of master mix containing 20 p mol of each primer, 200 µM of each dNTP, one unit of Taq DNA polymerase in a PCR reaction buffer with 50 mM KCl, 10 mM Tris HCl, 1.5 mM $MgCl_2$ and five microlitre of template DNA were added. One negative control without template DNA was included to monitor contamination. One positive control with known viral DNA was also kept. The reaction was carried out in Applied Biosystems thermal cycler as per the following protocol.
One cycle: Hold 94°C for 2 minutes, Hold 37°C for 1 minute, Hold 72°C for 3 minutes.
35 cycles: Hold 94°C for 1 minute, Hold 55°C for 1 minute, Hold 72°C for 2 minutes.
One cycle: Hold 72°C for 7 minutes.
Hold 4°C until stored.
The amplified PCR products were electrophoresed in one per cent agarose gel for one hour at 50 volts.

RESULTS AND DISCUSSION

The carcasses appeared emaciated. Postmortem examination of D_4 revealed haemorrhage in muscles, necrotic foci and congestion in liver, diphtheritic membrane in oesophagus and congestion in spleen. Postmortem examination of D_5 revealed necrosis and congestion in liver and heamorrhage in heart muscles.Heart blood smears and impression smears, of liver and spleen obtained from D_5 subjected to Leishman's staining, revealed the presence of bipolar

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stained organisms while those obtained from D$_4$ failed to reveal any pathogenic organism.The BHIA plates inoculated with the material from D$_5$ yielded small round colonies while the blood agar plates presented smooth, convex, translucent, non-hemolytic colonies with a sweetish odor. Gram's staining of colonies from both the plates revealed small, Gram negative, coccobacillary organisms suggestive of the genus Pasteurella. MacConkey agar and SDA failed to yield any growth. The agar plates inoculated with materials from D$_4$ failed to yield any growth. The isolated organism was found to be non-motile and catalase and oxidase positive. Results of biochemical tests showed that the isolate was positive for indole, but negative for methyl red, Voges- Proskauer, citrate, nitrate and urease tests. Inoculation on TSI slant showed the reaction yellow slant, yellow butt, no gas and no H$_2$S production.

Agarose gel electrophoresis of the amplified PCR product of the DNA extracted from the liver tissue of D$_4$, revealed an amplicon size of 446 bp when viewed under gel documentation system. This confirmed the presence of DVE infection in the ducks.

The present study reports the detection of viral DNA, in liver tissues of ducks suspected of DVE infection, by PCR assay. Duck viral enteritis can sometimes be confused with duck pasteurellosis and *R. anatipestifer* infections. Hence, an accurate and early diagnosis of the disease is required for timely control of the disease. Confirmation of infection by virus isolation is laborious and time consuming. PCR is a rapid, sensitive and highly specific assay for the detection of bacterial and viral infections. Diagnosis of infection by PCR assay can help in early implementation of treatment and control strategies. The duck plague PCR assay has been reported by [4] as a rapid and easy method for diagnosis of the disease, when isolation and identification of the virus is not possible. In this study, the viral DNA polymerase gene was amplified by PCR using gene specific primers, as per [3]. PCR primers were designed against a 765 bp EcoR1 fragment of the duck plague vaccine virus for developing a PCR assay for detection of DVE by [5]. The gC gene of DPV was characterized by prokaryotic expression, antibody preparation, gene temporal transcription/translation course and subcellular localization by [6], who found that the expression of this gene appeared at the late stage of viral infection. The present study also documents the concurrent infection of DVE and duck pasteurellosis in the same farm. This could have occurred due to the immunosuppressive state induced by duck plague that led to secondary bacterial infections like *Pasteurella multocida*, *Riemerella anatipestifer*, and *Escherichia coli* [1].*Pasteurella multocida* infections in ducks have been reported by several authors [7, 8]. *Riemerella anatipestifer* infections, concurrent with DVE infections in ducks have been reported by [9].

CONCLUSION

The present study advocates PCR as a fast and confirmatory identification test for duck Plague/DVE infection in ducks. In addition, the assay can be a substitute to the virus isolation techniques, as it can easily detect DVE virus directly in clinical specimens.

ACKNOWLEDGEMENTS

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RESEARCH ARTICLE

A Statistical Analysis of Numbers in Mythological and Epic Parts of *The Book of Kings* (*Shahnameh*)

Majid Khosravi* and Mohammad Behnamfar

Persian Language and Literature, Birjand University, Birjand, Iran.

*Address for correspondence
Majid Khosravi
Persian Language and Literature,M. A.,
Birjand University, Birjand, Iran.
E.mail: majid.khosravi2020@hotmail.com

ABSTRACT

Numbers have special sacredness, ominousness and functions in variety of cultures and beliefs. *The Book of Kings* by Ferdowsi describes how a nation is determining its culture and ideals. This valuable work consists of Old Iranian culture and traditions including ominousness and sacredness of numbers. The investigation of numbers in *The Book of Kings* uncovers an aspect of some Iranian beliefs in this area. Ferdowsi uses numbers with various applications and frequencies. In this study, authors attempt to show various applications of numbers in mythology and epic parts of *The Book of Kings*. The results of the study show that, mostly, Ferdowsi uses even numbers. Number 2 among even numbers and number 1 among odd numbers are highly applied in *The Book of Kings*; moreover, numbers 40, 100, 1000 of even numbers and 3 and 7 of odd numbers are more frequent than other numbers.

Key words: Ferdowsi, The Book of Kings, Statistical analysis, Numbers, Numbers function

INTRODUCTION

Moein dictionarystates that number is defined as some units, count and calculation (Moein: Number). Numbers, concepts and numerical coefficients are used in all routine affairs of human life and common sciences and techniques, thus, numbers are important in human life. Pythagoras students believe "anything that can be recognized has number as it is not possible to perceive something without number" (Neshat, 1989). Some people believe that "number indicates fundamental structure of the world system. If such power was not present, the world was dark and ambiguous, we were not living in the reality world, and we were in hopelessness and illusionary world; only in the world of numbers, we can perceive the meaning of the world (Cassirer, 1972; Cassirer, 2011).*The Book of Kings*, writen by Ferdowsi, is highly concerned with the application of numbers. Although it seems that numbers are used without any purpose in *The Book of Kings*, one can say that Ferdowsi uses all numbers intentionally. The importance

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of numbers is observed in some verses while decoding some of them; for example, when Zal is tested and some questions are asked, numbers play important roles(Ferdowsi, 2008).

However, it is possible to say that religious sacredness and belief in numbers have been reflected in different ways among different nations at different times. According to Plato, numbers are symbols for the harmony in the world; according to Aristotle, number is the source and essence of all things. In addition, Greek philosophy allocates gender to numbers (Aghasharif, 2004: 56) .Nowadays, studying the most aspects of human life reveals many examples that show numbers have qualitative and spiritual positions beyond their quantitative values. However, their qualitative values have been forgotten in spite of their influence on the beliefs and behaviors of people. Holiness, auspiciousness and inauspiciousness are most common and the most prominent qualities that are attributed to numbers. In this regard, two classes of numbers are detected in the field of culture and folklore: auspicious and inauspicious. In this division, the former causes luck and the latter brings bad luck and misfortune for people. For example, in Babylonian culture, 3rd and 16th days of month have common titles meaning resting and holiday and the days 7, 14, 19, 28 are ominous and some practices are carried out in these days (Afshar, 1978). Numbers 6, 7, 40 are Arabic ominous numbers; the Iranians and Babylonians considered 60 and 60 multiples valuable and they preferred to do their works in these days (Neshat, 1989).

Ferdowsi applies numbers in various ways to show his purposes such as explaining multitude, describing the troops in battlefield, describing body members, considering the sacredness and ominousness of affairs, showing perfection of anything, defining the importance of affairs, considering the duration of festivals and mourning, emphasizing the affairs, etc.The present study attempts to show different frequencies, sacredness, and values of numbers in myths and epics of *The Book of Kings* by descriptive and statistical analysis.It is worth to mention that this paper concerns the mythological and epic" sections of *The Book of Kings* and the historical sections are not included.

Even numbers

Two

This number is used 889 times in *The Book of Kings* and it has high frequency compared with other numbers. From mythological aspects, two animals with the same solar symbol signals strong power, even if they are different like two lions or one lion and one bull. In Zoroastrian myths, number 2 is stated in the Ahuramazda and Satan combat. Ancient Ariayiz believed in two opposite forces of truth, or Asha, and lie, or disorder. In Zoroastrian religion, the followers of truth are called Ashavan and the evil doers are called Drugvan (Hinls, 2004).
Ferdowsi uses this number in its real meaning not its symbolic meaning by mentioning the members of the body organ like two faces, two hands, two eyes, two ears, two lips or by describing various cases like two months, two weeks, two men, two horses, two benefits and etc. (Ferdowsi, 2008).

Four

This number is used 15 times in *The Book of Kings*. Number 4 is considered as the origin of eternal nature and it is a symbolic number. "The symbolic meaning of four is associated with square and cross. In prehistoric era, number 4 was used to stable and tangible things (Shovalie, 2013). Four is a complete number and by combining numbers 3 and 4 we reach 7, as perfection" (Yavari, 2010). Like many poets who consider the symbolic aspect of this number, Khaghani takes the advantages of this number and creates very attractive images. Ferdowsi applies number 4 for stability and safety. For instance, Ferdowsi's skill and his precision in using the numbers are manifested in his narration of Siavush as he asks four shields for the battle. He can use any other number, but he uses number 4 to show that stability and safety of Siavash is provided if he is protected from four sides (Ferdowsi, 2008).

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In another example, when Sudabeh's betrayal becomes apparent, Keykavoos does not kill him due to four reasons(Ferdowsi, 2008).Four reasons in these verses imply that Ferdowsi is adept at playing with numbers. He could use any other number to describe the numbers of Keykavoos' reasons without raising an area for contradidiction. Nevertheless, he uses number four in order to show that Keykavoos' mind and thoughts are surrounded by reasons in all four aspects.

Six

This number is used six times in *The Book of Kings*. "Some numbers like 3, 6, 9, 12, 40, 100 and 1000 are called perfect numbers, and if the sum of some things achieves these numbers, its cycle is finished and a new cycle is started. Sometimes, some numbers are subtraction of other numbers and the smaller number is of great importance as 5, 99, or 11; sometimes these numbers are increased to achieve the perfect number; in this manner, the obtained number is important as 7, 13, 10, and 1001. Some mythologists believe that there is special consideration for numbers in myths. When a number achieves perfection, it will be at the peak by adding one number. They believe the added number leads to absorption. For instance, creation is done in six days, then the 7th day is the obtained by adding 1 to the number of creation days, therefore, 7 becomes sacred, and it is holiday (Malmir, 2008).Ferdowsi uses number six in various cases and tries to show its greatness and perfection, this claim is proved by the following description of the battlefield in Keyghobad story.In this verse, the poet employs exaggeration as a rhetorical part of speech to show the perfection of the event by applying number 6. Ferdowsi says that due to the dust in the plain, it seems that earth cycle is at its perfection and it is finished. Since earth and sky have seven stories in the past, Ferdowsi describes a situation in which one of the earth stories is separated from dust and goes to sky; one story is reduced from the earth and is added to sky because the horses are running with excitement in battlefield. Indeed, the Ferdowsi's poetic imagination is strong in this verse and shocks the readers.

Ten

This number is used 52 times in *The Book of Kings*. Pythagoras and his followers regarded the world as a combination of single and paired numbers and the best number for them was number 10 because this number includes all the numbers making the world. In other words, number 10 is the symbol of the entire world (Hinls, 2004).Number 10 is obtained from the cobmination of 3 and 7 as two lucky and secret numbers. Some people may believe that combination of two numbers is an illusionary subject, but it has been repeated in ethnic beliefs and religious creeds. Generally, this number is good in *The Book of Kings* and Ferdowsi employs it for war, peace, sending the messenger or gifts, describing the champions etc. One of the best examples in this regard is Ferdowsi's application of number 10 for defining the major power of Sohrab at ten years old(Ferdowsi, 2008).

Thirty

This number is used 15 times in *The Book of Kings*. Dr. Malmir says that number 30 is perfect number and it is considered as the end, thus, 30 means arriving at the end, death, and change. In *The Book of Kings*, a man becomes king, governs for 30 years, and finally he is killed. People benefit from the results of his kingdom and civilization is formed (Malmir, 2008).Ferdowsi pays attention to the symbolic aspect of number 30 and mostly mentions number 30 to show its perfect. He uses this number when he aims to define the death of a phenomenon and emergence of another new phenomenon. The best example here is the early verses of *The Book of Kings* about the creation of moon.

Forty

This number is used 26 times in *The Book of Kings*. Number 40 is a perfect number (see explanations of number 6). This number has the greatest position in various fields of religion, myth, common beliefs, magic, literature, history and routine life of the nations.

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Human cognition of number forty has a history as long as his creation. Human being has known this number from the beginning of his creation when the human existence soil was exposed to sunlight to reach maturity. In fact, this phenomenon causes number forty to be considered as a symbol for the early evolution, and the divine and heavenly authorities confirm this number. "Forty is the symbol of perfection and Jung believed that at forty a person is complete. Mediating for 40 days to achieve the desires or avoiding the sin and mourning at the 40th day are associated with such interpretation of number 40. Thus, the fortieth day of each season is the symbol of the peak of that season (Hinls, 2004).

In *The Book of Kings*, the 40-day worship is defined. When Kavus was saved by Rostam and Gudarz(Ferdowsi, 2008). The festivals and mournings are mentioned with various times in *The Book of Kings*, but when Ferdowsi states forty days of festivals and mournings, the following day is a time for change and entrance into another stage. It can be said that number 40 in relation to the mournings of *The Book of Kings* indicates the completeness of time and is observable in Iranian culture for symbolizing the end of a task. A prominent example of using 40 in the festivals and mournings in *The Book of Kings* is suggested after Afrasiab is killed, there were forty days of celebration(Ferdowsi, 2007).

Forty indicates perfection and a new stage is started after forty days; if a king were died, the successors would not use the thrown for forty days of mourning for a king.During his attempt to provide a mass army for Twelve Roc Battle, Keykhosro claims every one who does not able to visit the king in forty days, he will lack dignity and magnitude(Ferdowsi, 2007).Generally, it can be said that 40 in *The Book of Kings* is used to indicate perfection of a period, test, punishment, purification, return and entrance to another stage or final stage; perfection and maturity show the importance of this number.

100

This number is used for 99 times in *The Book of Kings*. Hinls says, "Number 100 in Iran and Iranian world of myth indicates perfection and it has magic capability" (Hinls, 2004). Ferdowsi applies this number for cinveying multitude. In the story of Khaghan of Chinar, Ferdowsi refers to the multiple gifts:Ferdowsi refers sometimes to the symbolic aspect of this number. For example, he recalls the duration of Keyghobad soverinty in this way: After 100 years, Keyghobad died and new kingdom of Keikavus started (see explanations of number six).

It can be said that the term "%) as derivatives of 100 is used in *The Book of Kings*. In Haft Khane Rostam, Rakhs goes to the dragon domain and says:According to this type of using "100%" in the above verse, some critics argue that this order of words for a verse "was more common in Ferdowsi age or before that in Iran" (Sharafoldin, 2014). In addition, they believe that the term "percentage" has entered recently in Persian language and literature and it had equivalent in Old Persian language (Ibid). Nevertheless, some other critics believe that English term "percentage" has no equivalent in Persian and they are ignoring the ancient background and richness of Persian culture((Ferdowsi, 2008).

1000

This number is used 51 times in *The Book of Kings*. Thousand has special sacredness in many cultures based on the importance of number 10 and its multiples including 10*10 and 10*100. Thousand is common in many traditional beliefs. A Prophet, a great redeemer, emerged to change the entire world. Jesus emerged after 1000 years for Jewish people. In Iranian mythology, Oshider, Osidhermah and Soshians will emerge in the last millenniums of the world to make the world a place for justice way from Satan (Hinls, 2004).Malmir (2008) considers this number as a perfect number and believes that "…as the counts reach these numbers- perfect numbers- its cycle is finished and a new cycle is started. In Persian literature, 1000 consists of two symbolic concepts "many" and "myths". Like most of the Persian poets, Ferdowsi uses 1000 in *The Book of Kings* to show the multitude of the troops and gifts. For example, Ferdowsi applies 1000 to show the long-term soverinty of Zahak and few other kings who ruled for more than 1000

years in *The Book of Kings*: For gifts, he says, Another point is the ominousness aspect of the number in Siavash story when the welcome by thousand old men signifies the death of Siavash at the end of story.Another notable example is the thousand riders that company Garsivaz when he is going to meet Siavashgard. Can this number forecast a bad fortune for him in the story?

When Afrasiab decides to fight against Siavash in the same story, Siavash is companied by thousand soldiers to face him; at last, all troops are killed and Siavash is improsoned.

10'000

This number is used 24 times in *The Book of Kings*. Ferdowsi uses this number to refer to the number of warriors, or generally, to describe the war tools and what is associated with battlefield. For example in the story of Khaghane Chin, he says:The number is used to describe the number of visitors or gifts in order to convey the concept of multitude, but it is less frequent than numbers like "hundred thousands" and "thirty thousands".

12000

This number is used 9 times in *The Book of Kings*; Ferdowsi uses "ten and two thousands" for expressing selection of warrior for battle, some of this type of verses are: And other examples are not included in the study. After the investigating the use of this number, it is revealed that 12000 is sacred in *The Book of Kings*, thus, the warriors in any battle with a 12000-troop are victorious. For example, the wars of Rostam with the king of Hamavaran, the war between Godarz and Tus, the war between Esfandiar and Arjasb, the number of Rostam, Gudarz and Esfandiar troops are 12000 soldiers, and all the 3 warriors won the war.Apart from military affairs, ferdowsi uses the number for heavy taxes, the number of slave girls and the number of worshipers conveying the multitude meaning.

30'000

This number is used 38 times in *The Book of Kings*. Ferdowsi uses this number to express the number of blades, swords, warriors and shields. In the story of Fereidoon, he states: In Twelve Roc Battle, Piran arranges his army of thirty thousands soldiers to oppose Gudarz army. When Keykhosro calls for the help of a Roman army, he uses thirty thousands horsemen and infantry to form the base of his army. In order to fight against Keykhosro, Afrasiab places thirty thousands soldiers at the center of his army. There is some sort of secret or fortune in the employment of nubmer thirty thousands regarding or disregarding an arrangement for war. The reason may lay in the fact that thirty thousands is a multiple of number three.Sometimes Ferdowsi uses this number to describe financial affairs, and it means a large amount of money:

100'000

This number is used 36 times in *The Book of Kings* and Ferdowsi uses this number to convey multitude and decorate his exaggerations for describing various scenes. An example is represented in the story of Keighobad:Ferdowsi's skill in using numbers is uncovered when one is aware that numbers like hundred thousands are used not only to convey multitude but also to refer to the minor aspects of concepts. In Gashtasp story, he says:

Odd numbers

One

Odd numbers are frequently used *The Book of Kings* so that number one is used 273 times. Number 1 is the most widely used number and it is used to describe every object in hidden or obvious ways. In the book, it is the reminder

of God's goodness and one thousand scourges imposed on "Hallaj" while he was saying one God with every scourge. One reminds the coin counting of Bayazid: a mystic that with adding every coin said one again and when he was challenged said that he does not know anything except one. Sum can be outside from one, but sum and account can be completed only with one (Aghasharif, 2004: 28) .Number 1 reminds us of unity; in Islamic interpretations, God in the meaning of unity indicates the absolute existence. In Iranian mythology, the first day of any month is called Ahuramazda and it implies the relationship between God and number 1. This number in *The Book of Kings* conveys time as "one week, "one month", "one day" etc. Some examples of the number are represented in the story of Manuchehr's kingdom.In addition, it is stated in Twelve Roc story:

Three

This number is mentioned 165 times in *The Book of Kings*. There are various items about number 3 in the papers and books showing the sacredness and importance of the number.According to common belief, number 3 is sacred. Although some Iranians in Islamic era regarded the number as an ominous number. For example, Abunas rFarahi considered ominous numbers as: (Rezayi, 2011).It can be said that not only this number is not ominous, but also common people consider it in various cases such as traditional and religious practices that proves its sacredness. The symbolic references of number 3 not only belong to Iranian culture and literature but also to most of great religions and traditions in the world. Besides, various cultures and sub-cultures in the world and great religions like Buddhism, Zoroastrian, Judaism, Christianity and Islam use this number symbolically as an important essential to form the foundation of their customs (Mahmoodi, 2012).

The belief on the sacredness of number 3 has some similiarities indifferent cultures. For example, in ancient times, marriage ceremony was held in 3 or 7 days; nowadays, this custom is observed in the nomads (Mahmoodi, 2012). Moreover, purification of the objects in three times and saying salavat for three times, the division of world into three sections that is mentioned in *The Book of Kings* and the division of Iraninto three parts by Fereidoon among Selm and Tur and Iraj indicate the sacredness. Some Zoroastrian symbols and tales also emphesize the holiness of number three icluding three days and night war between Tishtar (Tir) and Satan of dryness. The belif in three components of the word, water, fire and soil, by the Zoroastrians results in their attempt to neither burn the dead nor put them in the sear or bury in earth (Mahmoodi, 2012).

Number 3 has a special place in compounds and metonyms as well as Proverbs. For example, three-hores) is a metonymy for Hurry (ibid, 156). Tree divorce) is a metonymy for leaving the work for always (ibid), (three skirts) is a kind of clothing with long seams (ibid). (three Qibla) is Qiblah of the Jews, Christians and Muslims (ibid). (three souls) is the natural, animal and sensual souls (ibid) and … The importance is intensified when many poets mention number three in their poems. For example, Molana talks about number three in this way:(Molavi and Mohammad, 2013).Number 3 indicates perfection in the mythology of various countries. It leads to a condition in which trinity gods are the main gods and other gods are after these gods. Although Ahura and Ahriman are derived from Zarvan, Trinity in Iran is based on Zarvan, Ahura and Ahriman (Hinls, 2004). Ab, Ibn and the Holy Spirit are based on trinity in Christianity. It is stated that origin of ancient trinity leading to sun worshipping as one of the oldest primary religions symbolizes three solar gods: sunrise, midday and sunset and the repetition of this cycle (ibid, 498). In some non-Iranian mythologies, we face some aspects of this number. For example, in Czechoslovakia mythos, god of "Triglov" has three heads signifying three important issues: religion, war and living (Aghasharif, 2004). In Egyptian mythos, we see sometimes trinity of "Oziris, Izis and Horus" (Vio, 1996). Trinity of "Berhama, Vishno and Shiva" is trinities of Indian myths (Eyones, 1994: 65).

The recent researches show that the number "three" is mostly manifested in Persian literature in Khaghani poems, and he is a number-based poet. It means that numbers are used more than other adjectives and compounds in his poems and particular numbers are used in various forms (Shafagh and NiaziVahdat, 2009). However, Ferdowsi (2008) considers the mysterious aspect of this number and focus on its sacredness. The high frequency rate of number

three in *The Book of Kings* uncovers this idea. Ferdowsi (2008) applies number 3 in battlefields and ceremonies. Indeed, this number is used in *The Book of Kings* intentionally, and it does not occur as the result of using metric or other issues. Therefore, Ferdowsi uses it consciously and he aims to highlight a goal or show a particular issue. Now we mention various applications of this number in *The Book of Kings*.

Ferdowsi talked about some wars prolonging three days or nights. For example, in Siavosh's letter to Kavus, he says:(Ferdowsi, 2008)Because number three is a perfect number, when the counting reaches these number, its cycle finishes and a new cycle starts (see explanations of number 6). With these lines, Ferdowsi decides to show the final perfection of wars and battles by describing them with number three. According to the verses, a new phenomenon is occurred at the fourth day or month and new cycle is created. This is shown masterly in the following verses:
This issue is true about wars in *The Book of Kings*. Three days or three weeks of celebrations are other frequent examples occurred in *The Book of Kings*. Ferdowsi explain celebrations by mentioning number 3 to the reader. For example, in the story of Bijan and Manije:Tahmine puts an armlet created by three rubies and three beads on Sohrab's arm; it shows the symbolic aspect of this number:Or, Sohrab plays polo when he is three years old:

It is interesting how a three-year boy is skillful at the game polo. Ferdowsi attempts to define the perfection and maturity of Sohrab by refering to his polo playing.Other symbolic aspects of number 3 are drinking wines for three nights and drinking three glasses of wines as frequent practices in *The Book of Kings*. In the story of Siavash, he states: In *The Book of Kings*, some personalities and mythological heroes convert into some characters, but this division of myth turns one person to three persons as Garshasb is divided into three man including Garshasb, Nariman and Sam (Sarkarati, 2010).Briefly, number three in *The Book of Kings* indicates perfection; it means that an affair should take three days or three stages to close perfection. Total life, the childhood, youth and aging years are three stages having been free from critical conditions or engaging in contradictory conditions (BozorgBigdeli and Akbari, 2007).

Seven

This number is used 42 times in *The Book of Kings*. Many studies are conducted regarding number 7 and many colclusions are made in this regard. This section explains various aspects of the number.
Number 7 attracts the attention of many people in the world. This number was the subject early human beings and troglodytes by the age of civilization; it was used t refer to sacred concepts and or satanic issues. Sacredness of number 7 is one of the oldest cultural elements for Mesopotamian people; however, there is not an evidence to prove the influence of Babylonian-Assyrian culture in this regard (Cassirer, 2011). The oldest tribe considering number seven is Sumerians. Babylonian of Saminejad, Baniisrail Saminejad, Arabs and Indo-European tribes respected number 7 (Moein, 1989: 253-254).

Number 7 has great validity and extraordinary importance in different religions. For example, the seven Hindu gods are called "ADI TYA" (ibid, 255). Seven Zoroastrian "amshaspandans" implies their care for and respect to this number because they believed in the seven proximate angels or big Angels (ibid, 256). The number has a special place in Judaism: animals that were in the ship with "Noah", are seven, the number of cows and spikes that "Pharaoh" dreamed were seven, and fertile years and years of famine, each lasted seven years (ibid, 258). In Christianity, the seven miracles of the thirty three miracles of Jesus are mentioned in the Gospel of John (nasiri deghan, 2009: 74) .In addition, number seven has a particular meaning for the Muslims. The first Sura of Qur'an (the eternal miracle of the Prophet) known as "sabolmsany" is composed of seven verses. Seven hellos in Quran, seven skies and seven earthes, seven stages of Hell, seven fat cows and seven skinny cows that "Pharaoh" dreamed, seven men that were companions of Kahf (cave), seven times of cleaning the unclean objects and seven parts of body that should be placed on the ground in prostrating are considerable instances of Qur'anic numbers (Moein, 1989:262-266). Ferdowsi (2008) uses number seven many times for various purposes including the explanation of seven heroes; he describes how the seven following heroes are selected with various attributes: Zahak (evil king), Fereidoon (good king), Siavash (benevolent prince), Forud (defeated prince), Piran (Turan ruler), Rostam (Iranian hero), and Bahram

Chubin (another hero of Iran).Seven walls: Siavash established "Gong Dezh"city with seven walls: golden, silver, steely, brazen, irony, glazed and Kasgenin. (Nasiri deghan, 2009: 100).

Seven countries: Although dividing the world into seven countries is not an exclusivel feature of *The Book of Kings*, it is referred in this work:(Ferdowsi, 2008)Rostam and Esfandiar's Seven Labours: Seven positions or the stages between Iran and Touran and Rostam and Esfandiar had great risks in these regions.Seven skies and seven earthes: Babylonian believed in seven stages of sky and seven stages of earth, this idea is reflected in *The Book of Kings*.One-week celebrations and mourning: in Siavash story, after Giv and Keikhosro meet each other, a one-week celebration is established and at the eighths day, Keikhosro went to Keikavus and says:

Or when Rostam hears about Siavash's death, he mourns for one week and then the troop moves at the eighths day:Seven colors: Yellow, Blue, Orange, Red, Purple, Green, light blue.Seven years: In *The Book of Kings*, seven years are used to educate, this is uses in present culture. Ferdowsi gives Piran Keikhosro to the shepherds:Beyond all these proofs, seven is used mostly by Ferdowsi in *The Book of Kings* so that mentioning all the examples is not reasonable for this study. Now we refer briefly to some of the other applications of this number in *The Book of Kings*: seven great forgiveness of Keykhosro, seven lashes, seven heroes, seven dreams, seven women who were captives, seven kings, seven planets, seven men, seven piece of jewelry, seven springs etc.

According to studies, Siavash stor has the highest frequency of number seven usage. In this story, even Sudabeh's plots are seven. Astronomers' engagement with their horoscopes to find the real owner of two dead children for a week, Keykavoos's one-week silence and avoidance to talk about Sudabeh's plots, Siavash's seven years test for surrogating Keykavoos are other examples of number seven in *The Book of Kings*(Ferdowsi, 2008).Is the repetition of the number seven with a cryptic storyline not related to Siavash? Does Ferdowsi seek to multiple the wonders and mysteriousness of the tale?

Thirteen

Thirteen is an inauspicious number for the Jews, the Christians, and even the Europeans. For example in the Torah, a difficult catastrophe was occurred for the Jewishes in this day. Christians believe that Jesus was caught on the thirteenth day of month and his disciples were thirteen at the last evening. As a common belief, this number is also inauspicious among the Europeans. There is not a thirteenth floor in some European buildings and instead they write 1 +12. Having been influenced by ancient beliefs Iranians take refuge to nature on the thirteenth day of spring. Affecting by the belief of ancient Iranians, Ferdowsi avoids using this number in his *Shahnameh*, but this belief is rejected in Islam, especially among Shia, because "Imam Ali (AS)" was born in Kaaba in thirteenth of Rajab.

DISCUSSION AND CONCLUSION

Number is a subjective and abstract concept used in past by human beings and draws certain beliefs and attentions. This investigation has shown that the sum of even and odd numbers in *The Book of Kings* is 62 including 46 even and 16 odd numbers.These figures indicate that ferdowsi tends to use even numbers more than odd numbers; he has always a positive attitude towards even numbers and cosiders them as blessing and fortunate numbers. The proof for this claim is the frequency of odd and even numbers (46 even and 16 odd numbers) in *The Book of Kings*. In addition, Ferdowsi uses number two, as the most frequent even number in *The Book of Kings*, more than number one, as the most frequent odd number in *The Book of Kings* (889 times number two and 273 times number one). Another reason for such a usage is the binary nature of Ferdowsi's mind and worldview. In other words, there are wars between truth and falsehood, light and darkness, and God and devil all through out *The Book of Kings*. In fact, Ferdowsi is describing Pre-Islamic Iranian culture for readers through a binary vision. In this manner, it is resonable to argue that the Tousian scholar uses even numbers more than odd numbers to follow this attitude. Admittedly, none of the even

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numbers is considered inauspicious in Iranian mythology, and of course, Ferdowsi had been aware of this claim. The clever use of numbers in *Shahnameh* explicitly represents his accuracy and knowledge of sacredness and ominous of numbers; this knowledge leads him to use mostly even numbers in his masterpiece *The Book of Kings*.

In *shahnameh*, some numbers are auspicious and some are ominous. On the one hand, some of them are used for explaining multitude, counting and describing the troops in battlefield, describing body members, considering the sacredness and ominousness of affairs, and showing perfection of anything. On the other hand, some of them are uses for defining the importance of affairs, considering the duration of festivals and mourning, emphasizing the affairs. Moreover, many of these numbers are closely related to the life and personality of heroes of the stories and they can be realized only by careful attention and contemplation. Among even numbers, two and among the odd numbers, one is mostly used in *The Book of Kings*; 40, 100 and 1000 of even numbers and 3, 7 of odd numbers are the most frequent numbers. The outcomes of investigating other books and articles and the use of sacred numbers indicate that the value and importance of some numbers like three and seven are common in most of the literatures and cultures in the world. Other results of the study show that the numbers were used intentionally in *The Book of Kings* and Ferdowsi uses all numbers consciously for considering any issue consistent with the symbolic meaning of the number. Briefly, the numbers in *The Book of Kings* play important roles. Another important issue regarding the sacredness and ominousness of numbers is that number 13 is not used in *The Book of Kings*. The following chart shows the frequency of numbers in *The Book of Kings* (Figure 1).

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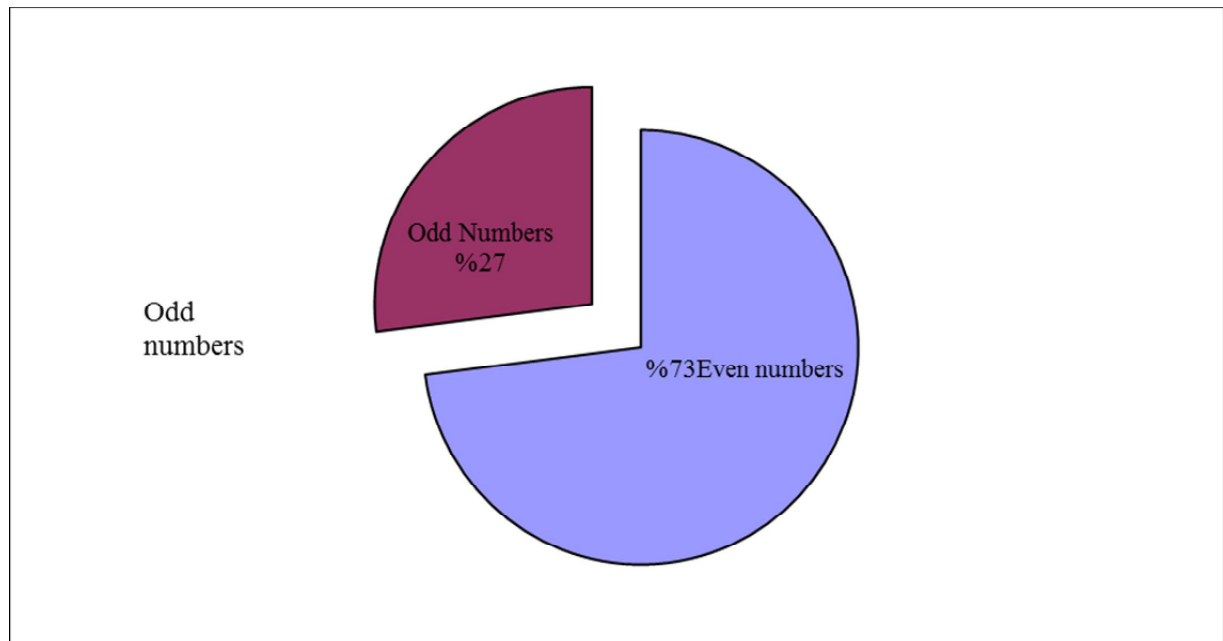
Figure 1: The frequency of numbers in the *Book of Kings*

RESEARCH ARTICLE

Identification and Prioritization of Financial Ratios Affecting the Cement Firms' Performance Evaluation using Analytic Hierarchy Process

Loghman Hatami-Shirkouhi[1]*, Mohammad Gholami Mehrabadi[2] and Mehran Nemat[1]

[1]Roudbar Branch, Islamic Azad University, Roudbar, Iran.
[2]EMBA of Allame Tabatabaei University, Tehran, Iran.

*Address for correspondence
Loghman Hatami-Shirkouhi
Roudbar Branch, Islamic Azad University,
Roudbar, Iran.
E.mail: loghmanhatami@yahoo.

ABSTRACT

Proper evaluation of firm performance is not only important for investors, shareholders and lenders, but also is of great importance for firms active in similar sectors. Currently, increase in cement consumption for developmental infrastructures including constructions and expanding constructional operations, constructional activities and projects, financial resources required for restoration and investments on cement industry have made it as an effectively important infrastructural industry in the world. In relation to importance of cement industry and investment on it, the current study evaluates and prioritizes financial ratios effective on performance evaluation of firms listed in Tehran Stock Exchange. The present study used 13 financial ratios as criteria for overall survey of performance and analytic hierarchy process (AHP) as an instrument for prioritizing these ratios.

Key words: Tehran Stock Exchange, analytic hierarchy process, shareholders.

INTRODUCTION

Proper evaluation of firm performance is not only important for investors, shareholders and lenders, but also is of great importance for firms active in similar sectors. To determine competitive quality of firms and evaluate their financial performance is vital for developing considered sector. Currently, cement sector is a growing market mainly due to increased investments on housing and infrastructures. Moreover, cement demand increases parallel to development of construction sector. The increase occurs

based on economic stability, decreased exchange rate and increased generality of mortgage system. It is worth noting that according to American Geological Institute (http://www.agiweb.org), Iran was the highest-in-rank cement producer within Middle East. Globally, Iran is the ninth country following China, India, America, Japan, Russia, South Korea, Brazil, and Turkey, respectively; thus, Iran has regional and global potentials to attract domestic and foreign investments, particularly private sector. It is important to possess knowledge about performance of cement-producer firms for reliable investments or successful stock purchase.

An important issue regarding investment decisions is lack of a proper framework to make decisions under complicated conditions. Therefore to achieve this goal, that is to provide a proper bed for awareness and correct decisions of investors and shareholders, it is of great importance to provide a framework for prioritizing financial ratios influencing performance of cement firms listed in stock exchange for investors, shareholders, and lenders.
Annually, Industrial Management Institute (IMI) conducts similar studies as 'Top Hundred Iranian Firms'. These firms are ranked and compared according to indices of firm size and growth, profitability and performance, export, liquidity, liability, and market indices. In the other word, the main factor to select firms is their sales following which selected firms are ranked according to other factors. Given that companies listed in top hundred firms act in a certain market, their sale volume reveals their influence on the market. Although sale volume is not the only objective which managers seek for, total long-term corporate goals are directly or indirectly related to it (Darvish& et al., 2009). Accurate and detailed information causes confidence in investors as well as informed transactions. However, there is no enough legal obligation for informationdisclosure in Tehran Stock Exchange (TSE) and its operational mechanisms do not possess adequatepower for motivation and legal obligation(AnvariRostami, Khotanlou, 2006). As noted above, ranking is based on a particular index and the essential objection to such methods is that they do not determine the top firms; instead, they may determine the largest firms (AnvariRostami&Kashan, 2004).

Literature Review

Performance evaluation of stock companies listed in TSE and related problems have extensively attracted interests of domestic authors. For example, Malekian and Asghari (1385) studied the relationship between economic value added (EVA) and return on assets (ROA) to evaluate performance of firms listed in TSE. Ramezani (2008) also studied the relationship between EVA and ROA for evaluating firm performances. Using TOPSISmultivariate decision-making model, Momeni and NajafiMoghadam (2004) evaluated economic performance of 170 firms listed in TSE from 13 different industries. They initially identified indices whichcan include aspects of complete evaluation. They considered 9 criteria including sale return on sales, return on assets, return on working capital, loan effectiveness measurement index, average period for collection of debt, costs as a percentage of total sales, earnings per share, price to profit ratio and economic value added as those criteria which can provide a complete evaluation. Kashanipoor and Rasaiian (2009) studied the relationship between market value added and indices of performance evaluation in TSE. They considered market value added as dependent variable and five variables including economic value added, return on assets, and annual return on equity, profit prior to tax and operating cash flow as independent variables; they studied the relationships using data from 189 different companies and regression.Modares and Farajolahzadeh (2009) studied the relationship between Q-Tobin ratio and Earningsper Share (EPS) to evaluate performance of firms listed in TSE. They studied correlations and substitution of EPS by Q-Tobin ratio to evaluate firm performances. Saeedi and Abujafari (2009) studied the correlation of EVA and ROE to evaluate performance of chemical industries listed in TSE. Using EVA model, Abzari et al (2008) evaluated performance of firms listed in TSE essential metals group and studied its relationship with factors of profit accounting. They tested hypotheses using correlation analysis of regression. Their results confirmed no significant relationship between economic value added and accounting indices (earning per share and actual return on equity).

Lo and Lu (2009) studied performance of Financial Holding Companies (FHC) in Taiwan and provided a combinational method. Ho and Oh (2008) ranked Taiwanese stockbrokercompanies. They evaluated performance of 28 stockbroker companies based on indices such as operating costs, employees, profit, brokers' charge, earning per share, and net income and using two-step DEA method. Stock evaluation is a problem related to ranking of stock companies interested by many authors. For example, Samaras et al (2003) introduced a multivariate decision-making support system to evaluate Athens Stock Exchange (ASE). Their introduced system evaluated stoke based on three approaches including fundamental analysis, technical analysis and stock-exchange analysis.

Liu and Zhao (2004) solved stock evaluation problem using data envelopment analysis (DEA). Xue-min (2004) evaluated joint stock companies using factor analysis. They compared stock of companies based on 10 financial variables which finally decreased to three main variables using their suggested method. Due to limiting hypotheses of traditional models for stock evaluation, Tehrani and Falavarjani (2006) used residual income model to value common stock. This model is modified form of dividend discount model (DDM) in which a constant relationship is not assumed between accounting data and future dividend and certain dividend policy. Becker and O'Reilly (2009) used genetic programming for quantitative selection of stock. They reduced 65 different variables to 4 main groups including valuation measures (such as P/E), quality (such as ROA), analyst sentiment (income predictions) and price sentiment (such as historical return on stock).

MATERIALS AND METHODS

Indices

Indices considered for ranking cement firms listed in TSE are provided according to financial ratios in four groups including liquidity ratios, financial leverage ratios, profitability ratios and growth ratios. Each main ratio includes several minor ratios. Theindiceswere supported by literature and during appointments or emails to senior managers of TSE broker companies. Table 2 shows indices effective on evaluation and ranking of active companies in cement industry listed in TSE.

RESULTS

Financial indices influencing on performance of cement firms and extracted from literature were supported by appointments and emails to senior managers of TSE broker companies. Output of appointments made ahierarchical structure to evaluate cement firms listed in TSE. Figure 1 shows hierarchical structure of the problem.

For developed analytic hierarchical process (AHP) inventory, 15 experts were selected by different views of financial consult and stockholders.Matrix of paired comparisons was inconsistent for 6 experts. Eventually, experts were re-asked three of whom rejected to re-conduct paired comparisons. Experts' validity of inconsistency rate was re-studied.Then, experts' opinions were integrated. Table 3 and 7 show integrated expert opinions based on AHP.To calculate final weight of each sub-index which indicates significance of sub-indices according to experts, it is essential to multiply weights of third-level sub-indices by weight of second-level index containing sub-index. Table 8 shows second-level indices, local weight of third-level sub-indices and final weight of sub-indices considered for evaluating performance of cement firms listed in TSE.

CONCLUSION

To achieve main objective of the study, a list of indices and criteria effective on performance evaluation was extracted by literature review; the list includes 13 indices such as Current Ratio, Quick Ratio, Cash Ratio, Dept Ratio, Shareholder's Equity to Total Assets, Fixed Assets to Shareholder's Equity, Fixed Assets to Long Term Debt Ratio,

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Net Profit Margin Ratio, Return On Equity Ratio, Growth Ratios, Operating Profit Growth, Shareholders' Equity Growth, and Assets Growth.Then, AHP model was used to prioritize financial ratios influencing on performance of cement firms listed in TSE. Findings show that according to experts, profitability ratio plays an important role in evaluating performance of cement firms. Therefore, cement companies need to focus particularly on this ratio. Among sub-indices of financial ratios, three ratios including net profit margin ratio, cash ratio and return on equity ratio are three top sub-indices, respectively. Fixed assets to long-term ratio, debt ratio and sales growth are the lowest sub-indices, respectively.

Results from current study can help managers and experts of Iranian cement industry as a high-income and important industry for continuous improvement plans in both top and weaker companies. Lower-performance firms can model top companies and improve their position in cement industry. Top companies can also develop proper strategies to maintain and improve their positions. Results from current study can be a guideline for investors on cement industry.

ACKNOWLEDGEMENTS

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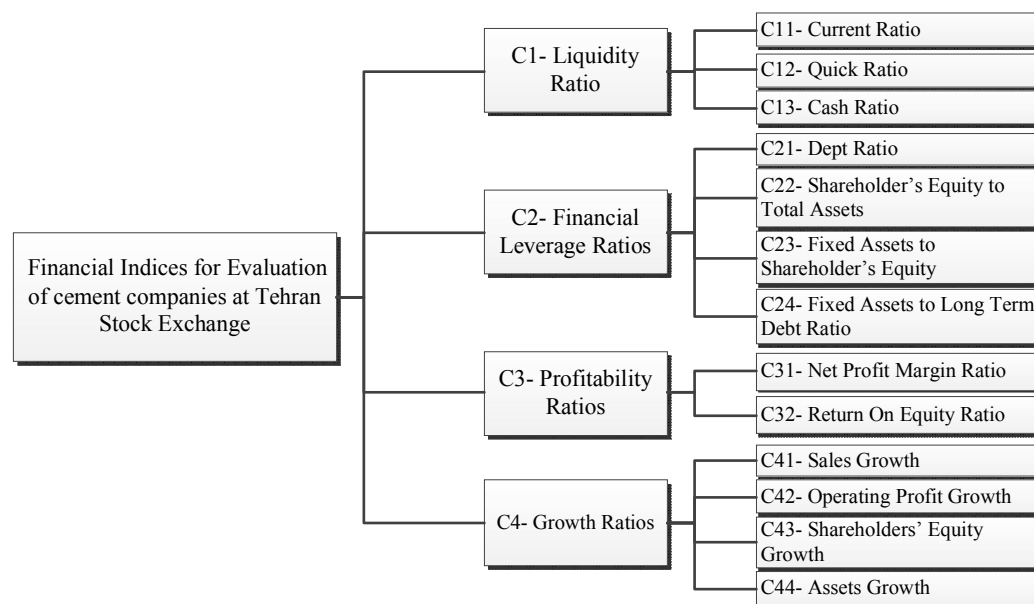
Figure 1: Hierarchical structure designed for evaluating performance of companies listed in TSE

Table 1: Literature of performance evaluation and ranking stock companies

Author/ organization	Year	Area	Measure/ index	Method
Safari	2003	Investment companies (listed in TSE)	-	Sharp and Trainor
Momeni and NajafiMoghadam	2004	Tehran Stock Exchange	Return on sales, return on assets (investments), return on working capital, lending profitability index, average period for collection of debt, costs to total sales ratio, earnings per share, price-earnings ratios, economic added value	TOPSIS and entropy technique
Khajavi et al.	2005	Tehran Stock Exchange	One-year rate of return, two-year rate of return, three-year rate of return, earnings per share, price to earnings ratio, beta coefficient, and sigma factor	Data Envelopment Analysis
AnvariRostami and Khotanlou	2006	Tehran Stock Exchange	gross profit ratio, operating profit ratio, net profit ratio, efficiency ratio, total assets and return on equity	Spearman Correlation Coefficient

| Sabeti Saleh | 2010 | Companies applying to finance banks (listed in TSE) | beta coefficient (systematic risk), financial ratios (liquidity, efficiency, etc.), earnings allocated to each share, capital increase, balance sheet, profit and loss, return, risk and return, growth (EPS), sales growth, growth in earnings margin, price to earnings ratio (P/E) | TOPSIS and fuzzy network analysis |
| Johnson and Soenen | 2003 | - | book value to market value ratio, size, stable growth rate, profitability, capital structure, liquidity, cash conversion cycle, fluctuations in earnings, research and development expenditures, advertising expenditures | Simple linear regression model |

Table 2: Top indices, sequentially

	Ratio type	Ratio	Symbol
1	Liquidity	Current Ratio	CRR
2		Quick Ratio	QR
3		Cash Ratio	CAR
4	Financial leverage	Dept Ratio	DR
5		Shareholder's Equity to Total Assets	SETAR
6		Fixed Assets to Shareholder's Equity	FASER
7		Fixed Assets to Long Term Debt Ratio	FALTDR
8	profitability	Net Profit Margin Ratio	NPMR
9		Return On Equity Ratio	ROE
10	growth	Growth Ratios	GR
11		Operating Profit Growth	OPG
12		Shareholders' Equity Growth	SEG
13		Assets Growth	AG

Table 3: Integration of paired comparisons by experts for second-level ratios of hierarchical structure

	C1	C2	C3	C4	Weight
C1	1	1.1576	0.9567	1.8764	0.2819
C2	0.8639	1	0.3412	0.933	0.1704
C3	1.0453	2.9308	1	2.5678	0.3901
C4	0.5329	1.0718	0.3894	1	0.1577

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Table 4*: Integration of paired comparisons by experts for sub-indices C1*

	C11	C12	C13	Weight
C11	1	1.3225	0.4598	0.2628
C12	0.7561	1	0.4666	0.2192
C13	2.1749	2.1432	1	0.5181

Table 5*: Integration of paired comparisons by experts for sub-indices C2*

C2	C21	C22	C23	C24	Weight
C21	1	0.5121	0.3593	1.2345	0.1493
C22	1.9526	1	0.9014	3.1563	0.3318
C23	2.7832	1.1094	1	4.2891	0.4120
C24	0.81	0.3168	0.2331	1	0.1069

Table 6: Integration of paired comparisons by experts for sub-indices C3

C3	C31	C32	Weight
C31	1	1.7295	0.6336
C32	0.5782	1	0.3664

Table 7: Integration of paired comparisons by experts for sub-indices C4

C4	C41	C42	C43	C44	Weight
C41	1	0.6632	0.6246	0.5513	0.1680
C42	1.5078	1	0.6321	0.7891	0.2247
C43	1.6011	1.582	1	1.4255	0.3348
C44	1.814	1.2672	0.7015	1	0.2725

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Table 8: Local weight and global weight of sub-indices effective on performance evaluation and ranking cement firms.

Financial Ratio	Weight	Sub-index	Local	global weight	Ranks
C1	0.2819	C11	0.2628	0.074083	4
	0.2819	C12	0.2192	0.061792	6
	0.2819	C13	0.5181	0.146052	2
C2	0.1704	C21	0.1493	0.025441	12
	0.1704	C22	0.3318	0.056539	7
	0.1704	C23	0.412	0.070205	5
	0.1704	C24	0.1069	0.018216	13
C3	0.3901	C31	0.6336	0.247167	1
	0.3901	C32	0.3664	0.142933	3
C4	0.1577	C41	0.168	0.026494	11
	0.1577	C42	0.2247	0.035435	10
	0.1577	C43	0.3348	0.052798	8
	0.1577	C44	0.2725	0.042973	9

RESEARCH ARTICLE

Influence of Daytime Melatonin Administration on Anaerobic Capacity and Melatonin Rhythm of Handball Players.

Chittibabu. B

Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram,Tamilnadu, India.

*Address for correspondence
Dr.Chittibabu. B
Assistant Professor,
Department of Physical Education and Sports Sciences,
Annamalai University, Chidambaram – 608002, Tamilnadu, India.
E.mail: b.chitti@hotmail.com.

ABSTRACT

The study was proposed to investigate the changes owing to administration of melatonin on anaerobic capacity and melatonin rhythm among healthy male handball players. To accomplish the purpose of the study, thirty (30) male university handball players were selected at random as subjects, who volunteered to participate in this study. However, during the course of the study six players withdrew and twenty four (24) players completed this study. These players were randomly classified into two groups namely melatonin and placebo, each constitute of 12 players. These players were selected from Department of Physical Education and Sports Sciences, Annamalai University during the academic year 2004 – 2005. The experimental variable selected in the present study was day time administration of 3mg of melatonin and placebo tablets around 10:00 O'clock for 30 days. The criterion variables selected in the present study were anaerobic capacity and melatonin rhythm. Anaerobic capacity and fatigue index was assessed through running based anaerobic sprint test and melatonin through blood sample. To monitor 24 hr changes in melatonin blood samples were collected at 00:00, 04:00, 08:00, 12:00, 16:00, 20:00 and 24:00 hr respectively. Anaerobic capacity was assessed at 08:00, 12:00 and 16:00 hr respectively. The result of the study showed that the melatonin group had no significant changes on anaerobic capacity. The anaerobic capacity found to peak at 16:00 hr before and after administration of melatonin and placebo to respective groups. As a result of melatonin administration mean power had dropped 3.33 watts (0.92%) at 08:00, 3.32 watts (0.90%) at 12:00 and 4.44 watts (1.18%) at 16:00 hr. Similarly, melatonin in melatonin group showed a significant phase delay of 1 hr 7 min. The melatonin group had a significant diurnal variation on melatonin. This group had experienced increased in melatonin about 23.25 pg/ml at 12:00 hr. It is concluded that daytime melatonin administration significantly affect the power output and alters melatonin rhythm.

Key words: Melatonin, anaerobic capacity, RAST, handball, players

INTRODUCTION

Melatonin (*N-acetyl-5methoxytryptamine*) has received considerable attention in recent years (Atkinson *et al*., 2003). Despite originally being considered as relatively unimportant in humans, it is now recognized that melatonin influences a wide range of physiological functions. Nevertheless, some claims that exogenous administration of melatonin can help the intellectual and physical development of children, delay the ageing process, increase resistance to cancer and other diseases, lower cholesterol and even prolong sexual activity are unsubstantiated (Atkinson, *et al*., 2005).The physiological effects of melatonin that have been studied most relate to human biological rhythms. Melatonin is an indole, which, during the hours of darkness, is converted from serotonin and its precursor tryptophan and secreted by the pineal gland into the bloodstream. The supposed 'control centre' for human circadian rhythms is the paired suprachiasmatic nuclei of the hypothalamus and these nuclei have melatonin receptors. Light is a powerful inhibitor of melatonin secretion and daytime concentrations are close to zero, unless exogenous melatonin is administered, usually orally (Atkinson, *et al*., 2005).

Oral melatonin is absorbed rapidly and leads to peak values (>*10000 – 20000 pmol.l⁻¹*) in plasma to be observed within approximately 1 h of ingestion. Elimination half-life is about 47 min for a 5mg dose. In addition to the link between melatonin and control of biological rhythms, it is known that exogenous melatonin administration has clear hypnotic and hypothermic effects under resting conditions when factors such as the activity level, posture and the exposure of the subject to bright light are controlled. Reductions in core temperature are variable, ranging from 0.01°C to 0.38°C, but are related to plasma concentrations of melatonin, so that the lowest body temperatures are also recorded approximately 1 h after administration (Atkinson, *et al*., 2005).Recently, several researchers have attempted to examine the effects of melatonin on performance components that are more relevant to sports competitions than simple tests of mental performance. In a study 14 participants whose proprioception and balance were tested before and after administration of 10 mg of melatonin. The results indicated that all participants showed a decrease in the ability to balance posture, although no indication as to how long these effects lasted could be given. In the first study to include physical performance tests (*e.g. cycling time trial performance, grip strength*), Atkinson *et al*. (2003) examined whether ingestion of 5mg of melatonin before nocturnal sleep leads to any hangover effects on performance in the morning. Melatonin was found not to affect any performance measures in the morning, 8 h after administration, nor was it found to alter the subjective sleep quality of the physically active participants (Atkinson, *et al*., 2005).

Knowledge of the time course of variables tied to physiological modifications induced by physical exercise is important in sports. This is true both in the professional field, identifying the most favourable physiological moment to obtain the maximum result from performance, and for the amateur, allowing one to take full advantage of the benefits that physical activity produces for the body. In different sports, physical performance is subject to circadian type modifications (Carandenta, *et al*., 2006). The purpose of the study was to investigate the changes owing to administration of melatonin on anaerobic capacity and melatonin rhythm among healthy male handball players.

MATERIALS AND METHODS

Ethical Approval

Approval for the study was obtained from the Annamalai University Institutional Human Ethics Committee, Rajah Muthiah Medical College, Tamilnadu, India

Subjects

Thirty (30) male university handball players were selected at random as subjects, who volunteered to participate in this study. However, during the course of the study six players withdrew because of their personal reasons and twenty four (24) players completed this study. These players were randomly classified into two groups namely melatonin and placebo, each constitute of 12 players. These players were selected from Department of Physical Education and Sports Sciences, Annamalai University during the academic year 2004 – 2005.

Physical characteristics of the subjects

The age of the subjects ranged between 20 and 22 yr. The mean ± SD of age, height and body mass were 21.13 ± 0.80 yr, 1.79 ± 0.5 m, 78.4 ± 5.1 kg, respectively. On average, the players had 4.9 ± 2.1 years of playing experience and represented Annamalai University in Inter University competition and underwent regular morning training between 06:30 to 08:30 and evening practice between 16:30 to 18:30 regularly prior to the commencement of this study. Players remained passive for remaining hours.

Environmental factors

Chidambaram is 5.75 metres above mean sea level (*MSL*) and Latitude with 11°24′ North and 76°44′ East. During the course of the study the environmental maximum average temperature recorded was 36.03 ± 1.90 and minimum average temperature recorded was 24.83 ± 1.17. The facts on sunrise and sun set and length of the day on initial data collection day was 05:46, 18:31 and 12 hours 45 minutes, and during final data collection day it was recorded as 05:51, 18:39 and 12 hours 48 minutes.

Experimental Design

The duration of the study was thirty (30) days and carried out during the month of June 2005. The selected thirty subjects were randomized and divided into two groups of fifteen (15) in each and only twenty four (24) completed the study twelve (12) in each group. The data was collected at seven different times of the day 00:00, 04:00, 08:00, 12:00, 16:00, 20:00 and 24:00 hr respectively. Melatonin and placebo administration was carried out under single-blind conditions. In melatonin group 3mg of melatonin was administered every day between 09:30 to 10:30 hr (*at irregular time points to avoid medicine as an additional time cue*) for thirty (30) days (Message, *et al.*, 1998). In placebo group the subjects were administered with placebo throughout the experimental period thirty (30) days. In the present study, since the dosage level of melatonin was 3 mg there are no adverse effects, ulceration or trauma in melatonin group. However, Running-based anaerobic sprint test was used to measure anaerobic capacity and fatigue index which was measured at 08:00, 12:00 and 16:00 hr respectively.

Variables and test

The experimental variable selected in the present study was day time administration of 3mg of melatonin around 10:00 for 30 days. The criterion variables selected in this study were anaerobic capacity and melatonin. The anaerobic capacity was measured through running based anaerobic sprint test and melatonin was assessed through Vaughan (1995).

Melatonin and Placebo details

Melatonin tablets of 3 mg strength (*Aristo Pharmaceuticals Ltd, Mumbai, India*) were used. The placebo tablets, identical in shape, size, colour, and packaging were specially prepared for the study by Aristo Pharmaceuticals Ltd, Mumbai, India.

Collection of blood samples and processing

The phlebotomists were recruited for the process of obtaining samples of venous blood. Five milliliter of venous blood was collected from each subject through venous puncture by using standard disposal syringe. The serum was separated by 3000 rpm for 10 min. Blood samples were collected from the subjects of both experimental and control group at seven different times of the day with four hours interval. In order to assess the complete biological cycle of the variables confined to this study, the attempt was made to test the selected variables at seven different times (00:00, 04:00, 08:00, 12:00, 16:00, 20:00 and 24:00 hr) of the day. During each of the above testing period blood samples were collected from both groups at resting condition. From the total 5ml of blood, 1ml of blood is centrifuged, plasma and serum was obtained and serum was used for estimation of melatonin and plasma was used for cortisol estimation.Low volume of blood was collected at each sampling time to minimize the effects of stress and disturbance that might influence the results. After the blood collection, plasma and serum were separated and stored in dry ice pack for hormonal analysis, which has been carried out immediately by Radio Immuno Assay (*RIA*) and Immuno Radiometric Assay (*IRMA*) kit using gamma – scintillation counter (*Electronic Corporation of India, Chennai, India*). The sensitivities of the hormone assays are cortisol - 0.21μg/dl and melatonin - 0.2pg/ml.

Statistical Analysis

Analysis of cosine fit curve

The cosine fit curve was calculated by using the formula: $f(t) = M + A \cos (\omega t + \phi)$ which defines four parameters characteristic of rhythm: MESOR (M); amplitude (A); acrophase (φ) and correlation value (r). Time series analysis of the oscillation (*measurement of acrophase, amplitude, MESOR, r and p values*) was done as proposed by Halberg *et al.*, (1977) by using 'cosinor win' computer software program.The acrophase (φ) is the measure of peak time of the variable studied. The MESOR difference was calculated by using paired t test for melatonin.

Three way repeated measures

To assess anaerobic capacity 2 × 2 × 3 ANOVA with last two factor repeated design was computed. In which, the first factor denotes two groups (*melatonin and placebo*), the second factor refers to testing condition (*before and after administration of melatonin and placebo*), and the third factor indicated different times of a day (*08:00, 12:00 and 16:00 hr respectively)*. Whenever the obtained interaction '*F*' ratio value was significant, simple effect was used as a follow up test. Then the Scheffé S test was applied as post hoc test to determine the significant paired mean differences. The level of confidence was fixed at 0.05 to test the significance. The data was analysed using SPSS version 11.

RESULTS

Anaerobic capacity

Anaerobic capacity at different times of the day is significant irrespective of groups and testing conditions as the obtained *F* ratio of 3.42 is greater than the required table value of 3.21 at $\alpha = 0.05$ for the df of 2 and 44. However, remaining comparisons showed no significant difference. The melatonin group had no significant changes on mean

power. The mean power found to peak at 16:00 hr before and after administration of melatonin and placebo to respective groups. As a result of melatonin administration mean power had dropped 3.33 watts (0.92%) at 08:00, 3.32 watts (0.90%) at 12:00 and 4.44 watts (1.18%) at 16:00 hr.

Melatonin

The acrophase of the melatonin in melatonin group before administration peaked at 1:20 and after administration it peaked at 2:27. A delay of 1 hr 7 min was found on melatonin group on serum melatonin. In placebo group before administration peaked at 1:19 and after administration it peaked at 1:21. MESOR difference of melatonin on melatonin group reveals no significant difference as the obtained t value of 4.115 is less than the required table value of 2.447 at $\alpha = 0.05$ for the df of 6. However, placebo group reveals a significant difference as the obtained t value of 2.909 is greater than the required table value of 2.447 at $\alpha = 0.05$ for the df of 6 are presented in Table – 1.

DISCUSSION

Anaerobic power or capacity is applicable to many sports and sports skills, and maximizing this ability is a top priority for athletes. In this study running based anaerobic sprint test (*RAST*) showed time of day effect and this was confirmed by the works of Sébastien, *et al.*, (2005). Maximal exercise of short duration demonstrates circadian rhythmicity closely in phase and shape to that of core temperature. This similarity applies to anaerobic power and anaerobic capacity (Reilly & Down, 1992). In the current study, the main findings of the study indicated that tympanic temperature peaks in the evening, anaerobic capacity showed significant time of day effect which peaked at 16:00 hr. Hill, *et al.*, (1992) in their study they confirm the time of day effect of anaerobic capacity and found to peak at 16:00 to 17:30 hr. In the current investigation, anaerobic capacity showed no significant effect of melatonin. A greater mean anaerobic occurred in the evening at approximately 15 watts compared to morning and 8 watts compared to afternoon. These results have commonly been found in the studies of Atkinson and Reilly (1995) and Atkinson and Reilly (1996). According to Drust (2005) and others, a general parallelism exists between rhythms of physical performance and core temperature. This parallelism is seen in many studies which have been carried out under normal conditions. A casual link between physical performance and core temperature has often been assumed, as a rise in temperature promotes the activity of muscles and nerves, metabolism, and the cardiovascular and respiratory systems.

Aldemir (2000) and others stated that during the early morning exercise the body clock causes the endogenous (*clock-driven*) component of core temperature to be increased at this time, therefore subjects were in a heat gain mode, and the thermoregulatory mechanisms were directed more towards heat conservation than heat loss. As a result, the heat load produced by the exercise induced a quicker increase of core temperature and a less rapid dissipation of the heat load by dilation of the vascular beds of the limbs (Aldemir, *et al.*, 2000). During the late afternoon, by contrast, a balance between the heat loss and heat gain modes was present since the endogenous component of core temperature was near its peak as a result; heat-loss mechanisms were engaged more readily. An interaction between the circadian rhythm of core temperature and changes in temperature produced by activity has been found in studies in mice and humans. Since the mechanisms for producing the circadian rhythm of core temperature and protecting the body against a heat load are very similar in humans, there is an interaction between the two. As a result of this, some aspects of thermoregulation varies at different times of the 24 h clock (Aldemir, *et al.*, 2000).

In humans melatonin has diurnal variations. The hormone secretion increases soon after the onset of darkness, peaks in the middle of the night and gradually falls during the second half of the night (Arendt *et al.*, 1982; Follenius, *et al.*, 1995; Pévet, 2000). This circadian rhythm of secretion plays an important role in its hormonal activity. The ingestion of melatonin may alter the normal circadian rhythm of melatonin secretion, but the reports on this effect are

inconsistent, probably because of variations in the timing of the administration of melatonin in relation to the light-dark cycle (Brzezinski, 1997).

Phase shifting of human circadian rhythms by melatonin was initially described in humans in the early 1980s. It has been established that melatonin administration at 10:00 enhanced phase shifting of circadian rhythms. The endogenous circadian rhythm of melatonin delays by 1hour 7 minutes in melatonin group that received 3 mg of melatonin. In this study, the phase – shifting effects of melatonin appeared to be dose dependent, with 3 mg dose producing phase delay. This is consistent with findings in humans (Burgess, Revell & Eastman, 2008) and rodents (Sharma, *et al.*, 1999). In melatonin administered group there was a significant increase in melatonin level at 12:00 hr which resulted from 3 mg of melatonin around 10:00 O'clock. This finding is in accordance with Dawson, *et al.*, (1996).

CONCLUSION

It is concluded that daytime melatonin administration significantly affect the power output in the daytime and it also alters endogenous melatonin rhythm. The daytime melatonin administration delays the sleep by 1 hour seven minutes which may be used counter jetlag for our athletes when competing in different time zone.

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Table-1.Circadian characteristics of melatonin and placebo group on melatonin

Circadian characteristics	Melatonin group		Placebo group	
	Before	**After**	**Before**	**After**
Acrophase	20° (1:20)	36° (2:27)	19° (1:19)	20° (1:21)
MESOR	21.4	26.4[†]	21.8	22.2[*]
Amplitude	24.4	18	23.8	24
r.value	0.74	0.30	0.75	0.74

[†][*]Significant at 0.05 level of confidence

[†]Within melatonin group comparison; [*] Within placebo group comparison

The Study of Effective Factors on the Efficiency of Production, Amount of Production and Production structure of Wheat, Peas and Barley Producers in Neyshabur

Zahra. Noori Tupkanloo

Member's of Scientific Boards of Department of Agriculture, College of Agriculture Neyshabur Branch, Islamic Azad University, Neyshabur Iran.

*Address for correspondence
Zahra. Noori Tupkanloo
Ph.D Student of Agriculture Economic,
Member's of Scientific Boards of Department of Agriculture,
College of Agriculture Neyshabur Branch,
Islamic Azad University, Neyshabur Iran
E.mail: Zahra.noori.2007@gmail.com

ABSTRACT

This paper, analyzes the effect of quantitative inputs such as fertilizers and improved seeds on production and total productivity as well as the effect of technical changes of qualitative inputs such as regions of the cultivation, the soil, and use or non-use pesticides on production, productivity and production structure of farmers. Estimated production functions for three crops wheat, barley and peas showed that the use of these inputs has increased overall productivity; also the users of these inputs have an average 22.19 % increase in production. Test results for the input showed significant improvement in peas and wheat functions and non-significant changes in barely which their functions are increasing, so extending production technique (i.e. using fertilizer and improved seed) causes technical changes of production by the farmers.

Key words: - production structure, total productivity, quantitative inputs, qualitative inputs, production techniques

INTRODUCTION

Agricultural sector is one of the oldest and major sectors of economy in developing countries like Iran. Although in the developing procedure of country this has lose some importance, a major share of domestic net production has composed job opportunity and non-oil foreign business and also in order to provide the food needs of country and to have some contributions in economic growth it has a specific status. Generally developing economy of country is

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affected by developing agriculture and the agriculture development is feasible trough production of different goods all over the country. We can mention some changes in technology and increasing the productivity among so many ways of increasing agricultural crops (Karbassi and Noori Toupkanloo, 2008). Economists focus so much on productivity and its role in development. Emphasis in this case is to an extent that some consider the underdevelopment phenomenon as a consequence of low productivity. Currently, higher productivity and better use of existing facilities actually have a higher level than a choice and has become a necessity .considering the elements of economic growth in developed and developing countries shows that the share of increasing productivity is more than the share of investment. We can say that today productivity has turned to nation's wealth and its continuant promotion is known as a survival condition for systems (Dashti et.al, 2009). Traditional and low production work, as well as raising awareness of farmers in the use of quantitative and qualitative inputs needed help.

Production and productivity of production inputs and technical change on the structure of the review has been. So Yohannes &Gungal (1991), CRP improved seed inputs and tillage farmers in the central highlands of Ethiopia to increase the efficiency of their production increase is 12 percent .Technological change leads to qualitative factors as well as the transfer function is high. Also Frisvold and Ingram (1995), in their study showed that among the 28 countries in SSA (semi-arid Africa) for the years 1985 to 1973 the growth in the use of traditional input, output, and input source, prevails in modern is of secondary importance.

Caparlber and Deny, (1986), using a production function showed that the productivity of the tea produced in Canada and America were low. Hayati and Peyman (1998) showed that factors of production such as seed, fertilizer, phosphate and nitrogen fertilizer statistically with chickpea production in Kurdistan, but no significant relationship between factors such as labor, pesticide and machinery production function in terms of statistically significant amount of production and the farmers did not use the optimal combination of production factors. Karbasi and NooriToupkanloo(2008) showed that labor force, consumption of chemical fertilizers and seeds has a statically significance relation with the production of comunium in Khorasan and the farmers do not use the optimized combination and do not use them logically and correctly. MousaNejad and Mehrabi (1996) showed that manure had no significant effect on the yield of pistachio in Rafsanjan city, qualitative factors such as soil texture, level of education of farmers and agricultural land ownership is also not produce significant differences in performance. Noting that Neyshabur has inherent talents in culturing wheat, barley and pea, and the major aim of agricultural committee is increasing the production and operation of these crops; in this study these crops are selected to be investigated.

METHODOLOGY

Using the production function, we can produce changes in the productivity of some important factors such as fertilizer and seed that we consider in this paper. Production function shows technical relationship between the product and the limiting factors of production (inputs) (Ferguson, 1971). The production function can be used to evaluate the efficiency of individual production factors (Peterson & Hayama, 1977). In the discussion of efficiency and quality of production inputs and technical changes are also noted. Technical changes that occur when the input is a bit more of these inputs may be used. Technical changes to increase the quality of inputs in the production of farm management as a result of developments that led to the reorganization of the structure are referred to. Progress in improving quality of farm management inputs is qualitative. For example, better management of farm labor will result in higher quality (Yohannes & Gungal, 1991). There are different production functions for the comfort and ease of production function Cobb – Daglass used. Its mathematical form is briefly described below:

$$Y = f(X, Z)$$

$$Y = \Pi_{i=1\ldots k} \, \beta_0 \, X_I{}^{\beta_i} \exp(\alpha_0 + \Pi^n_{i=1} \, \alpha_j Z_j + U) \qquad (1)$$

In this function Y represents the amount of product, X_i is tangible input vector and Z_j is a vector of quality inputs. If we take the logarithm of both sides of the function (1) it can be written as follows:

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$$Log Y = \delta_0 + \sum \beta_I Log (Xi) + \sum \alpha_j Z_j + U \qquad (2)$$

In this function:

$$\delta_0 = Log (\beta_0) + \alpha_0$$

For The three main products that were grown in the study area, the production function. In this function was estimated. In this function the dependent variable, the value of any of the products mentioned above and the independent variables included in terms of kilograms per kilogram of seed, fertilizer and cultivation kilograms per square meter. Other variables such as the use of herbicides, rocky land and the use of virtual variables are presented.

Total Factor Productivity (TFP)

The total productivity index is calculated as follows:

$$TFP_i = \frac{Y}{\sum \beta X}$$

Y is the total physical product and β, is the weight which in this study is estimated coefficients. This approach actually represents a total productivity and efficiency of each of the separate input does not specify the direction of the high application efficiency is measured (Salami, 1998).

To determine the increase percentage in production for an increase per unit in the input variable x, provided that all other factors are constant, the following formula is used (Jamison & Lau1982):

percent of increase in production = ($\frac{Y_1}{Y_0}$ -1)

When the Y_1 is the value of production per unit when input x is greater than its mean value by 0.5 and y_0 is the amount of product produced per unit when input x of babies whose mean value is less by 0.5 units. For a full transfer of beneficiaries and non-beneficiaries of each project, the value of this variable is defined dummy variable for farmers and other agricultural stakeholders a zero are considered. The dummy variable for the transfer of the production function or non-tangible difference in productivity as a result of the project has been used to. In this study, the normal technical change is calculated by the following model:

$$Y = e^{\delta_D} f(X, Z)$$

Where δ is dummy variable coefficient D (for D = 1 and a non-beneficial interest Winners D = 0). The subtraction factor productivity is measured intangible inputs X and Z, respectively, the input vector in equation (1) are tangible and non-tangible. Holding constant all other independent variables, the increase percentage in the interest of product design winners is measured as $(e^{\delta}$ -1)*100:

RESULTS AND DISCUSSION

To implement this research the cross-sectional data for the year 2012-13 on selected crops (wheat, peas and barley) was used. The population of the study is all wheat, barley and peas farmers in Neyshabur. To achieve the research objectives, data required to produce the questionnaires and interviews have been collected. For this research three areas named Sarvelayat in Neyshabur, the plains and Zebarkhan was selected and generally 180 questionnaires were completed. Farmers chose a two-stage cluster sampling was used. Thus, the first among in Neyshabur, three major regional producer of wheat, barley and chickpea acreage based on the product selected using random sampling each region, were selected by a villages, at the second stage through systematic random sampling, farmers in selected villages selected were interviewed after removal of suspicious and unreliable questionnaires, data were collected using the proposed formulas and functions were calculated for the results of these studies selected products are stored in table (1) and (2) are given.

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Cobb – DaglassProduction function for two groups of small farmers using inputs (fertilizer and improved seeds) or have not been used for three crops of wheat, barley and peas was estimated that the results has been presented in the table 1.

The production function in equation number (2) was determined for three crops, wheat, peas and barley. In the three products mentioned explanatory power of independent variables approval range from 0.75 to 0.98. Production function estimation results indicate that farm size is significant and positive impact on the production of most products has been studied. Of course this is under cultivation and the amount of product that can be said about the negative climate conditions, water is the cause of this negative relationship. Greater use of fertilizer input, field soil for growing crops will be more favorable. As was expected, given the significant positive effect on the amount of fertilizer production has been studied. Typically, if a decent amount of pesticide use will increase product value. Effects of pesticides on the crops studied, as expected, although the coefficient is not statistically significant. Peas grow best in soil moisture black, flat area with good soil moisture for crop growth. As you can see, this variable is significant and positive for product quality. All products were studied in the rocky ground cover, but no significant negative impact was seen on the value of the product.

As shown in Table (1) product stretches terms of quantitative inputs (seeds and fertilizer) for users of these inputs is lower than the other suppliers studied. This surprising result may be excessive use of inputs by the users of this input is compared to other manufacturers. Furthermore, the figures in this table also shows the difference between the two inputs , the input elasticity for consumer seeding for barley, wheat and peas were 0.65 , 0.36 and 0.46 respectively for the chemical fertilizer input of 0.4 , 0.123 and 0.57. Thus it can be stated that the efficiency of producers who have used the two inputs are being studied further.

Total Factor Productivity (TFP)

The differences in total productivity index of consumer fertilizer and improved seeds to other farmersare, respectively, equal to 0.96, 0.79 and 0.52 for barley, wheat and peas –so we can say that improve of quantitative inputs leads to increase of agricultural productivity.

Restructuring of production and technical change of quantitative and qualitative inputs

Changes in the production structure of wheat , barley and peas as a result of increased use of fertilizer and improved seeds and improved quality of inputs such as crop -growing regions , rocky land and use or non-use of pesticides by growers is briefly presented in the table 2 .The figures written in the table2, shows that the test for changes in every production trend among users of these inputs compared to other suppliers , shows a significant structural change in production function of pea and wheat in 95 and 99 percent and an non-significant transition in barley. Insufficient resource offer to small farmers and traditional distribution is of reasons of non-significance structural changes for barley production function. There was no significant transfer in the atmosphere to produce no increase in production due to the negative effects of insects and pests on the production of this product.Component test for transport in the intercept shows, significant positive differences for all products studied. This means that a normal technical change in the production function using inputs other than farmers for three products of this study.Transfer of production to the consumers is high, so a large part of the technical changes in production are due to expanded production techniques (i.e., use of improved seed and fertilizer inputs).In order to validate the results of t-test we can use it for differences in the intercept. T test result shows a significant statistical difference.Non-significance difference in quantitative differences may be the result of the fact that quantitative input qualities used by suppliers are fairly like that of suppliers using inputs conventionally. The results also show that users of fertilizer and improved seedshave an increase in production of barley by 23.57 percent, 25.14 percent for wheat and pea yield increased by 17.87 percent.Because total factor productivity in three crops of this study for the users of quantitative inputs were high and the amount of production of users of these inputs in all these crops were high comparing the other users.

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CONCLUSION

The results of this study can be used for traditional farming systems and be effective with low production. Also the results of this study could be used by farmers in raising awareness of them to use necessary qualitative and quantitative inputs.

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Table 1 - Summary of estimates of the Cobb – Daglass for the selected which was grown by users than other farmers of the two inputs

peas		wheat		Barley		Output
non users of these inputs	users of these inputs	non users of these inputs	users of these inputs	non users of these inputs	users of these inputs	input
5.85 **(1.04)	6.55 *(1.72)	0.18 (0.08)	0.06 (0.12)	8.55 (1.16)	200 (0.20)	constant
0.75 (3.56)	0.85 ***(4.45)	1.03 ***(24.52)	0.95 ***(39.29)	-0.98 ***(-7.48)	-.91 (25.1)	Cultivation
1.78 (0.84)	1.29 (1.44)	0.37 (0.84)	0.007 (0.39)	-0.71 (-0.61)	-0.06 (-0.38)	improved seeds
1.07 *(1.38)	0.5 *(0.81)	0.17 ***(0.707)	0.04 ** (0.62)	0.45 **(0.88)	0.05 (0.57)	fertilizers
-2.25 (-1.12)	0.42 (0.31)	0.156 (1.25)	-0.029 (-0.18)	0.60 (0.90)	0.075 (0.65)	pesticide
1.27 (1.26)	0.74 (1.12)	0.05 (0.52)	0.133 (1.71)*	0.5 (1.16)	0.1 (1.00)	rocky ground cover
0.92 (0.78)	-0.86 *(-1.06)	-0.05 (-0.43)	-0.11 (-1.20)	-0.53 (-1.31)	(-0.59)	region

Resource: study results   *significance in 10% **significance in 5% *** significance in 1%

Table 2 - Summary of the results of Cobb – Daglasstest for structural change examinations

Test for intercept term inputs (Quality inputs)	TEST for seed and fertilizer inputs (Quantitative inputs)	Test for all slope coefficients	Output
0.968*	0.99	0.82***	barley
0.08**	2.76*	1.165***	wheat
0.532*	0.176*	0.57**	pea

RESEARCH ARTICLE

Performance Evaluation of Main Office of Value Added Tax in Tehran City by EFQM Model

Mohammad Masihi* and Farshid Fereydouni

Financial Management, UAE Branch, Islamic Azad University, Iran.

*Address for correspondence
Mohammad Masihi
Financial Management,
UAE Branch,
Islamic Azad University, Iran
E.Mail: m.masihi@hotmail.com

ABSTRACT

Based on the importance of replacing the tax incomes instead of oil incomes, the value added tax law was enforced from the beginning of October 2008. The main office of the value added tax of Tehran had major role in successful implementation of the law by considering the number of tax payers and the money received. The present study evaluated the performance of the mentioned main office by EFQM model. The evaluation was done based on 9 criteria of EFQM model, revised in 2010 and it was done by the self-administered questionnaires. The study population was all the top and middle managers of the main office including the managing director, deputies and chiefs of tax affair. According to the study population limitation, the sampling was not done. According to the results, the performance of the main office was above the average.

Keywords: Tax, Value added tax, Performance evaluation, Organizational excellence and EFQM model.

INTRODUCTION

The development of tax system is one of the main issues of economic development in Iran and replacing the oil revenue with tax revenues is one of the most important issues of social and economic development plans. Doing an important part of economic activities in underground economy and the lack of determining the tax practically and seriously is as one of the important priorities of Iran economy caused that tax revenues to GDP ratio is not greater than 8% at the best years and it is far from the predicted goals in development plans. Also, it is low ratio compared to the other countries (Bird, 1992). Thus, the lack of achieving the predicted goals besides the current important conditions of Iran economy due to economic sanctions made identification, evaluation and improving the quality of

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tax taking process unavoidable by the tax affairs organizations and orientation of the mentioned organization as excellent organization is taken into consideration (Taghizadeh and Noorossana, 2010). The Foundation is in the tradition of the American Malcolm Baldrige Award and was initiated by the European Commission and 14 European multi-national organizations in 1988 (Nabitz et al., 2000). The present study introduced EFQM (European quality management foundation) as a self-assessment framework causing continual improvement of the organizational activities. The performance of the main office of value added tax of Tehran city is also evaluated. Indeed, the lack of evaluation and control system in an organization means the lack of communication of the internal and external organizational beneficiaries and caused the rapid inefficiency of the organization.

The organizational excellence model

Excellence is one of the highly applied terms in economic literature in the late 20, 21th century. Various parts of economic sectors look for excellence. The organizational excellence is a framework for performance evaluation that is designed and developed by a group, institution, country and organization for the comparison, selection and improving the organizations performance and profit and non-profit units (Bou-Llusar et al., 2009). Excellence refers to the best performance of management of an organization to achieve the great results and it is arising from the fundamental concepts of management including achieving balanced results, increasing value of the organization, leadership with caution, management by the processes, success through the employees, developing the creativity and innovation, building the participation and responsibility for stable future (Wongrassamee et al., 2003; Andjelkovic Pesic and Dahlgaard, 2013).The model is consisting of 9 criteria, the first 5 criteria are enabler factors covering what an organization does. They are the factors making the organization empowered to achieve the excellent outcomes. The next four criteria are the outcomes achieved by an organization and indicated the achievements of implementation of enabler factors. These indices help the organization toward organizational excellence and the relationship between each of the criteria and scores is as followings.

Leadership

The excellent organizations leaders form the future and act as a model for values and ethics and they inspire others. They are flexible and enable the organization predicts the condition timely to be sure of the continual success of the organization.

Strategy

The excellent organizations implement their mission via creating beneficiary-centered strategy. The policies, plans, goals and processes are developed to fulfill strategy.

People

Excellent organizations respect their employees and create the culture allowing the fulfillment of personal and organizational goals with mutual benefits. They encourage the employees and create motivation and enable them to use their skills and knowledge for the organization benefits.

The Partnership and Resources

The excellent organizations plan and manage the foreign participations, providers and internal resources to support the strategy, policies and effective process operation. They are sure; they can manage the social and environmental effects effectively.

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Processes & products & services

The excellent organizations design and manage the processes, products and services to create increasing value for the customers and other beneficiaries.

Customer results

Excellent organizations are create and agree about a set of performance indices and relevant achievements to control successful implementation of the supporting policies based on the customer's needs and expectations.

People results

The excellent organizations plan and manage the foreign participations, providers and internal resources to support the strategy, policies and effective process operation. They are sure, they can manage the social and environmental effects effectively.

The society results

Definition of excellent organizations: It creates and agrees about a set of performance indices and relevant achievements to control successful implementation of strategies of the society, environment and supporting policies based on the external beneficiary needs and expectations.

Key results

Definition of excellent organizations: It creates and agrees a set of the key financial and non-financial results to control successful implementation of supporting strategies and policies based on the needs and expectations of the key beneficiaries.The excellent organizations plan and manage the foreign participation, providers and internal resources to support the strategy and policies and effective operation of the processes. They are sure, they can manage the social and environmental effects as effectively.

The evaluation of the performance of tax affairs of Sanandaj city based on balanced scorecard model.Salavati et al., (2012) in a study considered the success key of the companies in information era as investment and management on intellectual assets. Thus, BSC is used as an effective tool to meet our demands and by translating the intangible assets to real value for all beneficiaries in the organization allowed the organizations to implement the distinctive strategies successfully. The present study aimed to evaluate the tax affairs performance of Sanandaj city in accordance to BSC. In this study, the researcher designed a model based on the strategic map of Kaplan and Norton in state and non-profit organizations. He used real statistics and questionnaires based on 5-item Likert scale to analyze four aspects of BSC in tax affairs of Sanandaj city. The analysis results of four aspects showed that the first aspect (financial aspect) and second aspect (tax payers' aspect) were supported and the third aspect (internal processes aspect) and fourth aspect (learning and growth aspect) were not supported.

The study of the performance of Municipality of region 3 and 18

Ehsanifard and Ehsanifard (2013) analyzed the satisfaction of the citizens of the municipality performance of Tehran by excellence model as:

The mean satisfaction of the citizens of regular collection of garbage in region 3 of Municipality 64.33 of 100 was the highest and in 18th region with 37.33 of 100 was the lowest. Averagely, the citizens satisfaction of regular garbage

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collection was 54.35 of 100. 2- The mean satisfaction of controlling the channels, ponds and water in region 3 with 53 of 100 had the highest satisfaction and region 18 with 22.66 of 100 had the lowest satisfaction. Averagely, the mean satisfaction of the citizens. Averagely, the mean satisfaction of the citizens of improving the traffic condition was 34.6 of 100. 4- The mean satisfaction of the asphalt condition of the passages in region 3 with 39.33 of 100 had the highest satisfaction and in 18th region with 1.21 of 100 had the lowest satisfaction. Averagely, the mean satisfaction of the citizens of asphalt of the passages was 30.66 of 100. 5- The mean satisfaction of the condition of green space in region 3 with 55.33 of 100 was the highest and in region 18, with 26 of 100 had the lowest satisfaction. Averagely, the mean satisfaction of the citizens of controlling the green space was 36.52 of 100. 6- The mean satisfaction of the continual communication of Municipality with the citizens in region 3 with 22.66 of 100 was the highest and in region 18 was the lowest of 100.

The mean satisfaction of having access to public transportation in region 18 with 6033 of 100 had the highest and in region 3 with 34.66 of 100 had the lowest. Averagely, the mean satisfaction of the citizens of availability of public transportation was 50.66 of 100. 8- The mean satisfaction of the behavior of the municipality authorities with the clients in region 3 with 48.33 of 100 was the highest and in region 18 of 100 was the lowest. Averagely, the mean satisfaction of the citizens of the behavior of the municipality authorities with the clients was 32.63 of 100.

The mean satisfaction of the speed of work in municipality in region 3 with 44.66 of 100 had the highest and in region 18 with 23.66 of 100 was the lowest. Averagely, the mean satisfaction of the citizens of the speed of work was 30.89 of 100. 10- The mean public satisfaction of the citizens of municipality performance in region 3 with 5.49 of 100 was the highest and in region 18 with 31.33 of 100 was the lowest. Averagely, the mean public satisfaction of citizens of municipality performance was 40.70 of 100.

Thus, averagely, the highest satisfaction of the citizens of municipality performance in collecting the garbage with 54.35 score of 100 and the lowest satisfaction was dedicated to the continual communication of the citizens with the municipality with 19.36 of 100.According to the researches, the speed of the work by municipality had the greatest effect on citizens' satisfaction of the municipality performance.The behavior of the municipality authorities with the clients had influence on citizens' satisfaction of the municipality performance.Continual communication of the municipality with the citizens had effect on satisfaction of the citizens of the municipality performance (lowest satisfaction)

Research Methodology

This study was descriptive-cross section design. The study population was all the top and middle managers of the main office including the managing director, deputies and chiefs of tax affair. According to the study population limitation, the sampling was not done and the questionnaire was distributed among people. In this study, self-administered standard questionnaire based on organization model EFQM was used. The questionnaire was closed and including 50 questions based on progress percent. The data were analyzed by descriptive method. The reliability of the questionnaire was 0.75 by Cronbach's alpha. The characteristics of the society were described based on 9-item criteria of EFQM model.

The analysis of the leadership indices in Table 1 showed that the top leaders of the main office are available on time to the tax payers and employees. The audiences believe that the managers have little role in formulating the strategy. According to the sample population, the practical measurements and conduct of the managers were consistent with the values of main office.

The analysis of driver indices in Table 3 include leadership and strategy indices and the strategies of main office were in accordance with the goals. The top managers were successful in doing their management activities (planning, organizing and coordination). According to the study population, the study of pioneers' criterion of main office was

relatively good.The analysis of the people indices in Table 4 showed that the plans of the people are directly arising from the strategic plans and goals. According to the sample population, all the employees participated to improve the performance of main office. The audiences believed that the efforts of the employees to improve and develop success of the main office are acknowledged.

The analysis of beneficiary indices in Table 5 showed that collaboration with the beneficiaries led to the identification and achieving more opportunities in services and performance and the main office approach guaranteed its goals and values to apply financial resources, strategic goals. The top managers achieve the high quality services by using intellectual asset of the co-workers as best. According to the study population, the availability of the main office to the data of beneficiaries and tax payers including (performance, process, trust and satisfaction) was low. The audiences believed that the shortage of physical assets including the buildings, equipment influences the benefits of main office and strategic goals of the main office.

The analysis of the processes indices in Table 6 showed that controlling the activities and services by the standards and requirements explained in (ISO 9000 ISO 14000) was relatively weak. The approach of the main office identified the needs of the tax payers by a reliable method and attempted to respond to the needs identified by the tax payers on time. The main office attempted to improve the support activity of the main services continually (information technology, legal and office) and by identification of the opportunities and needs via the data analysis of the tax payers improve the processes of operational data of other main tax offices.

The analysis of the system indices (employees, beneficiaries and processes) in Table 7 showed that strategy conformity and absorption and the goals of the main office of the people were not successful but the main office attempted to coordinate the employed employees with the organizational norms and value and by management styles, the employees participation in decision making is increased. The availability of the main office was limited to the information of the beneficiaries and tax payers including (performance, process, their trust and satisfaction and etc.). The main office via improving the internal processes identified the requirements of the tax payers and met their demands timely. Totally, according to the audiences, the system criterion was in relatively good condition.

The analysis of the enabler factors indices (driverand system) in Table 8 showed that according to the audiences, the main office by score 326 of 500 was in good condition based on the enabler factors.The analysis of the indices of the customer results in Table 9 showed that according to the target population, the survey of the tax payers was face to face and the information received by the tax payers is not documented and survey is done at management level and it is far from the ideal conditions.

The analysis of the indices of the employees' results in Table 10 showed that absence, disease and etc indices are measured in main office and the appropriate decisions are made. Thus, the survey is done of the employees informally and the results of survey are not documented.The indices of the society results in Table 11 showed that according to the audience, the activity of the main office is compared with other similar offices and helped the welfare of the beneficiaries relatively and had good perception of the results of main office performance.

The analysis of the indices of key results of performance in Table 12 showed that according to the population view, the main office was excellent and active in achieving the key goals of claim and dealing with the file of the tax payers and this achievement is compared with previous years of the main office and the function of other offices.

The analysis of the main office results in Table 13 showed that according to the sample population, the key results, society results, employees and tax payer results and main office results were acceptable. Thus, we can attempt to improve it.

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Evaluation Results

The analysis of the indices of the evaluation results in Table 14 showed that according to the population study, the performance of the main office of value added tax by organizational excellence model was above average.

CONCLUSION

- Value added tax main office of Tehran was active in achieving the key goals as claim and controlling the tax payers' field and this achievement is compared with the previous years of main office and the function of other offices.
- The top managers of main office are available to the tax payers and employees and they respond to the tax payers and employees and investigate the problems effectively and fulfill the goals of main office and they are practical model for the values of main office.
- The absorption and conformity strategy and goals of main office of the employees were not successful but the main office attempted to coordinate the employed staffs with the organizational norms and values and by various management styles increased the employees participation in decision making. Thus, all the employees are familiar with the plans of achieving the goals of main office in their work field.
- The main office approach guarantees the strategic goals, the goals and values of main office in using the financial and human resources. The top managers by using the intellectual assets of the co-workers attempt well to achieve the high quality services.
- Support activity (information technology, legal and office and etc.) is associated with the relatively weak main services and the data of the tax payers, operational data of other beneficiaries are available hardly to the users. The availability of the main office to the information of the beneficiaries and tax payers including (performance, process, trust and satisfaction and etc.) is low.
- The shortage of the physical assets as buildings, equipment, influences the benefits of main office and strategic goals of main office.
- The managers of main office of value added tax had no important role in designing the main office strategy and in case of changing the main office strategy, should wait for the decisions of the superior to adapt the activities of the main office with new strategy. This reduces the maneuver power of the manager in macro decisions and the managers act slowly.
- The survey of the tax payers is face to face and the information received of the tax payers is not documented and survey is done at management level.
- Survey of the employees is done unofficially and orally and the results of the survey are not documented.
- The control of the activities and services is not done by the standards and requirements explained in (ISO-14000, ISO 9000).

Recommendations for the managers and strategists

- The tax affairs organization should consider the views of the top managers of the main offices in developing the strategy and give more freedom in correction of the new strategy.
- The tax affairs organization should acquire the views of main offices of tax in employment and employ the staffs based on the needs of the offices.
- For easy access to the performance and process data of the tax payers and beneficiaries, the performance and process data of the tax payers and beneficiaries should be linked to the tax affair organization via some organizations as goods and services stock market, customs office, industries ministry and other organizations and institutions. The data collected from the tax units can be given to a department to turn the data to information and the data can be given to the supervising units rapidly.

- Main office of value added tax of Tehran documents survey of the tax payers and employees. It is recommended to create private site of value added tax main office and have survey of the tax payers and employees.
- To meet the benefits of main office and conformity of the goals with the organization strategy, the required physical assets as buildings, equipment are given to the main office of value added tax of Tehran.

The recommendation for future studies

- In future studies, the performance of the main office of value added tax of Tehran city is investigated via the views of the tax payers and employees of the main office.
- In future studies, the effect of employees' qualification and their loyalty on performance of the main office of the value added tax of Tehran is investigated.

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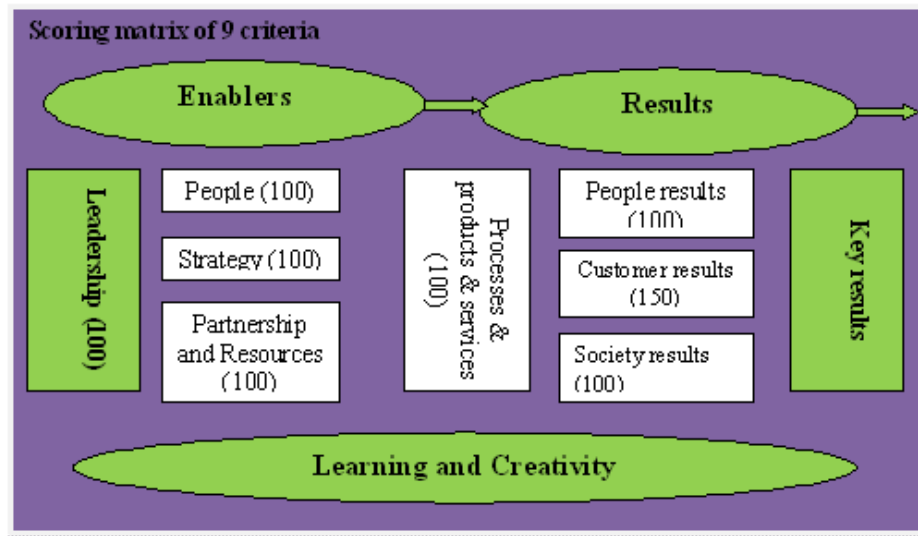
Figure 1- Scoring matrix of 9 criteria

Table 1- The leadership indices

	Participation in formulating the strategic statement	continues improvement of main office Structure and process management system	Practical measurements, supporting and emphasize on values of main office	employees access and constructive and timely acknowledgment	Meeting the tax payers and beneficiaries
current situation	8	13	14	15	18
Ideal situation	20	20	20	20	20
Deviation of the ideal condition	12	7	6	5	2

Table 2- Strategy indices

	Formulating the strategy and plans of activity In accordance with the internal and external data	Supporting the strategic goals and values of main office by the policies, plans and goals	Familiarity of the most of the employees with the plans to achieve the goals of main office In work place	The ability of recognizing the methods of appropriate time of changing the strategies
current situation	16	19	18	16
Ideal situation	25	25	25	25
Deviation of the ideal condition	9	6	7	9

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Table 3- The driver indices (leadership and strategy criterion)

	Leadership	Strategy	Drivers
current situation	68	70	138
Ideal situation	100	100	200
Deviation of the ideal condition	32	30	62

Table 4- People indices
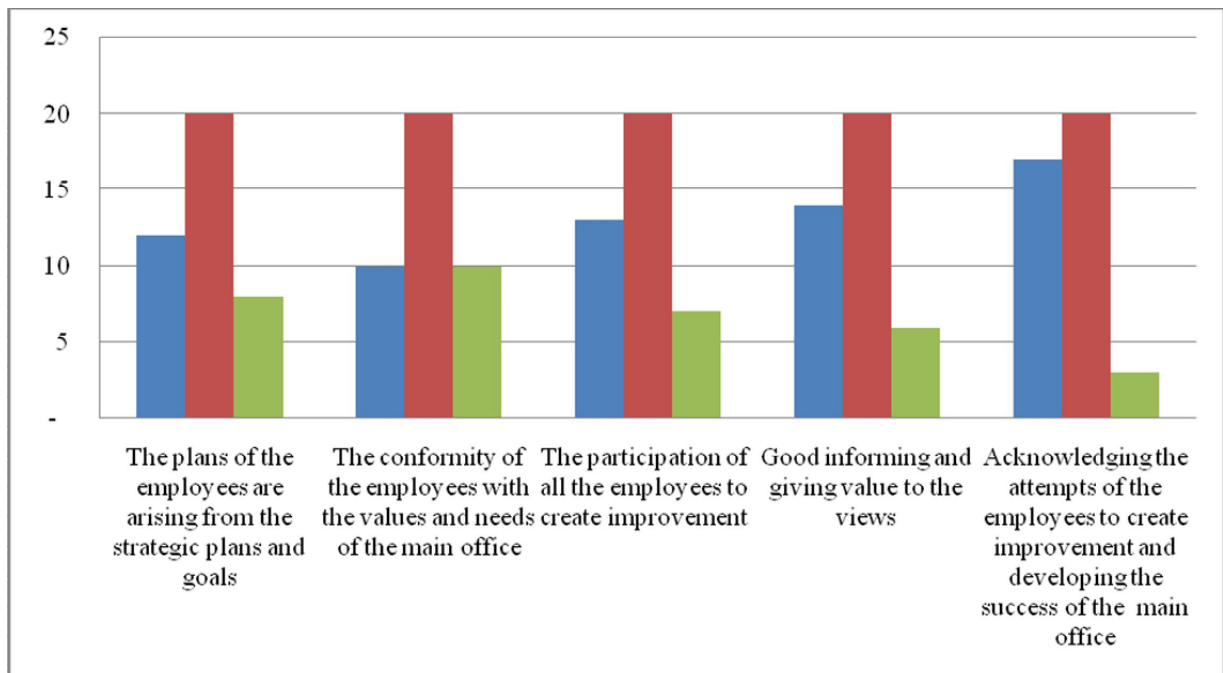
Table 5- Beneficiary indices

	Communication in collaboration of other beneficiaries leads to achieving more opportunities in services and high performance	Easy access to information including the data of beneficiaries and tax payers (trust and satisfaction)	The approach guaranteeing the application of financial resources along with the strategic goals and values of main office	The physical assets including the buildings and equipment to achieve the benefits of main office and strategic goals	Using the intellectual asset as best to achieve the advantages in providing services
current situation	13	8	14	8	12
Ideal situation	20	20	20	20	20
Deviation of the ideal condition	7	12	6	12	8

Table 6- The processes indices

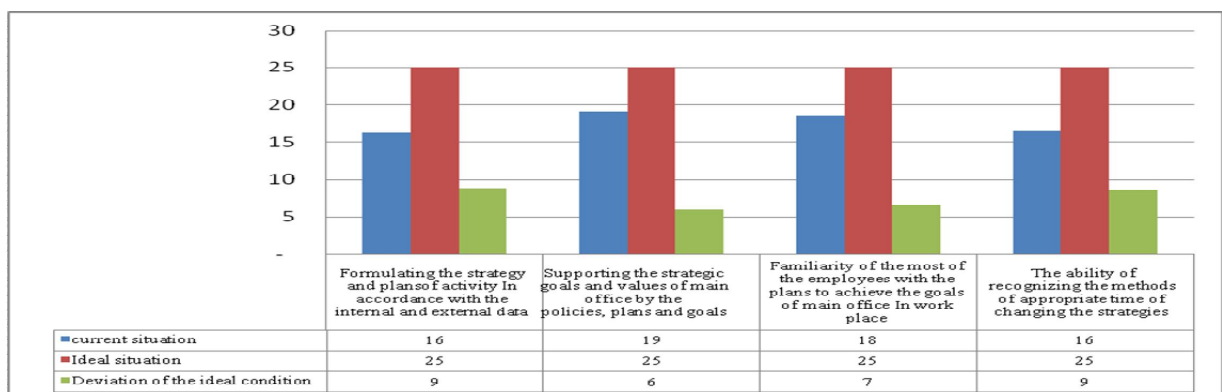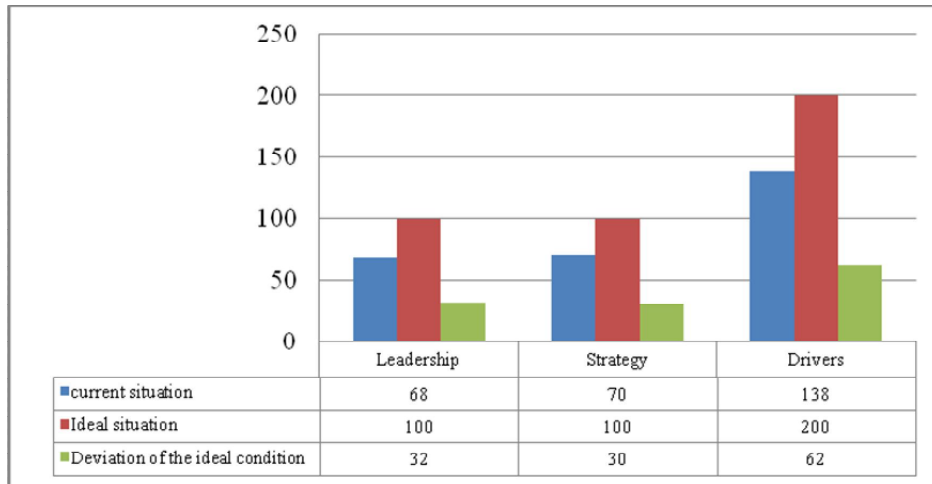|	Controlling the activities and services by using the explained of requirements of ISO 14000; ISO 9000; ISO 14000;ISO 90000	The complete method of main office to determine the needs and expectations of the tax payers	Timely meeting the demands of tax payers	The identification of the opportunities and needs via the data analysis of tax payers, operational data for continual improvement of process	Using detailed method to evaluate the implementation and effectiveness of control systems of main office activities	Complete solution of the problems instead of temporary solution	Improving the support activity (legal and office information technology and etc.), continual, at least in line with the activities and main services
current situation	7.775625	9.6525	8.9375	8.9375	9.47375	9.47375	7.954375
Ideal situation	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Deviation of the ideal condition	6.524375	4.6475	5.3625	5.3625	4.82625	4.82625	6.345625

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Table 7- The indices of system (employees, beneficiaries and processes)

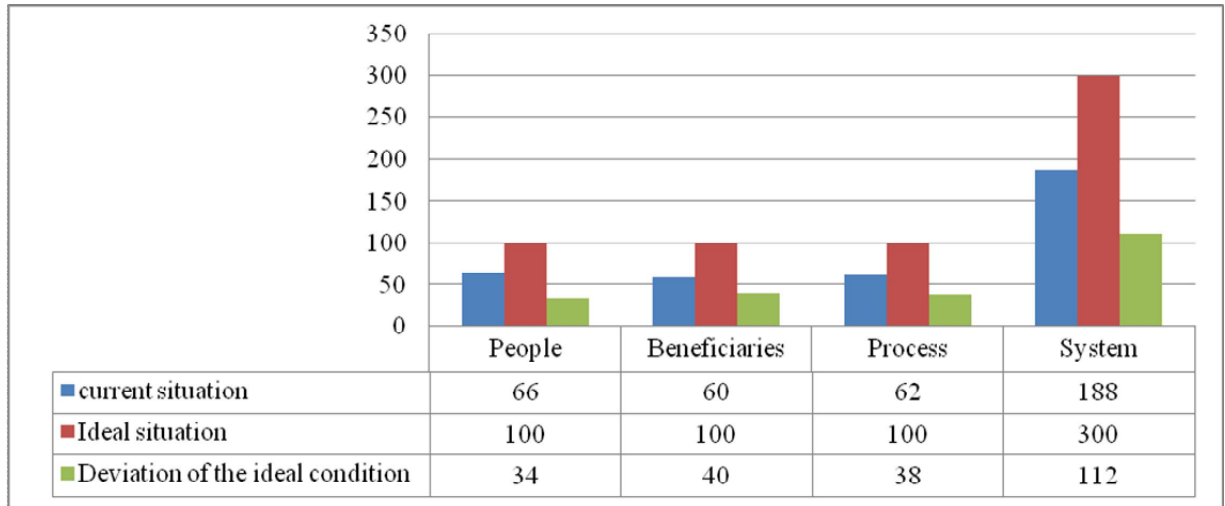|	People	Beneficiaries	Process	System
■ current situation	66	60	62	188
■ Ideal situation	100	100	100	300
■ Deviation of the ideal condition	34	40	38	112

Table 8- The enabler factors indices (driver and system)

	Pioneers	System	Enabler factors
■ current situation	138	188	326
■ Ideal situation	200	300	500
■ Deviation of the ideal condition	62	112	174

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Table 9- The customer results indices

	Communication with the tax payers to achieve trust via the following indices (complaint, acknowledgment of the tax payers and etc)	Internal indices of the tax payers' satisfaction showed positive trend of the performance of the main office.	The internal indices associated with the satisfaction of the tax payers compared with the main office	Determining the tax payers' satisfaction via survey	Separating the internal indices of tax payers to identify new tax payers	The results of survey of the tax payers of the main office performance is shown positive	The results of tax payers survey are compared with the peer main office	The common methods of real identification of the tax payers satisfaction	The survey result of the tax payers are used continually for improving the performance of main office
current situation	11.45	11.46	10.17	5.64	5.74	4.46	5.07	10.89	6.99
Ideal situation	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Deviation of the ideal condition	5.22	5.21	6.50	11.03	10.93	12.21	11.60	5.78	9.68

Table 10- The indices of the people results

	The indices of absence, disease, hastening, satisfaction and morale of the employees are evaluated.	A survey is made of the employees, work place, job expectations, reward and education	The internal indices are compared with the main office	The employees are aware of the survey results and managers act based on survey	The employees' satisfaction is improved.
current situation	14	8	9	9	10
Ideal situation	20	20	20	20	20
Deviation of the ideal condition	6	12	11	11	10

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Table 11- The indices of population results

	The results led to the welfare of the beneficiaries and society	The activity of the main office is compared with other offices.	Good public perception of the beneficiaries and society of the results of the main office
■current situation	16.96	21.31	24.64
■Ideal situation	33.33	33.33	33.33
■Deviation of the ideal condition	16.34	11.99	8.66

Table 12- The indices of key results of performance

	The results of key achievement (claim amount, control reports and etc)	The results of key achievement (claim amount, control reports and etc) compared with other main offices	The results of key achievement (claim amount, control reports and etc) separated	All activities of services presentation are measured	The results of activities show the improved trend.	The results of the activity of services are compared with other offices	The results of administrative and support activity are developed
■current situation	16.39	13.50	13.72	11.57	13.50	14.57	17.36
■Ideal situation	21.43	21.43	21.43	21.43	21.43	21.43	21.43
■Deviation of the ideal condition	5.04	7.93	7.71	9.86	7.93	6.86	4.07

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Table 13- The indices of the results of main office

	The tax payer results	Employees results	Society results	Key results	Main office results
■current situation	72	50	63	102	287
■Ideal situation	150	100	100	150	500
■Deviation of the ideal condition	78	50	37	48	213
■current situation (%)	48	50	63	68	57
■Deviation of the ideal condition (%)	52	50	37	32	43

Table 14- Indices of evaluation results

	Existing condition	Ideal condition	Deviation from good condition
Enabler factors	326	500	174
Main office results	287	500	213
Performance evaluation result	613	1000	387

RESEARCH ARTICLE

An Evaluation of Theoretical Foundations for Ta'zir Executions in Imamia Jurisprudence

Hossein Rahimi*, Mehdi Nick Nafs and Bahram Farahmand Saaber

¹Department of Criminal Law and Criminology, Faculty of Advanced Studies, Bushehr Branch, Islamic Azad University, Bushehr, Iran.

*Address for correspondence
Hossein Rahimi
Department of Criminal Law and Criminology,
Faculty of Advanced Studies,
Bushehr Branch,
Islamic Azad University,
Bushehr, Iran.
E.Mail: hossein.rahimi2020@hotmail.com

ABSTRACT

This study aims to evaluate theoretical foundations of ta'zir executions in Imamia jurisprudence; it explains ta'ziri punushments and ta'zir executions in Imamia jurisprudence with respect to execution as a punishment for some crimes. Although most of jurists belive that ta'zir punishments should be less than hadd punishment and some rely on ta'zir punishment by limiting it to just flogging, reasons, including the obligation to preserve the Islamic state and the individual and community interests, disposal of war against God and the state (Moharebeh) and prevention of vice can be a permit for the death penalty in the form of ta'zir. In order to afford information for descriptive-analytical evaluation, books, periodicals, articles, databases and networks were used for data collection. According to provided tools, the researcher explains the definitions and dimensions of the issue after gathering available sources and a library studies. Then, he describes the contents and offers a general and comprehensive analysis of the proposed hypotheses and variables (from different angles and aspects. Finally, after summarizing the arguments, parameters and analyses, this paper presents a new definition by extracting its favorable results from the context of the issue.

Keywords: Execution, Ta'zir, Punishment, Imamia jurisprudence

INTRODUCTION

By referring to a rule, ta'zir for all sins, some jurists argue that ta'zir is the basic punishment for both venial sins and mortal sins; but others believe that ta'ziri punishments is assigned for only mortal sins, and we are not allowed to punish those who commit venial sins.In the definition of ta'zir, the status of "not having been specified" is introduced as base. In *Canons of Ta'zir*, the author states, "the class of punishments that are fixed for certain crimes are called hadd and the punishments for the rest of crimes are called ta'zir" (Mohaqiq Helli, 2010).

In *Masalik*, "lack of command" is stated as base as he says, "The base of ta'zir is lack of command, and people often deserve it" Shahid Thani (1998). The reason for stating the adverb "often" is the existence of rare opposite cases in traditions. Islamic traditions have appointed some specific punishments for specific ta'ziri crimes that some jurists believe in the exactness of the punishment without any intensity or moderation. Apart from such ta'ziri punishments, the legislator is allowed to make a decision based on the situation. Therefore, for punishing most of the convicted individuals according to ta'zir, the principle of "not having been specified" is considered. It should be noted that the appointed punishment by Imam for a particular crime had been case-depended and it is not necessary to follow the same procedure; thus, many traditions and sayings, and consequently jurists' awards, the quantity and quality of punishment is optional and depends on the opinion of the governor (Sheikh Tusi, 2008); even jurists's consensus confirms this method (Sheikh Tusi, 2003).

The Shiite jurists' instance in talking about the quality of ta'ziri punishment is scourge so that some jurists have established a principle in this regard and claims, "The principle of punishment for ta'ziri crimes is scourge, and penalties such as imprisonment, battery, financial penalties, etc. are inconsistent with the principle and illegal. The specific excluded cases follow the insistence of religious sources on a particular type of punishment; in the other cases, ta'zir is performed by flogging guilty". The above principle has been established because most of the jurists have discussed ta'zir in their books as a punishment "gentler than hadd." They interpret the expression by laying their base on two grounds: first, ta'zir must be carried out the same as hadd punishments performing by lash; second, the number of lashes must be less than the number in hadd. Due to the above argumentations, the principle of punishment by whip in ta'zir has been established. At the same time, some jurists believe that whip is included in ta'zir; for instance, Allameh Helli announces, "Ta'zir is performed by whip, imprisonment, rebuked or …" (Allameh Helli, 2010). As he continues in "customs of judgment and sentencing", "A judge must consider prisoners at the beginning of his legal career and he must free all innocent or ta'ziri victims" (Allameh Helli, 2010).

While one may conclude from this sentence that Allameh does not believe in imprisonment as ta'zir (and he believes in the freedom of ta'ziri victims), but according to his former discussions, he has accepted ta'zir as a proper punishment and he comments on their freedom based on the possibility of their innocence, or the dissenting opinion of judge and former judge in ta'zir.However, ta'zirat refers to the class of punishments that the religion has not determined any specific convicted person, and they are performable according to the governor idea and due to his discretion. The present study seeks to investigate whether ta'ziri punishments is less than hadd punishment and are summarized, as jurists say, in just some whips even though if their crime is so heavy that bring huge damages to society and threatens social, political and economic security; or can we appoint a punishment heavier than whip? For example, while with the existence of all predicted conditions, a thievery of an object that has a trivial price results in the hand amputation, is it possible to say that a billion Rials defalcation of state treasury, which damages the economic security and reputation of Islamic society and its system, deserves just some lashes. Since the religion has not appointed a specific punishment for defalcation, consequently, it is considered as ta'zir and ta'zir is less than hadd, are some lashes enough?

It is raised in Shiite religious books that "ta'zir is gentler than hadd;" the books have not differentiated between intensity and weakness of crimes. Intensity and weakness of crimes are effective in the quantity of punishments,

which are of course less than hadd; for instance the minor offenses deserves ten lashes and major ta'ziri offenses deserves the number of lashes less than hadd.

Ta'zirat and State Decree for Capital Offence or Crime

Ta'ziri punishments are the class of penalties that are not fixed for certain crimes and related punishments is decided by the state governor according to the intensity of offences, the personality of convicts, the situation of the crime and space-time conditions.

Death Penalty as a State Decree

If a person committed a sins considered as venial sins by religion, he deserves ta'zir; his ta'zir is performed basically by whipping less than hadd. Of course, in some cases the guilty is punished by imprisonment, exile or other punishments that is restrictive more for the guilty. However, some times the crime is so intense that endangers the bases of Islamic state, but it is considered among venial sins. For example, jurists have limited prohibited hoarding in some specific objects. It means that hoarding of foods like salt, dates, raisins and wheat are legal. Therefore, one can hoard these foods are he deserves no punishment.In this manner, when Islamic society is endangered by illegal behaviors of some jobbers or offensives, Islamic state (government) can impose tough rules in order to deal with economic instability, inflation and cultural and political crises etc. The concrete examples of such situations are economic crimes such as illicit drug trade or purchase and sale of currency and prohibited goods as well as serious damages to cultural values such as establishment of corruption centers or behaviors threatening Islamic values.

In the case of expediency in order to maintain Islamic system and, Islamic government can even appoint ta'ziri punishment of execution as a state decree; particularly with regard to the fact that many of Islamic rules can change due to time and space requirements. Of course, the change does not affect fixed rules of Islam presented in God's book and the tradition of infallibles; but it affects other rules providing that reason can induce the exact expediency and corruption of rule.

Primary and Secondary Decrees and Tough Ta'ziri Punishments

With about argumentations on state decree, It can be concluded that if we regard tough ta'ziri punishments as state decrees, we can not consider them as secondary decrees. Real decrees are divided in two groups of decrees including real primary decrees and secondary decrees.

Real Primary Decree

This class of decrees refers to verdicts issued for a situation without considering the exceptional circumstance with respect to interests and corruptions.

Secondary Decree

Secondary decree is issued due to the exceptional circumstances of competent persons such as emergency, reluctant, fear, helplessness, sickness, insolvency, loss, etc. in specific subject; in other words, secondary decree are bound to the occurrence of secondary subjects (Gorji, 1990). In spite of the contradiction with its primary decree, the secondary decree can be issues such as the case of cutting Samare ibn Jondab's tree by the command of the Prophet (pbuh) according to the principle "No damage," which is incompatible with the principle "control over the property" (Ibn Babawayh, 2008). While people can control their properties, and they can manage them in their own way, the Prophet ordered to cut Samare ibn Jondab's tree because since the tree was located in the property of another person,

his ownership would result in a loss for property owner; therefore, due to the validity of secondary decrees, the tree was cut. Here, the loss justifies the emergence of secondary decree and the new decree is valid (Ansari, 1997).

Imamia Reasons for Justifying Ta'ziri Punishments Tougher than Hadd Punishments

While jurists mostly believe that ta'zir must not be tougher than hadd, some decrees indicate that a ta'ziri punishment tougher than hadd has been appointed. For the continued deviation from the principle in ta'zir and performing a tougher punishment, One of three reasons can be cited: (1) respect the the individual and social expediency; (2) the disposal of war against God and the state (Moharebeh); (3) prevention of vice.

Individual and Social Expediency

Some cases is found in religious books that assigns a punishment authority to governor to act according to the the expediency of community, and prevents others to repeat the same crime. Ibn Barraj avers:"Peculator steals obviously from the roads and streets, he should be punishes so that he puts away his deed; consistent with Imam's opinion, the punishment shall be performed in such a way to more appropriate and more preventive" (Ghazi Ibn Barraj, 2006). About crooked men, he states, "A fraud should be disciplined, and it is necessary to be punished by Imam in such a way to avid him committing the same action in future" (Ghazi Inb Barraj, 2006). Obviously, a crime does not stop by just few lashes, and perhaps a few lashes are not righteous and preventive retributions, thus, the punishment should be tougher. In his title *Moqnae*, al-Shaykh al-Mufid describes fraud as, "One who takes the advantage of properties of people by deception and craftiness, and he is responsible for them and must be punished so that never repeats this action. The governor introduces him to people to beware of him (Mufid, 2010).

Given the above reasoning, the purpose of imposing tougher penalties is respect to guilty person's expediency to avoid committing further offenses and respect to the expediency of society not to be affected by the same offenses. Considering individual and public expediency in ta'zir was argued in a conference on enforcement of Islamic criminal law and its impact on crime in 1976 in Saudi Arabia. Ta'zir was described in the following way:"Ta'ziri crimes, which include most of the crimes and contrary to hadd crimes, rely on the dominance of governor; many required conditions such as time and place circumstances must be considered in their punishments, and the governor can reduce its intensity except in cases relating to public security or life expediency."

The Disposal of War against God and the State

In some cases, jurists violate the principle of ta'zir by lashes in order to avoid war against God and the state. Abu Salih's comments in juridical book *Kafi* confirms, "If a person sells a free women, whether she is his wife or not, he should be punished by cutting his hand because he has committed corruption on earth." This decree is verified by Sheikh Tusi in *Nahaya* (Sheikh Tusi et al., 2010) and Mohaqiq Helli in *Saraer* (Helli, 2007).In *Saraer*, Allameh Helli proposes ta'zir for stealing a dead man shroud costing less than a quarter of dirham; but for the second robbery, he offers cutting hand as the punishment. He argues the decree by saying, "Because the thief has repeated his crime, he is a corruptor and engage in corruption on earth; therefore, the real reason for cutting his hand is the corruption not stealing a quarter of dirham" (Helli, 2007).Thus, cutting one's hand in the above contexts is the result of corruption on earth, not due to selling a free person, and it is performed for repetition of stealing a shroud without the mentioned price.

While jurists consider a punishment less than hadd for independent ta'ziri crimes, Religious books indicate the death penalty for some particular ta'ziri crimes. A few examples of these are:

- Sallar et al believe "People are allowed to kill one who claims prophethood" (Deilami, 2007). Since claiming prophet hood is not a haddi crime, it is a ta'ziri crime; evidences for justifying death penalty for this case permit us to consider death as punishment for ta'ziri crimes.
- Muslim jurists believe "Muslim witch is convicted to death and of course, witchcraft is not a haddi crime.
- After enumerating types of haddi crimes in *Sharhe Lo'meh* and discussing each of them in a particular chapter, Shahid Thani (2005) brings a chapter titled "Other Punishments"; in this chapter, he discusses apostasy and offers death for the crime.

By introducing apostasy in "Other Punishments," he does not consider apostasy as a haddi crime and appointed death for it. It means apostasy is a ta'ziri crime having been punished by death.

Prevention of Vice

Death penalty for ta'ziri crimes can be defended in the framework of preventing vices. In this manner, if behavioral and spoken warning is not effective in removing a vice action, the third way will be a physical warning. In other words, in addition to advertising and cultural practices, practical practices should be performed to avoid vice and corruption in society for removing corruption. For this purpose, the practices should be performed step by step as much as possible. It means if the crime is stopped by a few lashes, one cannot punish convicted by a tougher punishment; however, if a one-year imprisonment works, imprisonment should be considered as prevention of vice. Finally, if prevention of corruption and vice cannot be performed in any way except death, the death penalty can be performed according to the concept of dissident in Imam Khomeini and othe jurists' sentence on "Enjoining good and forbidding wrong." Imam Khomeini avers in *Tahrir al-Vasila*:"The murder of dissenter is not allowed unless by the permission of an infallible, and nowadays, the qualified jurist is the representative of infallible with respect to acquisition of conditions" (Khomeini, 2005). That is to say since murder of dissenter is allowed by the permission of an infallible or the qualified jurist and while ta'zir is performed by the admission of qualified jurist, a ta'zir that results in death is allowed.

Ta'zir Executions in Imamia Jurisprudence

An investigation of juridical sources indicates that death penalty has been predicted for ta'ziri crimes in same cases, though jurists consider ta'ziri punishment less than hadd punishment in general cases. Shiite jurists believe "The murdur of one who claims prophethood, and one who says insults and profanity to the Prophet (pbuh)" (Shahid Aval, 1994). Since claiming prophethood and saying insults and profanity to the Prophet are not haddi crimes, they are ta'ziri crimes, and evidences for justifying death penalty for this case permit us to consider death as punishment for ta'ziri crimes. Moreover, Muslim jurists agree, "Muslim witch is convicted to death"; Sheikh Tusi claims, "Anyone regards witchcraft legal, his murder is necessary whatsover" (Sheikh Tusi, 2010). For Sheikh no religious reason is needed for murder of witchcraft (Sheikh Tusi, 2010).

After enumerating types of haddi crimes[1] in *Sharhe Lo'meh* and discussing each of them in a particular chapter, Shahid Thani (2005) brings a chapter titled "Other Punishments"; in this chapter, he discusses apostasy[2] and offers

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[1] In *Sharaye*, Mohaqiq Helli counts the reasons for add as 1 - adultery, 2 - Functions of adultery, 3 – accusing of of adultery, consumption of alcohol, 5 - Robbery 6 – banditry. In *Tahrir al-Vasilah*, vo;.2 pp. 455-97, Imam Khomeini introduces six chapters titled 1 - adultery hadd, 2 – sodomy and pimp, 3 - accusing of of adultery, 4 - consumption of alcohol, 5 – Robbery, 6 – war against God.

[2] We have two types of apostates: 1 – Natural apostate, a person that one of his parents were Muslim in conception, and he had chosen Islam after maturity, then he has tergiversated. 2- National apostate, a person whose parents were not Muslim, he had converted to Islam after maturity, then he has tergiversated. Natural apostate shall be killed without penitence, and his penitence is

death for the crime. By introducing apostasy in "Other Punishments," he does not consider apostasy as a haddi crime and appointed death for it. It means apostasy is a ta'ziri crime having been punished by death (Shahid Thani, 2010).

In his report of conference on enforcement of Islamic criminal law and its impact on crime, Abol Ghasem Gorji states that Ta'zir is retribution for sins without any specific punishment and it starts by reproach and ends in death. In addition, Ali Reza Feiz believes ta'zir begins by the most moderate punishments and tougher punishments end it. Therefore, it includes all types of punishments with different qualities. It is extended from giving advice, warning and dismaying to flogging, imprisonment and life imprisonment and execution (Feiz, 2010). Abbas Zeraat agrees the text of Article 16 of Islamic Penal Code indicates that ta'zir has not exclusive implications of flogging, imprisonment and fines. Consequently, they can be extended to execution (Zeraat, 2010). The fifth chapter of Islamic Penal Code (Restrictive and Ta'ziri punishments – Article 513) proposes execution as a punishment for saying insults and profanity to the Prophet, but it does not speak of apostasy[3] and witchcraft.On the contrary, the draft of Islamic Penal Code regards the Prophet's vituperative[4], apostasy[5] and witchcraft[6] as hadd crimes[7]. Khoee (2011) counts sixteen items for hadd crimes in which insulting the Prophet, apostasy and witchcraft are included.

CONCLUSION

This study has focused on the different aspects of execution in Imamia jurisprudence. In juridical foundations, the death penalty was elaborated; categorizing of real decrees, Imamia jurists have divided real decrees in two groups of primary and secondary decrees. Ta'ziri execution is considered as a primary deree. According to Imam Khomeini, death penalty results from state decree as an instance of primary decrees, and they are prior to other primary decrees because maintain Islamic system of government is prior to all other obligations. Therefore, the most important priority in a islamic discourse is keeping the system alive; since all other state rules are designed to preserve the Islamic government, they are included in this group of decrees. Consequently, the government is allowed to approve tough and intense criminal codes to prevent social and economic crises, even though the approved rule is death penalty. Another reason for proving the correctness of execution in the class of ta'zir is revealed in the examples of ignoring the conventional principle of "hadd punishments less than ta'ziri punishments." Although most of the jurists agree on the principle, there are examples that violate this principle; the violations are justified according to three important reason:

1. *Individual and social expediency*: In many cases presented in religious books, ta'ziri punishment is suspended to the opinion of ruler to allow him to decide according to the expediency society. In fact, the purposes of imposing tougher punishments are respecting to the guilty's expediency for preventing the same crime in future and considering the conditions of society for preserving it from further damages. Ta'ziri crimes, which cover most of the crimes and contrary to haddi punishments, depend on the opinion of the ruler. For ta'ziri crimes, retribution calls for many required conditions such as time and place circumstances must be

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not accepted; but if he is national, first, he should be asked to repent, if he refuses to repent, he will be killed. Nevertheless, female apostates, either natural or national, should not be killed.

[3] Article 12 of The Press Law stipulates: Everyone insulting Islam and its sanctities in the press, if results in apostasy, shall be punished by apostasy sentence and execution. If he has not recognized as apostate, he shall be punished by ta'zir law according to the religious judge.

[4] Article 224-1: Everyone saying insults and profanity to the noble Prophet of Islam (pbuh) is considered as Prophet's vituperative, and he is is convicted of murder as hadd.

[5] Article 225 – 7: Hadd for natural apostate is murder. Article 225 – 8: Hadd for national apostate is murder, but the decree will be terminated with three days advice to repent, if the convicted refuses to repent, he shall be executed.

[6] Article 225 – 12: A Muslim engaging in witchcraft and propagating the profession in society is considered as apostate, and he is convicted to death.

[7] Article 212 – 2: Crimes that has specific punishment in holy law are: adultery and its extensions (sodomy and lesbianism) 2 - prostitution, 3 – accusing of adultery, 4 - insults the Prophet, 5 - apostasy, heresy and witchcraft, 6 - drinking intoxicants, 7 - robbery, 8 - war and corruption on earth.

considered in their punishments, and the governor can reduce its intensity except in cases relating to public security or life expediency

2. *Disposal of war against God and the state*: when one's crime is not introduced as a haddi crime, it is allowed to kill a guilty in the framework of ta'zir for disposal of war against God and the state. Some examples presented by jurists in this regard are decrees for selling a free woman, claiming prophethood and the rules related to witchcraft.

3. *Prevention of vice*: Execution can be justified as a form of punishment for behaviors propagating vice in society. For this aim, if behavioral and spoken warning is not effective in removing a vice action, the third way will be physical warning. To be precise, beyond advertising and cultural practices, practical practices should be performed to avoid vice and corruption in society for removing corruption. For this purpose, the practices should be performed step by step as much as possible. It means if the crime is stopped by ten lashes, one cannot punish convicted by a tougher punishment; however, if a one-year imprisonment works, imprisonment is necessary for prevention of vice. Finally, if prevention of corruption and vice cannot be performed in any way except death, the death penalty can be perfomed as a tool to prevent vices. Abolishing the death penalty in a country like Iran, which the most important research sources for scholars are Quran and traditions, is not compatible with the culture and beliefs of people. This significant difference of Iranian culture with other cultures must be considered by all of the scholars trying to study this decree. In short, one cannot states generally that execution is an appropriate punishment or not, but each case must be judged by taking into account all the conditions and circumstances that exist in a country. Maybe, death penalty is an appropriate punishment for a specific country while it is not correct in another country.

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RESEARCH ARTICLE

Evaluating the Role of Organizational Spirituality in Promotion of Organizational Health

Poodineh A.R[1].,Yaghoubi N M.[2], Salarzehi H.[2] and Rakhshani M[3]*.

MSc of Management, University of Sistan and Baluchestan,Zahedan,Iran.
Facultyof Management and Economic, University of Sistan and Baluchestan,Zahedan,Iran.
MSc of Health, Safety and Environment, Azad University of Zahedan,Iran.

*Address for correspondence
Rakhshani Marziyeh,
MSc student of Health,
Safety and Environment,
Azad University of Zahedan,
Iran.
E.Mail: m.rakhshani56@gmail.com

ABSTRACT

The aim of present study is to investigate organizational spirituality role in promotion of organizational health in Jihad Agriculture organization of Sistan and Balouchestan. Our statistic society in this study was encompassed all Jihad agriculture employees working in Zahedan. The sample size was consisted of 137 employees that were selected using randomized sampling. Data collection was done using spiritual organization and organizational health questionnaires. To analyze the data, Pearson correlation coefficient, one-variable regression and stepwise regression were used and results showed a positive and significant relationship between spiritual organization and organizational health. The results of stepwise regression demonstrated that among spiritual organization factors, goal alignment and job meaningfulness could predict better organizational health.

Keywords: organizational spirituality, organizational health, job meaningfulness, goal alignment, Solidarity, religious spirituality.

INTRODUCTION

Organizations have an important role in human and governments' lives and their health has a huge impact on the success of the government (1). One of the factors that help the organization achieve its objectives is organizational health. This is the most obvious indicators of organizational effectiveness. Healthy organization is an organization that not only lasts for your environment, but also a period long enough to compromise their ability to survive and adapt to a constantly expanding.A healthy organization is the one that not only lasts in its environment, but also adopts in a long period of time and increases its ability in survival and adoption continuously (2). In a healthy

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organization, manager behaves friendly and supportive with his staff and has unity in his plans. The employees also tend to stay and work in organization more and work more effectively (3). In healthy organizations, employees are undertaker, dutiful and useful and own high spirit and performance. A healthy organization is where people come to work with enthusiasm and are proud of working there (4). The healthy organizations use their energy in achieving goals and lead to trust and consequently increase in efficiency and effectiveness of employees in organization (1 & 5). According to Lynden &Klingle, organizational health is an almost new concept and includes organization's ability for effectively doing its tasks towards organizational growth and improvement. A healthy organization is where people want to stay and work and become useful and effective (6 & 7). According to the importance of organizational health, the attention of management and organization experts has been focused on studying organizational health and its effective factors more than before.

Besides, today, ethics and spirituality of employees in organization is one of effective and important issues of managers and organization. In past, it was supposed that physical presence of employees in work environment is lonely enough and there is no need of existential spirituality of the staff. But today, people tend to work with their three existential dimensions, physical, mental and spiritual; because separating work life of employees from their spiritual life may cause decrease in their spirit and they are practically inseparable (8). Nowadays, the organizations have increasingly found that financial successes are worthless in compare with the expense of human values; and they have found new ways of helping the staff in balancing their work life and personal life and also bursting their potential competencies in work environment (9). Flexible and creative paradigm of spirituality has emerged in response to these needs and pressures, and many researchers have confirmed this (10). According to Knight and Kavang, spirituality is considered as an energetic force, motivator and inspirationof life (11 & 12).Spirituality means different things to different people in the new concept.For many people, spirituality is a search for finding the truth in one's life and relationship with a transcendent power that is called GOD. For religious managers and employees, such concept means obedience to GOD and his book. On the other hand, this word has many meanings to other people and is the achievement of New Age spiritual movement.In this case, spirituality is nothing more than an expression of emotions, and the new vision of life (13).Generally, there are mainly two views on the relationship between religion and spirituality; the first view is the one that is religious and spiritual based on his spiritual faith, but in the second perspective, a person can be spiritual without being religious (14). In Organizations also, for some people, spirituality at work is a religious connection, while for others it does not mean that (15). In fact, spirituality in work environment and organization includes efforts for finding an optimum aim in a person for work life, in order to establish a powerful relationship between the employee and his coworkers and other people who are shared in his work. It also includes adoption between basic believes of a person and his organization's values (16). A study, recently conducted via a huge council company indicated that the companies who have introduced spirituality based methods, have improved productivity andhave decreased job abandons considerably. Another study has shown that the organizations that have provided the opportunities to spiritual growth for their employees have outshined others. Other studies also report that spirituality in organizations has a positive relationship with creativity, employee satisfaction, team performance and organizational commitment (17).

As it is mentioned, spirituality in organizations has a positive relationship with creativity, satisfaction, team performance and organizational commitment of employees and many other positive factors of management. Also, studies indicate a significant positive relationship between organizational health and variables such as trust, employee effectiveness, management styles… (18). But, there are not many studies on the relationship between organizational spirituality and organizational health. In most researches, one of these variables have been studied in evaluation of organization and management' variables and sometimes they have mentioned the effect of spirituality on strengthening organizational health; and on the other hand, organizational spirituality has been studied one-dimensioned with non-religious views. Therefore, in this research, through a new view, organizational spirituality and its dimensions have been studied such that they are expandable both in religious and non-religious environments; and the role of organizational spirituality and its dimensions in changes of organizational health has been evaluated.

Organizational spirituality

Spirituality in organization is a new phenomenon that has attracted many researchers in different levels (19). Since second half of 20th century, a salient movement in revival of religious and spirituality (20) and increasing researches on organizational spirituality in recent years have been observed (21 & 22). It must be mentioned that these researches have been conducted via different titles, such as "organizational spirituality", "spirituality in work environment", "spiritual work environment" and "spirituality at work", but they have all evaluated the same concept (23 & 24).

On the other hand, there is no similar definition of spirituality in work environment and organization and current definitions are limited, ambiguous and sometimes inconsistent (23, 25 & 26). Totally, a comprehensive definition of organizational spirituality is as following:

Organizational spirituality is a framework of sensible values in culture and organization that leads to uplifting the staff during work process and provides the feeling of togetherness so that they feel accomplishment and esprit (27).
According to Mitroff& Denton, spirituality in work environment includes efforts for finding an optimum aim in a person for work life, in order to establish a powerful relationship between the employee and his coworkers and other people who are shared in his work. It also includes adoption between basic believes of a person and his organization's values (16).

Dimensions of organizational spirituality

Proportionate to this research, the dimensions that have been determined by researchers are as following:
1) Meaningful work (10, 16, 27, 28, 29 & 30)
2) Sense of affiliation (10, 16, 27, 28, 29 & 30)
3) Adopting with organization's aims and values (10, 16, 28 & 30)
4) Religious tendency (12, 15, 29, 31 & 32).

Meaningful work

This dimension of organizational spirituality is a deep sense of meaning and conception at work and shows that how the employees interact with the daily tasks in individual level. There is a suggestion about organizational spirituality that any person has the motivation and hope of being in a job that gives him a wide concept of life (10 & 28).

Sense of affiliation

This dimension of organizational spirituality contains feeling a kind of relation and affiliation with others (10). This dimension occurs in group level of human behaviors and signifies the interactions between employees and their coworkers. Correlation in work environment is based on this belief that people think that they are connected to each other and there is a relation between one's inside and the others' (28).

Adopting with organization's aims and values

This dimension of organizational spirituality is the experience of a strong sense of alignment between personal values of staff, mission and values of the organization (16). Alignment with organizational values means that people believe that managers and employees in organization have related values and a kind of strong conscience and organization attend the welfare of the employees and their affiliation (10).

Religious tendency

Religious spirituality is a kind of spirituality based on a particular religious tradition and is based on a framework and specific system of belief (33).In this orientation, spirituality is a part of a particular religion (21). According to Moghimi et al., historically, a lot of attention to spirituality is rooted in the religious and religions are the best ways to boost up spiritual dimensions of people to where spirituality does not reach maturity without religious (34). It could be said that religious people consider doctrines and teachings of their faith in their tasks and act based on religious.

Organizational Health

The term organizational health was used for the first time in 1996 by Miles ina survey on school organizational climate (35, 36& 37).According to Miles, the organizational health refers to a state beyond a short-term organizational effectiveness, and indicates a set of fairly durable features and is organization'ssurvival in its environment, compatibility and upgrade and expand the organization's ability to more compatibility (38).This term was first used to describe the aspect of continuity and survival of organizationbyHoy & Tarter(1997),Hoy &Miskel(1991), based on the work of Parsons, Bales &Sils(1953) as the organization's ability to adapt to the environment, coordination among members of the organization and reaching the objectives (35, 36& 37).

Levels and Dimensions of Organizational Health

Hoy &Fildmanhave divided the levels and dimensions of organizational health to three levels of "institutional, administrative and technical" and seven dimensions of "institutional unity" related to the institutional level, dimensions of "influence of the director", "compliance", "build" and "support resources"related to the administrative level, and dimensions of "spirit" and "scientific emphasize"related to technical level; they also have defined them as follows:

Institutional level of organizational health

Institutional level of organizational health binds the organization with its environment and has a dimension of institutional unity.

Institutional unity

Institutional unity refers to the organization's ability to adapt to the environment, the way in which the unity, consistency and integrity of organization plans are maintained.Employees are protected from unreasonable pressures and demands of citizens and the organization is not fragile in the face of public pressure.When the environmental demandsare not matched with the organization's plans, protesting local groups are not able to affect on organization's operations.

Administrative level of organizational health

Administrative level of organizational health, supervises and directs internal management' functions of organization and has four dimensions of "influence of the director", "compliance", "build" and "support resources".

Influence of director

Influence of director refers to the ability of manager in practically impressing the higher levels. In the other words, influence of director is the ability of manager in affecting the bosses and higher levels, encouraging them to attending

more the organization's affairs, not to encounter with hierarchical barriers in order to provide more services, not depending to higher level … that all are the keys of effective leadership.

Compliance

Compliance refers to the leadership behavior of manager that is open and friendly and is a behavior that shows manager friend, protector and cooperator of the staff. Such manager attends to the work results of employees and accepts their comments.

Build

It refers to a behavior of manager that is work-oriented and goal-oriented. In fact, build defines the behavior of manager in determining the occasions and work relations with employees, job expectations, performance standards and work methods clearly. Behavior of manager is task-based and work environment is structured and success oriented. Like compliance, it is an important dimension of effective leadership performance.

Resources support

Resources'Support refers to an organization that has enough, and even extra, equipment and facilities and these facilities are easily reachable. In fact, it is providing necessary facilities of organization and employees in order to implement the tasks effectively. Work facilities are easily reachable and the demands of employees are rapidly replied of this aspect.

Technical level of organizational health

Technical level of organizational health refers to the process of production and has two dimensions of spirit and scientific emphasize.

Spirit

Spirit is the sense of trust, sympathy and friendship that exists among employees. In fact, it refers to the collective sense of friendship, openness and mutual trust among the staff. They provide correlated unit and do their work and training actions with enthusiasm, like each other, love their job, help each other and are proud of the organization.

Scientific emphasize

Scientific emphasize refers to the limit that organization needs scientific and cultural superiority and tries for. Any organization has perfect standards, but reachable, in different fields and organizational environment is serious and ordered for teaching and learning new information in order to reach organizational standards. Managers in different levels of organization and employees try the same for reaching a new success. The employees respect scientific progress joint with creativity and innovation as a principle objective and the context for reaching this aim exists in organization for them (39 & 40).

Conceptual model of research

This model is a conceptual one based on theory relations among affecting factors and variables. The evaluating variables of this research are organizational spirituality and its dimensions as independent variable and organizational health as dependent variable.

Based on studies, organizational spirituality contains four dimensions of meaningful work, sense of affiliation, adopting with organization's aims and values and religious tendency; and organizational health also includes three levels of "institutive, administrative and technical" and seven dimensions of "institutional unity" related to the institutional level, dimensions of "influence of the director", "compliance", "build" and "support resources"related to the administrative level, and dimensions of "spirit" and "scientific emphasize"related to technical level.Therefore, since this research evaluates the relationship between organizational spirituality and its dimensions with the variable of organizational health, the following conceptual model has been provided as the theoretical framework of research.

METHODOLOGY

Current research is applied and correlative description. Population of research was all managers and employees of Agricultural Jihad in S&Bwith BA degree and higher that were 227 people. Among them, 144 people were selected based on Morgan table and via simple random sampling.To collect the required data, two types of questionnaires including organizational spirituality questionnaire and organizational health questionnaire were used.Questionnaire on organizational spirituality, was designed based on two questionnaires of spirituality in work byAshmos&Duchon (2000) and Milliman, Czaplewski& Ferguson (2003); and religious spirituality dimension was added to accommodate religious standards. The questionnaire measures four dimensions of meaningful work, sense of solidarity and belonging, alignment with organizational goals and religious spirituality.Organizational Health Questionnaire was designed adapted from Hoy &Fildman(1987) and measures three levels of "institutional, administrative and technical" and seven dimensions of "After institutional unity." The institutional level, "Influence of the director, compliance, construction and maintenance support resources, "the administrative level," emphasized the morale and scientific " relating to the technical level.In order to determine validity of questionnaires, the content validity method was used. Questionnaires were confirmed by experts and it was ensured that the they can estimate the considered factors.Also, the Cronbach's alpha coefficient was used to assess the reliability of the questionnaires. Accordingly, the total amount of alpha regarding organizational spirituality and organizational health were obtained as follows.

In this research, according to sample size and the possibility of distortion of some questionnaires, 150 questionnaires were distributed, among which 137 were returned. SPSS software was used for data analysis and answering the questions of research; and Pearson Correlation test and two-variable regression and stepwise regression were applied.

RESULTS

Among 137 employees in the organization,75.7% were male, 91.7% were married, 82.6%were experts, 69.4% served more than 16 years experience, 69% had a bachelor's degree and 31% had a master's degree.The results associated with the research questions using the Pearson correlation test, two-variable linear regression and stepwise regression were obtained as described in the following table.Pearson's correlation and linear regression bi-variable
The results show that:

- There is a significant positive relationship between organizational spirituality and organizational health in 99% of significance level and correlation value of 0.558; also organizational health variable is affected by organizational spirituality of 30.6% and the amount is significant with F = 61.087 and Beta= 0.558 at 99% of significant level $(P\langle 0/0\rangle$.

- There is a significant positive relationship between meaningful work and organizational health in 99% of significance level and correlation value of 0.311; also organizational health variable is affected by

meaningful work of 9.7% and the amount is significant with F = 14.45 and Beta= 0.311 at 99% of significant level $(P\langle0/0\rangle$.

- There is a significant positive relationship between sense of affiliation and organizational health in 99% of significance level and correlation value of 0.263; also organizational health variable is affected by sense of affiliation of 6.2% and the amount is significant with F = 10.01 and Beta= 0.263 at 99% of significant level $(P\langle0/0\rangle$.

- There is a significant positive relationship between alignment with objectives and organizational health in 99% of significance level and correlation value of 0.669; also organizational health variable is affected by alignment with objectives of 44.3% and the amount is significant with F = 109.084 and Beta= 0.669 at 99% of significant level $(P\langle0/0\rangle$.

- There is a significant positive relationship between religious spirituality and organizational health in 99% of significance level and correlation value of 0.141; also organizational health variable is affected religious spirituality of 1.3% and the amount is significant with F = 2.74 and Beta= 0.141 at 99% of significant level $(P\langle0/0\rangle$.

Stepwise logistic regression analysis to evaluate the priority of organizational health predictor variables in 99% of significant levelindicates that aligning with organizational goals (predictive variable) was able to predict 44.3% of organizational health (criterion variables) andhad the most prediction of organizational health. Then, meaningful work together with aligning with organizational objectives, were able to predict 47.9% of changes in organizational health and it lonely was able to predict 3.6% of changes in organizational health.

CONCLUSION

This research has been conducted in order to evaluate the role of organizational spirituality in promotion of organizational health. The results of analyzing the effects of organizational spirituality and its dimensions on organizational health indicates that these variables relate with changes of organizational health regarding their intense and strength and have a significant role in promotion of organizational health. It shows the importance and necessity of attending more on the role and benefits of spirituality in organization; the benefits that managers use to increase productivity, development and high performance of organization.

Also, based on these findings, the most important dimensions of organizational spirituality that must be attended to improve organizational health are aligning with organizational objectives and meaningful work. Therefore, trying to explain the goals and values of the organization more transparently and establishing a coordinated environment in order to move within the values and goals, as well as giving deeper meaning of work and sense of organizational identity for employees so that the individual gets energy, will lead to increase efficiency and effectiveness and promotion organizational health.Generally, encourage and promotion of spirituality in the workplace can be examined at two levels: individual and organizational. At the organizational level it is said that spirituality should be applied throughout the organization and the organization as a whole, should be spiritual.Mitroff& Denton (1999) stated that since there are many differences and conflicts between the preferences, interests and attitudes of individuals, spiritualityshould be promoted at the organizational level and taking the organizational as a wholerather than the individual level.On an individual level the emphasis is on encouraging individual spirituality. The focus is to encourage or complying the spiritual needs. In this level, it is supposed that organization is a set of people that have different spiritual views and leaders must understand various religious of people, accept it and provide the context of this variety. So, at this level encourage spirituality in the workplace begins by individuals instead of the entire organization. The spirituality at the individual level is created by encouraging people to talk freely about their spiritual ideas and help them to relate these ideas to organizational values (41). In this regard, it is recommended to the directors to try to improve the spirituality of work both at the individual and organizational level.

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Therefore, in order to strengthen and promotion of spirituality in work environment that leads to improve the organizational health, the following issues are recommended to managers based on the dimensions of organizational spirituality:

1) According to the finding of research based on the relation and effectiveness of organizational health and meaningful work, managers must find ways to give meaning to work so that improve in employee satisfaction of job will lead to create and promotion of organizational health. Measures such as job rotation, job enrichment, attending to the satisfactory nature of the job, sense of identity and importance of the work and get feedback from the job, will improve perceptions of meaningfulness at work by employees.Besides, cultural planning in order to create a dynamic and motivational organization affects on improvement of spirituality at work, because organizational culture creates employees' perceptions that could be effective on spirituality.

2) According to results based on the effect on sense of affiliation on organizational health, managers must care that creation of a friendly environment and cooperation in employees will decrease their stress and creates a kind of social capital in organization and increases sense of correlation among employees. In this case, strengthening the relations of people inside the organization as they feel each other as one team and trying to support their coworkers, will finally lead to increase in individuals and groups uniqueness and lets them consider themselves as a family member of organization.

3) According to the effectiveness of organizational health from alignment of employees with organizational objectives, managers must consider that if mission, vision and objectives of organization have been explained clearly for employees and the feedback has been attended by employees, and also the ideas of staff is considered about organizational values, and the welfare, health, spirit and life condition of employees are attended, the employees will easily accept the objectives and values of organization and will follow it. Using MBO and determination of objectives and clear aims by organization and aligning people with these objectives are ways that can vindicate this goal.

4) Since according to the results and also comments of researchers, religious learning in organization are related with work motives of employees, job satisfaction and other effective factors on organizational health, and in a higher level, will supply individual and organizational objectives; so managers must use it to reach the organizational goals.

5) In fact, the religious spirituality is a motivation in life, a force that inspires individuals towards a specific appeal or individuality beyond the target. Therefore, strengthening religious taught and encouraging people to ethics and a spirit of employees, leads to spiritual health of employees and also leads to welfare, effectiveness and credit of organization in facing with customers and shareholders. Hence,it is recommended to the directors to include encourage and strengthen the spirit through publication of educational and religious values, training religious courses, building consultancy and religious formation of support groups and other intellectual property, whether in individual or in the organizational programs.

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Cronbach's alpha coefficient

Number of Questions	Chronbach' Alpha for Oragnizational Spirituality	Number of Questions	Chronbach' Alpha for Oragnizational Health
25	0.822	44	0.928

Table 1. Results of bi-variable regression and correlation tests between organizational spirituality and its dimensions with organizational health

Independent Variable	Dependent Variable	R	R2	F	Standard B	T	Sig
Organizational Spirituality	Organizational Health	0.558	0.306	61.087	0.558	7.81	0.00
Meaningful Work	Organizational Health	0.311	0.097	14.45	0.311	3.80	0.00
Sense of Affiliation	Organizational Health	0.263	0.062	10.01	0.263	3.16	0.00
Alignment with Objectives	Organizational Health	0.669	0.443	109.084	0.669	10.44	0.00
Religious Spirituality	Organizational Health	0.141	0.013	2.74	0.141	1.66	0.00

Table 2: Stepwise regression results to prioritize organizational healthpredictor variables

Step	Variable	R	R2Adj	F	B	T	Sig
First	Alignment with organizational objectives	0.669	0.443	109.084	0.669	10.44	0.000
First + Second	Alignment with organizational objectives + Meaningful Work	0.698	0.479	63.495	0.634 0.202	10807 3.21	0.000

RESEARCH ARTICLE

A Comparative Study of Execution in International Instruments and Imamia Jurisprudence

Hossein Rahimi[*], Mehdi Nick Nafs and BahramFarahmand Saaber

Department of Criminal Law and Criminology, Faculty of Advanced Studies, Bushehr Branch, Islamic Azad University, Bushehr, Iran.

*Address for correspondence
Hossein Rahimi
Department of Criminal Law and Criminology,
Faculty of Advanced Studies,
Bushehr Branch,
Islamic Azad University,
 Bushehr, Iran.
E.Mail: hossein.rahimi2020@hotmail.com

ABSTRACT

This paper tries to study the theoretical foundations of ta'ziri executions in Imamia jurisprudence and compare it with international obligations; therefore, it focuses on ta'ziri punishments, ta'ziri executions in Imamia jurisprudence as well as international instruments in the field of death penalty. Although most of the Muslim jurists agree on the amount of ta'ziri punishment less than hadd punishments and some of them limited the punishment to some lashes, but reasons such as the necessity to maintain Islamic government, individual and social expediency, disposal of war against God and prevention of vice can be arguments to prove the correctness of death penalty in form of ta'zir. Death penalty is proposed by international documents in some specific cases, which consider mostly the occurrence of war; in normal circumstances, international community and international documents and commitments tend to abolish the death penalty. This study aims to show that there is not a full compliance between ta'ziri executions in Imamia jurisprudence and death penalties introduced by international obligations, and there is just some compliance between Shiite jurisprudence legal articles contained in the text of treaties, for example, the principle of 'legality of crime and punishment' in the documents and the religious principle of 'punishing without showing the way first being wrong' in Islamic jurisprudence. Some executions have been abolished in terms of international instruments, but they are issued and imposed in Iran. For instance, the death penalty for drug-related offenses. Results and findings of this study indicate that ta'ziri executions in Imamia jurisprudence and penal laws of Iran comply with international obligations in some cases and not in all cases. For example, Imamia jurisprudence and the Islamic Penal Code are

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consistent with international obligations and instruments in respect of prohibition of of pregnant women execution; but the issue of the age of criminal responsibility does not find a common point between Imamia jurisprudence and international obligations and instruments. In this regard, Islamic Republic of Iran accepted Convention on the Rights of the Child in 1993 with reservation, or The American Convention on Human Rights prohibits execution of persons over the age of 70 years while Imamia jurisprudence and Islamic Penal Code do not forbid this punishment.

Keywords: Execution, Ta'ziri punishment, Imamia jurisprudence, International conventions.

INTRODUCTION

Public international law has recently comments on death penalty that had been considered as the authority of rulers in the Middle Ages and the criminal tools and criminal policies of countries over the centuries, and the national sovereignties had monopolized it against international community. The regulations of paragraph 7 of Article 2 of United Nations Charter question these authorities and free it from the principle of "Non-interference in internal affairs of States." The change occurs as the result of changes in international law after Second World War due to remarkable rise of human rights. While traditional international regulations had focused on the relationship between states, the new regulations have drawn attentions from personal to international issues by legalizing prosecution and charging governments. The accusing reveals the failure to ensure rights having not been approved through unstable legalisation, but they are inherent in the human person (Zeraat, 2010).

Article 3 of Universal Declaration of Human Rights adopted on December 10, 1948 insists, "Everyone has the right to life, liberty and security of person." Many lawyers debated the concept of "the right to life" in the preparatory works of the declaration. The minority of lawyers tended to regard death penalty as reversal of the right to life, but it had not been agreed by all members. Therefore, the final text did not mention the penalty because it was clear that this does not contradict the right to life (George Pika, 2010).

The International Covenant on Civil and Political Rights (ICCPR) adopted in 1966 is the interpretation of some articles in Universal Declaration in form of legal obligations and the first retry to limit the death penalty. The sixth Article of this covenant[8] states, "Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life."The United Nations Commission on Human Rights (UNCHR), which consists of 18 individual and state experts for monitoring the implementation of the covenant, has stated several times that the death penalty intrinsically is not incompatible with the first paragraph of Article 6, especially due to a number of limitations stipulated in paragraphs 2 to 5 of the Article for its implementation. Consequently, since the contracting states are not obliged to abolish the death penalty according to Article 6, but they should limit its implementation.

Statistical Comparison of Death penalty in Iran and International Law

After China, Islamic Republic of Iran has occupied the second place in the ranking most executions with 388 executions in 2009; the next ranks are allocated to Iraq with 120 executions, Saudi Arabia with 69 executions, the United States with 52 executions, Yemen with 30 executions and Sudan with 9 executions. It should be noted that

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[8] Article six of International Covenant on Civil and Political Rights adopted on 16 December 1966.

Iran is in the first place of executions with respect to the proportion of the population. In general, it is claimed that two third executions are implemented in Iran. Many human rights organizations took a stand against Islamic Republic of Iran due to the executions carried out in Iran in recent years. Human Rights Watch expressed concern over the increasing number of executions in Iran on Sunday, January 30, 2011. They predicted that the number of people executed in Iran would reach "more than a thousand people" in 2011. This facts and claims call for investigation of execution from the perspective of international law (Shams Nateri, 2008).

Comparison and Contrast of Abolishing and Restrictive International Obligations and Imamia Jurisprudence and Islamic Penal Code
The International Covenant on Civil and Political Rights (ICCPR) Adopted on 16 December 1966

It is the interpretation of some articles in Universal Declaration in form of legal obligations and the first retry to limit the death penalty. The sixth Article of this covenant[9] states, "Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life."The United Nations Commission on Human Rights (UNCHR), which cnosists of 18 individual and state experts for monitoring the implementation of the covenant, has stated several times that the death penalty intrinsically is not incompatible with the first paragraph of Article 6, especially due to a number of limitations stipulated in paragraphs 2 to 5 of the Article for its implementation. Consequently, since the contracting states are not obliged to abolish the death penalty according to Article 6, but they should limit its implementation.

According to professor Breillat, the covenant remains no doubt about a desirable development towards the issue. The second paragraph of the article begins by "In countries which have not abolished the death penalty" According to the committee, this concept indicates that abolition is desirable and it is considered for the advances in the enjoyment of the right to life. This revocation has been strengthened again in paragraph 6 of Article 6 with these words, "Nothing in this article shall be invoked to delay or to prevent the abolition of capital punishment by any State Party to the present Covenant" (Ghorban Nia, 2008). This covenant has been adopted on April 4, 1968. The sixth Article of the covenant refers to the death penalty and paragraph 2 of Article 6 prescribes the death penalty for most significant crimes. According to Economic and Social Council of the United Nations, most significant crimes are deliberate crimes having deleterious or important effects.

According to Muslim jurists, crime is any damage to the physical integrity of individuals that has religious penalty such as retribution or atonement. The Arabic term for crime is 'Jenayat' meaning picking fruit from the tree; moreover, sin is a crime that brings retribution in this world and hereafter. Another definition for 'Jenayat' relates to aggression says, "crime of aggression means the planning, preparation, initiation or execution, by a person in a position effectively to exercise control over or to direct the political or military action of a State, of an act of aggression which, by its character, gravity and scale, constitutes a manifest violation of the Charter of the United Nations."[10]

Comparative Analysis

In this regard, ta'ziri executions in Imamia jurisprudence and Islamic Penal Code do not match with these conventions. Fourth paragraph of Article 6 in the covenant[11] talks about the right to seek pardon or commutation of the sentence, which is incompatible with the rules of Imamia jurisprudence (especially in the retaliatory execution).

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[9] Article six of International Covenant on Civil and Political Rights adopted on 16 December 1966.

[10] Article six of Kampala amendments on the crime of aggression.

[11] Paragraph 5 Article six of International Covenant on Civil and Political Rights.

In Penal Code the Islamic Republic of Iran, seeking pardon relates to the rules of forgiveness and pardon[12]; therefore, it does not include all crimes. The point of disagreement with religious and penal rules of Iran is the later reason. Provisions of the covenant declare the prohibition of pregnant women execution, which complies with Imamia jurisprudence and Islamic Penal Code.[13]In haddi, retaliatory and ta'ziri executions, religion and criminal laws of Iran suspends the issuance of sentence to the childbirth of pregnant women.

Convention for the Protection of Human Rights and Fundamental Freedoms Amended by Protocol No.11, adopted in Rome (the date of its entry was 1 November 1998)

Convention for the Protection of Human Rights and Fundamental Freedoms, also known as European Convention on Human Rights, is an international treaty drafted in 1950 by the then newly formed Council of Europe. Aiming to provide collective and effective guarantees for a limited number of civil and political rights through an advanced system of monitoring. In the first place, the right to life is recognized in the second Article[14] and torture or inhuman or degrading treatment or punishments are prohibited in third Article[15]. The right to life assured by the convention is not absolute in the European system because it relies on constraints. It can be derogated in time of war or other public emergency threatening the life of the nation that is mentioned in Article15 of the convention.[16] In any case, no derogation from Article 2, except in respect of deaths resulting from lawful acts of war, or from Articles 3, 4 (paragraph 1) and 7 shall be made under this provision. Among the legal provisions, the Convention expressly keeps the right to execute persons deserving such retribution (Mehr Pour, 2004). Apart from legal death verdict and three assumptions having been predicted in second paragraph of Article 2, death resulting from lawful violence, deliberate death of any person contravenes the Convention.

Comparative Analysis

Comparing the above convention with Imamia jurisprudence and punitive regulations of Iran, one can say that matching between them is available. According to Article 20 of Iran Constitution, all citizens have the protection of the law[17], and the first paragraph of Article 2 of the above convention states, "Everyone's right to life shall be protected by law..." Another important point in first paragraph of Article 2 in the convention is the legality of crime and punishment that is consistence with the religious principle of 'punishing without showing the way first being wrong' in Islamic jurisprudence.

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[12]   Articles 95 to 97 of Islamic Penal Code, adopted in 1392, introduces amnesty as one of the reasons for punishment collapse.

[13]   Articles 436 and 444 of Islamic Penal Code, adopted 2013, refers to the prohibition of retaliation of soul and body in pregnant women.

[14]   Article 2 of Convention for the Protection of Human Rights and Fundamental Freedoms amended by Protocol No.11, adopted in Rome, 1950.

[15] [15]   Article 3 of Convention for the Protection of Human Rights and Fundamental Freedoms amended by Protocol No.11, adopted in Rome, 1950.

[16]   Article 15 of Convention for the Protection of Human Rights and Fundamental Freedoms amended by Protocol No.11, adopted in Rome, 1950.

[17]   Article 20 of Iran Constitution: All citizens of the country, both men and women, equally enjoy the protection of the law and enjoy all human, political, economic, social, and cultural rights, in conformity with Islamic criteria.

Second Optional Protocol to the International Covenant on Civil and Political Rights, aiming at the abolition of the death penalty Adopted in December 1989

It is a side agreement to the Article 6 of International Covenant on Civil and Political Rights. It was created on 15 December 1989 and entered into force on 11 July 1991. The concentration on Article 6 shows that UN agencies have not ever given it up. In fact, this is the first international instrument that intends to cancel completely the death penalty in time of peace on earth. In spite of few contracting countries and the long process of admissions, the convention can be considered as relative victory. The protocol is a document consists of eleven capsule articles. Its first Article consists of two sentences; the first one obliged contracting parties not to seek for execution as a punishment.

Comparative Analysis

Since this is contrary to the Holy Quran text and Islamic Penal Code is inspired by Imamia jurisprudence, it is not possible to attach the protocol to Iran law; in addition, Iran law does not accept the right for conditions.

United Nation Convention on the Rights of the Child Adopted in 1989

One of the important issues to address the question of child executions in Iran is the reaction of other countries to this convention. Since legal systems of many Muslim countries based on Islamic Sharia and Islamic jurisprudence and Iran is one of the countries constituted by the majority of Muslim, it is obvious that their procedures can be reasons and examples to explain the Islamic view. Asoole fiqh, or Islamic jurisprudence, discusses the authority of inferences to religious traditions or practices of Muslims and appoints tradition as the base of many juridical decisions like the concepts of sanctities and insulting. Therefore, if the majority of Muslims have a common viewabout an issue, it will be considered by scholars and jurists as conventional practices. Articles 1 and 37 are two important Articles in Convention on the Rights of the Child that have arised the most remarkable debates. Article 1 defines child and states, "a child means every human being below the age of eighteen years unless under the law applicable to the child, majority is attained earlier." Iran has accepted this convention with a reservation (Hojati, 2011).

The form of government of Iran is that of an Islamic Republic, endorsed by the people of Iran on the basis of their longstanding belief in the sovereignty of truth and Qur'anic justice. All civil, penal financial, economic, administrative, cultural, military, political, and other laws and regulations must be based on Islamic criteria. This principle (Article 4) applies absolutely and generally to all articles of the Constitution as well as to all other laws and regulations. According to Article 125 of Iran Constitution, all international treaties must be signed by the president or his legal representative after obtaining the approval of the Islamic Consultative Assembly. Accordance of parliament act with the constitution and Islamic criteria will be assessed by Council of Guardians (Article 96 of the constitution). Thus, the Government of the Islamic Republic of Iran cannot commit to the ratification of international treaties contrary to domestic laws and Islamic norms due to construction of all provisions and parliament acta based on principles of Sharia and the Constitution.

Islamic Republic of Iran Reservation to 1989 UN Convention on the Rights of the Child

According to Article 125 of Constitution of the Islamic Republic of Iran, all international treaties with other governments must be approved by parliament. According to Article 4 of the Constitution, all laws and regulations must be approved based on Islamic criteria and all legislation passed by the Islamic Consultative Assembly must be sent to the Guardian Council to ensuring its compatibility with the criteria of Islam and the Constitution (Article 94). Therefore, the Government of the Islamic Republic of Iran cannot commit to the ratification of international treaties contrary to domestic laws and Islamic norms.

On the other hand, it is important to become a member of international human rights treaties that formulate and propose universal standards and principles to protect individual rights and freedoms. Having been established by sacrifices of devoted men, having been based on exalted human values combined with his commitment to God, and fighting to achieve justice, remove oppression, obtain respect for human dignity and freedom (Article 2 paragraph 6), Islamic Republic of Iran should eliminate all doubts about its face as violator of universal human rights principles and standards. In this regard, membership in treaties of international human rights can bring positive results. Of course, it needs the expansion of Government's international obligations in form of legally binding rules.

Adoption of Convention on the Rights of the Child in Iran has been one of the most controversial issues in legislative system of Iran. Precautionary approach of Iranian state occurs due to concerns about some of its provisions' inconsistency with Islamic principles. Iran, however, has made the following general condition in 1990, "Iran declares a reservation to articles and regulations that are contrary to the Islamic Sharia and reserves the right to announce such condition during approval." At the time of adoption in 1993, Islamic Consultative Assembly approved a single article of as follows: "If the text of the Convention is or becomes incompatible with the domestic laws and Islamic standards at any time or in any case, the Government of the Islamic Republic shall not abide by it."

Comparative Analysis

The provisions of the Convention do not match with the general rules of criminal responsibility in the Penal Code and Imamia jurisprudence. The convention prohibits the sentence of death for people under 18; but the age of criminal responsibility in the Islamic Penal Code is 15 for male and 9 for female guilty persons according to most Muslim jurists[18]. Discussions about execution of persons fewer than 18 years relate mostly to retaliatory executions for murder; and the concern of present study is ta'ziri executions. However, Islamic Penal Code adopted in 2013 has considered valuable and prudent strategies to deal with ta'ziri crimes of persons fewer than 18.[19]

UN Universal Declaration of Human Rights adopted in 1948

The **Universal Declaration of Human Rights** (**UDHR**) is a declaration adopted by the United Nations General Assembly on 10 December 1948 at the Palais de Chaillot, Paris. The Declaration came directly from the experience of Second World War; it represents the first global expression of rights to which all human beings are inherently entitled. The declaration consists of 30 articles and explains the UN perspectives on human rights. Provisions of the declaration determine fundamental, civil, cultural, economic, political, and social rights that all human beings in every country should have. Many scholars believe that the provisions of the declaration are binding and they have the validity of international laws because they have been accepted widely, and they are used to assess the behavior of countries.

Comparative Analysis

Article three of the declaration states, "Everyone has the right to life, liberty and security of person." Nobody can dispossess himself of his right, and the right is effective when the fetus is in the womb; thus, abortion is also punishable according to the law. Allah says in the Holy Quran that killing a human being is like killing all of humanity. Nowadays, with respect to citizens' rights to life, the governments not only should protect their life, prevent crime and maintain order but also it must provide the instruments such as food, clothing, education .... freedom; in addition, nobody can dispossess himself of his liberty or forgo the enjoyment of his liberty so long as it is

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[18] Articles 146 of Islamic Penal Code adopted in 2013.

[19] Articles 87 to 94 of Islamic Penal Code adopted in 2013 includes punishments and security measures for upbringing of children and juvenile

within the limits of decency and his action is not contrary to the law (Article 960, Civil Code).Right to life can be seen as the source of human rights and other rights are corollary to this principle. Article 3 of Universal Declaration of Human Rights states, "Everyone has the right to life, liberty and security of person." First paragraph of Article 6 of International Covenant on Civil and Political Rights declares, "Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life."

To be more precise, since God is the creator of people and their souls are in his hands, no one has the right to kill another person, so murder is a great sin and crime, and murderer deserves the most severe punishments. Thus, admiring of human souls is a definite decree in Islam, and Iran's judicial and penal codes, which are inspired by Imamia jurisprudence, recognizes the right to life. From this perspective, there is a consistency between Imamia jurisprudence (Iran legal system) and Universal Declaration of Human Rights.

American Convention on Human Rights Adopted 1969

The American Convention on Human Rights, also known as the Pact of San José, is an international human rights instrument adopted by many countries in San Jose, Costa Rica, on 22 November 1969. It seeks for limited imposition of execution to save the right to life. It goes beyond the UN Convention in many aspects. It has the same obligatory tone as the convention; the second paragraph of Article 2 stipulates, "In countries that have not abolished the death penalty, it may be imposed only for the most serious crimes and pursuant to a final judgment rendered by a competent court and in accordance with a law establishing such punishment, enacted prior to the commission of the crime." The provisions, which seem to try to legalize the conditions of Universal Declaration of Human Rights, have been completed with another decree forecasting and concerning future in this way, "The application of such punishment shall not be extended to crimes to which it does not presently apply" (Becarria, 2006).

In an advisory opinion, American Court of Human Rights has interpreted the first part of Article 2 as limitation of death penalty scope and its implementation in exceptional circumstances; it claims that this regulation is a step by step and irreversible process aiming at gradual elimination of death penalty.

Comparative Analysis

Most of the provisions in American Convention on Human Rights are in fact similar to International Covenant on Civil and Political Rights adopted in 1966; but the American convention limited the death penalty in future. As it was discussed, since American convention aims at the total abolition of the death penalty, it is not consistent with principles of Imamia Jurisprudence and Islamic penal laws. The convention says, death penalty shall not be imposed upon persons who, at the time the crime was committed, were under 18 years of age or over 70 years of age while such a limitation does not exist in Imamia Jurisprudence and Islamic penal laws. Moreover, it allows death penalty in significance crimes in time of war, public danger, or other emergency.

CONCLUSION

International law, Documents, and commitments in order to cancel or limit the death penalty in some cases correspond to Imamia Jurisprudence and the Criminal Code of the Islamic Republic of Iran and they are not consistence in other cases; therefore, a partial consistency exists in their relation. It was elaborated that Iran has accepted some of the international documents as a contracting party. In addition, Iran has not joined some instruments and it has accepted some of them by a reservation entitled as consistency with religious principles.As it was mentioned, the main source for studies on execution in Iran is Quranic verses and traditions. Moreover, according to fourth Article, all civil, penal financial, economic, administrative, cultural, military, political, and other laws and regulations must be based on Islamic criteria. As a result, the total abolition of ta'ziri execution and the compliance of Iran's penal code with this aspect of documents and international obligations is not possible, at all.

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With respect to the fact that this study discusses ta'ziri executions, international documents hs declared the abolition of all types of death penalty. However, Imamia jurisprudence and Islamic Penal Code will never admit the abolition of haddi and retaliatory executions; but they may be more flexible in terms of ta'ziri executions.

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Studies on the Influence of Metal Ions on the Synergistic Inhibition of the Corrosion of Mild Steel in an Acidic Solution

Shanmuga Priya .V* and UmaRani .C*

Department of chemistry, Govt. Arts College, Salem,TamilNadu,India.

*Address for correspondence
Shanmuga Priya .V
Research Scholar,
Department of chemistry,
Govt. Arts College, Salem,
TamilNadu,India.
E.Mail: priyaviswalingam@yahoo.co.in
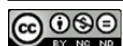
ABSTRACT

The present structure deals with the synergistic action caused by effect of metal ions on semicarbazones of substituted piperdin-4-ones on mild steel in acidic medium. The synergistic effect has been studied by weight loss and electrochemical methods. The electrochemical parameters such as I_{corr}, E_{corr}, C_{dl}, & R_t for mild steel in acidic solution with and without inhibitor were calculated. The synergism parameter (S) is defined and calculated from inhibition efficiency and surface coverage values.This parameter indicating that the enhanced inhibition efficiency caused by the addition of metal ions.

Keywords: Corrosion, mild steel, inhibitors, electrochemical measurements, synergistic effect.

INTRODUCTION

Acid solutions are widely used in industry, such as acid pickling, industrial acid cleaning, acid descaling and oil well acidizing. Because of the general aggressively of acid solutions, inhibitors are commonly used to reduce the corrosive attack on metallic materials. There are various organic inhibitors which tend to decrease the corrosion rate of steel and iron in acidic solutions (1-5). Most of the effective organic inhibitors used contain heteroatom such as O,N,S and multiple bonds in their molecules through which they are adsorbed on the metal surface(6-10).

Although the synergistic effect of various substituted with metal ions piperidin-4-ones(11) are well known, the mechanism for their beneficial action is little known and there exist a limited number of attempts to explain the nature of mechanism. Metal ions are known both to stimulate and inhibit the corrosion of metal.

The aim of the present work is undertaken:

- To estimate the inhibition efficiency of substituted piperidin-4-ones with semicarbazone in controlling the corrosion of mild steel in 1 N H_2SO_4.

- To study the effect of substituted piperidin-4-Ones with semicarbazones and metal ions concentration on its inhibition efficiency.
- To study the corrosion inhibition using the polarization techniques and AC impedance spectra.

METERIALS AND METHODS

Preparation of the specimen

Mild steel specimens of the following composition have been used throughout the present work.

Carbon : 0.07
Sulphur : Nil
Phosphorous : 0.008
Silicon : Nil
Manganese : 0.34

The mild steel specimen of 5×2.5 cm^2 was polished mirror finish and degreased with trichloroethylene, and used for the weight loss method.

Inhibitors

01SC-Semicarbazone of γ-2,c-6-diphenyl-t-3-methyl piperidin-4-one
02SC-semicarbazone of γ-2,c-6-diphenyl-t-3-ethyl-N-methyl piperidin-4-one
03SC-semicarbazone of γ-2,c-6-diphenyl-t-3-ethyl piperidin-4-one

Weight loss method

Mild steel specimens in triplicate were immersed in 250 ml of the solution containing various concentration of the inhibitor (various piperidin-4-ones with semicarbazone) in the presence and absence of $ZnSO_4$ and $CdSO_4$ for one hour. The weight of the specimen before and after immersion was measured. The corrosion inhibition was then calculated by using the following equation

Corrosion rate (mmpy) = 87.6×W / (D×A×T)
Where   W   = Weight loss in mg
        D   = Density in g/cc
        A   = Area of exposure in cm^2 and
        T   = Time in hours.
   Inhibitor efficiency has been calculated by using the following equation

Inhibitor efficiency (%)   = $W_0 – W_e / W_0$
   Where
        W_0 is the weight loss without inhibitor and
         W_e is the weight loss with inhibitor.

Potentiostatic polarization studies

This study was carried out using an electrochemical impedance analyzer with a three electrode cell assembly was used. Mild steel rod was used as working electrode, platinum electrode was used as the counter electrode, and saturated calomel electrode (SCE) was used as the reference electrode. Corrosion potential, corrosion current and tafel slopes were calculated(12-13).

Ac impedance measurements

Ac impedance measurements were taken out at the open circuit potential using electrochemical interface and a frequency response analyzer from 10 KHZ to 1 MHZ by applying 5mV A.C voltage. Nyquist plots were plotted from these experiments and R_t (charge transfer resistance) and C_{dl} (double layer capacitance) values were obtained from the Nyquist plots(14).

RESULTS AND DISCUSSION

Table 1 gives the values of the inhibition efficiency of various substituted piperidin-4-ones(15) in 1N H_2SO_4 in presence of 1M $ZnSO_4$ and $CdSO_4$ and 0.2mM inhibitors by weight loss method.The weight loss measurement indicates the synergistic effect caused by metal ions. Addition of 1 M metal ion increases the inhibition efficiency of 0.2 mM inhibitor,when compared with blank.Figure 1 to 3 gives the potentiodynamic polarization plots of mild steel for substituted piperidin-4-ones of semi carbazones with metal ions. The corrosion kinetic parameters derived from these curves are given in Table 2.The polarization curves shifted towards the region of lower current density with adding inhibitors with metal ions. This result suggests that while the inhibitor alone functions as cathodic inhibitor, the inhibitor-Zn^{2+} and Cd^{2+} combination acts as a mixed inhibitor. The low corrosion rate in potentiodynamic polarization studies by Zn^{2+} and Cd^{2+} ions shows that it is perfectly acting on the metal surface.Nyquist plots for mild steel in 1N H_2SO_4 for substituted piperidin-4-ones of semicarbazones with metal ions are shown in the figure 4 to 6. Table 3 gives the value charge transfer resistance (R_t), double layer capacitance (C_{dl}) and inhibition efficiency obtained from the above plots.

The data indicates that C_{dl} value decreases with increases by adding metal ions when compared with blank. The addition of metal ions increases the R_t values. The C_{dl} value decreases is due to the adsorption of inhibitors on the metal surface. The synergistic parameter(16) (S) was calculated using the following relationships that are provided by Aramaki and Hackermann.

$$S_I = (1 - I_{1+2}) / (I - I'_{1+2})$$
$$S_\theta = (1 - \theta_{1+2}) / (I - \theta'_{1+2})$$

Where

I_{1+2} = $(I_1 + I_2) - I_1 I_2$

I_1 = inhibition efficiency of the anion

I_2 = inhibition efficiency of the cation

I'_{1+2} = measured inhibition efficiency for the cation in combination with anion.

θ_{1+2} = $(\theta_1 + \theta_2) - \theta_1 \theta_2$

θ_1 = surface coverage by anion.

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θ_2 = surface coverage by cation.

θ'_{1+2} = measured surface coverage by both anion and cation.

This parameter was calculated from the values of inhibition efficiency and degree of surface coverage (θ) i.e., S_I and S_θ and their values are given in the Table 4.The S_I values given in the Table 4 are more than unity and this suggests that the enhanced inhibition efficiency caused by metal ions to the inhibitors is only due to a synergistic effect.The synergistic effect brought by the combination of inhibitor and metal ions for corrosion of mild steel in 1M H_2SO_4 can be explained as follows. The strong chemisorption of metal ions (Zn^{2+} and Cd^{2+}) on the metal surface is responsible for the synerigistic effect of metal ions in combination with inhibitor cation. The positively charged inhibitor ions (protonated semicarbazone group) are then absorbed by coulometric attraction at the metal surface, where metal ions already absorbed by chemisorption. Stabilization of absorbed metal ions by means of electrostatic interaction with positively charged inhibitor leads to greater surface coverage and there by greater inhibition.

The order of synerigisim observed in metal ions is $Zn^{2+} > Cd^{2+}$Addition of Zn^{2+} and Cd^{2+} to the inhibition solution initially forms Zn^{2+} - Inhibitor complex and Cd^{2+} - Inhibitor subsequently converted into Fe^{2+} - Inhibitor complex on the anodic sites. The released Zn^{2+} and Cd^{2+} combines with OH^- to form $Zn(OH)_2$ and $Cd(OH)_2$ on the cathodic sites. Thus the protective film consists of Fe^{2+} - Inhibitor complex and $Zn(OH)_2$ and $Cd(OH)_2$.

CONCLUSION

Semicarbazones of various substituted 2,6-diphenyl piperidin-4-one exhibits maximum efficiency towards inhibition of corrosion of mild steel in IN H_2SO_4 media. This is probably caused by the formation of an complex at lower concentrations due to adsorption.Addition of metal ions enhances the inhibition efficiency.Semicarbazones of various substituted piperidin-4-ones and metal ions in combination inhibits the corrosion of mild steel in 1N H_2SO_4 by affecting both cathodic and anodic reactions.Values of the synergism parameters (S_I and S_θ) shows that corrosion inhibition produced by substituted piperidi-4-ones and metal ions combination is synergistic in nature.

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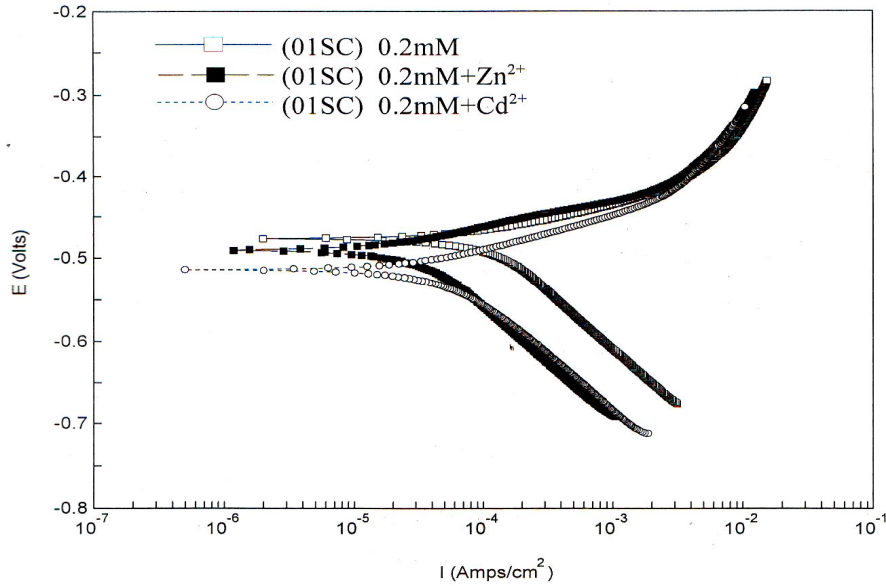
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Figure – 1
Potentiodynamic polarization curves for mild steel in 1N H₂SO₄ in the absence and presence of metal ions with (01SC)
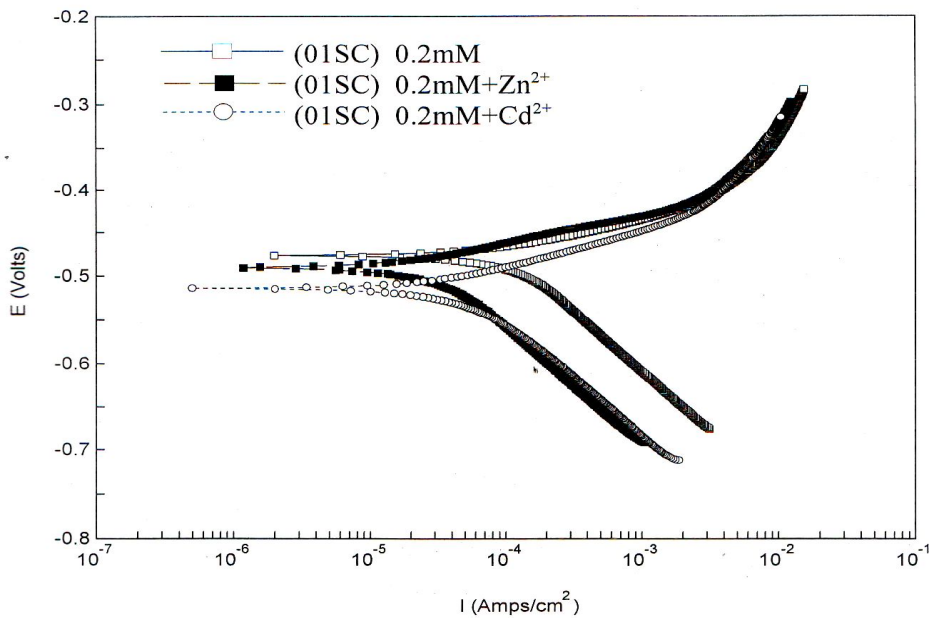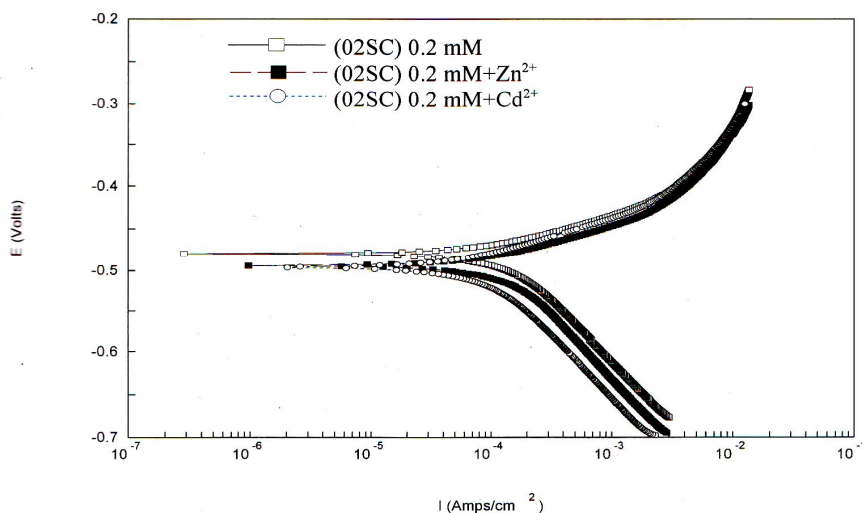

Figure – 2
**Potentiodynamic polarization curves for mild steel in 1N H₂SO₄ in the absence and presence of metal ions with (02SC)**

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Figure – 3

Potentiodynamic polarization curves for mild steel in 1N H₂SO₄ in the absence and presence of metal ions with (03SC)

Table 1: Corrosion parameters of various piperidin-4-ones with semicarbazone and metal ions on mild steel in 1 N H₂SO₄ from weight loss measurements.

Sl. No	Name of the inhibitor	Weight loss (g)	Corrosion rate (mmpy)	Inhibition efficiency (%)	surface coverage (θ)
1	Blank	0.07385	66.34		
2	01SC+Zn²⁺	0.0108	9.70	85.38	0.8539
3	02SC+Zn²⁺	0.0097	8.72	86.87	0.8687
4	03SC+Zn²⁺	0.0177	15.90	76.03	0.7613
5	01SC+Cd²⁺	0.0123	11.05	83.34	0.8334
6	02SC+Cd²⁺	0.0106	9.52	85.65	0.8565
7	03SC+Cd²⁺	0.0186	16.71	74.81	0.7481

01-Methyl Substitution 02-Ethyl-N-Methyl substitution 03-Ethyl substitution

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Table 2: Potentiodynamic polarization parameters for the corrosion of mild steel in 1 N H₂SO₄ with and without various piperidin-4-ones with semicarbazone

Sl. No	Name of the inhibitor	I_{corr} (mA/ cm2)x10⁻²	E_{corr} (mV vs SCE)	b_a (mV/ dec)	b_c (mV/ dec)	Corrosion rate (mmpy)	Inhibition efficiency (%)
1	Blank	4.58	-519	119	-137	104.94	
2	01SC+ Zn²⁺	0.37	-499	51	-136	8.48	91.92
3	02SC+ Zn²⁺	0.12	-501	65	-144	2.75	97.38
4	03SC+ Zn²⁺	0.13	-500	65	-148	2.98	97.16
5	01SC+ Cd²⁺	0.52	-510	49	-135	11.91	88.65
6	02SC+ Cd²⁺	0.92	-501	111	-173	21.08	79.91
7	03SC+ Cd²⁺	0.95	-503	66	-146	21.77	79.26
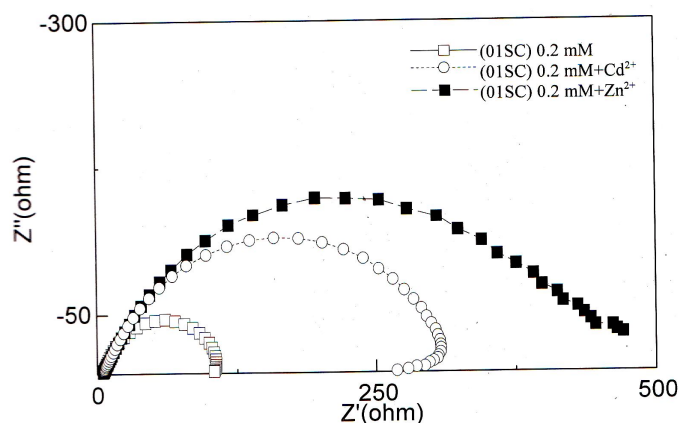
Figure 4:Nyquist plots for mild steel in 1 N H₂SO₄ in the absence and presence of metal ions with (01SC)
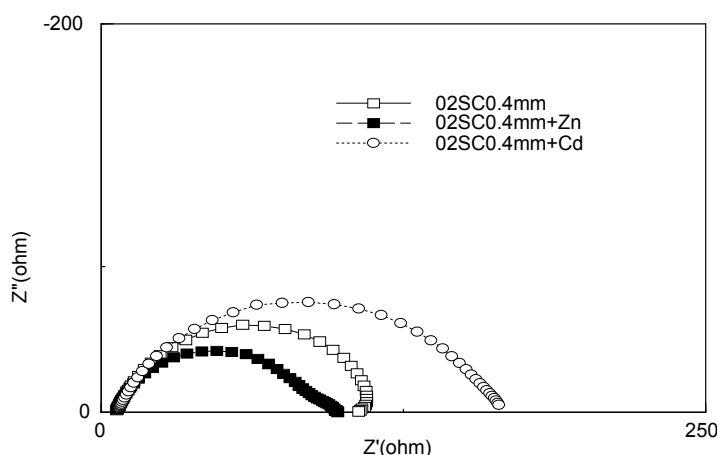
Figure 5:Nyquist plots for mild steel in 1 N H₂SO₄ in the absence and presence of metal ions with (02SC)
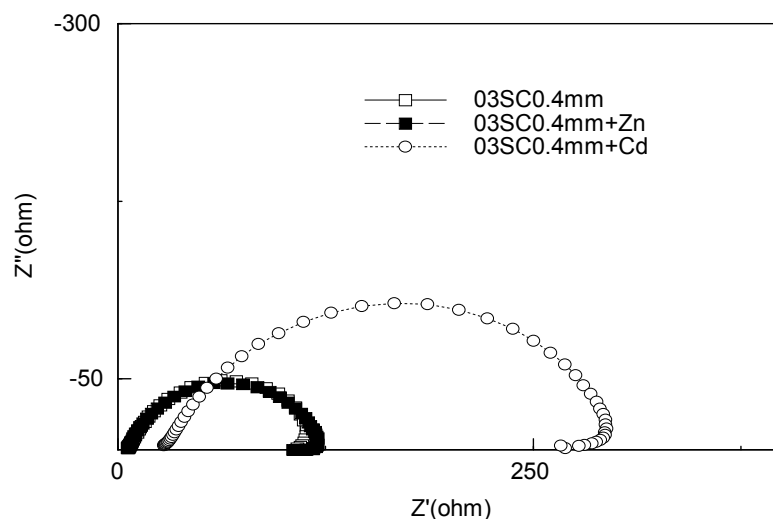
Figure 6:Nyquist plots for mild steel in 1 N H_2SO_4 in the absence and presence of metal ions with (03SC)

Table 3:Impedance parameters for the corrosion of mild steel in 1 N H_2SO_4 with and without of piperidin-4-ones with semicarbazone

Sl. No.	Name of the inhibitor	R_t (ohms)	C_{dl} (μ farads)	Inhibition efficiency (%)
1	Blank	30.93	0.11	
2	01SC+ Zn^{2+}	465.28	0.17	93.50
3	02SC+ Zn^{2+}	274.57	0.18	88.85
4	03SC+ Zn^{2+}	115.55	0.15	80.50
5	01SC+ Cd^{2+}	306.35	0.13	89.78
6	02SC+ Cd^{2+}	115.55	0.16	73.07
7	03SC+ Cd^{2+}	90.09	0.11	65.94

Table 4:Synergistic parameters

Sl.No	Halide and metal ion concentration (1 M)	(01SC)		(02SC)		(03SC)	
		S_I	S_θ	S_I	S_θ	S_I	S_θ
1	$ZnSO_4$	0.16	1.30	0.16	1.31	0.13	1.24
2	$CdSO_4$	0.14	1.22	0.14	1.23	0.12	1.15

Juridical–Legal Evaluation of Transactions Nullity in Iranian Law

Farzaneh Dorri

Department of Public Law, Faculty of Human Science, Science and Research Branch, Islamic Azad University, Tehran, Iran.

*Address for correspondence
Farzaneh Dorri
Department of Public Law,
Faculty of Human Science,
Science and Research Branch,
Islamic Azad University,
Tehran, Iran.
E.Mail: farzaneh.dorri@outlook.com

ABSTRACT

All people may encounter economic problems leading them not to be able to clear their accounts in their life, which the problem is more probable for merchants due to the credit-bade nature of their practices. Previous schools did not differentiate between bankrupts including traders and non-traders. Legal status of transactions of may convert to a new situation. The conversion of legal statuses can be examined in the framework of various hypotheses including the conversion of correct contract to a void contract. Such a correct deal capable of being cancelled is called "voidable transaction". In Islamic jurisprudence, the state of inability to pay off debts includes in bankruptcy law. Voidable contracts are different from revocable contracts and rejectable contracts. Voidable contracts are well known in European law, but in Iranian legal system, conversion of a correct contract to an invalid one is surprising. The present paper tries to examine the nullification of transactions in Iranian law in a legal-juridical viewpoint.

Keywords: nullification, transaction, juridical foundations, legal foundations;

INTRODUCTION

Contracts may be subject to one of the three verdicts: the accuracy, invalidity and ineffectiveness; however, some lawyers consider ineffective contracts as accurate contracts and divide them in two groups of valid and invalid bonds (Shahidi, 2000). The later division derived from jurists' opinions, which comment ineffective contracts are included in valid contracts (Sahin Al-Javahir, 2005).

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Sometimes, the legal status of contract changes from its primary order, and finds a new legal status. Due to the three states of accuracy, invalidity and ineffectiveness, the conversion of contracts can be hypothesized in six statuses, which some of them are impossible. For instance, the void, or illegal, contracts have no legal existence and are equivalent to invalid contracts. While sometimes many people think erroneously that if two parties are content, the contract is effective, parties' consent contrary to mandatory verdicts have no effect and the parties must agree on a new contract regarding it prerequisite conditions. It should be mentioned that in Hanafi School, the modification of illegal contracts is accepted (Ghanavati, et al, 2000).

Ineffectiveness of contracts ignored the prerequisite conditions of correctness is deterrent to rule of will and provider of monitoring conclusion of contracts by society that may be used to protect parties (Katouzian, 1992). However, considerations of some secondary effects for canceled contracts are observed in rare cases of Islamic law. For example, the warranty of perception in Article 362 of Civil Code is regarded as the effect of correct selling, but in fact, when the transaction is corrupted, the seller is responsible for object of trade and the buyer is responsible for the price of object. Islamic jurisprudence does not differentiate between traders and non-traders; anyone who is in debt over his property is considered as bankrupt. If this situation is proved for the authorities, he will be prohibited from interfering in his property. The four following conditions are necessary for disqualification of an individual and seizure of his assets:

1. The bankrupt's debts must be proved for authorities.
2. The assets of bankrupt are not enough to settle his debts.
3. The debts are current.
4. All, or some, of the creditors ask for his bankruptcy.

With approval of Procedure Code in 1950, the religious definition of bankruptcy was considered by legislators. Insolvency and bankruptcy rules were adopted in 1931, which insolvency was side-by-side bankruptcy. Insolvency and Bankruptcy Code was abrogated in 1934 due to the approval of Insolvency Code, and from this time legal status of bankruptcy was removed totally from related provisions. According to Article 39 of of Insolvency Code, "No tiral will be accepted as insolvency from the effective date of this Act." Of course, the legislators use the terms bankruptcy and insolvency in approval of provisions such as Articles 1264 and 1265 of Civil Code that shows split of writing and must be modified in the next considerations (Jafari Langroodi, 1996).However, this paper tries to investigate legal ad juridical effects of nullity of transactions in Iranian Law.

METHODOLOGY

The Concept of Transaction Nullification

In the terminology of law, nullification means to void, destroy or terminate, and it is called the termination of an act or legal status and what has legal validity (Jafari Langroodi, 1999). In addition, "the nullification of a contract is defined as the sentence of a legal authority on the rejection of a contract, or an interest individual removes the effects and terms of a contract due to provisions of law." Dr. Katouzian introduces a contract as voidable when it has the capability to be terminated at the beginning of conclusion (Katouzian, 1992).In Iranian law, since Article 426 of Civil Code is a general rule, all non-intentional transactions are invalid. While law talks only about invalid transactions of the age, in spite of appearances, one can focus on invalid, revocable, and valid as three types of transactions.

Invalid Transactions

Form the time of economic failure, a merchant who is aware of his situation must stop all of his transactions that are damaging his creditors. Dr. Hasan Setoodeh Tehrani argues in this regard, "Therefore, the malice of a merchant that do a transaction damaging his creditors is approved, and consequently all of his detrimental transactions to credotors are terminated." Justifying Article 423 of Commerce Act, Hasan Setoodeh Tehrani comments:

"The reason for invalidity of mentioned transactions in Article 423 is clear. At the time of economic failure, the businessman must present all of his assets to creditors to divide the assets equally between themselves because he is no longer able to do his obligations. Any action that would result in the loss of the property, or causing the preference of some creditors must not take place (Setoodeh Tehrani, 1971).

Article 423 states that the following transactions of a businessman are invalid at time of economic failure:

- All voluntary settlements, or donations, and in general, all gratuitous transfers including both movable and immovable assets.
- Payment of any debt, including current or matured, by any means that is to come.
- All transactions that bound a movable or immovable property of businessman, and leads to damages for creditors (Farahnakian, 2005).

Article 423 of Iranian Civil Code declares invalid the payment for current or matured debts of a businessman by any means, therefore, in paying the debts, currency or maturity do nt make any difference.

Jurisprudential Foundations in Bankruptcy

Although the provisions of Iranian Commerce Law is derived from the laws of foreign countries, due to the jurisprudential richness in this issue, it is necessary to study the jurisprudential bases of transactions by failed businessman s at first; then, the commercial issues must be regarded. Imamia jurisprudence does not discuss the bankruptcy of businessmen, but insolvent has been discussed in religious sources in such a way that are extendable to businessmen. A careful attention to these sources reveals two ideas about validity or invalidity of transactions before sentencing his insolvency. Some scholars agree the validity of the transaction and other scholars believe in the invalidity of them.

Invalidity Theory

Few Imamia jurists believe that the transactions of a bankrupt before sentencing his insolvency are invalid. They consider invalid all contracts required the transfer of a borrowed property less than its fair price because when clearance of accounts are necessary, the transactions reject the requirements and are corrupted. They suppose the initiation of gratuitous transactions invalid (Sobhani, 1988).

This group of scholars refers to some tradition. As an example, once Imam Sadiq was asked about the debts of a man who has less property than his debts and donated a properly before his death. Imam answers, "The donated property must be sold to pay the debts." Thes scholars argue two important points.First, the debtor can pay his debts disregarding a fair distribution of his assets among creditors because the settlement of a debt has nothing to do with other debts; therefore, there is no prohibition on discharging some debts and charging remaining debt. The justifications about his inability to settle his debts do not consider the equality in the settlement of all debts. However, precautions comment on regarding the equality in proportion.Second, settlement of credit before sentencing one's insolvency is also invalid like settlement of debts.

Invalidity Theory

Most of Shiite believes in the accuracy of bankrupted merchant sentencing his insolvency so that Allameh Helli claims consensus of the idea (Allameh Helli, 2001). In order to prove the validity of such transactions, Moqadas Ardabili argues that reason and traditions imply the accuracy of interferece in a property by conscious men unless there is proof in contrary to it, which indicates that the lack of prroos about a disscussed issue does not terminate it. The interferences of debtor after sentencing his insolvency is not effective due to the consensus of the idea among jurists. Therefore, the action is allowed in the other cases. Moreover, if the invalidity of his interferences is sentenced, we may lead him to insolvency because

debts of many people are more than their properties (Moqadas Ardabili, 2000). In his book *Javahir al-Kalam*, Mohammad Hasan Najafi states, "In this situation (before sentencing one's insolvency), debtor is not prohibited from disposition of his properties. Thus, if he makes a decision that removes his ownership on the property, the disposition is correct and effective, and he shall be considered as one who has no property to settle his debts. In *Tazkara*, the author claims that consensus takes place on sentencing one's insolvency as a prerequisite to stop him from disposition of his properties." (Najafi, 2013).Some contemporary jurists consider all transactions of a bankrupt before sentencing his insolvency as valid transactions, but they question transfer of property that lead to an escape from paying debts (Mosavi Khomeini, 2006). Consequently, evaluation of the jurists' opinions, from past to present, shows that the issue is scientifically developed to terminate the transactions of one who faces economic failure in the case of capability to damage creditors.

Gratuitous Transactions

In the first paragraph of Article 423 and after announcing the nullity of donations and voluntary settlements, Iranian legislators declare the nullity of all gratuitous transactions about either movable or immovable properties. The words "all gratuitous transactions" refer to all types of trades beyond donation and voluntary settlement that results in the free transfer of an object or an interest to another person, for instance, clearing the accounts of a failed merchant or giving alms. All types of such dealings with different titles are invalid, and they are considered as transactions intending to corrupt debts. It is not necessary to remind that the rule is not only effective for the object of trade but also for the interests of bankrupt's properties. In this regard, transactions titled inhabitance and usufruct are invalid after sentencing the insolvence of a bankrupt, and he cannot transfer freely his assets to another person.

Paying off Debts

In Commerce Code, the situation is different; it means all forms of paying off debts in the time between suspensions and sentences are illegal. Using the word "all" in the second paragraph by legislators includes all debts of debtor, however, the legislators mentions the name of some of them. Therefore, one cannot imagine any exception for the rule. It should be mentioned that the legislators declare the invalidity of all payments including both current and matured debts by all meanis either material or non-material. Law does not differentiate between assured and non-assured debts. The debts may relate to commercial or non-commercial transactions.

The legislator does no focus on the methods of payment. Thus, transferring a credit, paying off, cancellation, conversion of obligations and so on, through which a seized businessman, or one of his relations, agrees on the voidance of a transaction to return a property to its previous owners, are invalid and ineffective because the principle of equality in the rights of creditors governs Commerce Code. One of the conditions in automatic adjustment is the freedom of debt, or indebted object, and while the assets of a bankrupt belong to his creditors, his assets and properties cannot be adjusted automatically with debts that arises after his bankruptcy.

In this regard, the payments might be accomplished in cash, or one of the commercial documents, money orders, or in general, any device that is commonly used in trade for payment. Legislator has not exempted any payment in Law and it has declared the invalidity of all forms of paying off either current or matured including issuance of promissory notes and bills of exchange, cheque or cash with respect to Article 423. It seems legislators have disregarded business documents having a particular importance in today's world in terms of international trade and playing an important role for business, production and industrial units, and declare their nullity (Erfani, 1987). Some may think that the word "pay off" means the payment of the debts with respect to the intention and hand of the bankrupt-debtor, or his legal surrogate, but it is not true in reality because:

1. Accepting theory is opposed to the principle of equality of creditors and allows some of his creditors to receive all of their credits with collusion or in non-collusive ways like dicker, and left nothing for other creditors.

2. The exact source for second paragraph of Article 423 Commerce Code is the second part of Article 446 of France Commerce Code that stipulates, "Payments by cash or through the transfer and sale, purchase etc. for current or matured debts and payments results from non-cash or business documents are void."

Consequently, the commentators must be more accurate and consider "pay off" as many actions including deposit, dicker and restoration of debts regardless of doers.

Collaterals of Debts

In some cases, a bankrupt businessman gives a part of his property to creditor as collateral to avoid others to recognize his suspension status. In this manner, the holders of collaterals are prior to others according to Articles 415 and 517 of Commerce Code; such a priority priority is contrary to the principle of equality of creditors.Pursuant to paragraph 3 of Article 423 of the Commercial Code: "All transactions bounding one's movable or immovable properties and damaging creditors are void and ineffective." This solution is adapted from French law, currently in French law Article (106-107) 1985 sets out the items that led to the detriment of creditors, but in Iranian law the term "bounding" is added, and does not assign any monopoly. To bind a property means the maintenance of owner's ownership and the exclusion of others to have any right about the discussed issue, and it prevents him to have a right to transfer it freely.

Revocable sale is not included in these items; one should appeal Article 218 of the Civil Code to terminate it because in revocable sales the buyer is considered as owner as soon as he makes the conclusion. However, the term "bind" refers to objects that are in deposition of merchant. The same argument is true about rental contracts. The rental status of a property does not stop an owner to sell his property. Obviously, such deals are void if they damage the creditors. For instance, a businessman puts an object as mortgage and it loses its value; because the availability of such objects is not beneficial for creditors, revocation of the deal is useless. The paragraph states that "unless it damages the creditors" because the businessman is not the real insolvent and he is not prohibited to manage his properties.

Revocable and Valid Transactions

Commerce Act does not mentioned explicitly the name of revocable transactions in the time after sentencing one's bankruptcy, but it may be derived from some provisions of Civil Code about cancellation of transactions and the priority principle. Two contradictory sentences can be deduced from Article 424 of Commerce Code.

1. When a bankrupt transacts "after cessation date," the deal is not revocable. It bases on the concept of condition.

2. If a transaction is revocable before the cessation date, all the more, it shall be revocable after the cessation date with respect to previous terms and provisions.

To reject the first theory, Article 424 of Commerce Code is just presenting rules for situations before cessation date, and does not basically rely on the concept of condition. The opposite side would claim that when a bankrupt agrees on such a dealing being not mentioned conditions before cessation date, the transaction is not revocable. Indeed, to prove the accuracy of a transaction before cessation date does not confirms its approval after cessation date.In addition, the principle of equality of bankrupt creditors' rights calls for the preference of priority principle over the first interpretation. Therefore, the interpretation as priority principle complies with the interests of creditors' committee, and the revocable transaction are valid after cessation date. According to the principle of correctness, all

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transaction, except corrupted and revocable ones that have been fulfilled during the time between cessation and sentencing are valid. The legislator has not presented any article about gratuitous transactions during the suspicious age, although he generated transactions before the date of cessation to those during the date of cessation; in this case, it should have the termination conditions. This case is controversial among lawyers, and Iranian law needs an article about gratuitous transactions.

Ambiguities and Exceptions Suspicious Period
Article 557 of Commerce Code

According to Article 557 of Commerce Code stipulate, "All contracts concluded after the cessation of businessmen are invalid for every one, even the businessman himself. The party of contract is obliges to return the received money or properties of the contract to interest people." This article apparently indicates that all contracts are included in this rule; Article 557 is considered as a supplement to Article 423 of the Commerce Code. Dr. Setoodeh believes all transactions have bad intentions during cessation date, consequently they are invalid (Setoodeh Tehrani, 1971, p. 183). Dr. Eskini argues that the subject of rule 557 relates to Article 556. He believes since Article 557 is presented where the discussion is about the misdemeanors and crimes of non-merchant persons, it is a sanction for these types of transactions. He comments that while Article 423 declares some transactions of a businessman invalid during cessation date, it is not logical to consider his entire transactions invalid in just some months later (Eskini, 2005, p. 75). It is better to declare those transactions void that are damaging the creditors because not only this interpretation is not literally but also an interpretation based on historical, logical and especially based on interests is more proper.

1. In terms of historical interpretation, Article 557 of Iranian Commerce Code is taken from Article 598 of French Commerce Code. Articles 593-597 of French version discuss crimes, punishments and felonious contracts of people and Article 598 of French Commerce Code considers the civil aspect of them and sentences their voidance. Moreover, these contracts are void for everyone, even for the bankrupt businessman. It is clear that the nullity of the contract occurs due to people's fraud and collusion, and they are detrimental to individuals, society, and the creditors' committee. Therefore, Iranian legislator has omitted the word "En omtre", which means in addition, to change the concept of rule, but in fact he makes mistake.

2. In Iranian version, since the rule is presented in chapter related to the misdemeanors and crimes of non-merchants, its concern is definitely contracts results from the items that have been mentioned in the previous provisions, such as the case of France. Iranian Commerce Code, the same as discussed rules, has considered two aspects of criminal and civil for the perpetrators' behaviors. It punishes perpetrators in terms of criminal and terminates contracts and decisions in terms of civil rights. Thus, in Article 557 of Commerce Code, the legislator intends to discuss contracts concluding based on fraud and offenses and setting forth in Articles 551 to 556.

3. In terms of interest-base interpretations, the real reason for termination of transactions with a bankrupted businessman is society or creditors' losses; when it has not such effect and consequence, common sense does not allow them to be canceled. The evidence of this interpretation is 556 of Commerce Code, which says "When the manager of a settlement, either he is indebted or not, colludes with insolvent in discussions about the bankruptcy, or makes a private contract, that brings benefits to his side or looses to the other side, or sides, he will be convicted to endure a six months to two years disciplinary punishment by misdemeanors court." Therefore, Article 557 of Commerce Code involves contract damaging the status of creditors.

When the legislator invalidates some transactions and considers them to the detriment of creditors, it is not rational to argue that delcareing the voidance of all transactions carried out by a businessperson during cessation date. The settlement authority can allow businessman to continue his economic and commercial activities to settling time.

According to Article 500 of Commerce code, some of the activities of a bankrupted businessman are correct after sentencing the verdict. Consequently, the legislator stipulated Article 557 with respect to effects and extents of Article 423.Considering the above arguments, the nullification of bankrupt transactions in Article 423 is obtained due to three conditions:

1. Operating transaction in cessation date.
2. To damage the creditors.
3. Issuance of adjudication.

Limitations in Performing the Principles of Revoking and Voidance

Financial demands of creditors are not generally returnable; the reason for such situation is limitations in performing the principles of revoking and voidance. In fact, the limitations in performing the principles of revoking and voidance results from either the principle of genuineness or the passage of time.The validity of the Commercial Code transactions targets transactions performed beyond three paragraphs of Article 424. Sanction for the implementation of this principle in this matter is a relative nullity; it means creditors can request it. The condition is applied even in transactions before cessation date. Nevertheless, the principle of genuineness in Article 223 of Civil Code is performed if all conditions of Article 190 of Civil Code are fulfilled. The sanction of execution of Article 195 of Civil Code is absolute invalidation; it means it must not be damage the creditors. Thus, if the settlement authority is not able to achieve verdict for voidance or nullification according to Articles 195 of Civil Code and 423 of Commerce Code, delegation of creditors will incur losses. The principle of genuineness has been legalized in the following forms, and its opposition is not provable according to Article 423.

Negative Actions

According to Article 429 of the law of non-litigious matters, heir can either accept or reject the bequest, and if he dies, refusing the bequest is transferred to the heirs. Therefore, if you did not accept the loss may endanger creditors.
In testament, a testator may reject possessory will during cessation date and impair the rights of creditors. In French law, creditors can either reject or accept the bequest through indirect claim to surrogate of debtor and settle (receive) the demands of creditor (Safari, 1997, p. 76).

Positive Actions

Article 3 of Law of certified cheques stipulates, "Death and bankruptcy of certified cheque issuant shall not destroy the rights of cheque holder, the creditors who have supply the cheque are not allowed to seize the funds of cheque if it is issued or ceded to another person. If a property transfers to another person for the enforcement or execution of documents in cessation date, the transfer is invalid. But if a creditor recieves a certified cheques and transfers it to another person, this rule will not apply."In Article 24 of Melli Bank statute, it is stated, "If one of the bank customers is insolvent, does not pay his debts on time, or does not settled bank satisfactory, the bank can withdraw all of its claims from his account."

Comparative Analysis of the Suspected Period

In French Law, the suspected period is founded base on intention to refuse settlements. Article 107 of new French Law onwards, two types of revocation is predicted.

A. Mandatory revocation: it includes free legal acts, transactions with possibility of lost, and premature payments.

B. Voluntary revocation: Settling liquid debts and performing gratuitous, where the creditor or party is aware of the cessation sensitivity, are revocable. Therefore, paying the bills are effective and nonrevokable in

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commercial documents mentioned in Article 129 of new French Law. This is consistent with the Commerce Code because it provides credibility to commercial papers. In this manner, although the current account of seized person is closed by the bank, if the debtor is seized and he is not able to pay off his debts, the bank can moves the unpaid bills to the negative column of his current account, and settle the customer's debts to manager.

CONCLUSION

In Iranian legal system, all transactions are valid, void or ineffective. Valid transactions whose conditions are met and there is no fault or defect in its principal. Void transactions refer to transactions whose presence and absence are the same; they do not work in legal procedures. Ineffective transaction is legal term for dealings that has no impact due to incompleteness, but they are transformable to valid or invalid transactions in case of resolving defects.In Iranian legal system, refusing to pay even one debt may lead to sentencing as bankrupt businessman; even if his properties are enough to settle his debts and it may damage the businessman's reputation. Article 424 of Commerce Code has predicted transactions with intention to refuse paying off debts or damaging creditors. The Article involves particular conditions, which their existence can void the transaction. The conditions are:

1. The transaction occurs before cessation date.
2. Its purpose is to refuse paying off debts or damaging creditors.
3. The loss is more than a quarter.
4. The transaction has not occurred more than two years ago.

In Article 424 of Commerce Code, the legislator assumes party has not bad intentions and he has entered the situation to gain more benefits, but the businessman has bad intentions. Therefore, if the loss is not more than a quarter, the transaction is not terminated because the convention amount of loss in commerce is a quarter. If the party has not paid the price difference, he will be excluded from interest creditors, and the settlement authority must pay the price difference to him before distribution of debtor's property among the creditors. In gratuitous transactions, the rejection of a quarter losses by legislator leads to rejection of priority in gratuitous contracts with more than a quarter loss.

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RESEARCH ARTICLE

Managing Credit Risk in Financing Agriculture

Hadi Saeidi* and Omid Sharifi

[1]Young Researchers and Elite Club, Quchan Branch, Islamic Azad University, Quchan, Iran.
[2]DBA, Department of Business Administration, AMU, U.P., India

*Address for correspondence
Hadi Saeidi
Young Researchers and Elite Club,
Quchan Branch,
 Islamic Azad University,
Quchan, Iran.
E.Mail: saeedi260@gmail.com.

ABSTRACT

Agriculture is, without a doubt, one of the riskiest sectors of economic activity. Increasingly, farmers, firms, governments, and many other actors are learning that agricultural production and marketing are complex activities, marked by pervasive and increasing risks that result from a broad set of structural, demographic, market, and institutional changes some of which are associated with globalization and the creation of new technologies.Risk is an unavoidable but manageable element in the business of agricultural production and marketing. Downward production/price levels significantly reduce income in the short-term and there can be serious repercussions in the absence of effective risk management tools. Yet, many institutions remain wary of agricultural and agribusiness credit risk as they do not know how to assess it and price it correctly for their loans.

Keywords: Credit Risk, Agriculture Financing, credit risk models, Agriculture Finance, agribusinesses

INTRODUCTION

Agriculture is, without a doubt, one of the riskiest sectors of economic activity. At the same time, agriculture holds enormous potential for reducing poverty in rural areas. Agricultural risks have a profound impact on poverty in that they undermine possibilities for rural entrepreneurs (particularly farmers) to accumulate assets, invest in and develop businesses, and gain access to health and education services. Farming methods, and the context in which agricultural production and marketing take place, have changed dramatically during the last few decades. Increasingly, farmers, firms, governments, and many other actors are learning that agricultural production and marketing are complex activities, marked by pervasive and increasing risks that result from a broad set of structural, demographic, market, and institutional changes some of which are associated with globalization and the creation of new technologies. The recent apparent increase in the frequency of natural disasters such as earthquakes, hurricanes,

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droughts, and floods has implications for managing agricultural risk. Data suggest that climate change is leading to increased volatility in weather patterns and consequently to instability in commodity prices, which places severe financial stress on producers, consumers, exporters, importers, financiers, and governments. As budgets to respond to crises are under pressure, many organizations are thinking about ways to establish risk management strategies before a crisis occurs, rather than reacting after the event. Responding to a problem is generally more costly, less efficient, and difficult to manage in the aftermath of a crisis. Risk in agriculture is pervasive. Several risk and vulnerability assessments have shown that commodity price, yield (mainly due to weather) and health risks are the most important risks that rural households face. Social and personal risks include problems such as theft of crops and livestock, fire due to the negligence of farmers or their neighbors, family illness and loss of labor, and failure in the functioning of social and physical infrastructure. Human health problems, for example, emanating from HIV/AIDS is having devastating effects on the rural economy in parts of Africa. Risk is an unavoidable but manageable element in the business of agricultural production and marketing. Changes in yields and output prices generate high variability in farming household income. This leads to complications in both short-term production and long-term planning. Agricultural producers are constantly faced with decisions on whether to expand or reduce production, whether to invest in the acquisition of new fixed and movable assets and whether to change the composition and intensity of agricultural inputs. The ultimate inescapable but very crucial decision by a farmer is whether to stay in farming or to exit. This last resort decision is certainly of great concern to policy makers. In the absence of labor-absorbing sectors in the rest of the economy the exodus of farmers out of rural areas can have dire socio-politico-economic consequences for many governments.

State of the problem

In many developing countries, risk management techniques are underdeveloped or insufficient for institutions to efficiently lend to activities in the agricultural sector. Information on borrowers' credit histories is rarely available, resulting in information asymmetries that make accurate credit risk assessment difficult. In addition, while agricultural borrower's major assets are production and land, it is often difficult for banks to use these as collateral and particularly difficult to foreclose on land in case of default (World Bank, 2005). Downward production/price levels significantly reduce income in the short-term and there can be serious repercussions in the absence of effective risk management tools. The situation is further aggravated when downward trends are the result of systemic1 shocks to the whole sector (i.e. widespread within or across regions in a country such as; drought, frost, hail, flood, extensive pest attacks, earthquake). Such negative shocks can, for example, affect farmers' ability to repay financial obligations and in the worst cases lead to massive welfare loss. In either case financial institution dealing with the agricultural sector will experience some degree of destabilizing effect in the flow of their financial resources. The evaluation of credit risk can be defined as a process that is used by financial institutions to measure the credit risk (default risk) associated with any lending transaction. The Basel Committee on Bank Supervision defines credit risk as "the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with the agreed term" (Basel Committee, 2000). When the borrower fails to meet his financial obligations (i.e., when the borrower defaults) the bank incurs a financial loss. Credit risk is mostly associated with loans and securities in a bank's balance sheet and it is the largest risk, from market and operational risks, confronted by financial institutions. Credit risk is regarded as the primary cause of bank failures and it is the most visible risk faced by bank management (Fraser et al., 2001).Therefore, the evaluation of credit risk is cardinal to the success and profitability of any financial institution.

Literature Review

Barry, Escalante, and Ellinger use a slightly different approach and estimate credit scores and credit risk migration matrices from farm business summary data. They find that retention rates are the highest rates in the credit risk migration matrices, but that these retention rates are much lower than those estimated in studies utilizing rating agency data. Their results could be due to the characteristics of the financial performance of agricultural businesses and/or the different types of data used to estimate the matrices. As opposed to the "through-the-cycle" approach

used by the rating agencies, theirs is based on the current and historical financial situation of the farm business. Credit risk measurement tools are commonly referred to as credit risk models; and credit risk modeling has become a key component in the risk management system of financial institutions (Lopez & Saidenberg, 2000). In literature, the quantitative approaches to credit risk evaluation (i.e., credit risk models) are classified into two families, namely: Traditional credit risk models and Modern credit risk models. The Traditional credit risk models are further classified into three (3) broad classes - Expert Systems and Artificial Neural Networks, Credit Scoring and Credit Rating models. Modern credit risk models are also further classified into three broad classes, namely: (i) Structural credit risk models, (ii) Reduced Form credit risk models, and (iii) Multi-factor Econometric credit risk models (Allen *et al.*, 2004).Whichever credit risk model (traditional or modern) is used, the primary objectives of evaluating credit risk for a financial institution still remains the same: to enable the financial institution to differentiate good credit from bad credit; evaluate the credit risk associated with individual loans and loan portfolios; forecast possible credit losses over the coming years; to differentiate loan price over borrowers exhibiting different risk; to determine the loan loss reserves and the risk based capital requirements; to evaluate credit concentration and set concentrate limits and to measure risk-adjusted profitability (Lopez & Saidenberg, 2000).Agricultural borrowers adjust by resorting to informal credit, reduction of farm inputs, suboptimal production techniques, and borrowing from family and friends. This limits the investment in farm equipment and capital as well as other agricultural assets such as oxen. In addition, producers concentrate on low-risk low-return activities because they cannot access the start-up capital required and cannot transfer systemic risks.

The combined effect is to push producers (farmers) into poverty (World Bank, 2005; UNCTAD, 2004). Liang (1989) showed empirically that credit risk reduces bank profit because a bank recognizes expected costs associated with high risk, such as higher premiums on uninsured deposits demanded by risk-averse investors. Berger and De Young (1997) examined the inter-temporal relationship between loan quality and cost efficiency using the Granger causality concept. Their empirical results suggest that high levels of problem loans cause banks to increase spending on monitoring, working out, and/or selling off these loans and possibly become more diligent in administering the portion of their existing loan portfolio that is currently performing. Credit risk is regarded as the primary cause of bank failures and it is the most visible risk faced by bank management (Fraser et al., 2001). Credit risk modeling has been developed rapidly over the past decades to become a key component in the risk management system of the banking industry. Credit risk models help bank management measure the credit risk associated with individual loans as well as their asset portfolio.

They enable a bank to forecast possible credit losses over the coming year, to differentiate loan prices over lenders having different risks, to determine the loan loss reserves and risk-based capital requirements, to evaluate credit concentration and set concentrate limits and to measure risk-adjusted profitability (Lopez and Saidenberg, 2000). Most credit risk models consider two sources of credit risk: default risk and migration risk. Default risk is the risk that borrowers default, meaning that they fail to meet their debt obligation. Default triggers a total or partial loss of any amount lent to the borrower. Migration risk is the risk that obligors' credit rating goes down into a lower loan classification. The deterioration of credit rating doesn't imply default but it does imply that the probability of default has increased (Bessis, 2002). In credit risk literature, models that are used to evaluate or measure default risk (credit risk) are classified in several ways. Allen *et al.* (2004) and Georgakopoulus (2004) also classify credit risk models into two broad families, namely: traditional credit risk models and modern credit risk models. Each family has several classes.The other major constraints in agricultural lending are high transaction and supervisory costs. High levels of transaction and supervisory costs contribute to the absence of functioning rural financial markets and institutions in many developing countries.

This lack of adequate financial services can also be partially attributed to the rapid disengagement of governments as the primary source of agricultural lending in many post-liberalization economies. When public sector banking institutions began pulling out of lending or changing their nature of operations, the private sector was expected to

take over and offer credit in the agricultural sector. But in many developing countries this space has not yet been filled adequately by the private sector (Langenbucher, 2005; World Bank, 2005a).

Credit risk management

Credit risk is well-known in the financial industry. Yet, many institutions remain wary of agricultural and agribusiness credit risk as they do not know how to assess it and price it correctly for their loans. This "risk of the unknown" coupled with the lack of the traditional mortgage or other forms of commonly used collateral simply cause them to severely restrict agricultural and rural financing. As stated by the leaders in Rabobank, the largest agricultural lender in the world which is the only commercial bank with a Triple A rating, "Agriculture is no more risky than that of any other sector." Three things must be noted – firstly, the usual credit risk analysis such as the five "C's": Character, Capacity, Capital base, Collateral and Conditions, are as important as ever (Bakx, 2005). Secondly, the credit risk assessment must go beyond the client and look at the whole value chain. The health of the value chain and competency within the value chain must be assessed for its trends, the short and long-term position of clients and countries within the competitive agribusiness chain and the expected levels of risk of the value chain and the segments within it. The success of Rabobank mentioned above depends to a large extent on their careful analysis of both each value chain and industry as well as each client. Furthermore, it is able to use that knowledge to know at what levels finance is most needed and effective and to work with the farmers, agribusinesses and/or national and export marketing companies to structure their financial products and services to meet the risk profiles and cash flows of those clients (Miller *et al.*, 2007 and Bakx, 2005). Thirdly, value chain financing often combines the provision of business support services with the provision of credit. It is inherently multi-dimensional with multi-stakeholders all interested in each others' success in order to have efficient and profitable agribusiness chains. Moreover, it is well tailored and more suited to the multiple development requirements of specific farmer groups than, for example, credit only services provided singularly through financial institutions (Bakx, 2005).

Evaluation of Credit Risk

Credit risk is defined as "the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms" (Basel Committee, 2000). It is usually associated with loans and securities, which by generating interest income, are the primary source of revenue for banks or lending institutions. The primary effect of high credit risk on a financial institution (bank) is loss in assets and interest income. This reduces the bank's profit, depletes its capital and might at the extreme, lead to --bank failure. During 1980s and 1990s, the banking industry was confronted by the forces of financial deregulation and globalization. Many banks suffered during this period for a multitude of reasons, including the heavy loan losses emerging during late-1980s and early-1990s. There have been other drivers of change the industry, such as a worldwide structural increase in the number of bankruptcies, a trend towards disintermediation by the highest quality and largest borrowers, more competitive margins on loans, a declining value of real assets, and a dramatic growth of off-balance sheet instruments with inherent default risk exposure (Altman and Saunders, 1998). These worldwide phenomena have led to the development of modern credit risk evaluation techniques (Kim, 2006). The goal of credit risk management (or evaluation) is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should also consider the relationships between credit risk and other risks. The effective management of credit risk is a critical element of a comprehensive approach to risk management and essential to the long-term success of any banking organization (Basel Committee, 2000). Most credit risk models consider two sources of credit risk: default risk and migration risk. Default risk is the risk that borrowers default, meaning that they fail to meet their debt obligation. Default triggers a total or partial loss of any amount lent to the borrower. Migration risk is the risk that obligors' credit rating goes down into a lower loan classification. The deterioration of credit rating doesn't imply default but it does imply that the probability of default has increased (Bessis, 2002). There have been various arguments about the definition of default. They vary by models and by banks, and depend on the philosophy and/or data available to each

model builder. Liquidation, bankruptcy filing, loan loss (or charge off), non-performing loan, or loan delayed in payment obligation are used at many banks as proxies of loan default. Default risk can be measured at individual loan level, which is called stand-alone credit risk and at portfolio level, which is called portfolio credit risk. The most direct and common measure of default risk is the probability of default (PD), which is the likelihood that a loan falls into default. It captures the volatility of default risk and is usually expressed as a distribution and its parameters, probability density function (PDF) or cumulative distribution function (CDF). It is calculated for an individual borrower as well as for entire bank portfolio. When calculating default risk at the portfolio level, Value at Risk or simply VaR has become the industry standard measure. It is defined as the loss exceeding expected loss (or unexpected loss) at some given fraction of occurrences (the confidence interval) if a portfolio is held for a particular time (holding period). When estimating credit risk facing a bank, common practice is to employ a long holding period (one year or more) and a small confidence level, usually one percent or less (Jackson & Perraudin, 1999). VaR is a theoretical measure of the potential loss for a portfolio capturing downside risk. Its concept is favored for three major reasons, which are providing a complete view of portfolio risk, measuring economic capital, and assigning a fungible value to risk (Bessis, 2002). In credit risk literature, models that are used to evaluate or measure default risk (credit risk) are classified in several ways. Allen *et al.* (2004) and Georgakopoulus (2004) also classify credit risk models into two broad families, namely: traditional credit risk models and modern credit risk models. Each family has several classes. Figure 1 below, illustrates the classification of credit risk models according to Allen et al. (2004) and Georgakopoulus (2004). This is the classification of credit risk models that is used in this study.

Traditional Credit Risk Models

Traditional credit risk models try to estimate the probability of default (PD), rather than the potential losses in the event of default (LGD). Furthermore, these models typically specify "failure" to be bankruptcy filing, default, or liquidation, thereby ignoring consideration of the downgrades and upgrades in credit quality that are measured in mark to market models. The three (3) broad groups of traditional credit risk models that are used to estimate the Probability of Default are: (i) Expert systems, including artificial neural networks; (ii) Rating systems; and (ii) Credit scoring models (Allen et al., 2004; Georgakopoulus, 2004).

Expert Systems Models

Historically, bankers have relied on expert systems to assess credit risk. These are based on, Character (reputation), Capital (leverage), Capacity (earnings volatility), Collateral, and Cycle (macroeconomic) conditions. Evaluation of these variables is performed by human experts, who may be inconsistent and subjective in their assessments. Moreover, traditional expert systems specify no weighting scheme that would order these systems in terms of their relative importance in forecasting the probability of default. Thus, artificial neural networks have been introduced to evaluate expert systems more objectively and consistently. The neural network is "learning" using historical repayment experience and default data. Structural matches are found that coincide with defaulting firms and then used to determine a weighting scheme to forecast the probability of default. Each time that the neural network evaluates the credit risk of a new loan opportunity, it updates its weighting scheme so that it continually "learns" from experience. Thus, neural networks are flexible, adaptable systems that can incorporate changing conditions into the decision making process. Empirical tests of the accuracy of neural networks produce mixed results. Kim and Scott (1991) use a supervised artificial neural network to predict bankruptcy in a sample of 190 firms. While the system performs well (87% prediction rate) during the year of bankruptcy, its accuracy declines significantly over time, showing only a 75%, 59%, and 47% prediction accuracy one year prior, two years prior, and three years prior to default, respectively. Altman and Saunders (1998) examine 1,000 Italian industrial firms from 1982-1992 and find that neural networks have about the same level of accuracy as do credit scoring models. Podding (1994), using data on 300 French firms collected over three years, claims that neural networks outperform credit scoring models in bankruptcy prediction. However, he finds that not all artificial neural systems are equal, noting that the multi-layer perceptron (or back propagation) network is best suited for bankruptcy prediction. Yang *et al.* (1999) use a sample of

oil and gas company debt to show that the back propagation neural network obtained the highest classification accuracy overall, when compared to the probabilistic neural network and discriminate analysis. However, discriminate analysis outperforms all models of neural networks in minimizing the type 2 classification errors, which is, misclassifying a good loan as bad (Allen *et al.,* 2004). During "training" the neural network fits a system of weights to each financial variable included in a database consisting of historical repayment/default experiences. However, the network may be "over fit" to a particular database if excessive training has taken place, thereby resulting in poor out-of-sample estimates. Moreover, neural networks are costly to implement and maintain. Because of the large number of possible connections, the neural network can grow prohibitively large rather quickly. Finally, neural networks suffer from a lack of transparency. Since there is no economic interpretation attached to the hidden intermediate steps, the system cannot be checked for plausibility and accuracy. Structural errors will not be detected until estimates become noticeably inaccurate.

Credit Rating Models

External credit ratings provided by firms specializing in credit analysis were first offered in the USA by Moody's in 1909. Agency ratings are opinions based on extensive human analysis of both the quantitative and qualitative performance of a firm. Companies with agency-rated debt tend to be large and publicly traded. Moody's primary business is providing credit opinions on financial obligations for investors. These ratings are well-accepted by the investment community and extend not only to commercial firms but municipal, sovereign and other obligators. These ratings cover approximately 6,500 firms worldwide and 3,000 in the USA (Falkenstein *et al.,* 2000). The credit opinions are statements about loss given default and default probability, specifically expected loss and thus act as combined default prediction and exposure models. White (2002) identifies 37 credit rating agencies with headquarters outside of the US. These firms offer bond investors access to low cost information about the creditworthiness of bond issuers. The usefulness of this information is not limited to bond investors. The Office of the Comptroller of the Currency (OCC) in the USA has long required banks to use internal ratings systems to rank the credit quality of loans in their portfolios. However, the rating system has been rather crude, with most loans rated as Pass/Performing and only a minority of loans differentiated according to the four non-performing classifications (listed in order of declining credit quality): other assets especially mentioned (OAEM), substandard, doubtful and loss. Similarly, the National Association of Insurance Commissioners (NAIC), in the USA, requires insurance companies to rank their assets using a rating schedule with six classifications corresponding to the following credit ratings: A and above, BBB, BB, B, below B and default. Many banks have instituted internal ratings systems in preparation for the Bank of International Settlement (BIS) New Capital Accords whose implementation started in 2005. The architecture of the internal rating system can be one-dimensional, in which an overall rating is assigned to each loan based on the probability of default PD; or two-dimensional, in which each borrower's probability of default is assessed separately from the loss severity of the individual loan (LGD). Treacy and Carey (2000) estimate that 60 percent of the financial institutions in their survey had one-dimensional rating systems, although they recommend a two-dimensional system. Moreover, the Bank of International Settlement (2000) found that banks were better able to assess their borrowers' probability of default than their LGD. Treacy and Carey (2000) in their survey of the 50 largest US bank holding companies and the Bank of International Settlement (2000) in their survey of 30 financial institutions across the G-10 countries found considerable diversity in internal ratings models. Although all used similar financial risk factors, there were differences across financial institutions with regard to the relative importance of each of the factors. Treacy and Carey (2000) found that qualitative factors played more of a role in determining the ratings of loans to small and medium-sized firms, with the loan officer chiefly responsible for the ratings, in contrast with loans to large firms in which the credit staff primarily set the ratings using quantitative methods such as credit scoring models. Typically, ratings were set with a one year time horizon, although loan repayment behaviour data were often available for 3-5 years.

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Credit Scoring Models

Credit scoring began as a tool for banks to decide whether or not to grant credit to consumers (Thomas, 2000). Durand (1941) was the first paper that employed statistical methods in discriminating good and bad loans. Since then, many researchers have made efforts to develop better theoretical and empirical models. New statistical methodologies have been utilized in this area and remarkable development in computer systems enables banks to apply a variety of new models. Today, many banks are implementing credit scoring models in their credit decision-making. Credit scoring models are widely used in credit card approval, mortgage loans and consumer loans and are increasingly used for business loan applications (Mester, 1997)11. When constructing a credit scoring model, banks are confronted by two critical issues, (1) the functional form and (2) choice of explanatory variables. There is no common consensus on which variables should be included in a credit scoring model because economic theory hardly supports the issue. As a practical matter, the choice of the explanatory variables largely relies on data availability. There are four methodological forms of parametric models in the credit scoring literature: (1) Discriminant Analysis (DA), (2) Linear Probability Models (LPM), (3) Logit models and (4) probit models. DA assumes that there are two groups of loans, good and bad and finds the best linear combination of explanatory variables, thus, characteristics of borrower, that can discriminate each group (Betubiza & Leatham, 1990). There is a great deal of literature on discriminant analysis (DA) in 1970s and 1980s, including studies by Altman et al. (1977), Sexton (1977) and Reichert et al. (1983). Linear probability models (LPM), logit models and probit models employ standard statistical techniques and provide banks with the probability of default for a borrower. LPM use a least square regression approach, where the dependent variable is 1, if a borrower is in default, or 0, otherwise. The regression equation is expressed as a linear function of explanatory variables (Orgler, 1970).

Logit and probit models are different from LPM in that they assume the probability of default is logistic or normal distribution. Application of logit and probit models in credit scoring began in the 1980s under the background development of quantitative choice model in 1970. After Wiginton (1980) and Grablowsky and Talley (1981), numerous papers have been published, and logit and probit analysis became the most preferred models in credit scoring research. It has been pointed out that a weakness of DA is that the method doesn't produce a probability of default. Furthermore, when DA models are estimated, the OLS estimator used is not efficient because it basically assumes that explanatory variables of two groups are normally distributed and have the same variance-covariance matrix (Turvey, 1991). Since the DA approach exhibited good performance in large samples in spite of statistical problems and because it has the advantage of technical convenience in estimation and maintenance, it was widely used in the 1960s and 1970s. LPM has similar statistical problems to DA. Its biggest problem is that the estimated probability of default might exist outside the interval (0, 1). LPM has the advantage in that it can suggest default probability and its estimated parameters can be easily interpretable. It also has the advantage of technical convenience. Logit and probit models were developed to solve the statistical problems existing in DA and LPM. Estimators of logit and probit models are efficient and consistent. These methods do not need the strict assumptions on data. Loan officers can conveniently calculate the default probability of a borrower with the logit or probit model, but the parameters estimated are more difficult to understand because of their nonlinear characteristics (Green, 2000; Maddala, 1983). Since the 1980s, there have been many attempts to use non-parametric statistics or artificial intelligence techniques such as neural networks, recursive partitioning algorithms, expert systems, and nearest neighbour methods. These models are highly flexible in modelling because they do not have distributional assumptions on data and/or do not require pre-specification of the model (Chhikara, 1989). A great deal of attention has been given recently to new methodologies. Some argue that new techniques can improve the predictive accuracy of credit scoring models (Desai et al., 1996; Freed & Glover, 1981; Frydman et al, 1985 and Srinivasan & Kim, 1987).

Many consulting institutions are applying these new statistical techniques. In spite of their statistical advantages and good performance, these models have as many limitations as non-parametric models. Most of all, they cannot provide the probability of default and informative parameters useful in loan pricing, management policy decisions, and portfolio credit risk modelling. Model accuracy has been a critical argument in research on credit scoring

models12. There have been many papers arguing a specific model representing the best accuracy, but generally there were no major differences in performance among these models. Thomas (2003) argued that there is no conclusive evidence on model accuracy and there is no agreement on which statistical technique should be preferred. No matter what model banks use, the application of credit scoring can cut operating costs by making the loan process simple, reduce potential loan losses and focus attention more on problem loans. Banks are expending the application of credit scoring over their credit line. For example, recent modifications of credit scoring models have given banks the opportunity to treat small business loans as retail credit (Allen et al., 2004; Longenecker et al., 1997; Mester, 1997).

Modern Credit Risk Models

Modern credit risk models are classified into three (3) groups. The first group is Options-Theoretic Structural Approach pioneered by Merton (1974). The second group is the Reduced form approach utilizing intensity-based models to estimate stochastic hazard rates, pioneered by Jarrow & Turnbull (1995); Jarrow et al. (1997) and Duffie and Singleton (1998, 1999). The third group is the *Multi-factor Econometric* approach pioneered by Wilson (1997a, 1997b). The three (3) approaches propose differing methodologies to accomplish the estimation of default probabilities. The structural approach models the economic process of default, whereas reduced form models decompose risky debt prices in order to estimate the random intensity process underlying default. Multi-factor econometric approach uses the intuitive theory that credit cycles closely follows business cycles and hence the approach proposes a methodology of linking macroeconomic factors to the probability of default of a loan.

Structural Credit Risk Models

Structural credit risk models use the option pricing theory in valuation of loans, as first proposed by Merton (1974). In fact, Merton's (1974) model is regarded as the classical structural credit risk model. There is an assumption that borrowers have an incentive to repay the loan if the firm's assets exceed the amount borrowed and default on the loan otherwise. According to Merton's (1974) theory, if a loan is repaid, the lender will earn a fixed return on the loan. If a loan is in default, the lender can suffer large losses that may exceed the outstanding principal and interest. This behavior makes loan payoff to the lender analogous to writing a Put Option on the assets of the borrowing firm. The value of a risky loan is dependent on the variables used in calculating the value of the option: the short-term risk-free interest rate, the loan time horizon, the amount borrowed, the market value of the assets of a firm and the volatility of asset value. The last two variables are usually not directly observable. Proprietary credit risk models such as KMV solves this problem for corporate borrowers by using a firm's stock price to estimate market value of its assets and volatility of the firm's equity to estimate volatility of assets. KMV offers a "Private Firm Model" for non-traded firms and approximates their asset value and asset volatility by those of publicly-traded firms with similar characteristics. It would not be appropriate for agricultural lenders to use the Private Firm Model since there are no publicly traded firms with similar characteristics: agricultural firms (farms) are in general a lot smaller than even smallest of publicly-traded firms. Lyubov (2003) proposes an approach of directly computing the borrower's market value of assets based on balance sheet information and calculate volatility of assets based on historical borrower balance sheet data. This approach was used by Katchova and Barry (2005), who used a borrower's current balance sheet data and historical balance sheet data to determine the borrower's market value of assets and asset volatility respectively. After all of the five required variables are available, the probability density function (PDF) of the borrower can be determined. The Distance-to-Default is calculated as the difference between the asset value and loan (debt) value, divided by the volatility of asset value. If one makes the assumption that future asset values are normally distributed around the firm's current asset value (projected growth rate can be incorporated in calculating the future asset value distribution), probability of default (PD) can be derived from the Distance-to-Default using a normal distribution. Katchova and Barry (2005) used this procedure to measure the credit risk in the loan portfolio of the Farm Credit System in the US. For proprietary credit risk model, KMV, the calculate Distance-to-Default is mapped to its historical data base to calculate the probability of default (PD). The KMV model calculates PD as the number of firms that defaulted within a specified time horizon with asset values of given distance from default

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divided by total number of firms with asset values of given distance from default. The empirical based PD can vary significantly from the PD based on the normal distribution.

Reduced Form or Intensity-Based Model of Credit Risk Models

The reduced form model was originally introduced by Jarrow and Turnbull (1992) and subsequent research includes Jarrow and Turnbull (1995), Jarrow et al. (1997) and Duffie and Singleton (1999). Reduced form credit risk models use a mathematical technique common in loss distribution modeling, which was developed in the insurance industry, the so-called actuarial model14. Credit Suisse Financial Products developed a commercial reduced form model, which is called Credit Risk Plus. Credit Risk Plus only models default risk, not migration risk. In other words, it is assumed that at the end of the risk horizon the borrower is in one of two states, namely, default or non-default. Contrary to the option-based structural model, this model does not make any assumptions on timing and causality between default and other variables. The influence of systematic factors on the default rate is supposed to be captured through default rate volatilities instead of default correlation between borrowers. It further assumes that the probability of default for a loan is constant over time. Credit Risk Plus first assigns each loan to a credit rating category (or segment) and calculates key inputs for each loan: (1) credit exposure, (2) obligor default rate, and (3) obligor default rate volatilities. Default rates for each loan are usually estimated by mapping of default rate to its credit rating15. Default rate volatility is defined as the historical standard deviation of the default rate. Loans are assumed to be mutually independent of each other and each rating category consists of homogeneous loans with identical credit risk characteristics such as default rate and volatility. If there are a large number of loans in a portfolio, the effect of a loan exposure on the probability of default to the portfolio is very small and the default frequency in any given period is independent of default frequency in any other period. Under those conditions, the probability distribution for the number of defaults at the portfolio level during a given period of time can be represented by the following Poisson distribution:

$$1) \quad P(n) = \frac{\mu^n e^{-\mu}}{n!}$$

Where: n is average number of defaults per year and μ stands for the expected number of defaults in the portfolio. To estimate the loss distribution for a loan portfolio, the joint default behavior of loans is captured by treating the default rate of a portfolio as a continuous random variable with volatility, which incorporates uncertainty about the future state of loans. The default rate for each segment (i.e., X) is supposed to follow a gamma distribution and can be expressed as:

$$2) \quad X_K \sim (\alpha_K, \beta_K), \text{ where: } \alpha_k = \frac{\mu_k^2}{\sigma_k^2} \text{ and } \beta_k = \frac{\sigma_k^2}{\mu_k}$$

The default rate at the portfolio level is calculated by a probability generating function of a gamma distribution and a probability generating function for the entire portfolio derived by the multiplication of probability generating function for each segment. Finally, the distribution of the credit loss is estimated by the probability generating function and depends on distributional assumptions, the default rate for each loan, the standard deviation of the default rate, and weight of each loan.

Multi-factor Econometric Credit Risk Models

The multi-factor econometric credit risk models evaluate systemic credit risk of a country, an industry or a portfolio segment as opposed to an individual exposure. This model assumes a homogenous credit standing for firms within a portfolio segment and the existence of causal relationship between credit risk of a portfolio segment and economic conditions associated with the loan portfolio (Bessis, 2002). The econometric model begins with the intuitive theory that credit cycles follow business cycle closely, but its behavior is different from industries. Since the state of nature is, to a large extent, driven by macroeconomic factors, the econometric approach proposes a methodology to link the

macroeconomic factors to the probability of default of a loan. Credit Portfolio View (CPV), which was the first multi-factor econometric model, was developed by Wilson (1997a, 1997b) of McKinsey Group. It focuses on the default rate and the migration rate. CPV consists of two model blocks: (1) the default block and (2) the time series block. In default block, default rate for a portfolio is formulated as a log it specification. The index variable (or default rate) is expressed as a linear function of macroeconomic variables (multi-factor model) and is assumed to follow logistic distribution as shown below:

$$3) \quad Y_{it} = \frac{1}{1 + \exp(z_{it})}$$

$$4) \quad Z_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_t X_{jt} + e_t$$

Where Y_{it} is conditional probability of default in period t for ithloan or segment, Z_{it} is the index value from the multi-factor model, X_{jt} macroeconomic variables, αs are unknown parameters and et is an error term. Each macroeconomic variable is supposed to follow a univariate autoregressive process of order 2, or:

$$5) \quad X_{jt} = \gamma_{j0} + \sum_{k=1}^{2} \alpha_{jk} X_{j,t-k} + V_t$$

This model simulates the joint distribution of the default rate conditional on the macroeconomic factors like unemployment rate, rate of economic growth, government expenditure and aggregate savings rate. To estimate the distribution of default probabilities for a loan portfolio, the model first determines the stochastic macroeconomic state. This is accomplished by simulating the relevant macroeconomic variables over several years more than 1,000 times. The conditional defaults probability is then estimated by country or by industry segment. It is also assumed that all default correlations are caused by the correlated segment-specific default. This means there is no further information beyond country, industry, the state of nature and the state of economy used for predicting the default correlation between borrowers. Finally the model estimates the default distribution for a portfolio from the relevant segment default distributions.

Credit Risk Management in Agriculture Finance

Credit risk -- the risk that a borrower may default -- resulting in losses to the lender, is among the most important risks that financial institutions face. Credit risk is generally considered to be higher for loans to agriculture because of the inherently high level of risk the sector itself faces.

As part of its ongoing work on lending for agriculture, the World Bank conducted a survey of 15 financial institutions in five African and Asian countries to understand how these institutions manage their credit risk (Nair, 2008). The survey brought a number of findings to light. The absence of well functioning national identification and credit information systems limited the ability of all 15 financial institutions to assess their clients' credit-worthiness. None of those that made small loans used traditional forms of collateral or conventional credit assessment systems, in which the approval decision is based on the detailed financial analysis of an individual applicant or project. Some of the financial institutions used simplified financial analysis, in which the applicant's capacity to successfully undertake an activity is assessed based entirely on cash flows. Others used parametric, area-based scales that were standardized to fit certain crops in a given geographical area. Some required evidence of land ownership, but without requiring mortgage or any other form of collateral. Some of the financial institutions that made small loans accepted joint liability by groups of between 5 and 20 individuals, and the loans were made either to individual members of the group or to the group collectively. Others delegated credit risk assessment to third parties – either individuals with local knowledge or field officers of partner organizations, such as a commodity buyer. All of the financial institutions surveyed continued to use traditional credit-risk assessment tools for large loans. While the use of insurance products and other instruments to manage financial risk is not common, two of the organizations studied bundled credit with life insurance, and one of them bundled credit with life insurance, health insurance, and area yield-based crop insurance. None of the organizations reported using financial price risk management

instruments, such as futures or options. Six banks used risk-based pricing for institutional and large individual borrowers, but not for small loans. Three out of the four development finance organizations examined did the latter. Most of the financial institutions studied, which had large agricultural portfolios, had significant expertise in agriculture, both at the loan officer level and at the senior level. Most of these organizations also had diversified loan portfolios -- across sectors, across geographies, and within the agricultural portfolio. The share of the agricultural portfolio in banks total credit portfolios ranged between 10 and 20 percent. In two of the development finance organizations (such as state development organizations and microfinance institutions (MFIs)), this ratio ranged between 30 and 40 percent, while the other two had nearly 100 percent of their credit portfolio in agriculture. The findings of the review suggest that all financial institutions interested in starting or scaling up lending to smallholder farmers and small rural enterprises should consider: (i) the use of innovative means, such as biometrics, for uniquely identifying clients; (ii) alternatives to traditional financial analysis, such as the use of cash flows rather than balance sheets; (iii) alternatives to traditional forms of collateral, such as tripartite arrangements and group lending; and (iv) developing agricultural expertise at credit officer and senior management levels. Further case studies of selected financial institutions revealed that basic banking tools and processes, as well as market facilitating institutions playing a key role, are the foundation for good agriculture.

Credit Risk Models in Agriculture Finance

Traditional credit risk models (especially credit scoring models) are extensively used in agriculture finance. Credit scoring models (in agriculture finance) have been used in the following studies to measure credit risk: Allen *et al.* (2006); and Novak and la Due (1994), *inter alia*. The study by Odeh (2005) examined the performance of logistic regression (i.e., credit scoring model), artificial neural networks (i.e., expert system) and adaptive neuro-fuzzy inference system (i.e., expert system), to predict credit risk using data from Farm Credit System, in the USA. Research on the application of modern credit risk models in agricultural finance is in its infancy. Lyubov (2003) developed the first modern credit risk model applied to agricultural lending; it is actually a portfolio credit risk model. The model is a reduced form model rooted along the lines of Credit Risk Plus, but addresses a disadvantage of this approach by incorporating recent research on sector relationships using a more stable algorithm. The model was applied to a representative Farm Credit System association in Minnesota, AgStar Financial Services. The model output is a loan loss distribution (i.e., the probability of default), which is used to calculate the expected and unexpected loan losses for the overall portfolio and to estimate required capital. Katchova and Barry (2005) specify an option based structural model much like the Credit Metrics and Portfolio Manager Models. This represents the first attempt at applying the theories of Structural Credit Risk Models to agricultural loans. Yan et al. (2009) addressed the problems of measuring credit risk under the structure model; their study proposed the use of unrelated regression model (SUR) to predict a farm's ability in meeting its current and anticipated obligations in the next 12 months. Kim (2006) developed a multi-factor econometric model much like Credit Portfolio View. The model was used to evaluate credit risk (i.e., determine the probability of default) in the Farm Credit System's loan portfolio, in the USA. In the model it was assumed that creditworthiness is a function of Net Farm Income.

When modeling credit risk in agricultural loans, one must account for the attributes of the agricultural sector and its borrowers, which is substantially different from the credit risk exposures in the other sectors of the economy. Agriculture is a capital-intensive sector with investment in farm land, buildings, machinery and breeding stocks dominating the asset structure of most types of farms (Barry *et al.,* 2003). The agricultural sector has liquidity problems; it experiences chronic cash-flow pressures resulting from relatively low but volatile returns to production assets. These characteristics contribute to the aggregate debt-servicing capacity and creditworthiness of farms (Barry et al., 2002). Credit risk in agricultural loans is closely tied to a farm's net cash flow just as it is for other retail loan categories16. Net cash flows in agriculture are volatile mainly due to the fluctuations in commodity prices and weather conditions. However, the expected net cash flow is a good leading indicator for the eventual creditworthiness of an agricultural borrower. Economic performance in the agricultural sector is also widely

influenced by events in both the domestic and international economy. Capturing the state of these economies may be in some cases critical when credit risk modeling for the agricultural sector.

CONCLUSION

The different types of models are used to measure credit risk. The credit risk models were classified into two broad families, namely: Traditional credit risk models and Modern credit risk models. In agriculture finance, traditional credit risk models (especially credit scoring models) are the most widely used models in quantitative evaluation of credit risk in loans. The use of modern credit risk models in agricultural finance is still in its infancy, with studies done by Yan *et al.* (2009), Kim (2006), Katchova and Barry (2005) and Luybov (2003) leading the way. At present, the lack of high-quality weather data, inadequate distribution of weather stations, limited supply of people with risk-modeling capabilities and expertise in agricultural risk management, small capital markets, and weaknesses in regulatory and legal infrastructure hamper the pace of progress. Since the depth and efficiency of financial markets are highly correlated with the speed of overall economic development, innovative methods of improving rural financial services will be critical in facilitating and sustaining any marked improvement in rural welfare.

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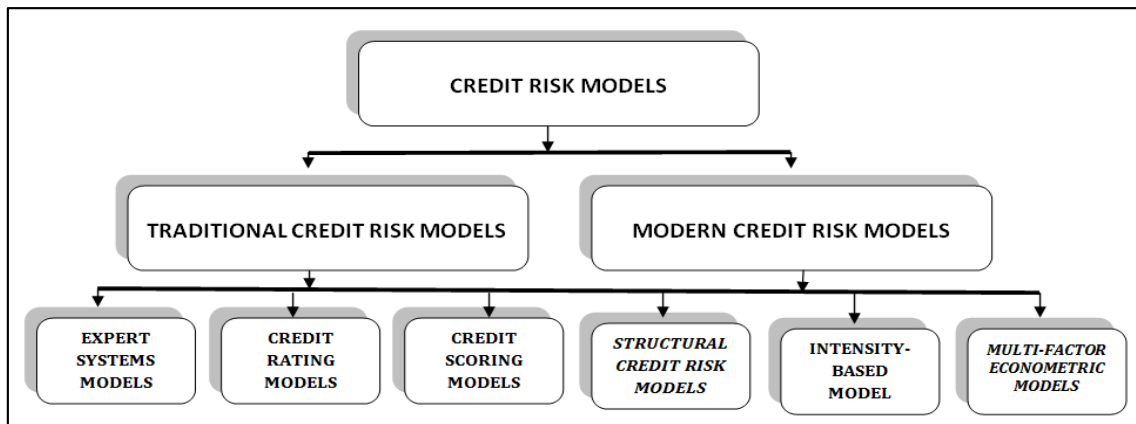
Figure 1: The Classification of Credit Risk Models

RESEARCH ARTICLE

Locating Appropriate Areas for Burying Wastes Using Fuzzy Logic and Analytic Hierarchy Process (Studied Area: Yazd City)

S.A.Almodaresi* and M.Mohamadpour

Department of GIS&RS, Yazd Branch, Islamic Azad University, Yazd, Iran

*Address for correspondence
Seyed Ali Almodaresi,
PhD Geomorphology, Assistant Professor,
Civil Engineering College, GIS&RS Department,
HesabiBlv, Safaeie, Yazd, Iran
E.Mail: Almodaresi@iauyazd.ac.ir

ABSTRACT

One of the important problems for municipal officials is to choose an appropriate place for burying municipal waste. It is obvious that nonconformity of correct locating can cause different environmental pollutions. In this study, some of information layer such as land use, lithology, distance from road, distance from railway, distance from waterway, distance from refinery, distance from city, distance from aqueduct, distance from airport, distance from park, distance from protected areas, distance from fault, distance from factories, distance from agricultural land, distance from industrial town, distance from village and … for locating waste burying place in Yazd city are used. In this study, methods based on fuzzy logic and analytical hierarchical process is used for locating appropriate areas. Initially, effective factors map for locating are made using J- shaped and sigmoidal fuzzy operators. And the fuzzy maps are modulated by SUM function and utility map of the area is gained. In second step, modulation was performed by analytical hierarchical process and weight overlay model using Expert choice software. The results show that created maps by SUM fuzzy operator with J- shaped and sigmoidal membership functions and maps by weight overlay model, show almost the same location for burying wastes in the studied area. Gained common value percentage for appropriate waste burying locations is as follows: 14.76% in weighted overlay, 16.25% and 24.03% in SUM fuzzy operator with J- shaped and sigmoidal membership functions respectively.

Keywords: Analytical Hierarchical Process (AHP),Fuzzy Logic,GeographicInformation System,Waste Locating, Yazd.

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INTRODUCTION

Waste is an integral component of human life[1]. Uncontrolled population growth, urban development, rising of new technologies and the resulting changes in habits and consumption patterns on the one hand and limitation of using natural resources on the other hand, in addition to creation of different kinds of problems in the quality of human life, has caused many social, economic and finally environmental in compatibilities[2]. One of the main and complex problems of societies is production of different solid wastes in different qualities and quantities and burying them [3]. Locating waste burying area at urban areas because of direct effect on economy, ecology and environmental health is one of the important problems in urban planning[4]. So management and proper disposal of wastes is the main world concern particularly at developed countries[5]. Nowadays, there are different methods for environmental management such as waste burying, biological refinement and burning[6]. Nowadays, sanitary burial of wastes is the most common method in many countries such as Iran [7]. In these days, engineered sanitary landfill is implemented in most progressed countries [8, 9, 10, 11]. In North America (USA and Canada), environmental laws, have explained the details of municipal landfill engineering projects and dangerous garbage completely. And those in charge of the landfill are forced to follow the rules [12, 13]. In recent years, progress of technology in the field of computer, has introduced geographic information system to the world which has been very helpful to locational information related sciences[5].Considering the vast capabilities of GIS in deciding problems and merging ability and overall investment of information layers, using GIS and technologies related to that is the best and the most reasonable choice to find an appropriate place for burying wastes [14]. Geographic information system (GIS) is surely appropriate because of its management ability of huge amount of data [4].

Therefore, using geographic system techniques, in addition to possibility of studying large areas, causes providence in time and money considering all of the parameters simultaneously[15, 16].Some of studies about waste burying location are: Heydarzadeh (2002) in a research has proceeded about locating solid waste burying locating of Tehran city identifying 12 effective factors in waste burying locating using GIS. These factors are: agricultural lands, flood areas, earthquake- prone areas, fault lines, jungles and farms, access roads, population centers, topography (damp), ground water depth, surface waters, land flooding and distance to production center (Tehran city). Analysis is based on Boolean and fuzzy logics. And finally, according to the produced results, the southern parts of Tehran city, are chosen as the best places for waste burying areas compliance with mentioned factors[17]. khorshiddoustand Adeli (2010) in a researchto find optimized waste burying place in Bonab city located in eastern Azerbaijan using geographic information system techniques and analytic hierarchy process, did pair comparison between categories after determining analytic hierarchy surfaces included goals, criterions, sub -criterions, choices (places of interest). And they used Expert Choice software for weighting criterions. For this purpose, the same as weighting the categories, analysis of consistency of judgment takes place which should be less than 0.1. This study aimed to locate environmental areas to bury wastes of Bonab city.

Criterions and sub -criterions used in this study including: geomorphology, environment, land use and economic conditions are considered. From 9 allowed location of burying places at the studied area, number4 at southern east of Bonab city with distance of 7 kilometers of Malekan city road is chosen as the best location. And other choices according to the weights of interest were in following priorities[18].To locate waste burying area, different methods have been used and because of that, different factors have been used to choose the appropriate location. Studies of [19, 20, 21, 22, 23, 24, 25, 26, 27, 28].are some of mentionable studies related to the topic. The purpose of this study is to make a map of appropriate places for burying wastes using fuzzy logic and analytic hierarchy process at the studied area.

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METHODOLOGY

Study Area

Yazd city, the capital of Yazd state, is a dry and flat plain between Shirkouh and Kharanegh mountains, which is located in 31 C 55 min north and 54 C 20 min east. Yazd city height above sea level is 1218 meters. It is limited to Ardekan city from north, to Taft city and Mehriz city from south, to Bafgh city from east and to Sadugh city and Meybod city and Esfahan state. Figure1 shows geographic location of the studied area.

InformationLayers

According to researches and considerations in this study, 17 effective factors are used to locate waste including damp, land use, lithology, distance from road, distance from railway, distance from waterway, distance from refinery, distance from city, distance from aqueduct, distance from airport, distance from park, distance from protected areas, distance from fault, distance from factories, distance from agricultural lands, distance from industrial towns and distance from village. Figure2 shows hierarchical structure criterions and sub-criterions of locating waste burying areas of Yazd city [29].

Locating Methods

In this research, the weighted overlay and the SUM fuzzy operator methods are used for integrating layers to obtain appropriate locations.

SumFuzzy Operator

This operator is defined by using Equation 1

Equation 1 $\mu Combination = 1 - \left(\prod_{i=1}^{n} (1 - \mu i) \right)$

Whereμi represents the membership value of the i inthe factor map.

Weighted Overlay or Weighted Linear Combination

In this method criterion score of factors are multiplied in factors weight. The products are accumulated in vector form and collection of the scores is gained. Weighted linear combination method could be expressed as equation2[3].

Equation 2S=$\sum W_i X_i$

S: desirability, Wi: factor weight, Xi: criterion score of factor i. Table 2 show the criterions points range.

Standardization of Layers

In the location evaluation process, a primary step is to ensure a standardized measurement system across all factors considered. Since most images still hold cell values for the original map codes, these have to be standardized to a uniform suitability rating scale. In this research for perform locating, firstly effective layers in locating were standardized. For this purpose fuzzy logic and Value-weighted has been used for standardization of layers.

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Fuzzy Logic

Standardization process in fuzzy logic through formatting amounts and values in the shape of a membership collection becomes implemented. In this condition the maximum value which is 1 belongs to maximum membership and the minimum value which is 0 belongs to the minimum membership in the collection[29].In fuzzy logic, every area considering the value that observes the criteria of interest gets a membership value which expresses its desirability of the area. Thus the area with higher membership value has higher desirability. The finality of Boolean logic doesn't exist in fuzzy logic and every layer is graded in a scale between 0 and 1. In addition to scale choosing problem to make fuzzy maps, the fuzzy function type should be considered to choose better function for the criteria of interest. Among famous functions, J- shaped, User defined and Sigmoidal functions could be mentioned[30]. One of other effective factors in standardization fuzzy maps is determination of threshold limit which is called control points. But, the point which should be noted in choosing the function is the increasing or decreasing type of the function. By decreasing type, it means minimum binding or descending type of function and by increasing, it means maximum binding or ascending type of function[30]. Table 1 shows the threshold values and type of fuzzy function for standardization the benchmark map in fuzzy logic.in this study, fuzzy optimization was done in Idrisi software.

Value-Weighted

In this research, for overlayding, factors between 0 and 7were marked. Assigning values to specific factors amounts to the making of decision rules in the shape of thresholds for each factor. Table 2 shows the class boundaries and standardized measurements employed for each factor.

Weighting to Criterions and Sub- Criterions

AHP is a multi-objective, multi-criteria decision-making approach that employs a pair-wise comparison procedure to arrive at a scale of preference among a set of alternatives[31, 32, 33].In this study, firstly all of the mentioned criterions and sub- criterions are compared by pairwise comparison method and the relative importance rate of each pair is entered in a matrix according to the existing scoring from 1 to 9. Then the weights and also consistency ratio (CR) are calculated. Performed calculations showed that CR is less than0.1 which means the estimated weights have been accepted[30]. Tables 3 to 5 show criterion comparison matrix and sub criterions and final weights respectively.

RESULTS

To do locating operation and reaching appropriate areas to bury wastes, standard maps from previous steps are established for integrating standardized layers in GIS environment from 3 methods: 1) Sum fuzzy operator with J- shaped membership function Figure3. 2) Sum fuzzy operator with Sigmoidal membership function Figure4. 3) Weighted linear combination Figure5. The results of each method are presented in the following.

CONCLUSION

The results showed that produced maps using Sum fuzzy operator with J- shaped and sigmoidal membership function show nearly the same location compared with the maps produced by analytic hierarchy process at the studied area. Common values percentage of appropriate locations to bury wastes for analytic hierarchy process is 14.76% and for Sum fuzzy operator with J- shaped and sigmoidal membership functions are 16.25% and 24.03% respectively. The percentage of moderate locations to bury the wastes for analytic hierarchy process is 27.78% and for Sum fuzzy operator with J- shaped and sigmoidal membership functions are 21.88% and 25.04% respectively. The percentage of weak locations to bury the wastes for analytic hierarchy process is 32.22% and for Sum fuzzy operator

with J- shaped and sigmoidal membership functions are 24.50% and 21.89% respectively. The percentage of inappropriate locations to bury the wastes for analytic hierarchy process is 24.23%, and for Sum fuzzy operator with J- shaped and sigmoidal membership functions are 28.08% and 22.06% respectively. Andthe percentage of very inappropriate locations to bury the wastes for analytic hierarchy process is 0.98%, and for Sum fuzzy operator with J- shaped and sigmoidal membership functions are 9.27% and 6.96% respectively.

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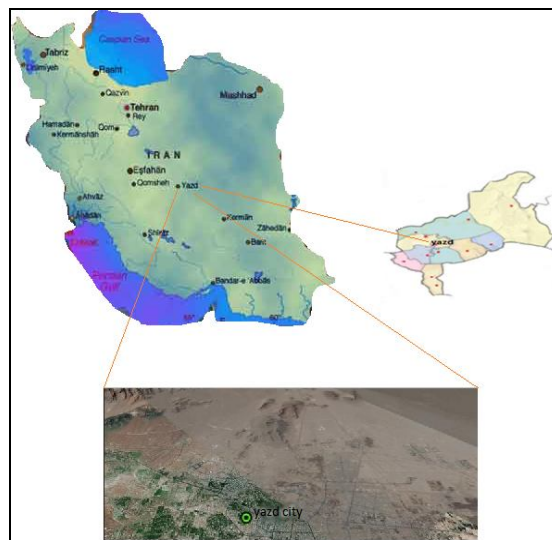
Figure 1:Geographic location of the studied area

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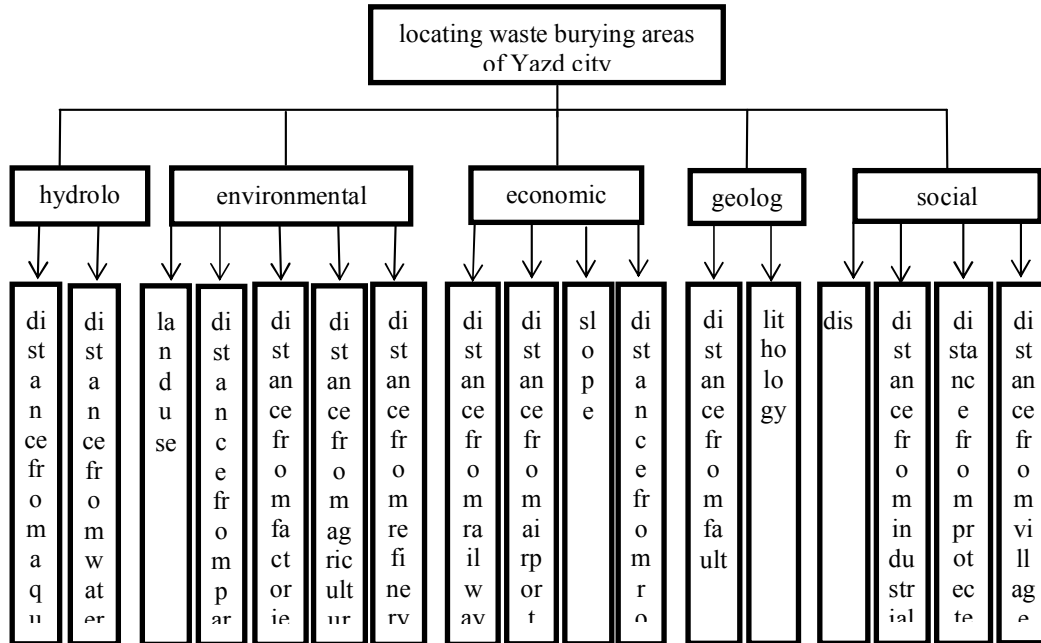
Figure 2:Hierarchical structure of waste burying location
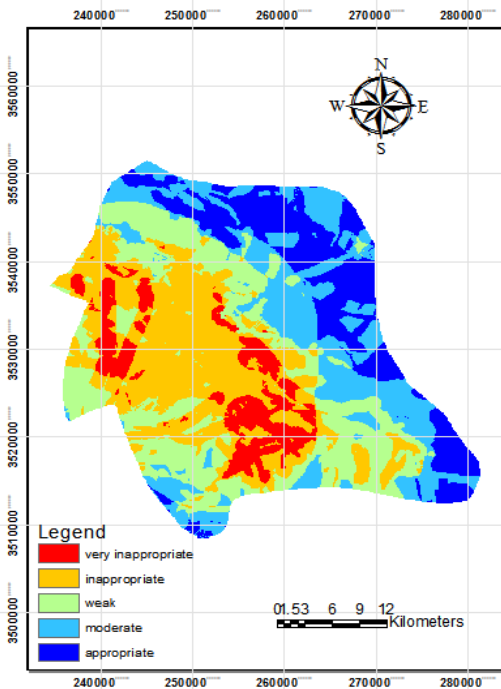
Figure 3:Obtained result from integrating Sum fuzzy operator with J- shaped membership function.
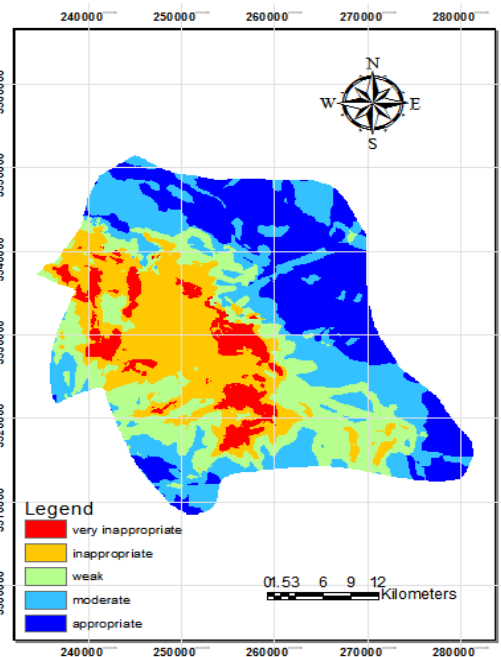
Figure 4:Obtained result from integrating Sum fuzzy operator with sigmoidal membership function

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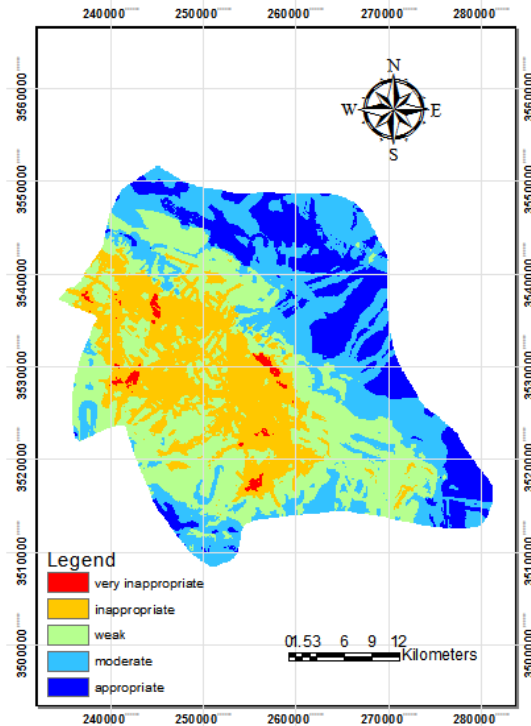
Figure 5:Obtained result from integrating weighted linear combination (weight overlay)

Table1:Standardization of layers

type of the fuzzy function	shape of the fuzzy function	control points(m)				layer
		d	c	b	a	
J,S	Increasing	9000	*	*	3000	distance from city
J,S	Increasing	5000	*	*	1000	distance from industrial towns
J,S	Increasing	3000	*	*	600	distance from protected areas
J,S	Increasing	3000	*	*	1000	distance from village
J,S	Increasing	500	*	*	100	distance from fault
J,S	Increasing	Qt2[23]وURig[24] وPec[25],K1t[26],E2s[27]	*	*	Qs[20]وTRn[21],Eos[22]	Lithology

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[20]un consoliatedwind blown sand deposits and back shore sand duns
[21]Greenish grey shale and grey limestone
[22]Salt dome
[23]Low level piedmont fan and valley teracesdeposite
[24]Red marl ,gypsiferous marl , sandstone and conglomerate (Upper Red Fm .)
[25]Conglomerate and sandstone

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J,S	Decreasing	40	*	*	10	Slope(%)
UD	Decreasing	1000	600	200	200	distance from road
J,S	Increasing	10000	*	*	8000	distance from airport
J,S	Increasing	700	*	*	100	distance from railway
J,S	Increasing	Sand&baer	*	*	Residential&agricultural	land use
J,S	Increasing	2500	*	*	500	distance from park
J,S	Increasing	2500	*	*	500	distance from factories
J,S	Increasing	3000	*	*	1000	distance from agricultural lands
J,S	Increasing	5000	*	*	1000	distance from refinery
J,S	Increasing	800	*	*	200	distance from waterway
J,S	Increasing	1200	*	*	400	distance from aqueduct

threshold values or control points, type and shape of the fuzzy function for standardization benchmarks map in fuzzy logic.

Table 2: Valuation of Layers

value	Class		value	Class(m)	
0	0-200		0	0-100	
1	200-300		1	100-200	
2	300-400	score limitation for waterway	2	200-300	score limitation for railway
3	400-500		3	300-400	
4	500-600		4	400-500	
5	600-700		5	500-600	
6	700-800		6	600-700	
7	>800		7	>700	
0	0-500		0	0-500	
1	500-900		1	500-900	
2	900-1300	score limitation for factories	2	900-1300	score limitation for park
3	1300-1700		3	1300-1700	
4	1700-2100		4	1700-2100	
5	2100-2500		5	2100-2500	
7	>2500		7	>2500	
0	0-1000		0	0-1000	
1	1000-1500		1	1000-2000	
2	1500-2000	score limitation for village	2	2000-3000	score limitation for industrial towns
3	2000-2500		3	3000-4000	
5	2500-3000		5	4000-5000	
7	>3000		7	>5000	
1	residential	score limitation for land use	0	Qs	score limitation for lithology
3	agricultural		3	Eos,TRn	
5	sand lands		5	Qt2,URig	

[26]Thin to meddium bedded argillaceous limestone and thick bedded to massive , grey orbitolina bearing limestone (Taft Fm.)

[27]Sandstone , marl and limestone

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7	baer lands		7	K1t, E2s,Pec	
1	0-200		7	0-10	
5	200-600	score limitation for road	5	10-20	score limitation for Slope(%)
7	600-1000		3	20-40	
3	>1000		1	>40	
0	0-3000		0	0-600	
1	3000-5000		1	600-1400	score limitation for protected areas
3	5000-7000	score limitation for city	3	1400-2200	
5	7000-9000		5	2200-3000	
7	>9000		7	>3000	
1	0-1000		1	0-1000	
3	1000-2000	score limitation for agricultural lands	3	1000-3000	score limitation for refinery
5	2000-3000		5	3000-5000	
7	>3000		7	>5000	
1	0-400		1	0-100	
3	400-800	score limitation for aqueduct	3	100-300	score limitation for fault
5	800-1200		5	300-500	
7	>1200		7	>500	
			1	0-8000	
			3	8000-9000	score limitation for airport
			5	9000-10000	
			7	>10000	

Score limitation for criterions (Standardization)

Table3:criterion comparison matrix

Criterion	environmental	hydrology	geology	economic	social
Environmental	1	2	2	1	1
Hydrology		1	2	1	1
Geology			1	1	1
Economic				1	2
Social					1

Pairwise comparison matrix for assessing the final weights of criterions(Consistency ratio=0.04)

Table4:sub-criterions comparison matrix

sub-criterions	park	land use	factories	refinery	protected areas
Park	1	7	5	4	2
land use		1	9	9	3
Factories			1	1	6
Refinery				1	7
protected areas					1

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(Consistency ratio=0.04)

sub-criterions	city	village	industrial towns	protected areas
City	1	6	9	9
Village		1	4	2
industrial towns			1	2
protected areas				1

(Consistency ratio=0.04)

sub-criterions	Slope	road	railway	airport
Slope	1	4	5	2
Road		1	9	6
railway			1	3
Airport				1

(Consistency ratio=0.03)

sub-criterions	aqueduct	waterway
aqueduct	1	2
waterway		1

(Consistency ratio=0.00)

sub-criterions	fault	lithology
Fault	1	7
lithology		1

(Consistency ratio=0.00)

Pairwise comparison matrix for assessing the final weights of criterions

Table 5: criterion final weights

Weight criterions	criterions
0.009	distance from waterway
0.021	distance from airport
0.049	distance from aqueduct
0.172	land use
0.012	distance from factories
0.071	distance from agricultural lands
0.131	Lithology
0.018	distance from protected areas
0.041	distance from park
0.114	distance from road
0.009	distance from railway

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0.034	distance from village
0.011	distance from industrial towns
0.150	distance from city
0.037	Slope
0.012	distance from refinery
0.019	distance from fault

Criterion final weights for locating operation and reaching appropriate areas to bury wastes.

RESEARCH ARTICLE

Forecasting the Stock Price Based on Back Propagation and Simulated Annealing Hybrid Algorithm

Mohsen Ataei[1], Hamid Nabizadeh[2], Hadi Nabizadeh[3], Barat Saman[3] and Hadi Saeidi[4]

[1]Young Researchers and Elite Club, Shirvan Branch, Islamic Azad University, Shirvan, Iran
[2]Islamic Azad University, Neyshabur Branch, Iran
[3]Islamic Azad University, Qazvin Branch, Iran.
[4]Young Researchers and Elite Club, Quchan Branch, Islamic Azad University, Quchan, Iran.

*Address for correspondence
Hadi Saeidi
Young Researchers and Elite Club,
Quchan Branch,
Islamic Azad University,
Quchan, Iran.
E.Mail: saeedi260@gmail.com

ABSTRACT

In recent years, lots of researches are done for estimating exchange market, and scientists try to minimize the errors in estimation by help of different sciences. In this way, algorithms of artificial intelligence have acceptable responses. Back Propagation method is a appropriate way for estimating issues of exchange market. But since this algorithm may face some problems in local investigations, Simulated Annealing algorithm is used for updating the weights of the considered neural networks. The efficiency of this hybrid algorithm of Back Propagation and Simulated Annealing is examined by estimation of stock price on Tehran's exchange market. The obtained results show a great amount of accuracy of the hybrid algorithm of Propagation and Simulated Annealing in stock price prediction of discussed industries.
Keywords:

INTRODUCTION

Using methods to forecast the stock price and profit in future has always been important for scientists in finance. Naturally, in this way, there are durable and more applicable methods that have least passible errors on prediction. So for long the mathematical methods such as simple average, symphonic average, double average, and regression and so on were the only methods approved and used, but these method have their own shortcomings and mistakes. in the cases that there were no mathematical relation between data, and independent and relative variables, Using of artificial intelligence methods gives hopes, till they were considered as a substitution for mathematical method[1],[2].

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Before emerging and using of computers for forecasting the stock exchange, it was done by using different methods and the investors used these methods to maximize the return and minimize the risk. Due to the efforts of mathematics scientists, new and dynamic systems are formed to forecast the price in stock market. Although it's not so long that non linear models and advanced techniques are used, they get a good place in different sciences especially in economics. Non linear systems' experts try to explain the behavior of stock price and its forecasting by advanced non linear methods, among which are the artificial intelligence methods [3].Since 1970s and specifically from 1980, lots of efforts are done to forecast the stock price using new mathematical methods, long time series, and more advanced methods like artificial intelligence. The price information and stock indexes in different countries such as England, USA, Canada, Germany, and Japan are investigated to see whether or not there is any special structure in the stock price information, and so violating the casual steps hypothesis [4].

Efficient Market Theory

The market efficiency theory is presented since it was impossible to forecast the stock price because of numerous influential factors. Efficient market theory assumes that the stock pricing in the market is related to the buyers and sellers reaction to the latest information and the company's future. One of the theorists in market efficiency defines the efficient market as a stock exchange where many buyers and sellers react to the existing information and the outlook of the company's future, the stock of which are transacted in the market, and so appraise the stock price in the market [4].Examining the market efficiency of stock exchange is just concentrated on the stock market of New York, other stock markets of USA, and London's since 1980; so while these markets efficiency is very crucial for mass economical policies and economical development, the scope of these investigations is drawn to other stock markets. By the way the methods of evaluating the markets efficiency are also progressed and researchers try to use new advanced statistical or non statistical methods to get correct and reasonable results [5].

Galotti and Sciantavelli (1994) in an study done on the stock price of some American companies (except financial ones) show that stock price movements does not follow any special trend and political, economical, social problems effect the stock price instantly[4].Granger (1991) analyzes the casual steps hypothesis by contradiction and concluded that if the fluctuations in the stock price of the market are not casual but predictable, there is the possibility of a boundless wealth for investors. In his opinion, considering the present situation of New York's stock market, the price forecasting's possibility is less, so the market is efficient [6,7].

Artificial Intelligence

In the last decade of 20th century, scientists and researchers generally believe that considering the complex factors involved in the stock markets, the assumption of being logical for an investment, which is an undeniable basis for any modern financial investment and is one of the main assumptions of efficient market or market model, is not factual .They have found out the capital market has no certain order and use of complicated mathematics in dynamic and non linear systems can present models that violate the previous theories[2].In recent years, following the advancements in computer sciences, artificial intelligence and also discovery chaotic relations in non linear time series, activities are done to forecast the stock price in different countries. Artificial intelligence techniques such as neural network, Genetic Algorithm and Fuzzy logic obtained successful results in solving complicated problems.

White (1977) for the first time uses the neural networks in stock market to find the answer of this question if the neural networks are able to recognize non linear rules in time series, unknown rules in movements in assets' price and changes in the stock price? In his essay on this issue, he tries to show how a neural network does it. He proves it by an example of daily price of IBM11. After White's study in 1988, neural networks become popular in the field of finance and many studies are done on this issue all around the world [4].During 1988 to 1995, totally 213 researches has been done about neural networks in trade domain, 54 of them are in finance, and 2 of them are in forecasting and analyzing time series[6].

Salehi, Khodadadi and Abdolkhani , in an essay investigate forecasting the stock price of Iran's Steel industry based on artificial neural network of multi layer perception. The results of their study show high accuracy of this algorithm in forecasting the stock price[2].Mirza Zade, Tavakolli and Mohamadi, have done the stock price forecasting by artificial neural networks. One of the purposes of this research is using different information of stock market to obtain better results in forecasting. Empirical results show high accuracy for suggested method [7].Esmaeil Hadavandi, presents an approach base on Fuzzy genetic systems and artificial neural networks to establish an intelligent system of forecasting stock price, and the results indicate that this method has many advantages in comparison with other methods and can be used as a suitable tool to solve the problems related to the issue of forecasting.

Amir Hossein Monajemi uses Fuzzy neural systems and genetic algorithm to forecast the stock price. After planning and executing Fuzzy neural systems and genetic algorithm, the results of two methods are compared by four line criteria. The results show that the hybrid model of Fuzzy neural systems and genetic algorithm has better forecasting, higher speed and strong proximity in comparison with the neural network alone. Cao and Parry, examine the forecasting models of each (share) stock's profit (a comparison of BP algorithm and genetic algorithm) in 283 companies in different industries. They use a neural system with 7 input variables. The results show genetic algorithm is more accurate than BP algorithm in forecasting the stock price [2], [7].

In 2008, Chang and Liu apply TSK type fuzzy rule based system to forecast the stock price. Fuzzy model considers TSK technical index as an input variable and the result is a linear hybrid of input variables. This model is applied on information of Taiwan Electronics stock company and the obtained results indicate the accuracy is about 97.6 percent[6].Wang (2007) uses a linear neural network to forecast the stock price and also applies an instable, asymmetric hybrid for artificial neural networks to reduce the errors of forecasting. The results show that Grey-GJR-GARCH instable method is more capable of forecasting in comparison with other instable methods [4].

Chen et al (2007), apply fuzzy time series based on Fibonacci series to forecast the stock price. Their research considers a five-year period of TSMC data and a thirteen-year period of TAIEX data. This method is superior to other common fuzzy time series. Lin and et al (2007) use genetic algorithm to forecast the stock price. An important point for a trade law to be successful is assigning quantities to all parameters and their combinations. Since the scope of parameters changes in a big limit and the problem is to find the best combination of parameters, this study uses genetic algorithm to overcome this problem.

Cheng et al (2007) apply a two –parameter fuzzy time series to forecast the stock index. In their study, stock index and amount of transaction are the parameters which are influential in forecasting stock price index. The results affirm the high capability of this model for forecasting [4].Motavaseli and Taleb Kashefi (2007), compare the potentiality of artificial neural network and input technical analyses indexes to forecast the stock price and the results show that non linear neural networks can analyze the complexities of stock price time series and be applied for stock price forecasting.

Sinaee et al (2006) investigate the forecasting of stock price index by the use of artificial neural networks. Two sets of data are chosen for the neural networks' input. Different intervals of index and mass economical factors considered as neural network's variables in this survey are of the multi layer perceptron type, and are trained to BP and consist of three and four layer field forward neural networks, with different neuron amount in input layer and hidden layer[6].Also ARIMA linear model is used to forecast the price index in the next week and results indicate that neural network works better than Arima linear model in forecasting the price index, and the acceptable amount of MSE for networks errors in R^2 test data is against the market efficiency and random search.Mahdavi and Behmanesh (2007) analyze the model of forecasting stock price of investing companies using artificial neural networks. To design this model, a 3-layer neural network of sigmoid transition function is used. The results of this research indicate that if a neural network trains in a correct way, it can find out the relations between the variables and forecast the stock price

of investing companies with the least error[2],[6]. Toluee Ashlaghi and Hagh dust (2005) examine the patterning of forecasting stock price by the use of neural network and comparing it with mathematical forecasting methods. Their model is a widespread feid forward network with three layers, 6 elements in the first hidden layer, 4 elements in the second hidden layer, and 4 elements in the third hidden layer and sigmoid non linear function with training frequency of 20000. Observations of this research are contradicted to related observations of previous researches and the main hypothesis of the research. So it can be concluded that forecasting about Iran Khodro Company better responses to regression model instead of the designed neural network, so neural network is not always a good solution for all situations.

In 2005, Pai and lin use a hybrid model of Arima and support vector machines model to forecast the stock price in Taiwan and the results of their model are very promising.Zhang et al (2004), analyze the forecasting models of each stock profit in neural network (comparative analysis of sequential methods) with four types of one variable linear model, one variable neural network, and multi variable neural network in 283 companies. This study shows that neural networks are more accurate than linear forecasting models.Raee and Chavoshi (2004), try to forecast the stock market return in Tehran's stock market by artificial neural networks and multi factor model. To examine this method, daily stock price of Behshahr's industry development company is chosen as an instance. The obtained results show that both of these methods are successful in forecasting the behavior of the considered stock return but indicate the superiority of artificial neural network on multi factor model[8].

Julia Yim (2002), has done a research to compare forecasting neural network models with classical forecasting models, ARMA, GARCH. The evaluation criteria are MSE and R^2 and the results affirm the superiority of neural network on ARIMA and GARCH models.Aiken and Bsat (1999), use a neural network trained with genetic algorithm to forecast the interest rate of US treasury department and conclude that a neural network fits this situation [7].Garliause Kas (1999), tries to forecast time series of stock market by a neural network's accounting algorithm related to Kernel function and forecasting error return method, and concludes that forecasting financial time series by neural networks, fuzzy systems and genetic algorithms is better than doing it by classical models or other ones.

Chiang et al (1996), use a BP to forecast the net asset price of investing companies at the end of the year, then compare the network's data and the result of their work with the results obtained by traditional techniques of essay Economy and find out when the data are less, time neural networks acts better than regulation methods.Tan, Prokhorov and Wunsch (19995), design a system which can forecast the considerable short-term changes in stock price. First a pre-processing is done on data, then a neural network will be patterned to estimate the profitable situations.

Refenes, Zapranis and Francis (1994), patternize the stock price behavior by a neural network and then compare a neural network's performance with regulation model. This study shows that neural networks can be substituted by classic statistical techniques and be applied to forecast the stock of large companies, since these networks have better performance than statistical techniques [3].Yoon and swales (1991)_ professors of Missouri university_ apply a four-layer neural network for predicting and its results indicate this method is more reliable than traditional methods. The accuracy of this method is 77.7 % while the traditional method's is 65%.Since our purpose is to estimate the price of Tehran's stock market, and lots of information is available, BP model can be a good solution, but considering nature of this model which may face some problems in local search, SA is also applied to update the weights of neural system while it is remarkably strong in local searches [9].

Multi-layer feed forward neural network

Feed forward neural networks are examples of artificial neural networks, which are really applicable and useful. In this research, a 3-layer network is chosen that you can see its details in figure1. The output layer is linear and the

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hidden layer's non linear function is a hyperbolic function is presented in (1). The output of neural cells is the input amount without any change.

If the input and output amounts of output layer are (x_1, x_2,...., x_n) and (y_1, y_2, ..., y_n) and for hidden layer the inputs are (s1,s2, ...,sn) and outputs are (z_1,z_2,...,z_n). They can be calculated by these formulas:

$$z_i = \sigma\left(\sum_{j=1}^{n} W_{ij} + W_{ui}\right)$$
$$Y_k = \sigma\left(\sum_{i=1}^{?} V_{ki}Z_i + V_{vk}\right) \qquad 1$$

{w_{ij}} is the link weights of input layer and hidden layer. {w_{i0}} is the verge limit of hidden layer cells and {v_{ki}} is the link weights of hidden layer and output layer. Out put amounts can be calculated by (4).

$$Y_k = \sigma\left(\sum_{i=1}^{h} V_{ki}\, \sigma\left(\sum_{j=1}^{n} w_{ij}x_j + w_i\right)\right)$$

The learning set for feed forward network is as follow: A={(Xi+Ti)|i=1,2,...,n}
Xi is the input amount of neural network, and Ti is the desirable output. The error function which is non linear and based on this learning set can be calculated by (5). The learning process of feid forward neural network, is to obtain minimum amount of E which can be done by regulating the link weights and verge limit of neural cells [10].

$$E = \frac{1}{2} \sum_i^n$$

Backpropagation

For first time Paul Werbos presents the BP in 1974. This algorithm development makes a radical change in neural networks, by applying a method from efficient engineering because multi-layer networks with BP learning base are the most applicable in solving techno-engineering problems. This algorithm has two main passes, Forward pass and Back pass. In forward pass, the input vector is applied on the network, and its effects are transferred to output layers by middle layers. The output vector in output layer is the actual answer of network. in this pass, network parameters are stable and constant.In back pass, unlike the forward pass, parameters can be changed or adjusted. These adjustments are in accordance with error correction law. The error signal is formed in output layer, and error vector is the difference between the actual answer and the desirable answer of network. the error amount distributes in the network layers, after being calculated in back pass. Since the distribution is in opposite pass of signups link weights, the term BP is used to describe the corrective behavior of network. network parameters are adjusted in a way that the answers are to be as close as possible to the desirable answers[11].

Forward Pass

This pass is the same as the feed forward neural network pass, this means that to calculate the milled layer's nodes, formula 2 and for output layer's nodes, formula 3 can be used. It should be noted that the stimulus function in this neural network could be a binary sigmoid function which is represented in (6).

Back Pass

In BP neural network, considering the obtained output from (y_k) network and our desirable output (T_k), error amount can be got by(7).

$$S_k = (T_k - Y_k)F^T(W_{uk} +$$

δ_k is used to distribute error to previous layer (hidden layer) and then by the help of (8), not only the hidden layer and output layer's weights but also the bias of output layer are updated.

$$W_{jk(new)} =$$

So to distribute error to pervious layers and to update weights of input and middle layers, δj is needed, which can be measured by (9).

$$\delta_j = \sum_{k=1}^{m} \delta_k W_{jk} f'(V_{uj})$$

Now weights of hidden and input layer and also hidden layer's bias can be updated.

Simulated Annealing Algorithm

Some of the industrial optimization problems in their actual size are so broad and complicated, so the standard and traditional solutions are not applicable and waste lots of time for lengthy calculations, but fortunately because of advancements in commuter technologies and accounting capabilities, now it's common to use innovative methods and intelligent searchers. One of these methods is SA. This idea is first presented by Metropolis, who works in publication industry, in 1953. He likens paper to a substance which is got after cooling heated metals. If you heat a solid until it reaches to its melting point, then you cool it, its structural details would de dependant on the cooling way. If you cool it down gently, you will get big crystals which can be formed as you like but if you do cooling fast, you will not get what you want.

Operational methods

When SA is used in combination of other methods to solve the problems and to find local maximum and minimum, the main advantage of it can be observed. SA enables us to apply random search algorithm and limit the scope of desirable answers and reduce the acceptable functions while it increases some changes. Agreement can be calculated in this way is the increasing amount of F and T, which are control parameters. It is used when the amounts are applied in comparison with actual system and heating degree is calculated in comparison with the system apart from observable applied functions [12].

Strength Points

SA can work with intense, irregular and limited non linear models, and it is a general and strong techniques, its other advantage is it high flexibility and general optimizing power in the algorithm. The algorithm is really adaptive and reliable for any type of limited model. So these SA models can be adopted easily and this adaptability for any non linear change or in any random systems, makes them to specific optimizing algorithms with high capabilities, which enables them to be used in more than just one case.

Weak Points

In SA, some options are needed for circulation in an actual algorithm. There is a clear agreement between the quality of methods and their accounting time. A hybrid work is done for any categories of limitations and parameters to adjust the desirables in the algorithm. Attention in number of implementing SA can largely affect the results quality [13],[14].

Suggested Algorithm

According to what stated about SA and BP algorithms, it could be clear that the weak point of BP is the strength of SA. In other words, if you examine BP neural network algorithm, it's quit obvious that this algorithm has a good performance and results in general search, but in local search the situation as not the same. As much as a BP is accurate in general search, it is weak in local search and is not very accurate in this type of search. To put it in scientific terms, BP algorithm gets stuck in local extremums in complex situations and does not get desirable extremums of problem because of some errors in the neural network weights. On the other hand, this weak point of BP is the strength point of SA algorithm which is well-known for its high capability and accuracy for local search. So

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we try to minimize the amount of errors in the weights of suggested neural network by using SA algorithm. Therefore it can be claimed that the output of the suggested model is a desirable output. To implement it on Tehran's stock market, the suggested algorithm of the network has 8 variables as the network's input which are: primary price of stock, the minimum price of stock, the maximum price of stock, the price of stock at the day before, daily number of transacted stocks, the number of buyers in that day, average of daily price, and amount of transactions In the day. The network has an input as the ultimate stock price. After many experiments, we get to this conclusion that the best structure for the network should have 8 input neurons, 12 neurons for middle layer and one neuron in output layer. You can see the pseudo code of *suggested algorithm:*

Input: Problem Size, Input Patterns, ,
Network Construct Network Layers()
Initialize Weights (Network,Problem Size)
For
       Select Input Pattern(Input Patterns)
       Forward Propagate(, Network)
       Backward Propagate Error(Network)
       Update Weights using SA(Network)
End
Return (Network)

RESULTS

To examine the efficiency of suggested algorithm, the data set of the stock price of three industrial banks and financial institutions, car industry and its machinery pieces, and substantial metals of Tehran's stock market are investigated during the years 1386 to 1390.4 . We use the first three years to train the network and then the network should be able to forecast the fourth year, to demonstrate the accuracy of this model, we compare it with the BP neural network algorithm. If you consider figures 3 and 4, its obvious this hybrid algorithm of BP and SA has better performance than BP algorithm alone.As it is represented in figure 5, to get the minimum error, you should just repeat the suggested algorithm of learning phase for 2000 times (Epoch=2000), but frequency more than 2000 does not improve the situation. On the other hand, its obvious that if you consider the algorithm by less frequencies, the BP-SA algorithm surpasses the BP algorithm to minimize the errors of network. To determine the process of both algorithms, average of errors' square is used as evaluation criterion which is demonstrated in table1.As its shown in table1, the errors of suggested model in different stages of experiments are noticeably less than those of other methods.

CONCLUSION

In this essay, a hybrid algorithm of BP and SA is presented to forecast the stock price of three industrial banks and financial institutions, car industry and its machinery pieces and substantial metals of Tehran's stock market. In fact, according to the suggested model, we take the advantage of BP algorithm in general search and SA algorithm in local search, by using them together in our research. The obtained results of the experiments show high accuracy of this hybrid model of BP and SA to forecast the stock price.

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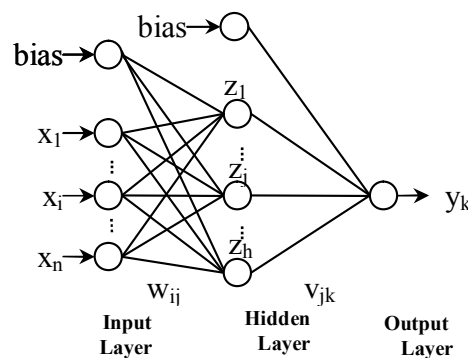
Figure1: A 3-layer feed forward neural network

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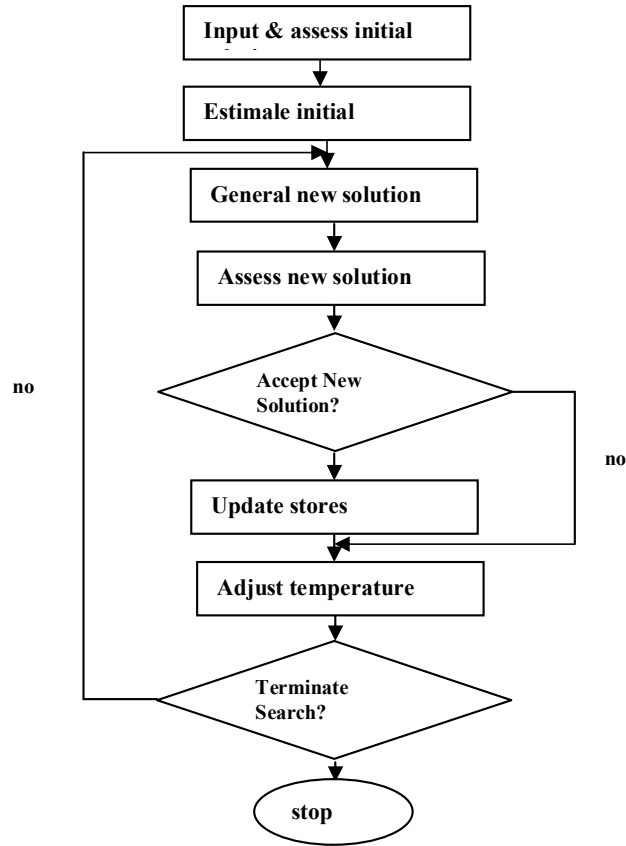
Figure2: SA algorithm structure
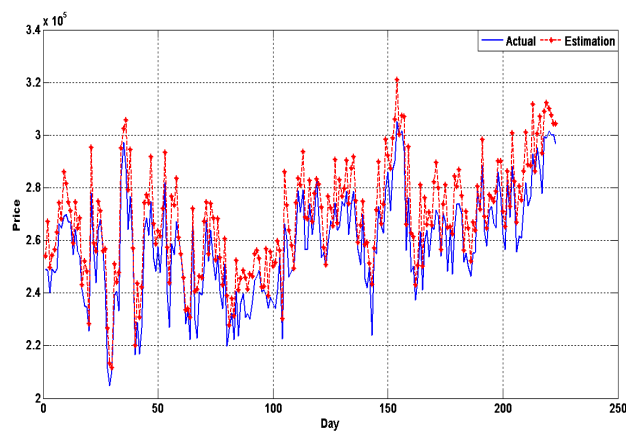
Figure 3: Estimating Tehran's stock market in 1390 by BP algorithm

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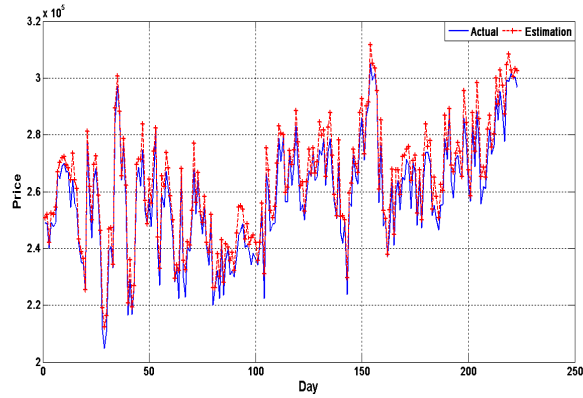
Figure4: Estimating Tehran's stock market in 1390 by BP-SA algorithm
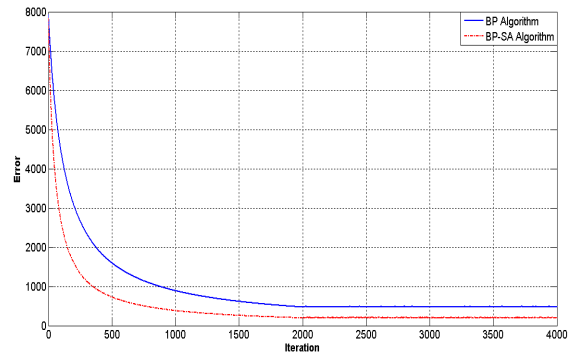
Figure5: Demonstrates the errors of two algorithms by the frequency of 4000

Table1: average of errors square & R² for two algorithmsBP-SA and BP

R² BP-SA	MSE BP-SA	MSE BP	Epoch
45.33%	1874.84	4720.33	100
60%	593.02	1417.25	500
80.20%	144.88	967.71	1000
98.72%	94.18	370.54	2000

RESEARCH ARTICLE

Prediction of Chlorophyll-a Concentration from Sea Surface Temperature using Artificial Neural Network at Coromandel Coast of Bay of Bengal

N.Madhavan[1]*,D. ThirumalaiVasan[2], P.Jawahar[3], N.J.Sangeetha vani[2] and G.NishaMeenakshi[2]

[1]College of Fishery Science, SVVU, Muthukur-524344, Andhra Pradesh,India.
[2]Institute of Remote Sensing,Anna University, Guindy, Chennai- 600025,TamilNadu, India.
[3]Fisheries College and Research Institute,Thoothukudi- 628 008, TamilNadu, India.

*Address for correspondence
N.Madhavan
Associate Professor, College of Fishery Science,
SVVU, Muthukur-524344,
Andhra Pradesh, India.
E.Mail: madhav_irs@yahoo.com

ABSTRACT

An Artificial Neural Network (ANN) model is developed in this study to predict Chlorophyll-a concentration through Sea Surface Temperature of south west monsoon season for Coromandel Coast of Bay of Bengal, India. Samplings were conducted from two cruises of NIOT research vessel during 17-19 July 2010 and 8-12 Aug 2010 in Bay of Bengal for the collection of *in-situ* Chlorophyll-a and Sea Surface Temperature data. Both the parameters were collected in the same latitude and longitude at an interval of one hour for each sampling. Artificial Neural Network (ANN) prediction on CASE1 water gives a strong Coefficient of Determination (R^2 = 0.6059) and Root Mean Square Error (RMSE = 0.0501)between the predicted and observed Chlorophyll-a concentration when compare to CASE 2 and combined CASE 1&2 models in the Bay of Bengal. The present study indicates that the ANN exhibits good performance in prediction of Chlorophyll-a in CASE 1 waters and not for CASE 2 waters when Sea Surface Temperature is available for the same station at Bay of Bengal.

Keywords: Chlorophyll-a, Sea Surface Temperature, Neural Network.

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INTRODUCTION

Tamil Nadu coast in Bay of Bengal is oneof the most biologically productive regions in the world giving livelihood for a total of 8 lakh fishermen in coastal areas.The productivity in the ocean is accomplished mainly through phytoplankton. The plankton contains photosynthetically active cells called chloroplast, which are responsible for fixing the carbon. The energy rich organic matter produced through photosynthesis by these plankton forms using chlorophyll-a form a base reference for understanding the production of a marine ecosystem. Estimation of Chlorophyll a indicates the standing crop of phytoplankton (Strickland and Parsons, 1968, Holm-Hansen and Riemann, 1978) and the productivity of the ocean. Phytoplankton is the main food for sardine larvae and other planktivorous organisms. The availability of food during the critical developmental period of sardine larvae determines the year class of fish populations is important in diminishing fish populations in Bay of Bengal. Pelagic herbivore fishes mainly feeding on Chlorophyll-a containing phytoplankton which contributed nearly 43% of total marine fish catch landings in TamilNadu coast (Anon, 2009).

Based on the availability of chlorophyll, several authors have defined the ocean water as Open Ocean (CASE-1 water) and coastal (CASE-2) waters.The quantitative information on the sea water constituents in the CASE 1 water optical properties are regulated mainly by chlorophyll-a concentration where as in the case of coastal (CASE-2) water the optical properties are regulated not only by algae but also from the gelbstoff and suspended matters which gives high water reflectance (Mudgal, 2009). CASE-2 waters mainly falls within 50 km from the mouth of a major river or in water depth less than 50 m. (Tilstone *et al.*, (2011), Lavender *et al.,* (2005), Moore *et al.,* (1999) and Madhavan *et al.,* (2012)).

Neural networks are simple nonlinear computing units and just imitating human neural system, have an input layer, a hidden layer and an output layer. Layers in between input and output layers are generally called as hidden layers. When data is loaded in the ANN (Artificial Neural Network), it must be preprocessed from its numeric range into the numeric range that the ANN can deal with efficiently. In this process, proper transformation of data simplifies the process of learning and may improve the generalizability of the learned results (Kim and Lee, 2004). Earlier analysis indicated the SST and the wind play a key role in Chl-a and its variability in the Arabian Sea (Lavender, et al., 2005 and Mudgal *et al.,* 2009).

In this paper an attempt has been made for the prediction of Chlorophyll-a concentration with the function of Sea Surface Temperature available in the same station in Bay of Bengal through Neural Network.

MATERIALS AND METHODS

Study area

In the present study the CASE -1 water are designated as >50 mts depth and CASE-2 waters are designated as <50 mts depth in the study area.The study area encompasses from Chennai to Nagapatnam coastal districts in Tamil Nadu, covering a coast line length of 416 km. Tamil Nadu coast (Fig.1) falls in the latitudinal and longitudinal extensions of 8° 05′ – 13° 35′ N and 76° 15′ – 80° 20′ E on the Eastern part of Bay of Bengal. Tamil Nadu coast is the second longest coast line of 1076 km among the maritime states of India.. The Coromandel Coast, the studied area, falls in the (Lat. and Long) extension of 13°27'00"N and 80°19'00"E the Eastern part of Bay of Bengal, Tamilnadu. It is one of the important fishing areas which contribute nearly 31% of the total marine fish landings of Tamil Nadu (Anon, 2009).

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Cruise Data

In-situ data on Chlorophyll-a and Sea Surface Temperature were collected from two cruises (Fig. 1) in Bay of Bengal from 17-19 July 2010 and 8-12 Aug 2010 August 2010. Surface water samples of two litters each with a replica were collected between 9 a.m.and 6 p.m.with Nansen water sampler mounted on a rosette equipped with a SBE-SEABIRD – CTD (Plate No.1). Samples were filtered with 47 mm Whatman GF/F glass fiber filters (Plate No.2), and chlorophyll-a concentration (Chl-a) was determined by extracting pigments in 90 % acetone for 24 hours and measured by Strickland and Parsons (1968) method. During the cruises, Sea Surface Temperature was also measured along the ship track using SeaBird SBE19 CTD. A total of 71 (30 first cruse +41 second cruse) station samples were taken up and 55 samples were considered for this study (Fig.1).

Neural Networks (NN)

The most common NN model is the supervised-learning, feed-forward net-work (Zhang *et al.*, 1998). *Back-propagation* is the most popular training algorithm in which the training data propagated forward through the network and the output data are calculated. The error between the expected output and the calculated output is computed. Then a minimization procedure is used to adjust the weights between two connection layers starting backwards from the output layer to input layer. There are number of variations of minimization procedures that are based on different optimization methods, such as *gradient descent*, *Quasi-Newton* and Levenberg-*Marquardt* methods. The forward and backward propagation are executed iteratively over the training set until a stopping criterion is met. In this study, a three layer Back-propagation Neural Network (BPNN) model has been developed with 15 hidden layers .Other details about transformation and no of epochs used for training are available in table No.01. This structure commonly known as $1i$:$15h$:$1o$, where the training regression value of more than 0.7 is considered for all three training, validation and testing of Neural Network modeling. A minimum of 10 repetitions is performed to identify the minimum MSE level for every iteration in testing for the best convergence. The entire modeling was performed in the Matlab (R2012a) environment.

Methodology

The data set was grouped into three categories, namely a). Data set as a whole b). CASE 1 water data set and c). CASE 2 water data set. From all the three categories approximately and randomly 85% of available data in Sea Surface Temperature is given for training inputs in the Neural Network model. The target values are 85 % of the Chlorophyll-a values corresponding to the Sea Surface Temperature values. The remaining 15% of data set is used for prediction purpose in both (SST and Chl –a) , which will give the prediction value of Chlorophyll-a value considering the Sea Surface Temperature previous training value for the present arrival of Chlorophyll-a value. For evaluation of predicted chlorophyll to the observed Chlorophyll-a two statistical methods were considered through a regression analysis.

Statistics such as Coefficient of Determination (R^2) and Root Mean Square Error (RMSE) to provide a numerical index of the algorithm performance and graphical criteria such as scatter analysis provides indication on the non-linear behavior of the fit. The RMSE analysis provides usefulinformation of the accuracy between model and *in-situ* data. The RMSE statistics for the observed against the predicted was generated using the following formula.

$$RMSE = \sqrt{\frac{N\sum(\log(C_{i\,mod\ldots}) - \log(C_{i\,means})^2}{n}}$$

Where C*i is* chlorophyll-a concentration for a point / station i, and n is the total number of stations in the data set. The performances of the predicted values were evaluated on the basis of a standard evaluation criterion (Chauhan *et al.*, 2002, Nagamani *et al.*, 2007 and Madhavan *et al.*, 2012). For a perfect performance, the values of R^2 should be close to one and the optimal model is selected when RMSE is minimized.

RESULTS AND DISCUSSION

Present work was conducted at Bay of Bengal, during south west monsoon season from Chennai to Nagapatnam coastal waters. The Chlorophyll-a values for the entire sampling ranged between 0.1845 to 2.5429 mg/m³ with a mean of 0.0891 mg /m³ and for Sea Surface Temperature the values are between 25.4 to 31.4 ° C with a mean of 28.80 ° C. Same way, the Chlorophyll-a values for the CASE 1 waters sampling ranged between 0.1845 to 1.4367 mg/m³ with a mean of 0.5571 mg /m³ and for Sea Surface Temperature the values are between 25.4 to 30.5 ° C with a mean of 27.83 ° C.The CASE 2 water Chlorophyll-a values are ranged between 0.1968 to 2.5429 mg/m³ with a mean of 1.0705 mg /m³ and for Sea Surface Temperature the values are between 26.8 to 31.4 ° C with a mean of 29.81 ° C.

A Total of 12 models (repetitions) were developed to compare and identify the best model with its MSE level for every iteration in testing. The minimum MSE level model among the 12 is selected and tabulated. Table -1. gives the summarized Neural Network training, validation and testing details. Table -2 gives the summary of Correlation statistical analysis details for the Neural Network modeling. The training regression plots were given for all the three models shown in Figure. 2. The best R value was estimated as 0.8207 for the CASE 1 training.

The Coefficient of Determination (R^2) for the CASE 1 waters from the table No.2 is 0.6059. This indicates a high level of Correlation about 78% level accuracy when compare to the CASE 2 and combined CASE 1&2 water prediction accuracies , which had R^2 values of 0.1614 (40 % Correlation) and 0.3564 (60% correlation) respectively. Further Root Mean Square Error (RSME) for the CASE 1 waters was close to zero (0.0501) which is ideal from the statistical point of view for a very good ideal prediction. The other two models showed very poor RSME values of 1.0982 for CASE 2 and 0.7044 for CASE 1&2 waters. The values are away from zero when compare to CASE 1 water RMSE.

Limited works has been done for the prediction of Chlorophyll-a from Sea Surface Temperature. But correlation studies have been conducted for both Chlorophyll-a and Sea Surface Temperature showing good correlation with each other. Kavak and Karadogan (2012) recorded at Black sea that Sea Surface Temperature was correlated with chlorophyll pigment concentration about 60% level. But other environmental factors also must be taken into account in determining Chlorophyll-a concentration, such as surface flow zones, salinity, temperature gradients (Duarte *et al.*, 1992), oxygen abundance(Tran *et al.*, 1993)., *El nino* (Chavez *et al.*, 1999 and Wilson and Adamec, 2001), *La nina* (Murtugudde *et al.*,1999 and Chavez *et al.*, 1999) and upwelling (Dey and Singh , 2003).

This result could be useful in connection with studies of global changes in temperature and what effect they could have on the total abundance of marine life (Kavak and Karadogan2011). Hood *et al.*, (1990) found two distinct waters masses in the coast of Northern California, one hot and one cold, which were divided by a front and gives a report as the landward side of the front, they found that there was a sharp decline in SST as well as an abundance of phytoplankton biomass. On the seaward side of the front, they observed an increase in SST as well as a decrease in the amount of phytoplankton biomass, which gives negative correlation between Sea Surface Temperature and Chlorophyll-a. SST and Chlorophyll-a pigment concentration, do not behave differently from each other (Kavak and Karadogan, 2011).

Heath (1988) indicated that the temperature plays vital role in increasing the plankton productivity at Antarctic region and observed increased phytoplankton production in autumn and spring. Similarly increased Chlorophyll - a was observed by Ohyama *et al.,* (1990) in Lake O-ike during higher temperature seasons. Lee *et al.,* (2008) observed seasonal variation in chlorophyll concentration at East China Seas. In Indian waters the SST and the wind play a very important role in Chlorophyll-a and its variability (Mudgal *et al.,* 2009).

Singh (1992) indicated there is existence of difference between two waters and require different algorithms to study the relationship. In the present study also the developed ANN model perform quiet satisfactorily for case I waters and not case II waters. This may be because of the availability of suspended solids and dissolved organic matter occur in abundance and their concentrations, which do not co-vary with chl-a concentration in most inland, estuarine, and coastal waters (Case II waters). Thus phytoplankton does not solely dominate the optical properties of such turbid productive waters, commonly referred to as case II waters. But in the case of case 1 water the optical properties are dominated by phytoplankton and the observed spectral features in the reflected light can be directly related to chl-a concentration. Such waters are commonly referred to as case I waters   (Morel and Prieur 1977).

Artificial Neural Network's performance over real time series is not satisfactory because the environmental factors and its seasonal fluctuations are not considered in ANN modeling. From this study, it could be established that Chlorophyll-a prediction from Sea Surface Temperature of Bay of Bengal was correlated with *in-situ* Chlorophyll-a concentration is by 78% for open (CASE 1) waters. This result could be useful in connection with studies of prediction of Chlorophyll-a and could be further improved by including other environmental parameters along with Sea Surface Temperature in future studies for near shore (case II) waters. It could be concluded from this study that simple SST recording is suffice to predict the chlorophyll content of Bay of Bengal off shore waters through Artificial Neural Networks and for the coastal waters further improvements are necessary to predict it effectively.

ACKNOWLEDGEMENTS

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Table1. Neural netwrok training, valdation and testing details

S.No	Descriptions	Details
1.	NN structure	$1i$:$15h$:$1o$
2.	Input to hidden Transformation	Tansig
3.	Hidden to output Transformation	Tansig
4.	Training function	Traingdm
5.	Trainparam.lr	0.3
6.	Trainparam.epochs	5000
7.	Trainparam.mc	0.6

Where

i	=	Input parameters
h	=	Number of Hidden layers
o	=	Output parameters
tansig	=	A Transfer Function used in Neural Network Hidden Layer
Traingdm	=	A Training Function used in Neural Network at the time of Training.
Trainparam.lr	=	Learning Rate. A Training parameter used in Neural Network at the time of Training.
Trainparam.epochs	=	Max. No. of training cycles during the time of training.
Trainparam.mc	=	Momentum Constant. A Training parameter used in Neural Network at the time of Training.

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Table2. Summary of Correlation Analysis for the Neural Network modeling

S.No	Descriptions	R	R²	RMSE
1.	CASE 1	0.7783	0.6059	0.0501
2.	CASE 2	0.4017	0.1614	1.0982
3.	CASE 1 & 2	0.5971	0.3564	0.7044
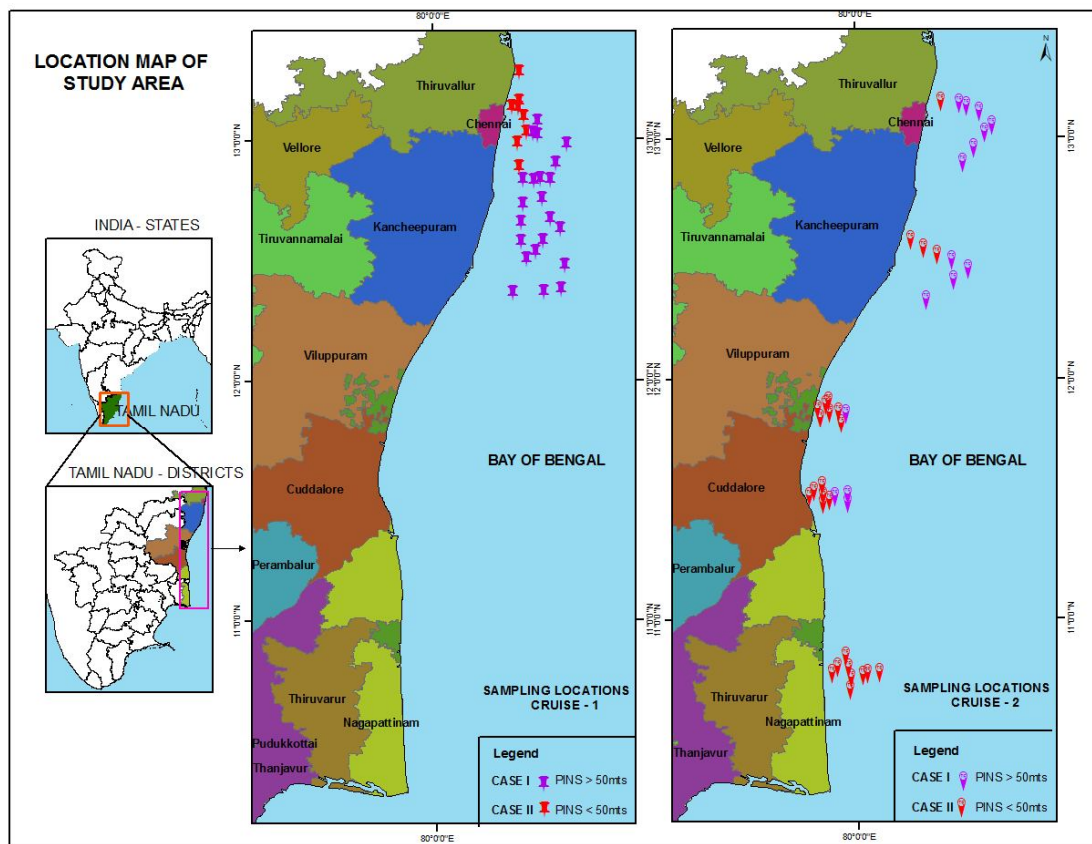
Figure 1.Sampling site locations for Chlorophyll-a concentration and Sea Surface Temperature   in Bay of Bengal.
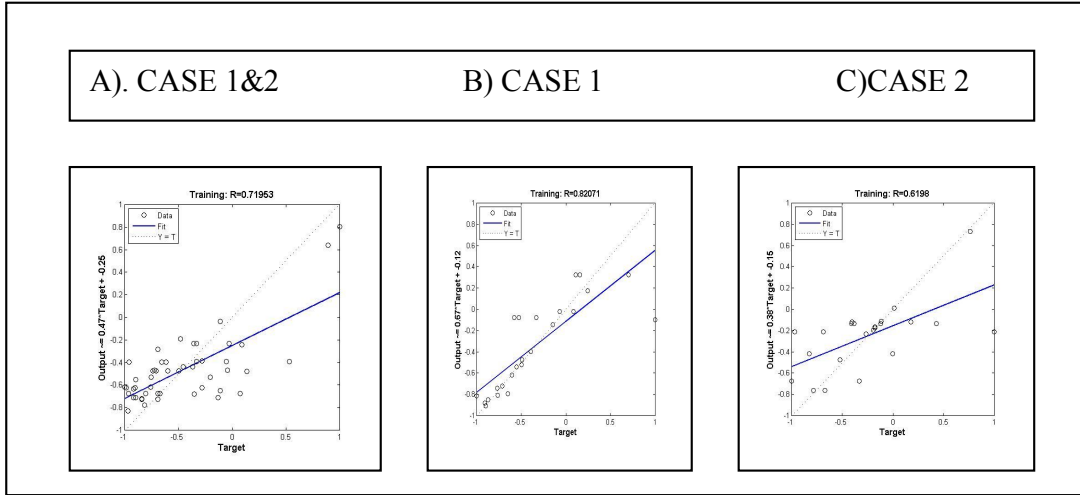
Figure 2. Training Regression Plots
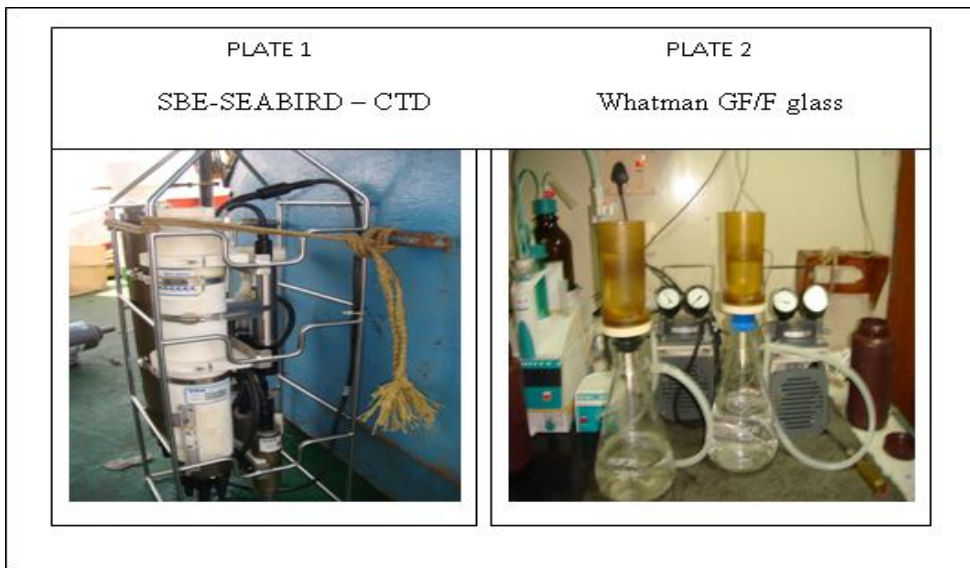
Nobel Prizes 2014

Physics

The 2014 Nobel Prize in Physics hasbeen awarded jointly to Isamu Akasaki and Hiroshi Amano of Nagoya University,Japan and Shuji Nakamura of the University of California, USA, for "the invention of efficient blue light-emitting diodes, which has enabled bright and energy-saving white light sources." Light emitting diodes, or LEDs, are the most energy-efficient lighting devices. Red- and green emitting diodes have been around for a long time, but nobody knew how to make a blue one, which was needed for blending with the others to create white light. Red and green LEDs were useless for general lighting. This year's laureates, working together and separately, found a way to produce blue light from semiconductors that finally made white LEDs possible. The key was to grow high-quality crystals of gallium nitride, a semiconductor for producing blue light – a process that had frustrated researchers. Light-emitting diodes are already ubiquitous – in pockets and purses, in smartphones, as well as in televisions, lasers and optical storage devices. "The LED lamp holds great promise for increasing the quality of life for over 1.5 billion people around the world who lack access to electricity grids," the Nobel committee said. "Due to low power requirements, it can be powered by cheap local solar power."

Chemistry

The 2014 Nobel Prize in Chemistry is to be shared by three scientists – two American and one German – for their work enabling optical microscopes to peer at the tiniest structures within living cells. Eric Betzig of the Howard Hughes Medical Institute inVirginia, USA, Stefan W. Hell of the MaxPlanck Institute for Biophysical Chemistry in Germany, and William E. Moerner of Stanford University in California, USA, were able to bring "optical microscopy into the nano-dimension," enabling scientists to "study living cells in the tiniest molecular detail".A fundamental law of optics known as the 'diffraction limit' states that the resolution can never be better than half the wavelength of light being looked at. As a result, how small an optical microscope can see is limited by the wavelength of light and the smallest object that can be resolved is about 0.2 millionths of a metre. Smaller objects such as bacteria, viruses and proteins cannot be resolved. But this year's Nobel laureates found a way to work round the diffraction – by making parts of the molecules glow.By lighting up and then turning off parts of the organism, they could combine images that brought the tiniest of molecules into clear view.The technique allows biologists to look at the mechanism of biological processes such as how DNA folds and unfolds within living cells using optical microscopy. In fact, over the past 10 to 15 years there has been increasing use of optical methods to look at single molecules at the nano level.

Physiology or Medicine

Three scientists – British-American researcher John O'Keefe, and Norwegian couple May-Britt Moser and Edvard I Moser – have been jointly awarded the 2014 Nobel Prize in Physiology or Medicine for theirdiscoveries related to an internal positioning system in the brain that works like an inner 'GPS' that makes it possible for us to orient ourselves in space. O'Keefe will get half the prize amount while the

Nobel Prize 2014

other half will be shared between the Moser couple. The first component of this positioning system wasdiscovered by O'Keefe in 1971. He found that in rats, specific nerve cells in an area of the brain called the hippocampus were activated depending on the position of the rat in a room, which made him conclude that these "place cells" in the brain formed a map of the room.More than three decades later, in 2005, May-Britt and Edvard Moser identified another type of nerve cell, which he called"grid cells" and which formed another key component of the brain's positioning system. They found that these cells generate a coordinate system and allow for precise positioning and pathfinding.Their subsequent research showedhow place and grid cells make it possible to determine position and to navigate. The work of the three Nobel laureates has answered a long-standing question that has bothered philosophers and scientists for centuries – how does the brain create a map of the space surrounding us and how can we navigate our way through a complex environment? The discoveries may also provide clues to how strokes and Alzheimer's affect the brain.
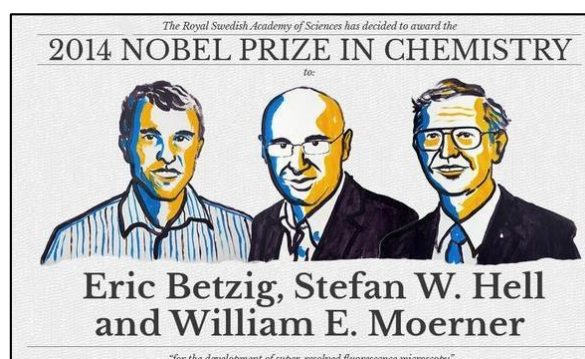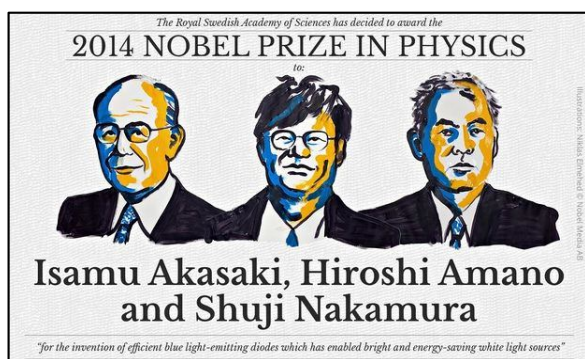
2014 NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE

John O'Keefe   **May-Britt Moser**   **Edvard I. Moser**

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Essentials of Management Accounting in the Organization

Hamid Saremi * and Yones Zandlaf

Department Accounting, Quchan Branch, Islamic Azad University, Quchan, Iran.

*Address for correspondence
Dr.Hamid Saremi
Department Accounting,
Quchan Branch,
Islamic Azad University,
Quchan, Iran.
E.Mail: hadi_sarem@yahoo.com

ABSTRACT

The purpose of management accounting in the organization is to support competitive decision making by collecting, processing, and communicating information that helps management plan, control, and evaluate business processes and company strategy. The interesting thing about management accounting is that it is rare to find an individual within a company with the title of "management accountant." Often many individuals function as accountants within the organization, but these individuals typically operate as financial accountants, costs accountants, tax accountants, or internal auditors. However, the ability to develop and use good management accounting (which covers a lot more ground than the product costing done by cost accountants) is actually an important ability for many individuals, including finance professionals, operational and marketing managers, top-level executives, and information technologists.Generally, in a very large company, each division has a top accountant called the controller, and much of the management accounting that is done in these divisions comes under the leadership of the controller. On the other hand, the controller usually reports to the vice president of finance for the division who, in turn, reports to the division's president and/or overall chief financial officer (CFO). All of these individuals are responsible for the flow of good accounting information that supports the planning, control, and evaluation work that takes place within the organization. , also in this article, we have studied recent changes in Management Accounting and respected disabuses which is the most important challenges and opportunities led to advance in management accounting. Therefore we will try to indentify the role of management accounting in the organization and its effects on productivity and effectiveness.

Keywords: management accounting, decision making, organization, finance, productivity.

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INTRODUCTION

The organization with the development of technology and change &Evolution creation in manufacturing systems faced with profound complex and changes. The extent of these changes is such way that management can not alone have sufficient knowledge about their environment in the organization. Therefore, it is necessary that a system be developed in order to assist to management in accurate identifying of problems, set goals, , define possible solutions, evaluate the solutions and selection of the optimal solution implementation, its monitoring and evaluation. Management information systems and decision support systems, have been created and developed to fulfill these functions and duties management information system and the systems supporting of decision making was created with this purpose were developed . The management accounting information system also has been developed in same filed, in a way that provides important part of the required information to management. For this reason, the manager cannot even with relying on the personal information and experiences and the information reflected in the financial statements fulfill their duties efficiently (Rasoli Valiolah, 2000)., Management accounting information system has been created with purpose to help to management in affair of decision making and has been developed and growth along with expanding and sophisticated system of production. The role of management accounting is the preparation and presentation of relevant and useful information and to help management in activities planning, control and management of the wise decision in realizing the objective of organization.Management accounting cannot be considered fixed a set of rules. Because it tries to assist to individuals within organization (board of directors, managers and others) in the field of decision making   and be trustful guidance to represent the policies and the future plans of the organization.

Management Accounting History

The cause of the management of the scientific and the emergence of factories and steel and rail can take the first step on the road to the need to management accounting. According to Johnson, It is information systems and management control in the growth and development of the transport industry and production and distribution in the years to 1925 1850 role. Demand for information to the planning and internal control, in the first half of this century 19. In that time, such as textiles and railways, for coordination between the various processes inside the? local administrative procedures needed. System such as textile factories have the ability to measure the return of the cargo to become Raw materials was made. 1925 to innovation, to improve the efficiency of the institutions in the field of mass production with a relatively high standard products contribution to pay the cost of active efforts, but the demand for managerial accounting system that control and coordination between the various activities of the organization, after the outbreak of the phenomenon of the horizontal integration and a few, known as the ratio of investment returns as a response to the emergence of large companies and a means to control their decentralized operation, the big innovation management accounting to 1920. In the middle of the twentieth century, issues such as pricing, such as those with full costing and standard costing. About the 1960 management accounting, witnessed a significant flow from the application of the model of some issues, planning and control. Changed environmental conditions and internal organizations and technological progress, the new measures for management accounting that traditional methods to them, and hence management accounting, in the service of the strategic objectives (Bakhtiari, Parviz, 2001).The Famous ratio of investment returns as a response to the emergence of large companies and a means to control their decentralized operation is considered strange innovation in management accounting till 1920. In the middle of the twentieth century, issues such as transforming pricing were attendant to the approaches like full costing and standard costing. In About the 1960 management accounting witnessed a significant flow from the application of the quantitative model of some issues i.e. Planning and control. The changing environmental and internal conditions of organizations and technological progress, has been provided the new criterions for management accounting that traditional methods are not responder to them, and hence management accounting has been in the service of the companies' strategic objectives.

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The direct costing issue can be considered the most important event of 1930 to 1950. Based on failure analysis of all Absorption costing, direct costing was innovated. Thereby   relevant and useful information possibility has been provided for managerial decision making.But in decade of 1960 this approach was developed and management accounting retrieved its former prosperity a little and approach based on the information economy was emerged as the new attitude towards the management accounting and management accounting raised in a full-scale as systematic matter and an important part of management information systems. The approach based economy considered the information like any other goods to be bought or sold. And so just like any other commodity cannot merely be attributed to the information, but the cost of producing these goods should also be considered.Management accounting has began its growth and development process from the beginning of the1990 decade increasingly and seriously , but the factors such as the scale growth of the organizations and economical firms, , technological Prodigious changes the complexity and adding fuel of the laws and regulations and finally the knowledge management development during the last three decades has put its effects on the development of the area of management accounting and its acceptance as an issue and teaching independent of financial Accounting. Management accounting   grown   during period of time and from merely emphasized on cost accounting has been changed to emphasis on topics related to the management control. The creation of computer systems in 1950, make accountants empowered to provide a wider range of services to managers. In the year 1990 management accountants were also merged with their companies 'financial affairs hence management accounting career and profession had another leap and prompted that since 1999 with the widespread of accountants 'tasks, including financial analysis and financial   management, management accounting in fact converted in to one of the   powerful arm to the management of organizations .

Management Accounting Functions

Management accounting refers to a function of tracking internal cost for any business process that helps an organization, firm or an individual in making decisions related to production, operation and investment in market. Companies need management accounting to know the efficiency of their budget, the cost of their operations and then allocate funds accordingly in production, sales and investment. The role of a management accountant is thus, very crucial for a firm's well being. His role and responsibilities are so huge that even a single miscalculation or underestimation of any business plan by a management accountant can put a company's future in danger (Taghavi Mahdi & Niknezhad Iran, 1994).

The role of management accountant include collecting, recording and reporting financial data from several units of an organization, observe and analyze their budget and suggest their funding and allocation. This includes estimation of cost of raw material, labor, manufacturing, sales and advertising, social media networking, lobbying and company's internal operation cost. A management accountant need to coordinate with all concerned departments to make an overall analysis of company's functioning capital and availability of funds and then he or she has to report all the information to senior management and board of directors. Thus a CFO is a source of information required by directors and CEOs to take decisions.

Management accounting's main role is budgeting. For a small company budgets are guide to all expenditures. Small businessmen decide a budget every year to fix their expenses on each process that is operation and production cost and then further investment. Thus here a management accountant has to review historical data to prepare an accurate prediction of a year's future expenses. Budget ensures coordination between the entrepreneur and his employees in implementing all the plans for the year ahead.

Time is very important for making all plans for a company's management. A management accountant's functions are time bound since he or she has to make predictions, budgets and report within a stipulated period so that they can be implemented at the time of need. A timely forecasting is needed with taking consideration of market uncertainties.

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The budget need to be according to the available working capital and exposure to market risks thus a certain amount of accuracy is very necessary. Before reporting the owners, a management accountant has to ensure accuracy of all information gathered to help in correct decision making.

Business technology software plays an important role now days in preparation of financial records, their analysis and forecasting. They help in dissemination of digital information and speedy processing of data for formulation of budget and its interpretation. This software provides tools that take required track record and automatically create financial predictions. Thus time and effort to calculate this lengthy information get reduced saving management accountant from lots of burden.

A management accountant need to be aware of everything, be it political situation that affect market, inflation, other exposures in market, competition, cost of labor, raw material, internal operations, coordination among different departments within a company as well as its interaction with rest of the business world and social media. Thus, he should be master of everything. He needs to outline challenges in advance to make his organization ready for cash crunch or any other risk. He needs to inform company owners in advance so that they can take financial decisions with consideration of available funds and requirements.

 According to above said matters the functions of management accounting can be summarized as follows:

1. To help strategic decisions determination and designing the organizational strategies.
2. long-term planning, short and medium-term of activities
3. Determining the capital structure and financing of it.
4. To design incentive strategies for senior managers and beneficiaries.
5. To help to operational decisions.
6. Operation control and ensure of the resources' efficiency.
7. To measure and reporting the financial and non-financial performance to managers and other stakeholders.
8. Protecting of intangible and tangible assets.
9. The organization' processes Implementation, risk management and internal controls.

Nature of Management Accounting

Nature of management accounting guides to know main characteristics of management accounting. Following are main points which show the nature of management accounting (Taghavi Mahdi & Niknezhad Iraj, 1994)

1.No Fixed Norms followed

In financial accounting, we follow different norms and rules for creating ledgers and other account books. But there is no need to follow fixed norms in management accounting. Management accounting tool may be different from one organization to other organization. Using of different tools of management accounting is fully dependent on the persons who are using it. So, business policy of each organization affects rules and regulation of applying management accounting.

2. Increase in Efficiency

it is the nature of management accounting that it is used for increasing in the efficiency of organization. It scans the points of inefficiency through analysis of accounting information. By taking action for improving, organization can increase the efficiency.

3. Supplies Information not Decisions

Management accountant supplies accounting facts and information and also provides interpretation, but decision making is fully dependent on higher authorities. Management accounting is just guide.

4. Concerned with Forecasting

It is the temperament of management accounting that it is fully concerned with forecasting. In management accounting, historical accounting information is analyzed through common size financial statement, ratio analysis, fund flow analysis and accounting data tendency for knowing the probability of next fact. So, all these things are especially useful for forecasting.
These forecasting may be related with following things
a) sales forecasting
b) production forecasting
c) earnings forecasting
d) cost forecasting

SCOPE OF MANAGEMENT ACCOUNTING

Management accounting is concerned with presentation of accounting information in the most useful way for the management. Its scope is, therefore, quite vast and includes within its fold almost all aspects of business operations. However, the following areas can rightly be identified as falling within the ambit of management accounting :(Shabahang Reza, 2000).

(I) Financial Accounting: Management accounting is mainly concerned with the rearrangement of the information provided by financial accounting. Hence, management cannot obtain full control and coordination of operations without a properly designed financial accounting system.

(ii) Cost Accounting: Standard costing, marginal costing, opportunity cost analysis, differential costing and other cost techniques play a useful role in operation and control of the business undertaking.

(iii) Revaluation Accounting: This is concerned with ensuring that capital is maintained intact in real terms and profit is calculated with this fact in mind.

(iv) Budgetary Control: This includes framing of budgets, comparison of actual performance with the budgeted performance, computation of variances, finding of their causes, etc**.**

(v) Inventory Control: It includes control over inventory from the time it is acquired till its final disposal.

(vi) Statistical Methods: Graphs, charts, pictorial presentation, index numbers and other statistical methods make the information more impressive and intelligible.

(vii) Interim Reporting: This includes preparation of monthly, quarterly, half-yearly income statements and the related reports, cash flow and funds flow statements, scrap reports, etc.

(viii) Taxation: This includes computation of income in accordance with theTax laws, filing of returns and making tax payments.

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(ix) Office Services: This includes maintenance of proper data processing and other office management services, reporting on best use of mechanical and electronic devices.

(x) Internal Audit: Development of a suitable internal audit system for internal control.

OBJECTIVES OF MANGEMENT ACCOUTNING

The prime objective of Management Accounting is to provide necessary information to the management for an effective and efficient execution of managerial functions. Various objectives of Management Accounting are enumerated as follows (Gholizadeh Mohammad Hosin& Salimi Azadi Khah Majid, 2009).

Analysis and interpretation of financial statements

Management Accounting collects analyses and interprets the necessary data from the results shown by the Financial and Cost Accounting System, and also provides necessary and relevant information to the management in a systematic and useful manner which is to be applied by the management in the process of its planning, controlling and decision-making. Various tools like Ratio Analysis, Fund Flow Analysis, Cash Flow Analysis, Comparative Financial Statement, Common-Size Statement and Trend Analysis are widely used in Management Accounting for analyzing and interpreting those data so as to make them easily understandable and useable to the management.

Planning and policy-making

Management Accounting provides necessary and relevant information to the management in the process of its planning and policy-making to achieve organizational goals. Various statistical forecasting techniques like Time-Series Analysis and Regression Analysis are used in Management Accounting to guide proper planning and policy-making.

Decision-making

 Management Accounting provides necessary and relevant information to the management in the process of its decision-making. The success of the management highly depends upon a perfect decision-making. Such decision-making broadly depends on the effectiveness of information network. Management Accounting provides the above information to the management by applying Marginal Costing Technique, Differential Costing Technique and Absorption Costing Technique, for an effective and accurate decision-making.

Controlling

Management Accounting applies various useful techniques such as Standard Costing, Budgetary Control, Responsibility Accounting and Management Audit, to ensure an effective managerial control over the use of resources of the enterprise. Management control is a control system which assures that the resources of the enterprise are effectively and efficiently used for achieving its goals and objectives. Management Accounting plays a significant role to the management in ensuring the existence of a proper managerial control system.

Communicating

Proper communication of the performance of various sections of an enterprise to different levels of management is essentially required for planning, controlling and decision-making. Management Accounting does such

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communication by preparing reports of performance of various sections of the enterprise with the help of management information system.

Coordinating

Management Accounting helps in coordinating various business activities of an enterprise. Its techniques of planning make a very good coordination between various activities of a concern. A master budget of the concern for a given period is prepared through coordination between various business activities of the concern. Proper reporting of different business activities are also made through coordination between various sections of the enterprise.

Tax planning

Determination of tax liability of the enterprise after availing various tax rebates and reliefs falls within the purview of Management Accounting System. Management Accounting helps the management in the process of tax planning by availing various tax rebates and reliefs and, thus, reduces the burden of tax of the enterprise, on the whole.

Advisory Service

Management Accounting renders valuable advice to the management for resolving any financial or other problems of the enterprise. To overcome any existing financial and other problems, various Management Accounting techniques are applied according to the nature of the problem. Management accounting also plays a very important role as an advisor to the management.

Technology and the Management Accountant

As you have read this introductory chapter to management accounting, you have likely noticed that the goals of management accounting information provided to the management and executive teams inside the organization are quite different from the financial accounting information provided to groups outside the organization, such as investors, creditors, and regulators. You may even ask how information and performance measures regarding quality and time can be provided by a typical general ledger system that is limited to debits and credits of dollar amounts. This is a good question! For most of the twentieth century, management accountants have been able to successfully produce management accounting information using the general ledger system of financial accounting. (Mokrami Yadola, 2003).

This marriage of management accounting and financial accounting information systems worked as long as the goal of management accounting was strictly to track cost information. Now, however, the emergence of JIT, coupled with increased competition in a worldwide market, has forced most organizations to compete on issues of quality and timeliness, as well as cost. The problem is that it is very difficult to use a debit/credit system to track organizational performance regarding quality and time. Thankfully, computerized information systems, specifically database systems, have progressed to a point where it is economically feasible for organizations to track just about any kind of information. Now the real challenge for current and future management accountants is to organize the immense amount of data that can be provided to support decision making without creating information overload in managers and executives. In this process, management accountants should understand how to use the most current technology. Typically, developing knowledge and skills in computer technologies will require additional courses of study for the future business professional. The goal of the remainder of this book is to provide you with a framework for developing cost, quality, and time-based information that supports the management process. This framework must

then be used with top-notch technology in order to provide information that truly adds competitive value to organizations!

Looking Forward in the Management Accounting Profession

Business professionals involved in management accounting have come a long way since the early days of management accounting in the 1800s. Today, management accounting professionals play a key role in many organizations. The nature of their work continues to expand as new industries develop and computer technology grows in importance in the gathering and use of information by decision makers.

For example, you've spent the bulk of this chapter being introduced to management accounting in the context of DuPont, a manufacturing business. However, businesses focused on service rather than manufacturing (e.g., law firms, banks, hospitals, transportation, hotels) are far and away the dominant industries in the U.S. economy. Further, merchandising companies (retailers and wholesalers) combine to be as strong an economic force as the manufacturing industry. And as you're certainly aware, the explosion of the Internet has established a new aspect in our economy—e-commerce. (Mam Begay, 2002).

At this point, e-commerce is generally a growing delivery platform for many service and merchandising companies, rather than a separate industry. You need to be aware of these trends as you work through this textbook. We will spend a lot of time applying concepts and tools of management accounting to nonmanufacturing settings. As we close this chapter, we want to leave you with two lingering, but important, questions. First, can a service or merchandising company effectively perform C-V-P analysis, product costing, and segment analysis? Or are these techniques useful only for manufacturing companies? Second, does the arrival of e-commerce in service, merchandising, *or* manufacturing organizations change your response to the first question? That is, as companies shift more and more of their operations (such as sales of software, financial services, and groceries) into the "virtual environment" of the Internet, does e-commerce affect the use of any management accounting techniques that you are studying in this textbook? Think about these questions. We plan to spend a lot of time in the next several chapters exploring some possible answers with you.

Challenges & Responsibilities of Management Accounting

Management accounting is an internal business function that tracks internal costs for decision-making purposes. Manufacturing and production companies often use management accounting to allocate production cost to each good or service produced by the company. Management accounting can face various challenges and carry several responsibilities in a small business. (Baharam Far&Rasoli, 2001)Management accounting challenges usually involve collecting, recording and reporting financial information from several divisions or departments. Cost allocation methods require information for direct materials, production labor and manufacturing overhead. This information is needed for multiple production departments. Management accountants are responsible for reviewing this information to ensure only the production costs are allocated to goods and services. Including non-production costs can distort individual product costs.

Budgeting is another important tool of management accounting. Small businesses often use budgets to plan future expenditures for operations. Owners typically conduct a budget planning process annually. This poses a challenge for management accountants to review historical financial information to prepare an accurate budget for the subsequent business year. Budgets ensure that the owner and managers act responsibly when spending money to improve operations.

Management accounting does not rely on individual accounting periods when recording financial information. It is a continuous accounting process that must be properly managed by owners and employees. Financial information

should be carefully separated to ensure that only timely, valid and relevant information is included on management reports. This process can involve the creation of internal management accounting policies that employees must follow when reporting information to the owners.

Owners should consider implementing business technology software as part of the management accounting process. Specialty software captures financial transactions electronically and sends it to individuals responsible for interpreting the information. Owners also can create financial reports so that the software automatically creates financial reports. Using business software can shorten the amount of time spent preparing financial reports. However, it forces management accountants to be responsible for reviewing the information to ensure its accuracy.Public accounting firms and professional accountants offer small business owners several important resources when setting up a management accounting process. Professional accountants can outline the specific management accounting challenges for the company. These accountants also can work with owners to create specific responsibilities that management accountants should follow. This professional advice ensures that owners capture all necessary financial information for future decisions.

Role of Management accounting in organization

Management accounting refers to a function of tracking internal cost for any business process that helps an organization, firm or an individual in making decisions related to production, operation and investment in market. Companies need management accounting to know the efficiency of their budget, the cost of their operations and then allocate funds accordingly in production, sales and investment. The role of a management accountant is thus, very crucial for a firm's well being. His role and responsibilities are so huge that even a single miscalculation or underestimation of any business plan by a management accountant can put a company's future in danger. (Namazi Mohammad, 2008).The role of management accountant include collecting, recording and reporting financial data from several units of an organization, observe and analyze their budget and suggest their funding and allocation. This includes estimation of cost of raw material, labor, manufacturing, sales and advertising, social media networking, lobbying and company's internal operation cost. A management accountant need to coordinate with all concerned departments to make an overall analysis of company's functioning capital and availability of funds and then he or she has to report all the information to senior management and board of directors. Thus a CFO is a source of information required by directors and CEOs to take decisions.

Management accounting's main role is budgeting. For a small company budgets are guide to all expenditures. Small businessmen decide a budget every year to fix their expenses on each process that is operation and production cost and then further investment. Thus here a management accountant has to review historical data to prepare an accurate prediction of a year's future expenses. Budget ensures coordination between the entrepreneur and his employees in implementing all the plans for the year ahead.Time is very important for making all plans for a company's management. A management accountant's functions are time bound since he or she has to make predictions, budgets and report within a stipulated period so that they can be implemented at the time of need. A timely forecasting is needed with taking consideration of market uncertainties. The budget need to be according to the available working capital and exposure to market risks thus a certain amount of accuracy is very necessary. Before reporting the owners, a management accountant has to ensure accuracy of all information gathered to help in correct decision making.

Business technology software plays an important role now days in preparation of financial records, their analysis and forecasting. They help in dissemination of digital information and speedy processing of data for formulation of budget and its interpretation. This software provides tools that take required track record and automatically create financial predictions. Thus time and effort to calculate this lengthy information get reduced saving management accountant from lots of burden.

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A management accountant need to be aware of everything, be it political situation that affect market, inflation, other exposures in market, competition, cost of labor, raw material, internal operations, coordination among different departments within a company as well as its interaction with rest of the business world and social media. Thus, he should be master of everything. He needs to outline challenges in advance to make his organization ready for cash crunch or any other risk. He needs to inform company owners in advance so that they can take financial decisions with consideration of available funds and requirements.

Organizational Internal Role

Today, along with other roles in the company, management accountants have a dual reporting relation. As a business strategic partner and producer of operational and financial information on the basis of the decision, management accountants are responsible for the group management of business and at the same time are also undertaker to report the   relationships and responsibilities to the financial institutions of the company .(Bahramfar Taghi&Rasoli valiolah, 1999).

The activities of the proposed by management accountants are, predicting and planning,   analyses and studies and monitoring the inherent in the costs and the activities that necessitates the dual accountability for both the financial group and business team. Examples of the duties in which response to the business team can be more than financial sector of companies have associated are operation Research, the development and formulation of new product costing, a stimulus measures and balanced assessment of the management the sales and analyzing customer profitability. In contrast, to prepare the specific financial reports, compliance the   financial data with recourse systems, and the reporting risk and regulations since all these will be obtained by collecting of some financial information from all parts of the company so they are more useful to the company's financial group.

In the companies that most of their profits will be obtained from the economic information, such as banks, printing and publication industry, telecommunications companies and defense contractors, the cost of IT are a significant source of uncontrollable expenses, which is the largest amount of most of the cost of the company after the total cost of compensation for work and to own property. A management accounting function in such organizations close cooperation with the IT sector to provide the cost of information technology is clear.With regard to the above, a broad view of rapid advancement of financial and accounting career is that financial accounting is for management accounting. According to the concept of value creation, Management accountants will help to the platform incitement of business success while financial accounting of the work and helping the, while and historical financial accounting is an attentive and historical endeavor.

Essentials of Management accounting in organizations

Management accounting system as the most important subset of management information system is considered as main source of information. Hence the establishment of the accounting system became an essential in the organizations.The technology rapid progress during the past several decades, have moved the managers of organizations to think of building a suitable system for planning , better and more effective control of the organizational operations(BakhtyariParviz,2010).

The management accounting is a system that can provide a variety of financial and non-financial information to users particularly to the " managers of any organization." the growing need for timely and accurate information to implement in the decision-making process, has made management accounting 'need has converted it to an inevitable issue. Management accounting system as the most important subset of management information system is the main source of information.

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Management accounting in comparison with the financial accounting is considered a new scientific discipline. Consequently, parallel to the emergence of new ways of information to help managers, concepts and tools of management accounting also gradually will be developed. In addition, the environment of organizations are rapidly changing and management accounting must also contributed to the information preparation and acts in such way that these changes may reflected. So that we can be sure that management accounting in the future as well as before can be considered as a tool to help managers Management accounting includes the design and use of accounting, within the organization. In fact, Management accounting be defined the process of identification,mesurment, analysis , interpreting and provide that group of financial and other quantitative and performance information that is used by management   in order to plan , control and assessment of the operation and the optimum use of resources within an organization, i.e. to ensure the proper utilization of resources and in response to accounting , (IFAC, 1998). In management accounting, with the emphasis on users inside the organization, the information is measured, evaluated and reported that be assistance to organization's managers in various levels in the implementation of the goals set for the organization.

Management accounting provide services for internal purposes of organizations and profit service units, and contrary to the financial accounting that is faced to the obstacles through a predetermined and clear series of the principles and criteria and it has not been organized by series fixed and unchangeable rules. The methods and rules of management accounting have been provide and determined through favorable decision-making to help to the organization in order to achieve considered objectives. For this reason, the methods of management accounting should be designed and used for each of organization according to their situation and position in business environment. In fact, management accounting should adapt itself with the specifications and requirements of the relevant organization.In addition, some of the concepts that are used in management accounting may not be applied in financial accounting. For example, in the management accounting, one of the effective costs in decision making is an opportunity cost that must be measured in a reasonable manner and considers in relevant decisions. While the cost practice in terms of financial accounting has no place. In total, the management accountants have freedom of action and authority to provide any kind of information which are useful to, management. The essence of the management is decision making and the decision is dealing with future events inherently. For this reason, management accounting, unlike the financial accounting that basically is focused on the past information mainly is provider of the information with the current and future nature In addition, the information of management accounting has to be available inevitably in detailed as soon as possible in order to assist to managers in different levels of organization on the decisions and assessments. in the form of a detailed and as soon as possible. Finally management accounting information is useful when it is correct, reliable and in case it is base on estimation accurate methods, as already stated, management accounting basic emphasis is on the supply of information   for planning and control through management.

CONCLUSION

With the development of human societies, commercial markets also have been extended and numerous, more larger commercial units have been emerged and to compete with each other. The organizations to maintain their competitive advantage in a today's dynamic and changeable environment must be able to coordinate themselves with changes and create predict and accountability ability towards these issues. Therefore the organization should have assessment of existing and favorable situation according to the environmental conditions of the assessment of the situation so that it can adopt the most appropriate strategy and enforce it. Management accounting systems can be effective to solve problems and obstacles of organizations in the way of their success achievement by providing new costing systems and cost reduction and offering new managerial techniques.

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Therefore using modern techniques of management accounting is not only a recommendation and in the present era as a management tool in the competitive business climate is considered as basic needs and a vital necessity, in recent years, the world's largest companies to compete on the international market level , reducing production costs, the reduction of waste, raising the efficiency, more profitability and in the result of competitive making of prices,   a new method of management by the name of management accounting has been used . This management, with providing thought of continuous improvement on the basis of the move towards zero defects, has tried to create an effective capability that has been manifested in approaches, techniques and numerous tools.

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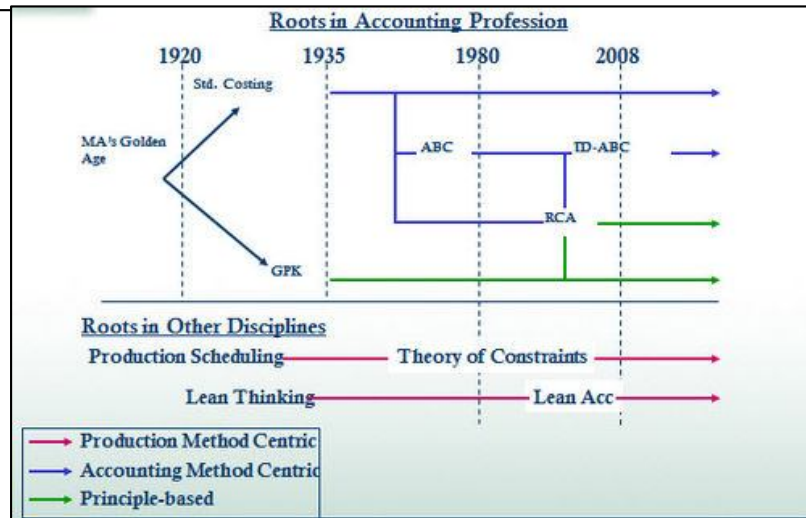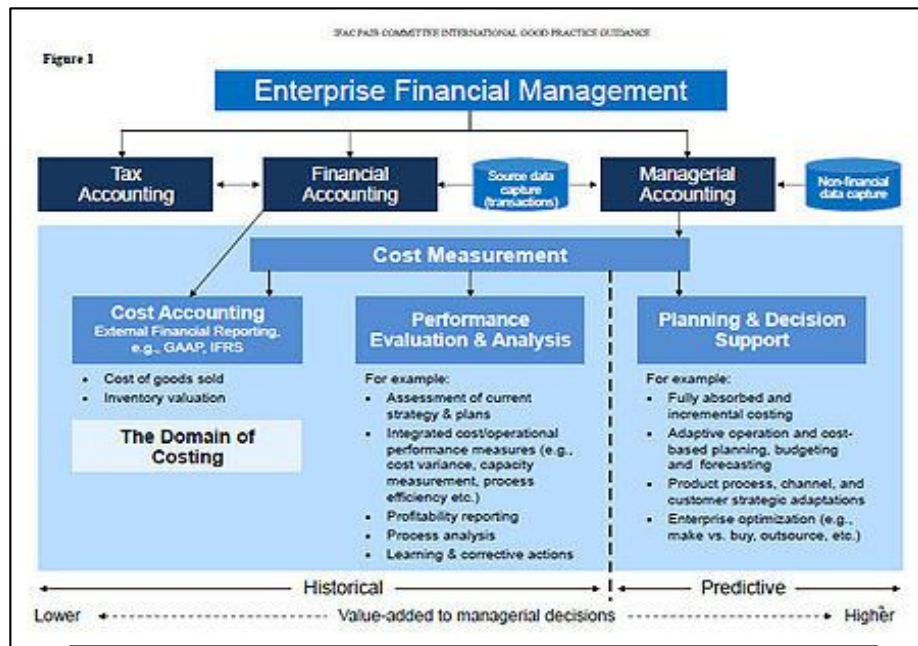
Effect of Depth and Planting of Reed on Removal Efficiency of Subsurface Flow Wetlands

Abolfazlrahmani sani[1] *and Fateme dareini[2]

[1]Department of Environmental Health Engineering, School of Public Health, Sabzevar University of Medical Sciences, Sabzevar, Iran.

[2]Department of Environmental Health Engineering, Student Research Committee, Sabzevar University of Medical Sciences, Sabzevar, Iran.

*Address for correspondence
Prof.AbolfazlRahmaniSani
PhD in Environmental Engineering,
Faculty Member, Department of Environmental Health Engineering,
 School of Health,
Sabzevar University of Medical Sciences,
Sabzevar, Iran.

ABSTRACT

Among the various methods, artificial wetland (canebrakes) wastewater treatment are known as successful systems in municipal and industrial wastewater treatment and in terms of energy costs and human resources, they are so affordable. Several researches have been conducted on wetlands' efficiency and the effect of the type of the plant in wastewater treatment, but there isn't much data on simultaneous impact of depth and planting or not planting in canebrake. Accordingly, in this study, five subsurface beds and three anaerobic ponds as pretreatments with a hydraulic retention time of 2 days according to the following characteristics were constructed: one serried bed with a pond as control item, and among the four research beds two beds with 60 cm depth with or without reeds, and two beds with 120 cm depth with or without reeds were serried. In order to irrigate the canebrake, the municipal wastewater existing in refinery was used with the following characteristics BOD=250mg/l، Tss=320mg/l، TKN=35mg/l ،TP=12mg/l و T.coli=2×10⁸And the canebrake performance was examined in a 2-year period.With the examinations during the pilot performance it was found that with an increase in the depth of the canebrake the removal efficiency of TSS and TE.coli is increasing, TKN and BOD5 is reducing and TP is remaining constant. Also, within a bed covered with plants, except for microbial agents, all the parameters have more removal efficiency than the bed without plants.Given that an increase in depth of the canebrake requires more costs, depending on the type of pollution in wastewater and also in the

absence of adequate land, we should start increasing the depth. And since the plant cultivated in bed has a role in oxygenation and accumulation of microbial growth, it couldn't be removed from the canebrake.

Keywords: pretreatment; primary sedimentation; anaerobic pond; anaerobic digesters; subsurface wetland.

INTRODUCTION

Canebrakes are the lands in which the water surface is above the ground surface or near it for a long time. This helps remaining the soil saturation conditions and the required plants' growth (1). Plant species emerged from water, such as Luis, reed and sand cane are the most common components of a canebrake system(2). Artificial wetlands are appropriate for the treatment of various types of wastewaters including municipal, industrial, and agricultural wastewaters(3).Different types of wetlands which are established in order to wastewater treatment include surface water flow systems, sub-surface water flow systems and vertical flow(5,4). Surface water flow systems are consisted of puddles or canals with impervious flooring and/or layers of soil or rock to create desirable environment for the growth of plants emerged from the water. Depth of water in such systems is maintained about 0.1 to 0.6 m. the water surface in these systems is in contact with the atmosphere and water flows in the bed at a low level(6). Sub-surface water flow systems are consisted of a series of canals or chips sealed by impermeable membranes or large puddles and layers of gravel in order to create an environment suitable for plants to grow(7). In such systems, the tank is excavated and filled with porous materials such as gravel and then water flows under the surface. The depth of gravel beds is normally made up to 0.6m. in vertical systems, wastewater id spread on the surface of the bed and thence leaks into the drainage system built in the bed floor, through the bed(8).

Waste stabilization puddles are types of man-made soil ones that filtrate the wastewater by natural factors, applying physical, chemical and biological methods(9). Types of waste stabilization puddles include anaerobic, optional and supplementary puddles(10). Anaerobic puddles are built with 3-5 m depth and retention time of 5-50 days and in order to create anaerobic conditions, the amount of their volume loading reaches up to 400 grams of organic matter a day per cubic meter of puddle volume(11).The puddles generally act as sedimentation of solids in cold seasons of the year, but in warm seasons with increasing the temperature (higher than 20 ° C) have a reduction up to 70% in their organic matter(12).Given the significance of the artificial canebrakes in terms of low costs and frequent use in the variety of filtration methods in this study, two effective factors in efficiency of these systems were simultaneously discussed so that results of which will be used in the fields of application.

MATERIALS AND METHODS

This study was conducted in wastewater treatment plant in Sabzevar, located at 7Km in the south of the city, in order to improve the quality of effluent waste from existing stabilizing puddles into the seasonal river in the area. In order for using the municipal wastewater entering the treatment plant, after establishment of junk and grain collector units, a small puddle with surface dimensions of 2X1m and depth of 1.5m was constructed inside which a mesh with pores of 1 and 2 cm was placed and then using asbestos cement pipes with 110 mm diameter, the wastewater was transported by the length of 4 Km to the pilot place.

Pilot units for anaerobic puddle

In this study three anaerobic puddles with 2days of hydraulic retention time as pre-treatment were applied. The puddles were constructed with 2m width and 4.4m depth. A puddle with control canebrake bed, a puddle with two beds of 60cm depth with and without reeds, and a puddle with two beds of 120cm depth with or without reeds were serried.Pilot units for sub-surface artificial canebrakes: five sub-surface beds were constructed having the following

features: a bed of 20m long, 13.3m wide and 6.6m deep covered with rush as control, and four beds in order to conduct the research, of 20m long, 6.6m wide and the following features were built. Two beds of 60cm depth one covered with rush and the other without rush , and two beds of 120cm depth one covered with rush and the other without it. All the stages were similar in terms of design and construction. In order to fill the bed, pea gravel of 5-9mm with porosity ratio of 35% was used. Beds were determined with hydraulic retention time of 2 days and loading amount of 65Kg per hectare per day. Tubing system was chosen to be U-PVC. In order to control the flow a control valve was installed on each puddle inlet so the flow in puddle and bed is modifiable. For irrigation of the beds, first on the inlet of each bed we used rubbles with dimensions of 5 to 10 cm for a 40 cm width, and the inlet pipe mesh was placed on this part so that the entering wastewater toward the beds penetrates deep into the bed. Beds inflow enters through the inlet pipelines at a distance of 1 m from each other and the treated wastewater was collected from three outlets by drainage system. Drainage design for each bed consisted of a U-PVC with the length of 160mm depending on the width of each bed (6.6 and 13 meters) was used and all the surroundings were covered with pores with 10mm diameter. The pipe was placed at the end of each bed and on the floor, and the outlet wastewater pipes were attached to it. To estimate the depth of wastewater in each bed in every 5 meter distance along the beds some bores made of U-PVC were placed vertically in the beds so that we could be able to estimate the depth throughout the wastewater bed. A tank of 2X2X4m was built to collect the treated wastewater and its waste was transported out of the treatment plant. Reeds were prepared from the banks of the city seasonal river, Kal-Shoor which is located in the south of the city and then they were planted by the depth of 30cm at every 50 cm distance from both sides in the beds. Water surface was maintained at about 10cm below the bed surface. The significant point in this study in that the control canebrake is covered with reeds by the depth of 60cm, similar with which were made the research beds. Therefore the reason is due to the fact that the designed canebrakes in most countries are generally the same as control one, in this study In order to enhance the reliability of the experimental data and to verify data from research beds, these control canebrakes were created.

Operating conditions

Conducted experiments included temperature, pH, COD, BOD5, TSS, TN, TP, and TC. Wastewater sample were prepared twice a week and each time was in form of a 4-hour compound then the results were extracted based on Average floating method. Sampling locations were from inlet and outlet of the puddles and sub-surface wetlands outlets which were immediately transported to the treatment plant. Wastewater samples were examined on the basis of methods mentioned in "Standard Method"(13).

RESULTS AND DISCUSSION

BOD5 Removal in beds

Results from pilots (figure 1) shows that increase in depth not only doesn't increase removal efficiency of BOD5 but also reduces it and also in a bed covered with canebrake removal efficiency is significantly higher than the bed without reeds.

The reason can be stated that in artificial canebrakes, various ways of oxygen transportation in sub-surface canebrakes is such that main and lateral roots are the ones which prepare oxygen for microorganisms to grow. Oxygen resulted from photosynthesis penetrates the stem of a hollow reed and reaches the underground roots and stems of a plant through gas transport cells and will spread in canebrake bed(14). Oxygen transportation is also possible through direct contact with the air and penetration to soil layers. Current displacement, that takes place with the two physical processes of evaporation and transpiration resulted from the pressure difference between water in plant tissue and the surrounding air, plays an important role in bed aeration. Also, the current displacement can take place by difference in wind speed through which the air is absorbed by reed's leaves and stems and transported to roots and underground stems then to bed for microorganisms to grow and to make nitrate. The oxygen

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transportation takes place about 5-45g per square meter a day depending on the plant density(7). Since most of reeds such as rush, sedge and Louie have roots with length of 30-70 cm depending on the plant type, and also because oxygen moves upwards while spreading around roots, so with the increase in depth from 60 to 120cm, the possibility of oxygen penetration into the bed floor will face serious problems and thus BOD5 removal according to aerobic method will be so limited.(16,15)In order to know the procedures during the removal of BOD along the bed and also to know the effect of depth on removal efficiency in canebrake beds, 60 and 120 were the removal amounts of BOD which were calculated according to distance from the inlet. Tables 2 and 3 show the removal amounts.

As we can see, in this review increase in depth also didn't lead to increase in removal efficiency in BOD, thus given that increase in depth is accompanied with increase in costs, this way in not suitable for efficiency increase.

TSS removal in beds

Reviews on TSS removal in beds show that both factors of increase in depth and choose of plant have a positive effect on removal efficiency of suspended solids (figure 2).As we can see in the table, the removal efficiency in canebrake with 120cm depth is first, and then comes 60cm depth canebrake, and gravel bed with 120cm depth has the third place. Suspended solids removal is performed by the application of physical methods and by trapping suspended solids through the sand filter(17), so the more we add the amount of sand bed, we can suppose more removal efficiency. Comparing the two sand beds of 60 and 120 without plants shows that the effect of reed in removal of suspended solids was more rather than increasing the depth of the bed. If this issue is carefully paid attention to, it seems reed will have dense roots while reaching the full maturity. Considering the fact that the reeds are adjacent at the time of planting,   one can say that their roots take up a large area in bed that will form a root filter beside sand filter(16), then the passing of the suspended solids through this compound filter is almost impossible, so we can see that the plant root is prior to increase in depth and efficiency of bed 60 with reeds is more than bed 120 without reeds.

TP removal in beds

Table 5 is indicating phosphorus removal in canebrakes. According to this table Phosphorus removal efficiencies doesn't have an acceptable increase with an increase in depth and so we can conclude that removal efficiency is almost remaining constant.We should take it into the consideration that phosphorus removal in canebrake bed is significantly more than a bed without reeds. The reason should be looked for in how to remove phosphorus in the bed.

The main mechanism for phosphorus removal in municipal wastewaters by artificial canebrakes is in these ways:

1. Phosphorus compounds surface adsorption on the surface of filling material of bed and roots in root zone
2. Direct adsorption by plants
3. Chemical precipitation of phosphorus with compounds of Aluminum, iron, calcium and clay minerals especially in soil beds and sedimentation on the bottom surface of the bed.
4. Creation of complicated compounds by complex interactions and sedimentation on the bottom surface of the bed and totally removal of phosphorus by surface adsorption processes and chemical precipitations depend on the quality and the type of filling material in bed. The more bed texture is made of small granule, the higher the removal efficiency of phosphorus compounds due to creation of more adsorption surfaces. The presence of compounds of iron,aluminum, and calcium in soil beds leads to an increase in removal potential of phosphorus compounds(18).

As mentioned earlier, phosphorus adsorption in bed directly or indirectly depends on the plant existing in bed; whether via root uptake or released oxygen from plants or via microorganisms which are accumulated on and

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around the roots for oxygen up taking that results in phosphorus removal(15). Phosphorus removal capacities are shown in Figure 3.

TKN removal in sub-surface beds

Table 6 shows Nitrogen removal in subsurface beds. As we can see the increase in depth of bed leads to a reduction in removal efficiency of Nitrogen but we can still see the effect of planting on increasing the removal efficiency.

Nitrogen removal mechanism in beds is as follows

The major mechanisms of Nitrogen removal include the two processes of Nitrification and denitrification. At the first stage ammonia under aerobic conditions turns into Nitrite by the two bacteria: Nitrozomonas and Nitrobacter, then Nitrite turns into Nitrate and after that under anaerobic and anoxic conditions will turn into Nitrogen by Nitrifierbacteria(19). The amount of Nitrogen during above mentioned processes in canebrake beds is reported 25-85 percent. Adsorption of nutrients such as Nitrogen and phosphorus is done by roots and especially by root hairs. Plants adsorb the materials in ionic form, so the Nitrogen existing in wastewater should change into nitrate nitrogen via oxidation and then into ammonia nitrogen via resuscitation which is done by microorganisms and the whole process is called Nitrogen fixation. In canebrake bed, nitrification is in a high rate and this is significant because Nitrogen is absorbed by plants as nitrate. Reed roots are among the most important factors that uptake nutrients and an increase in it lead to increasenitrogen uptake efficiency. In aerobic and anoxic zones due to nitrification and denitrification, Nitrogen removal is conducted by microorganisms(20).

As we can see with increase in depth of the bed due to the fact that there is a reduction in depth of root penetration, nitrification isn't possible so removal efficiency will be reduced. Also reed has a major role in nitrogen removal which can't be overlooked(16). Figure 4 shows the comparison of nitrogen in subsurface media.

E.coli removal in sub-surface beds

As we can see, increase in depth of the bed has been effective in increase of the removal efficiency but this increase is not that high to be an economic justification for the increased costs resulting from the increased depth. Figure 5 shows the comparison of coliform removal in subsurface media.

Pathogenic removal factors in canebrakes is done by trapping the microbes in the space existing in sand the process of aging among them and also the presence of antibiotics existing in wastewater(21). Thus this is done by increase of depth.

CONCLUSION

Building up the artificial canebrakes is a very successful way in treatment of a variety of municipal and industrial wastewaters and also has a wide range of application in this field. The suitable depth in these canebrakes is 60-70cm and this is appropriate for most of the plants used in the study. Increase in depth is a way to compensate for lack of surface in cases which there is land limitations, but this research suggested that increase in depth is not suitable for every kind of pollution removal in wastewater and the type of pollution should be recognized. Wastewaters in which pathogenic factors or suspended solids are the major reason for pollution, increase in depth is a suitable way for increasing the efficiency but for organic and nitrogen materials that are dependent on aerobic environment and biofilm growth, the increase in depth won't be effective. Also canebrake vegetation is so necessary for pollution removal from the wastewater and cannot be overlooked in any case.

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Table 1-Removal of BOD5 in the Substrate Surface

$_0$CTemp	Efficiency % BOD5			BOD5-Outflow mg/l			inflowBOD5 mg/l			name
	ave	max	min	ave	max	min	ave	max	min	
19	59	81	30	40	59	20	89	102	72	**reed base bed**
18	62	80	32	38	57	25	89	102	72	**reedbedin depth(60 cm)**
18	49	70	28	48	59	35	90	108	75	**sand bed in depth(60 cm)**
18	47	73	23	43	57	31	92	110	70	**reed bed in depth(120 cm(**
18	40	78	22	41	57	25	95	107	70	**sand bed in depth(120 cm**

Table2- BOD5 removal in wetland with depth of 60cm covered with reed terms of distance from the inlet

parameter	inlet	One 5meter	Tow 5meter	Three 5meter	outlet
temp^{o}c	25-35	24-34	22-33	21-32	20-30
BOD5 mg/l	120±9	86±7	67±5.5	58±5	45.5±4
efficiency BOD5%	-	45	34	12	9
					62

Table3- BOD5 removal in wetland with depth of 120cm covered with reed in terms of distance from the inlet

parameter	inlet	One 5meter	Two 5metwr	Three 5meter	outlet
temp^{o}c	25-35	24-34	22-33	21-32	20-29
BOD5 mg/l	120±10	100±8.5	86±7	75±6	70±4
efficiency BOD5%	-	34	28	26	12
					47

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Table 4- TSS removal in sub-surface beds

temp0C	Efficiency TSS%			Outflow TSSmg/l			inflow TSSmg/l			names
	ave	max	min	ave	max	min	ave	max	min	
19	71	86	32	26	39	23	56	67	42	**Reed base bed**
18	75	88	35	23	35	20	50	61	38	**Reed bed in depth(60 cm)**
18	65	74	30	30	47	25	51	60	39	**Sand bed in depth(60cm)**
18	83	89	39	21	30	18	48	62	40	**Reed bed in depth(120cm)**
18	74	76	30	27	49	21	51	62	38	**Sand bed in depth(120)**

Table 5- Phosphorus removal in sub-surface beds

temp0C	efficiency TP%			TPoutflowmg/l			TPinflowmg/l			names
	ave	max	min	ave	max	min	ave	max	min	
19	80	85	49	1.7	2	1	6	8	2	**Reed base bed**
19	87	90	65	1	1.7	1	5	7	2	**Reed bed in depth(60cm)**
19	55	69	30	3.2	3.5	1	5	7	2	**Sand bed in depth(60cm)**
19	83	75	60	1.2	2.2	1	5	7	2	**Reed bed in depth(120cm)**
19	61	78	32	2.4	3.2	1	5	5	2	**Sand bed in depth(120cm)**

Table 6- Nitrogen removal in sub-surface beds

temp0C	efficiencyTKN%			TKNoutflowmg/l			TKNinflowmg/l			name
	ave	max	min	ave	max	min	ave	max	min	
18	81	96	64	7.5	11	3	29	45	22	**Reed base bed**
18	86	94	62	4.3	7	2	28	41	21	**Reed bed in depth(60cm)**
18	55	64	35	14	23	11	28	41	21	**Sand bed in depth(60cm)**
18	75	76	44	7.8	15	6	28	41	21	**Reed bed in depth(120cm)**
18	60	69	40	16	22	11	28	41	21	**Sand bed in depth(120cm)**

Table 7- Total coliform removal in sub-surface beds

$tepm_0^C$	Efficiency TC%			Outflow TCmpn/100ml			Inflow TCmpn/100ml			names
	ave	*max*	*min*	*ave*	*max*	*min*	*ave*	*max*	*min*	
28	84	99	75	6.9×10^6	9×10^7	4×10^5	4.2×10^7	9.5×10^7	1.6×10^6	**Reed base bed**
18	92	99	75	4.3×10^5	5×10^5	3.7×10^5	2.5×10^7	5×10^7	1.5×10^6	**Reed bed in depth(60cm)**
18	90	99	73	4.4×10^5	5×10^5	3.8×10^5	2.5×10^7	5×10^7	1.5×10^6	**Sand bed in depth(60cm)**
18	96	99	78	1.9×10^5	5×10^5	3.3×10^5	2.5×10^7	5×10^7	1.5×10^6	**Reed bed in depth(120cm)**
18	97	99	79	1.7×10^5	5×10^5	3.1×10^5	2.5×10^7	5×10^7	1.5×10^6	**Sand bed in depth(120cm)**
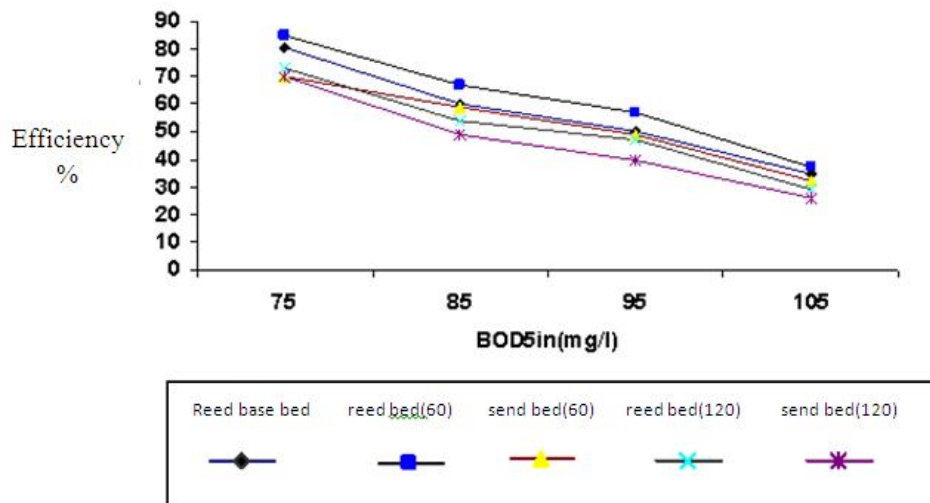
Figure1-Comparison of BOD5 removal in subsurface media
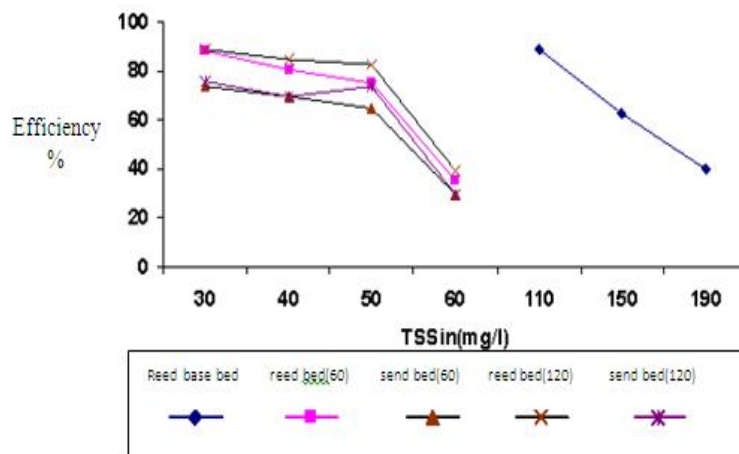
Figure 2-Comparison of TSS removal of subsurface bed

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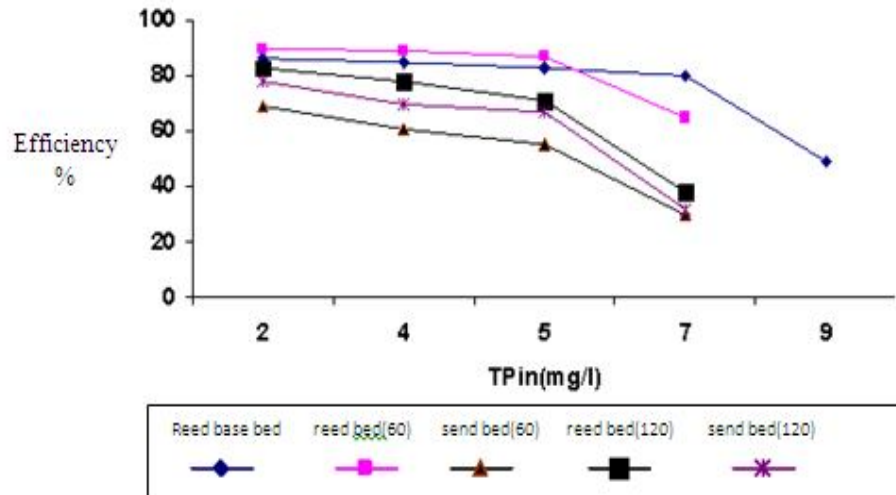
Figure 3-Comparison of phosphorus removal in the Straw Substrate
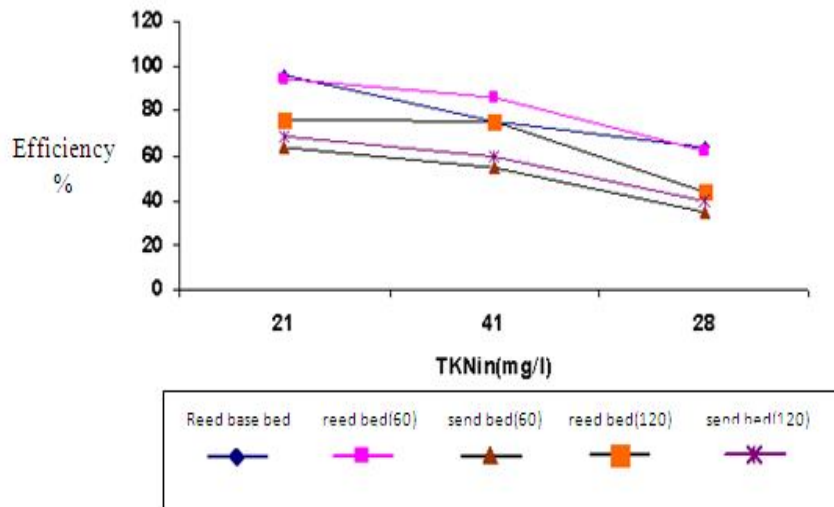
Figure4- Comparison of nitrogen removal in subsurface media

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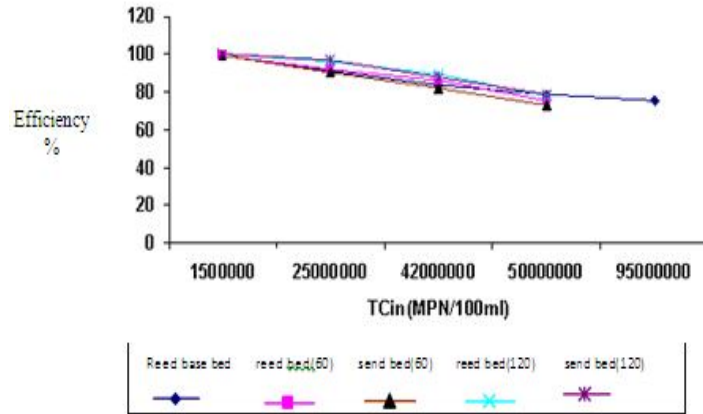
Figure 5- Comparison of coliform removal in subsurface media.

REVIEW ARTICLE

Packaging is an Effective Factor to Create Process of Strategic Brand Management in Pistachio Marketing.

Hamid Saremi[1]*, Mahdi Jalali [2] and Shahram Jalali [3]

Department of Accounting, Quchan Branch, Islamic Azad University, Quchan, Iran
Department of Management, Tabaran Institute of Higher Education, Mashhad, Iran.
Department of Management, Neyshabur Branch, Islamic Azad University, Neyshabur, Iran.

*Address for correspondence
Dr.Hamid Saremi
Department of Accounting,
Quchan Branch,
Islamic Azad University,
Quchan, Iran.
E.Mail: hadi_sarem@yahoo.com.

ABSTRACT

Pistachio trees are two basic from Anacardia case and from kind of pistachio. Kernel of pistachio is a powerful matter and full of proteins materials, greases, vitamins and salt. Some of the defects that exist in marketing of this product are weak advertising and unsuitable packaging. In this considering with use of one branding element, means packaging and with implementation of the four principles brand strategic management means identification and stabilize the organizations brand ,planning and implementation of marketing programs ,performance measurement, maintain and strengthening and development of brand equity. We can provide conditions for upside growth, in pistachio marketing.

Keywords: Marketing, Packaging, Pistachio, Strategic brand management

INTRODUCTION

Pistachio trees are two basic from familial of (AnaCardia case) and from kind of (Pistacia). It is worth mention that in this kind there are 11 different species which often are native to different regions of the more thon hemisphere. Normal pistachio of species (Pistacia Vera) is also known as the Iranian pistachio nuts. Kernel of pistachio has 18-22 percent of protein, 15-16 percent sugar, 50-60percent fat, 2/2 percent cellulose, 3 percent ashes and 5-6 percent moisture. According to the latest information from (FAO) cultivation of pistachios in the world varies and most of the rise is. From 2000 until 2011 in an eleven-year period. Cultivation of pistachios in the world varies. In this period the lowest level of cultivation with 417 thousand hectares was in 2000 and maximum of 651 thousand hectares from 2007

which was grew by 56 percent from the beginning of the period under review. But in 2008 hare significantly reduced and after a slow but has been up ward tread (FAO, 2002).

Some obstacles to the marketing of pistachios are:

1- There are non- professional traders in pistachio marketing

2- Another problem pistachio, is Aflatox in problem

3- Lock of proper advertising

4- Unsuitable packaging

Now considering that are reasons of the problem in pistachio exports is improper packaging and this subject is connecting By making brand in this branch of food industry, it's possible by uses of designing in packaging and process brand strategic management close to perfect conditions in case of marketing important product (Sedaghat et al.,2005).

Implementation brand strategic management
The marketing mix

One of the contributing factors in the purchase decision process is factors relating to the marketing mix which marketing mix can be composed of four major products, distribution and promoting. In following chart there are connections of product (Grönroos, 1997).

Familiagity with branding

For years, the science of branding is az a means to distinguish the goods of one manu facturer from other manu facturers. Aceording to the marketing society of America (American marketing association) brand includes: name, word or trademarks, symbol, desing or the combination of an these elements which used in order to identify the wares and services of one seher or group of seuers to make a distinction in competition arena from a technical perspective, ench time marketing specialist, name, logo, or creat anew symbol for anew product ,create a brand (Dickinson et al., 2007).

Selected brand effective elements

The most common elemeats of a brand are name,URL (uni form resource locakiors) , logo, symbols, characters ,packaging and slogans which that brand use them. Some of these options used to increase awareness about the brand or strengthening on exclusve right positive mental invocutions. The best test to measure the contribution of eneh element is to see clients with respects to that elements alone, how they think about the product or service. Sinee each of these different elements have diffarent advantages mast marketing managers of specific and unigue combination of an these elements ara used for each brand (Machado et al., 2012).

Packaging

There are many definitions for packaging but the most complete definitions of packaging provided by Pain in 1962:

1- The system which decrease time of preparing wares for transport, distribution, storage, retailing and consumption.

2- A concept is guaranteeing the delivery of the wares to end- users in favorable conditions and with minimal cost.

3- An economical –technical is that minimizes the cost of delivery while increases sales and thus profit of that to highest level (Riva et al., 2001).

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Implementation of strategic brand management

Strategic brand management deals for the concept, design and execution of marketing programs and activities aimed at the creation, measurement and management of brand equity (Park et al., 2014./)

Identifying and fixing the position of the brand

Strategic brand management processes with a clear understanding of the concept of brand, a brand that offers customers and begins the way for the brand according to the state competition. Place for brand is the design concept image and an option that could be receives valuable and distinct position in customer mind. This means that the potential benefits that this status can bring for organization, promote the highest. Value Creation and competitive position of a brand means to its superiority in the minds of consumers. In general, the position of the brand, convinced client's privilege or points of difference relatives to its competitors (Collis, 1994). Using the chart below can be determined the influence of package to stabilize its position.

Planning and applying brand marketing plans

The process in which users learn about the brand depends on Three Factors:
I. Choosing the elements or the main items that create the brand and the way of combining these elements together.
II. Integrating the elements of the brand by using marketing job and sales plan.
III. Other factors that may create additional thoughts for the users by communicating with other entities (e.g.: company or country, distributing place or other brands) (Cornelissen et al., 2007).

Evaluating brand function

The process of evaluating the position of brand is often the result of brand audit. This means, examining the brand comprehensively. To evaluate the security of the brand. First you should identify its particular value then offering the methods for promoting and improving this value. Brand audit needs deep perception of energy sources which belonged to the brand by the organization and customer (Noble et al., 2002).

Maintaining, improving and developing brand value

Maintaining and developing brand value is often a challenging and difficult activity. The process of applying the management types of brand value needs a wide range of theories which are taken in to consideration towards the brand value, so that methods which affect the brand will be understood and organized correctly that how these methods reflect the goods and how They should adjust with the place, time or marketing position in which they are work. In case of brand matrix-even the development of the product and the development of the brand can be taken in to consideration (Srinivasan et al., 2005).

CONCLUSION

Pistachio alang with it useful articles can be put into food cycle. In arder to do marketing for this praduct same related methods should be used suchas advertisment in which designiyand type of Packaging play important rales. By creating a particalar brand and applying at least four factors of canfirming organizatianal pasition thay con make an advartaye for the user, applying methods which an used to choose and integrate brand elements, evaluation that con perform the andit for the brand. And finaly maintaining and developing brand value that can be applied by using brand matrix- product, me can hope forward to develop the brand and do the markcting for pistachio.

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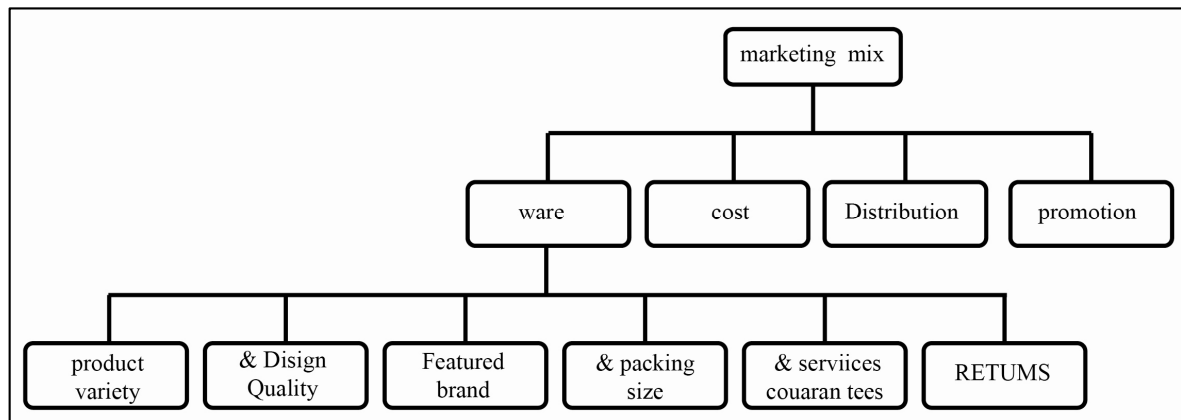
Figure 1 – Ware in markreting mix
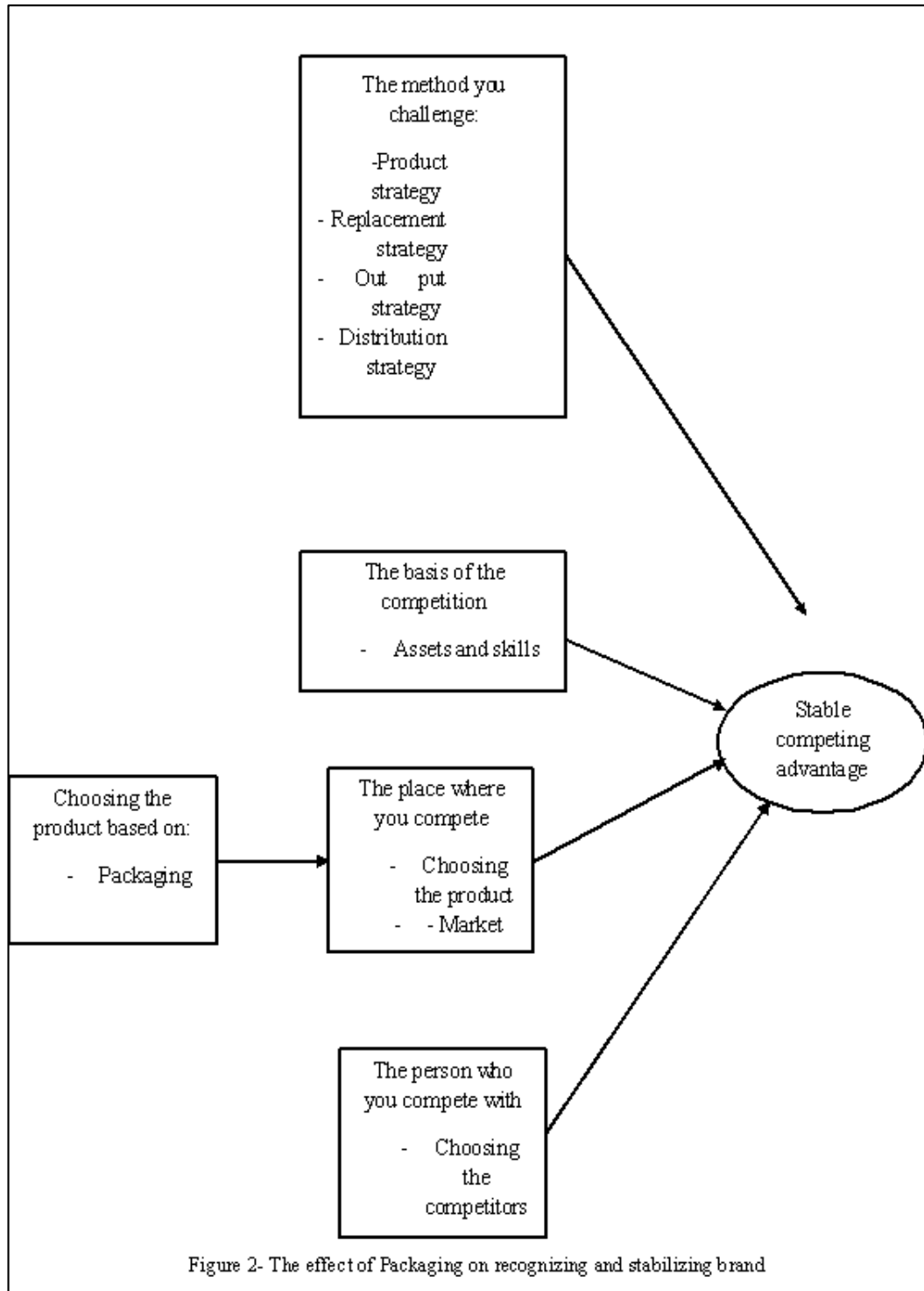
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Figure 2- The effect of Packaging on recognizing and stabilizing brand
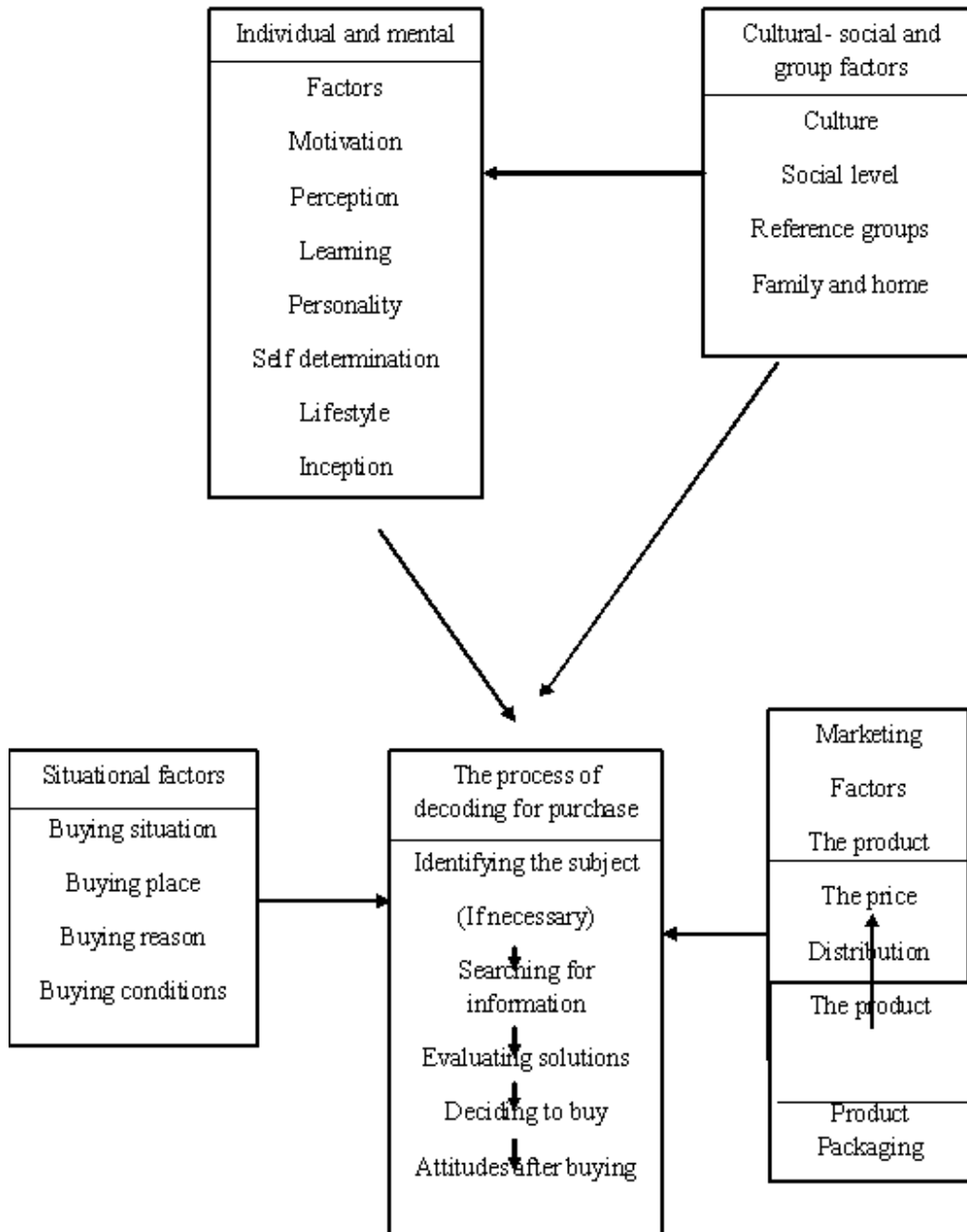
Figure 3 – Packaging is one of the key factors in the process of purchase decision

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Figure 4 - Packaging paves the way for evaluating brand function

Figure 5 – The effects of brand matrid- producy Using Packaging as a factor for developing brand
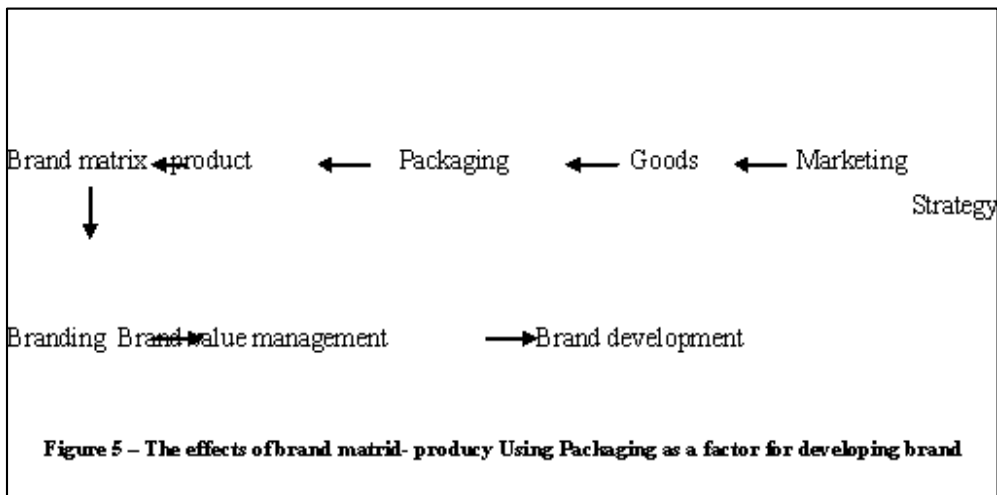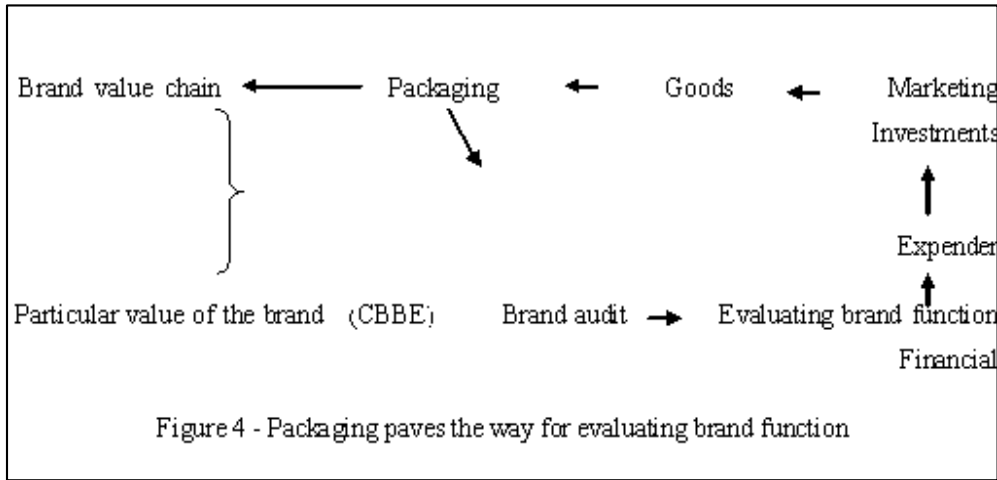
Table 1 – Criterion selection brand elements

Ability to maintaion and support	Compatibility	portability	Popular rate	Significantly Rate	Ability to remember
Legally	Flexible	The groups of product	Interesting & fun	Descriptive	Eazy identification
competitive	It updates	The geographic Boundariese	Have the aesthetic Appeod of	persuasian	Simple remember

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Table 2 - Four strategies for brand

Type of the product	
current	New
development product line	Brand development
Multi-brand products	New brand

RESEARCH ARTICLE

Profit Management Prediction with using Neural Networks Model and Modified Linear Jones Model.

Ali.Maghool

Department of management and Accounting, Neyshabur Branch, Islamic Azad University, Neyshabur , Iran.

*Address for correspondence
Ali.Maghool
Ph.D of Financial Management and
Member's of Scientific Boards of Department of management and Accounting,
Neyshabur Branch, Islamic Azad University, Neyshabur, Iran.
E.Mail: ali.maghool@yahoo.com

ABSTRACT

It is necessary to develop a model to predict earnings management. To reduce the risk of financial crises and helping investors to avoid large losses of market shares. Furthermore, it is difficult to limit the time for traditional technology audit, human resources, cost and effect on the normal behaviour of large and complex financial information, Therefore it is useful to develop a predictive model for auditors to identify the degree of manipulation of earnings management in the financial statements. Purpose of this research is studying and comparing neural network prediction and Jones linear model in order to predict earnings management of firms accepted in Tehran Stock Exchange. Research statistical sample includes all firms accepted in Tehran stock exchange during 2007-2011 and sample size is 160 concerning screening method and after eliminating outlier observations. Results of data analysis showed that prediction power of earnings management has significant difference with using neural network and Jones modified linear model. Jones modified linear determination factor is 51.1% which indicates that this model can predict 51.1% of firms' earnings management changes. On the other hand, results obtained by implementing neural network show that this model can predict 92.8% of variations in earnings management.Thus it can be concluded that the neural network model will have more power in profit forecasts.

Keywords: neural network, Jones modified linear model, earnings management prediction.

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INTRODUCTION

In order to reduce fraud risk and manipulating financial statements and helping investors to avoid high losses in stock market it is necessary to develop a model for predicting earnings management. Besides, it is difficult for traditional auditing technologies to limit time, human resources, expenditures and effect of abnormal behaviours influences on complex and large financial information. Therefore, developing a prediction model for earnings management is suitable for auditors in order to identify manipulation degree in financial statements. Numerous researches dealt with neural network ability in predicting financial performance. Therefore, main objective of this research is investigating and comparing neural network prediction power and Jones modified linear model for predicting earnings management. In order to achieve this purpose, research hypothesis is stated as below:
Earnings management prediction power using neural network and Jones' modified linear model have significant difference with each other.

Various researches have been done throughout the world including:Olson & Mossman (2003) attempted to predict stock return of 2352 Canadian companies during 1976-1993 using three methods logistic regression, least squares and genetic algorithm. Their results showed superiority of genetic algorithm relative to two other methods. Paw (2008) in a research by using information related to 720 Taiwanese companies during 2000-2005 studied genetic algorithms and multiple regression abilities in relation with modeling capital structure. Their results showed that model presented by genetic algorithm model has less error comparing with multiple regression model. Henry Hoagland (2012) in his research compared power of regression model with neural network model in discovering earnings management; therefore, it is considered as a better tool for discovering earnings management. Tehrani & Abbasion (2008) studied capability of neural networks for improving efficacy of technical analysis indices in predicting symptoms of stock price. Their results showed that artificial neural networks have prediction capability for predicting short term price change in Tehran stock exchange. Azar & Karimi (2009) predicted stock return using accounting ratios with artificial neural networks approach and concluded that using artificial neural network decreases estimation error of least linear squares. Arabmazar yazdi & Qasemi (2009) found that combination of artificial networks with genetic algorithm increases prediction power for selecting optimized variables. Zarin (2010) studied relationship between capital structure and economic value added with neural network software and stated that two-layered perceptron model outperforms neural network with radial functions in estimating given function and considering data return. Firozian et.al (2011) compared prediction ability of genetic algorithm and Z-Althman model in predicting bankruptcy of firms accepted in Tehran stock exchange and concluded that genetic algorithm has higher accuracy in predicting bankruptcy compared with Z-Althman; as a result, it is a more suitable tool for prediction. Pirovi (2013) studied precitablility of market value added based on capital structure and earnings ability using artificial neural networks and showed that two-layered perceptron model outperforms linear regression model in predicting value added.

METHODOLOGY

Research model and study variables
Jones' modified linear model
In this research, first we estimate and predict arbitrary accrual component (earnings management) using modified Jones model:

$$TA=NI-CFO$$

In which TA is total accrual, CFO is cash from operation and NI is net income. Then following model is fitted for total accruals against change in sale and finished cost of fixed asset:

$$Ta_{ut} = \alpha(1/A_{it-1}) + \beta(\Delta REV_{it}/ A_{it-1}) + \gamma(PPE_{it}/A_{it-1}) + \varepsilon_{it}$$

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In this equation TA_{it} is total accruals in year t for company i, ΔREV_{it} is revenue of year t minus previous year's revenues of company i, PPE_{it} is gross net assets in year t, A_{it-1} total assets at the end of previous year for company i, α, β and γ Jones model's coefficients and ε_{it} is model error in year t for firm i. Non-desired accrual components (NDAC) is obtained be following formula:

$$NDAC_{it} = \alpha\,(1/A_{it-1}) + \beta(\Delta REV_{it} - \Delta REC_{it}/\,A_{it-1}) + \gamma(PPE_{it}/A_{it-1})$$

In which ΔREC_{it} are accounts receivable of year t minus accounts receivable for year t-1 in firm t-1 and α, β and γ are obtained using least squares method in total accrual model that considering above equations, desired accruals component (DAC) is calculated through below model:

$$DAC_{it} = TAC_{it} - NDAC_{it}$$

Then using a multi-layered neural network accrual components (management) are predicted and neural network prediction error will be compared with Jones' modified linear model.

Multi-layered perceptron networks

In multi-layered perceptron networks, generally two signals are used that should distinguished from each other. One type are signals which move in left to right direction and other type are signals that move in right to left direction. First type is called functional signals and second type is error signals. The reason of naming is that first group signals are calculated based on each neuron inputs and corresponding network parameters and second group signals are branched from error signal and return distribution from output layer to other network layers which are called error signal and functional signal is distributed in go direction from one layer into the other layer in network. Error signals propagate in return direction.

Back-propagation algorithm

Error back propagation algorithm for multi-layered perceptron networks is generalization of least mean square algorithm. This index is linear squares mean.

Multivariate regression

In this method, a multivariate regression equation is calculated that equation multiples for each variable is determined based on its importance in predicting criterion variable. Correlation coefficient between predictors in multivariate regression equation and dependent variable is shown by multiples (Sarmad, 2005: 220). Multivariate regression model is as follows:

$$Y_i = \alpha + \beta_1\,X_{1,i} + \beta_2\,X_{2,i} + \ldots + \beta_n\,X_{n,i} + \varepsilon_{n,i}$$

In which:
Y_i: ith observation of dependent variable
α: width (constant)
$X_{n,i}$: ith observation for independent variable X_n (n=1,2,…,n)
β: independent variable coefficient
ε: distortion component
Determination factor i.e. R^2 in this model specifies that some percent of variations in dependent variable is explained by independent variable.
Linear regression can only be used in following conditions:

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1. One of assumptions in regression is lack of autocorrelation or serial correlation between errors (difference between real values and predicted values by regression model). In other words, covariance among error sentences will be zero.
2. Fitted regression model comes significant. For significance test of model, F-statistics is used in 95% level.
3. Equation errors had normal distribution with zero mean. In order to study errors normality, standard errors were calculated and error elements curve is drawn in regression model and compared with normal curve.
4. There was no correlation in regression pattern for independent variable (lack of multi collinearity). Because when intensity of relationship between independent variable was high, it is difficult to measure separately effects of each variable on dependent variable.

Significance test

In order to test significance of estimated regression coefficients, we assume that regression coefficient is zero. In other words, independent variable has no effect on dependent variable i.e. null hypothesis is as follows:

$$H_0: \beta = 0$$

Contrary hypothesis states that independent variable has effect on dependent variable variations i.e.

$$H_1: i_f \neq 0$$

In order to test these hypotheses t-Student was used in 5% significance level. If in 95% confidence (α=5%), absolute t obtained from test is larger than table t with same degree of freedom. H_0 is rejected and otherwise, it is confirmed. In this test, rejecting H_0 means significance of coefficient and accepting it means non-significance of coefficient.

Studying structure of used data and its models

In this research, regarding data type and statistical analysis methods, pooled data method which indicates cross-sectional data during time have been used to predict earnings management. Pooled data model which is called time series-cross section data method is conducted in different forms and it has various models which one of them is used considering research conditions. In cross-section and time series data studies, if cross-section effects coefficient and time effect did not become significant, we can pool all data and estimate them with ordinary least squares regression (OLS). This method is also called pooled data method. Fixed effects and random effects models are briefly explained here because of their importance:

Determination test in pooled data

In order to determine applied model in pooled data, a combination of different test is used as follows:

Chaw test

Chaw test is conducted to determine application of fixed effects model against pooling all data (integrated model). Hypotheses are as below:

H0: Pooled Model
H1: Fixed Effect Model
First hypothesis is based on restrained values and opposite hypothesis is based on unrestrained values. Chaw test statistics based on total error squares of restrained and unrestrained model is as below:

$$chow = \frac{(RRSS - URSS)/N - 1}{URSS/NT - N - K}$$

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This statistics has F distribution with N-1 and NT-N-K degree of freedom. If value of restrained F was less than table F, H_0 is rejected in determined significance level and significance level exists for cross-sections. Therefore, fixed effect model is selected; otherwise, pooled data model will be used (Ashrafzade & Mehrgan, 2008).

Hausman test

Hausman test is conducted to determine application of fixed effect model against random effects model. Hausman test is formed based on presence or lack of presence of relationship between estimated regression error and independent variables. If there is such a relationship, this is fixed effect model; otherwise, random effect model will be used. H_0 shows lack of relationship independent variables and estimation error and H_1 shows relationship (Zaranejad & Anvari, 2005):

H_0: Random Effect
H_1: Fixed Effect
Maddala (1998) showed variance estimation q with V (q) for Hausman test and presented M statistics as below:

$$M = \frac{\hat{q}^2}{\hat{v}(\hat{q})}$$

RESULTS

Mean error square variation curve

As following curve shows, in 1000 replications which was selected by system as predefined, mean errors squares in training data is 10^{-20} and in experimental data is 10^{-2} which is suitable and desired.

Data prediction error

As above figure shows, errors caused by earnings management prediction in statistical sample is trivial which shows high prediction power of designed network

Investigating data prediction power caused by network

24 networks were designed with training data. Now designed networks should be tested. Earlier it was said that 2011 data were used in test. After testing network, error of each network is calculated. Then the network with least prediction error was selected for this purpose. It was observed that network with 4 hidden nodes has least mean squares. Therefore, it is selected as best network for comparing with regression model. R^2 of neural network is calculated 92.8% using above formula which shows high power of neural network in predicting earnings management.

Comparing data prediction power obtained by network and modified Jones model

Modified determination factor for modified Jones model is 51.1% which indicates that this model can predict 51.1% of earnings management variations and on the other hand, results of conducting neural network shows that modified determination factor of neural network is 92.8% which can predict 92.8% of earnings management of firms. Therefore, research hypothesis that there is a significant relationship between earnings management prediction using neural network and modified Jones model is confirmed.

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DISCUSSION AND CONCLUSION

Research statistical sample includes all firms accepted in Tehran stock exchange which were 470 firms at the end of 2011 based on RahAvard Novin software and final sample was determined 160 firms using screening method and eliminating outlier. Regarding literature and nature of research hypothesis, pooled data were used in this research. Chaw and Hausman tests were used to determine suitable model (pooled or panel with fixed or random effects).

Chaw test

Chaw test shows that H_0 is rejected (pooled model). In other words, there is individual or group effects and tabulated (panel) data should be used to estimate regression method and Hausman test is used to determine panel model type (with random effects of fixed effects).

Hausman test

Results show that X^2 of Hausman test is 154.121 which are significant in 99% confidence level; therefore, regarding Hausman test, fitness of first and second regression model in this research is suitable using panel data with fixed effects method.

Testing regression classic hypotheses

1. Regarding Z-statistics Kolmogrov-Smearnov, because significance level for all variables is higher than 0.05; therefore, with 95% confidence we can say that above variables have normal distribution.
2. According to table, Durbin-Watson statistics for regression models is 1.67 which is in 1.5 and 2.5 intervals. Therefore, there is no correlation between errors.
3. In research regression model, mean error distribution is approximately zero and its standard deviation in near 1 (0.994). As a result, regression model errors distribution is normal.

Fitness of regression equation for Jones modified model

After testing regression assumptions for modified Jones model and ensuring them, regression equation for this model was fitted and results are summarized in table 1.

Based on table 1, significance level of total assets is 0.049 which is less than considered significance level in this research (5%); on the other hand, t-statistics value related to this variable (1.648) is larger than t-statistics of table with same degree of freedom (1.96). Therefore, this variable is significant in fitted regression for Jones modified model and estimated factor can be used for this variable. Significance level of total revenues, properties, machines and gross equipments is 0.046 and 0.047, respectively which are less than significance level in this level (5%). Also, t-statistics relevant to these variables are (2.182) and (1.972) which are both larger than t-statistics table with same degree of freedom (1.96); therefore, all three variables used in modified Jones model are significant. Determination coefficient and modified determination coefficient of Jones model are 56.3% and 51.1%, respectively. Therefore, we can conclude that regression equation for Jones modified model can explain 51.1% of variations in TA_{it}/A_{it-1} (total accruals to previous year assets) of studied companies.

Suggestions

Regarding research results that indicated high power of neural network compared with linear regression models like modified Jones model it is recommended to all analysts, investors and researchers to use neural networks for

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decision making about earning management prediction because this method leads to optimized decisions with higher efficacy due to its high accuracy.

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Table 1: Results obtained from regression equation for Jones modified model

Variable	Symbol	Coefficient	t-statistics	p-value
Constant	constant	-	-	-
Total assets	A	1.648	1.993	0.049
Total earnings variation	ΔREV	0.027	2.182	0.046
Properties, machines and equipments	PPE	-0.204	-1.972	0.047
Adjusted determination coefficient =0.511		Durbin-Watson 1.9		
determination coefficient =0.563				
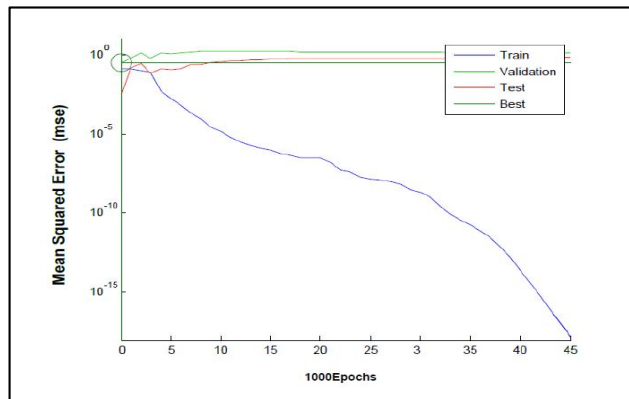
Fig 1: mean error squares variation
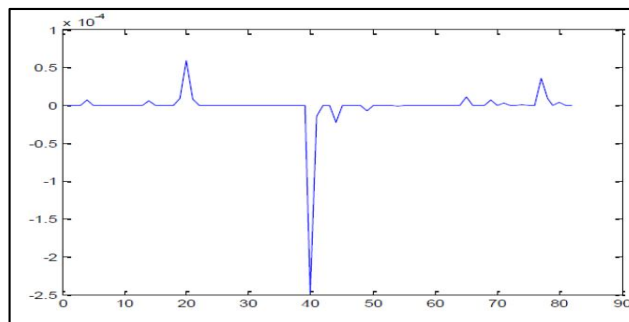
Figure 2: Data prediction error

RESEARCH ARTICLE

The Effects of a Pre-season High Intensity Training Period on Some Physical Factors in Elite Female Junior and Senior Taekwondo Players

Afsaneh sheikhi[1], Rooholah rezaee[1]*, Alireza dahaghain[2], Mahmood esmaeili Livari[3] and Shahin ghiafi[4]

[1]Sama Technical and Vocational Training College, Islamic Azad University, Andisheh branch, Andisheh, Iran.
[2]Sports physiology, Physical Education, Islamic Azad University, Karaj branch, Iran.
[3]Physical Education, Payam -e- noor University, Karaj branch, Iran.
[4]Department of Sports Biomechanics, Physical Education, Islamic Azad University, Karaj branch, Iran.

*Address for correspondence
Rooholah rezaee
Department of Sports Biomechanics,
Sama Technical and Vocational Training College,
Islamic Azad University,
Andisheh branch,
Andisheh, Iran ,
E.Mail: rooholah.rezaee@yahoo.com

ABSTRACT

The purpose of the present study was to investigate the effect of an intensive pre-season training on some physical factors (joint, muscle, skin and bone of the upper and lower limbs) in elite female junior and senior Taekwondo players. Subjects who were selected purposefully as convenient were 12 teenagers (mean age= 15.5 ± 0.71 years) and 12 young women (mean age= 20.43 ± 1.9). They had at least 3 continuous years of experiences in national campus or national championship. The athletes were in Iran campus for Asia competitions to get ready to obtain London Olympic qualification 2012 (juniors with Iranian coach and seniors with Korean coach). A specific questionnaire was utilized to consider physical injuries in different organs along with the causes and time of happening of injuries. It was a semi-experimental research design, in which to analysis data, mixed factorial analysis was used to compare changes in the incidence of different injuries in the phases of training between juniors and seniors and Chai-Square was utilized to compare between incidence rates of injuries at the end of 6th to 12th week($p < 0.05$). Result showed a significant increase in all kinds of injuries in whole body in second phase of training in relation to first and second phase of training of both groups. In comparison to the rate of incidence of injuries by training intensity, more injuries have been shown in seniors. Results indicated that although high intensity pre-season training can affect the incidence of injuries reduction or increase,

but there is no significant difference between effects of Iranian and Korean coach in incidence of injuries in this period. It is concluded that the high intensity training has not been impressive in reducing the negative physical factors, yet it has resulted to injuries. Furthermore the kind and intensity of training is a major factor to change the incidence rate of physical injuries.

Keywords: High intensity training period, physical factors, Elite female junior and senior Taekwondo players.

INTRODUCTION

In order to gain maximum performance or skill, athletes generally have an optimal level of practice.Athletes, who exercise less than optimal, may do not achieve their potential performance. On the other hand, some athletes who exercise in high intensity and volume may suffer from a considerable decline in performance capacity or may experience negative exercise adaptation. Coachesare always looking for a well-suited volume and practice so that they may reach the maximize performance in athletes. Unfortunately determining optimal volume and intensity of training for athletes (especially professional athletes) is very difficult and physical and psychological effects of severe exercises is an outstanding issue that has attracted the attentionof sports experts, coaches and athletes from long time ago.The limitations between severe exercise and overtraining have not been recognized yet.In spite of performed studies in this area, valid and exact physiological and psychological indexes have not been presented which its changes would be the indication ofthe cause or causes of overtraining (4).Besides the ever-increasing betterments in sports and applying other sciences in it, achieving success and precious sports outcomes is not easy to gain yet there are crisis and problems that has threatened athletes health. Since there are limited athletes (amateur and professional) who have not experienced the bitter sense of sports injuries. This may bring them about being far from sport events or even put a halt to their sport activities (9, 2). In many cases, these injuries are preventable due to recognizing the causes of incidenceto a considerable extent (11, 29, 35). It has been pointed out that the best strategy to avoid and prevent damageis to know the cause of injury. For example Acry, Hagel and Teto (2007), demonstrated that using helmet reduces the risk of head injuries by 22-60%.Head injuries are the most common cause of death in skaters and sky racers (37). Also, Eric, Dzmpr and Willie Peter(1994), suggested about the rate of spinal injuries in Taekwondo playersin competitionswasheld in America thatfrom among 802 recorded injuries, 292 of them has been so severe that players no longer were able to continue the competitionon that day (32). Among other factors, overtraining is the cause of the incidence of sports injuries that in various sources has been defined differently (33). Many researchers believe that overtraining causes diverse physiological, biochemical, immunological and psychological changes due to serious physical and psychological pressures in the long run or with unsuitable rest periods in athletes (21.4). It has adverse symbols in different individuals that leads to evoke negative factors, temper changes, physical disorders and finally declining athletes performance in exercises and matches(8). To achieve progress and success in sports, it is an important factor to take advantageof a good workout. An exercise which not only requires an overload, but also it should benefit from the combination ofan increasing overload and a suitable recovery[3]. If the short-term fatigue is associated with insufficient recovery, you will observe a positive adaptation and improvement in performance (43). If the balance between appropriate exercise and enough recovery is disordered, a situation will happenwhich is relevant to incompatible symbols and is accompanied by physiological and psychological symbols. Therefore reconstructing performance may need some days or weeks of rest(10). Ivarsson [4] (2008), about sports injuries among soccer players concluded that the major source of 23% of the damages, are trait anxiety and life stress (40). Hoffman [5] (2008),also showed about runners that a session of aerobic running on treadmill at a desired speed in order to reduce fatigue, indicatesfinally reducing physical injuries (36). Besides the importance of injuries in different sports, the causes of injuries and reducing athlete's performance should also be considered (12).According to Narenjchi Shotorbany (1388), the worst thing is performingmonotonous exercise, not having sufficient recovery time orperforming lighter exercises and increasingthe intensity of continuous training(23). Sharp and Kute dagis, reported that overtraining occurs mostly before or during competitive season and even accompanied by increasing the

intensity and volume of exercise (16). Also,Zetou,Komminakidou, Mountaki, Malliou (2006), suggested that a well-suited physical and mental health is necessary for successful performance in all daily activities for all social groups. This kind of sensitivity multiplies in successful sportsperformance in all activities of daily living.For this reason, different kinds of exercises and provisions are applied to boost athlete's physical fitness (52).Achieving maximum physical and mental fitness in individual sports is more important than team sports. Because in individual sports, athletes must relyentirely on their own mental and physical abilities and they have to be able to handle and control the rival in a short distance especially in martial arts (46).

There has not remained any doubt regarding to thepresent theoretical underpinning about theimportance of physical and mental fitness to increase the performance in sports,(17). The results suggested that the injury in athletes should be taken intoconsideration seriously in various sports and at all levels (exercise and match). In throughout the history of OlympicGames the most medals werewon in specific sports: weightlifting, wrestling and taekwondo (18).Taekwondo is one of the medal-winning sports in the World'schampionship or in Olympic Games.Since identifying the factors causing injuries and determining the extent of injuries and detecting the most widely injured areas youcan perform necessary prevention, and minimize the incidence of injuries (22,29).

 Therefore, to control and predict sports injuries, pathological science can be applied to achieve more success in sports (5). Some studies indicated that in various sports, including soccer, basketball, and sailing, the amount of injuries in girls and women is more than boys and men(53). Thus regarding the importance of athlete's mental and physical fitness to enhance their performance and to reduce the incidence of sports injuries, especially in stressful sports like Taekwondo, the present study is trying to consider the effects of intensive exercises in national team on sports injuries to improve their performance. Furthermore using the information you can help athletes in their future planning and attaining the peak performance and reducing sports injuries (45).

Moreover the study strivesto assist to reduce the risk factors byidentifying the mentioned cases among elite female Taekwondo players and discovering risk factors resulted from intensive exercises and the origin ofinjuries. Also it aimsto provide a chance to help coachesto be able to identify players who are at risk factors, and to prevente the occurrence of adverse events during intensive exercise. Considering that in some researches Taekwondo has the lowest portion of injuries, it standsfourth among all the ten in terms of low frequency of injury (4).But Gholampour (1381) describedin Taekwondo step by step that due to the type of sportswhich is based on fighting andachievingpoints is done by hitting each other in tournaments and training,the incidence of injuries rises significantly (13). Regarding the contradictory results,it is difficult to infer and consider the underlying process. Therefore, obtaining reliable results demandsrepeating study and controlling confounding variablesin other sports. The findings can be judged with the more assurance about the preparation training of the national team on common sports injuries (3). Taekwondo is one of the female most medal-winning sports in Iran and all around the world. Regarding the fact that the elite Taekwondo players endure training under physical and mental pressure, this question was posed to the researcher, how does the intensive pre-season training affect elite female junior and senior Taekwondo players? And are there any differences between the two groups with Korean and Iranian coach? Applying the results of the present study can be utilized to improve athletes training through considering mental factors resulting from intensive training besides physiological factors and progressingathlete's performance in various sports events. Moreover considering the situations and some causes of incidence of negative physical factors, can be a guide for athletes and coaches to prevent such conditions. The purpose of the present study is to investigate the effects of an intensive pre-season training on some of the physical parameters (joints, muscle, skin and bone in the upper and lower limbs) in elite female junior and senior Taekwondo players in Iran.

MATERIALS AND METHODS

In the present study, Subject were selected purposefully as convenient were 12 teenagers (mean age= 15.5 ± 0.71 years) and 12 young women (mean age= 20.43 ± 1.9). They had at least 3 continuous years of experiences in national

campus or national championship. The athletes were in Iran campus for Asia competitions to get ready to obtain London Olympic 2012 qualification (juniors with Iranian coach and seniors with Korean coach). A specific self-madequestionnaire was utilized to consider physical injuries in different organs along with the causes and time of happening of the injuries. Specific research questions for understanding physical damage (joint, muscle, skin and bone upper and lower limbs), which was designed to measure the subjects limbs and causes of injuries. Taekwondo Women's National team training was held in Taekwondo Federation under the supervision of Korean coach for youth and Iranian coach for teenagers. A pre-test was taken to identify specific physical injuries before starting the training from the two groups in the morning and under the same circumstances for all athletes. A post- test was taken after the 6th weeks of training. Also the last week, (12th week), in which the training intensity reduced, a re-test was taken again from both groups, at the same time withpre-test to compare the effects of exercise in both groups. The training lasted for three months continuously, six days a week, three sessions a day for about seven hours a day (techniques and fitness). In the last week when training intensity decreased, exercise was held twice a day, each session forthree hours.To analysis data, mixed factorial analysis was used to compare changes in the incidence of different injuries in the phases of training between juniors and seniors and Chai-Square was utilized to compare between incidence rates of injuries at the end of 6th to 12th week($p<0.05$).

RESULTS

The results of present studyabout investigating the effects of a period of pre-season intensive practice on emerge of skeletal injuries among youth and teens taekwondo players in general showed that among the varieties of injuries over different limbs, youths have the highest portion of injuries during the second phase of exercise (Figure 1).The frequency of skeletal injuries occurrence and the number of injured limbs over head and face during the first and third indicated a significant increase and in the second phase showed a significant decrease (Figure 2).On the whole, the amount of muscular injuries during the second phase had a significant increase. The amount ofmuscular injurieson upper and then on lower limbs is higher respectively (Figure 3).The occurrence of joint injuries among youths is 50% and in teenagers is 75% in the first phase. The frequency of joint injuries has a significant increase in comparison with the previous sectionsin every phase (Figure 4).The findings show that although an intensive pre-season training on physical factors (injuries, bone, skin, muscle and joint), by Korean and Iranian trainers from the sixth to twelfth week can be effective in reducing or increasing the injuries, there is not a meaningful difference between the effects of Iranian and Korean coaches in the incidence of injuries (Figure 2).Table 1: the result of Chi-Square test to investigate the significant difference between the effect of a period of intensive pre-season exercise among two groups with Iranian and Korean couches in junior female taekwondo players from 6th to 12th weeks.

DISCUSSION

The results showed that young people have allocated the highest proportion of injuries in the second phase of practice, about all kinds of injuries in various organs.Other researchers such as Zamani(2009) (10), Rahnama et al (2008) (8), Kazemian (2003) (16), Hatzimanouil et al (2008)(38), Nichols et al (2007)(45), Zetou (2006)(52), Budgett et al (2000) (30), confirmed the results.Nobahar (2010) and Narenjchi Shotorbani(2009) declared overtraining, performing wrong techniques and old injuries are the most important reasons of injuries in the second phase(5,23).Whereas the amount of injuriesin the first and third stages is more than second phase,it is probably that the incidence of injuries decreasesby enhancing experience and records in the sports. The reason is likely the increasing Taekwondo players (especially teenagers) ability to move, performing well-time defenses and positioning in the right situation accompanied by hitting the rival. According to Brenner (2007) (28), overtraining and exerting pressure by parents to compete are the common factors that lead to injury in teenagers. Bone fractures in the upper and lower limbs respectively have the most portionsin youths and teenagers.These findings are confirmed by Narenjchi and Jafari (2011) (23), Shabani (2010) (11), Barani (2009) (1), Zamani (2008) (10), Shams (2005) (12), Mehrabani (2007) (22), Kazemi and Wiley Peter (2004) (39), Alonso (2007) (25), Jangeh (2006) (41).

But the results of Ghalibaf and Haghani (2011) (14), are not consistent with the present study. They argued that the amount of bone injuries especially in upper and lower limbsincludes a small portion. Injuries are in evitable in sports full of contacts, especially in taekwondo; therefore, hitting plays an effective role inthe incidence of injury in Taekwondo. The difference may be the result of the fact that the mentioned studies were done in competition, whereas the present research was performed in exercise. The results showed that the frequency of incidence of bone injuries and a number of injuries in face and head declined in Taekwondo players in the first and third phases but it boosted in the second phase. Ghalibaf and Haghani Sani (2011) (14), approved the findings, while Narenjchi and Jafari (2011) (23), and Gholipour and Bayat (2011) (15), described the lowest incidence of face and head injuries.Maybe the contrast between the two studies is associated with difference in the type of sports and subjects. Narnjchy and Jafari, Gholipour (2011) (23), examined sports injuries in Karateka and did not approve the results.It is likelydue to the different safety conditions and protective equipment fromTaekwondo, as well as diverse techniques for winning the points. Usually a fist blow (Zuki) is one of the leading strokes in head, face and body to achieve a point in Karate. Whereas in Taekwondo a fistblow (Memtong Jiroki) to head and face not only has no points but also causes athlete to be sent off (it should be mentioned that foot stroke to head and face involves a higher score in comparison to other part of the body).

It should be noted that each sport has its own injuries, but one of the benefits of Taekwondo is using protective equipments such as Hugo, hat, leg and forearm straps ... in competition and exercisewhich totally leads to reduce the amount of injuries.According to Javaheri (1999) (4), Taekwondo stands forth among all thetenin terms of low frequency of injuries. Teenagers showed a meaningful increase in the total amount of muscle injury. The highest frequency of muscle injuryis in the upper limbs (59), and lower limbs (58). The results of Shabani (2010) (11), Kazemeini (2008) (17), Shams (2005) (12), Rezvani (1996) (6), Ramezani (1993) (7), Zemper and Pieter (1994) (32), causing Arriaza(2009) (27), confirmed the findings of the present study. Arriaza(2009) (27), declared lack of fitness, inadequate warm-up, incorrect techniques, nature of sports, personality, anxiety, emotional reactions to trauma, fear, anger, and loss of control as the contributing causes of sports injuries. Shams (2005) (12), also suggested that the main causes of injuries are insufficient warm-up, fieldsurface and practice. Regarding the fact that the mentioned population exercises in national level and benefits enormously from the best facilities, the amount of injury which isresulted fromfield surface dramatically reduces. On the other hand, perhaps the type of questionnaire and the population are different from the questionnaire was distributed among the elite athletes in the present study. Kazemeini (2008) (17) expressed being struck by the opponent, counterhitting, get holding mitt in exercises, hitting the opponent andmittand inadequate fitnessas the most leading injury inflicting in muscle injury in Taekwondo. Vatkinet al (1996) (50), in a recent study concluded that 50% of injuries caused by overtraining in youths who consulted with sports medicine clinics; moreover,healing injuries fromexcessive use of body in teens, needsmore time than acute injuries. The amount of sports injuries is 50% in youths and 75% inteens in the first phase. The frequency of joint injuries decreased significantly in relation to the previous phase.

Marty Powell (1998) (44), Kazemeini (2010) (17), Soleet al (2011) (48), Swensonet al (2009) (49), Leon Trait's et al (2009) (51), Nichols et al (2007) (45), Grinkht (1995) (19), Emery (2005) (33), found similar results tothe present study. Performing an inaccurate technique and previous injuries are the most leading factors that bring about joint injuries; therefore, athletes who suffer from patellofemoral syndrome are more prone to Hamstring injury. Sole and colleagues (2011) (48), Swensonet al (2009) (49), Tavtis et al (2009) (51), notified that the previous injuries which are repetitive, are more dangerous than the new ones. Since the repetitive injuries may play a contributing role in athlete's health andthe future sport participation,injury prevention should be a priority. Also awareness of injury patterns can be targeted at preventive efforts. The Brenner (2007) (28), investigating the injuries in athlete teenagers concluded that the proportion ofathletes with previous injury is higher than those without a history of injury. Marty and Powell (1998) (44), commented that previous injuries are the most significant agent to next damage.Kazemeini (2008) (17), notedbeing struck by the opponent (40%) is the most common cause of joint injuries.After thatknocking the opponent, hitting the mattress, counter hitting, holding the mitt,inadequate fitness and warm-up are the important factors. Rahnama Bambaichi (2008) (8), announced the amount of injuriesresulted from non impactsports

is higher than injuries resulted from high impact sports, while Taekwondo which is a high impact one, leads to more injuries. Thus regarding to the importance of physical fitness and health to achieve success, the amount of coach's experience and their knowledge is of crucial significance to select the kind and intensity of exercise in various sports (Especially, in martial arts that the athlete should be able to control the rival). Intensive exercises not only do not heal athlete's physical injuries but also they may bring about overtraining and incidence of new injuries that consequently leads to prevent championship. As a result, identifying negative physical factors on the one hand and ability to control and balance them on the other hand, can have an enormous influence on improving athlete's performance and their success. Due to the results of the present study about rising the amount of injuries in experimental group by a Korean coach, it is recommended to benefit from a knowledgeable and experienced coach to guide female national Taekwondo team.

ACKNOWLEDGMENTS

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Table 1: The result of Chi-Square test to investigate the significant difference between the effect of a period of intensive pre-season exercise among two groups with Iranian and Korean couches in junior female taekwondo players from 6th to 12th weeks.

Significant	Degrees of freedom	Squared statistic	Type of injury
329/0	1	948/2	Bony
358/0	1	057/2	Cortical
116/0	1	304/2	muscular
367/0	1	003/2	Detailed
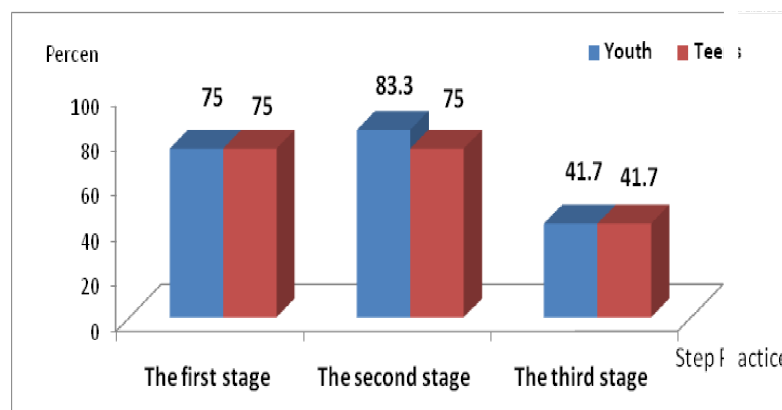
Figure 1. Comparison between the percentage of skeletal injury among teenage and youths taekwondo players.
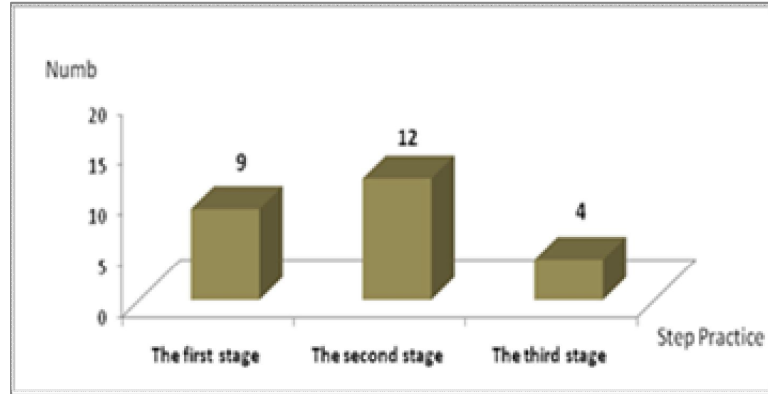
Figure2. The comparison between skeletal injuries over head and face of taekwondo players.
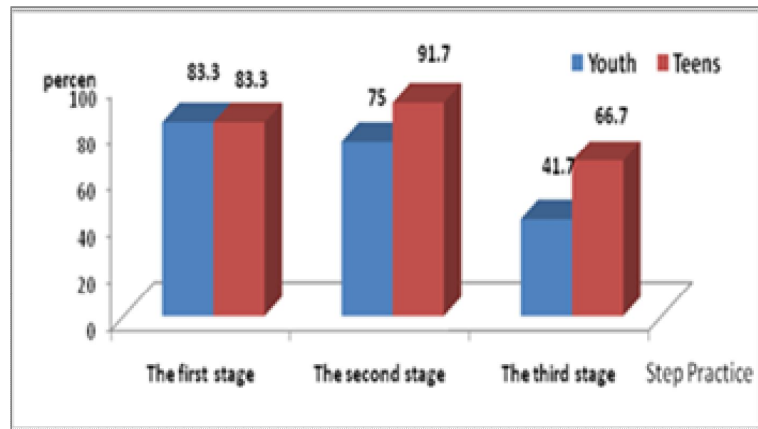
Figure3. The comparison between the percentage of muscular injuries among young and teenage taekwondo players.
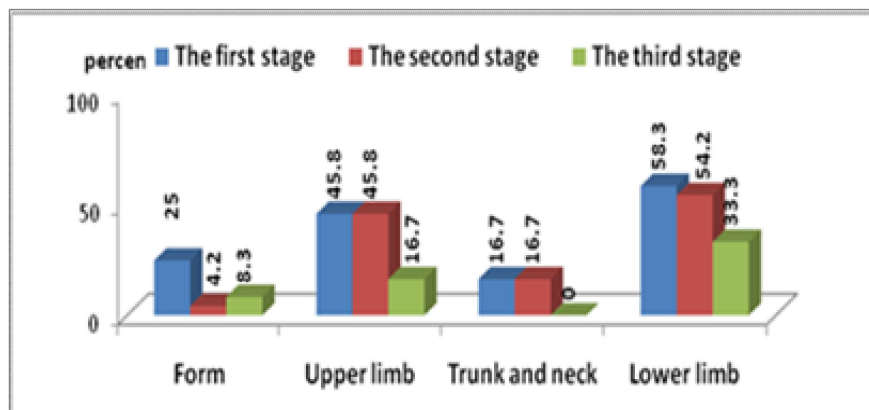
Figure4. The comparison between joint injuries in taekwondo player's limbs.

RESEARCH ARTICLE

Recurrent Damping Neural Controller based on HVDC Transmission System for Enhancing Dynamic Stability in a Power System

N.Taheri[1]*, H. Shakeri[2] and N. Azargun[2]

Department of Computer Engineering, Quchan Branch, Islamic Azad University, Quchan, Iran.
Sama Technical and Vocational Training College, Islamic Azad University, Yasooj Branch, Yasooj, Iran.

*Address for correspondence
N.Taheri
Department of Computer Engineering,
Quchan Branch, Islamic Azad University,
Quchan, Iran.
E.Mail: n.taheri.1362@gmail.com

ABSTRACT

This paper presents a novel linearized Phillips-Heffron model of a parallel AC/DC power system in order to studying power system stability. In addition, a supplementary damping online learning recurrent neural network controllers for VSC HVDC to damp low frequency oscillations in a weakly connected system is proposed. Multilayer recurrent neural network, which can be tuned for changing system conditions, is used in this paper for effectively damp the oscillations. Training is based on back propagation with adaptive training parameters. The effectiveness of the proposed controllers on damping low frequency oscillations is checked through eigenvalue analysis and non-linear time simulation under various disturbance conditions of over a wide range of loading.The presented control scheme not only performs damping oscillations but also the voltage and power flow control can be achieved. Simulation results obtained by MATLAB to verify the effectiveness of the VSC HVDC and its control strategy for enhancing dynamical stability.

Keywords: Power system dynamic stability, Suplementary Recurrent Neural Network Controller, VSC HVDC.

INTRODUCTION

The power oscillation phenomenon consists of synchronous generator rotors swinging relative to each other. Under severe disturbances the first swing may be considerably large and endanger the stability of the system. If the first swing is handled and reaches transient stability, there might still be a risk of losing synchronism due to low damping torque or voltage instability[1-3].

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As power demand grows rapidly and expansion in transmission and generation is restricted with the limited availability of resources and the strict environmental constraints, power systems are today much more loaded than before[3-6]. This causes the power systems to be operated near their stability limits. In addition, interconnection between remotely located power systems gives rise to low frequency oscillations in the range of 0.2–3.0 Hz. The power oscillation phenomenon consists of synchronous generator rotors swinging relative to each other[6-8]. Under severe disturbances the first swing may be considerably large and endanger the stability of the system. If the first swing is handled and reaches transient stability, there might still be a risk of losing synchronism due to low damping torque or voltage instability [8-10].

Power system stabilizers (PSSs) and flexible ac transmission systems (FACTS) also aid in maintaining power system stability and improving dynamic performance. However, PSSs may adversely affect voltage profile, may result in leading power factor, and may not be able to suppress oscillations resulting from severe disturbances [10-13]. FACTS controllers, such as Static Var Compensators (SVC), Thyristor Control Series Compensators (TCSC), Static Synchronous Compensators (STATCOM), and Unified Power Flow Controller (UPFC), can be applied to damping oscillations by adding a supplementary signal for main control loops. However, FACTS devices cannot participate in transmission power and are expensive for implementing [13-17].

Recently, voltage source converters based on high voltage direct current (VSC HVDC) systems have greatly increased. VSC HVDC transmission systems are utilized in power systems for several objects like interconnecting two neighboring systems which are using different frequencies, improving system transient and dynamical stability[16-19]. This interest results from practical characteristics and performance. It is well known that HVDC may improve the transient and dynamic performance of the interconnected AC/DC system due to its fast electronic control of power flow also transient stability of the AC systems in a composite AC-DC system can be improved by taking advantage of the fast controllability of HVDC converters [19-23]. Actually, VSC HVDC systems improve the transient and dynamic performance of the interconnected AC/DC system due to its fast electronic control of power flow and also the transient stability of the AC systems in a composite AC-DC system can be improved by taking advantage of the fast controllability of VSC HVDC converters[23-25].

In this paper a novel approach is presented to model parallel AC/DC power system namely Phillips-Heffron model based d-q algorithm in order to studying system dinamical stability. In addition, a block diagram representation is formed to analyze the system stability characteristics. By this modeling approach, it is possible to analyze the small-signal stability of the system and low-frequency oscillation phenomena which is caused by external disturbances such as variation of input torque and fault occurring.In order to enhance dynamical stability of power system, a supplementary signal obtaining by a recurrent neural controller is superimposed on the main input control signals in this paper. To measure the controllability of VSC HVDC supplementary controller by a given input (control signal), the singular value decomposition (SVD) is employed.

Configuration of Power System

Fig.1 shows a SMIB system equipped with a VSC HVDC. As it can be seen the infinite bus is supplied by HVAC parallel connected with an VSC HVDC power transmission system. The VSC HVDC consists of two coupling transformer, two three-phase IGBT based voltage source converters (VSCs). These two converters are connected either back-to-back or joined by a DC cable, depending on the application.

The AC side of each converter is connected to the line through a coupling transformer. The first voltage source converter behaves as a rectifier. It regulates the DC link voltage and maintains the magnitude of the voltage at the connected terminal. The second voltage source converter acts as a controlled voltage source, which controls power flow in VSC HVDC feeder. The four input control signals to the VSC HVDC are M_r, PH_r, M_i, PH_i where

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M_r, M_i are the amplitude modulation ratio and PH_r, PH_i are phase angle of the control signals of each VSC respectively. By applying Park's transformation and neglecting the resistance and transients of the coupling transformers, the VSC HVDC can be modeled:

$$\begin{bmatrix} V_{ld} \\ V_{lq} \end{bmatrix} = \begin{bmatrix} 0 & x_r \\ -x_r & 0 \end{bmatrix} \begin{bmatrix} I_{rd} \\ I_{lrq} \end{bmatrix} + \begin{bmatrix} \dfrac{M_r V_{dcr} \cos(\varphi_r)}{2} \\ \dfrac{M_r V_{dcr} \sin(\varphi_r)}{2} \end{bmatrix} \tag{1}$$

$$\begin{bmatrix} V_{bd} \\ V_{bq} \end{bmatrix} = \begin{bmatrix} 0 & x_i \\ -x_i & 0 \end{bmatrix} \begin{bmatrix} I_{id} \\ I_{iq} \end{bmatrix} + \begin{bmatrix} \dfrac{M_i V_{dci} \cos(\varphi_i)}{2} \\ \dfrac{M_i V_{dci} \sin(\varphi_i)}{2} \end{bmatrix} \tag{2}$$

$$C\overset{\bullet}{V}_{dc} = -(I_1 + I_2) \tag{3}$$

$$L_1 \frac{dI_1}{dt} = V_{dc} - V_{dcr} - R_1 I_1 \tag{4}$$

$$L_2 \frac{dI_2}{dt} = V_{dc} - V_{dci} - R_2 I_2 \tag{5}$$

Where V_l, V_b, I_r and I_i are the middle bus voltage, infinite bus voltage, flowed current to rectifier and inverter respectively. C And V_{dc} are the DC link capacitance and voltage, respectively. C_r, C_i, V_{dcr} and V_{dci} are the DC capacitances and voltages of rectifier and inverter respectively. The non-linear model of the SMIB system of Fig.1 is:

$$\overset{\bullet}{\delta} = \omega_b(\omega - 1) \tag{6}$$

$$\overset{\bullet}{\omega} = \frac{(P_m - P_e - D\omega)}{M} \tag{7}$$

$$\overset{\bullet}{E'_q} = \frac{(E_{fd} - (x_d - x'_d)I_t - E'_q)}{T'_{do}} \tag{8}$$

$$\overset{\bullet}{E_{fd}} = \frac{(K_A(V_{ref} - V_t + u_{PSS}) - E_{fd})}{T_A} \tag{9}$$

Where

$: P_e = V_{td}I_{td} + V_{tq}I_{tq}, V_t = \sqrt{V_{td}^2 + V_{tq}^2}, V_{td} = x_q I_{tq}, V_{tq} = E'_q - x'_d I_{td}, I_{td} = I_{ld} - I_{rd}, I_{tq} = I_{lq} - I_{rq}$ where P_m and P_e are the input and output power , respectively ; M and D the inertia constant and damping coefficient ,

respectively ; ω_b the synchronous speed ; δ and ω the rotor angle and speed, respectively ; $E_q^{'}, E_{fd}$ and V_t the generator internal, field and terminal voltages, respectively; $T_{do}^{'}$ the open circuit field time constant; $x_d, x_d^{'}$ and x_q the d-axis, d-axis transient reactance, and q-axis reactance, respectively; K_A and T_A the exciter gain and time constant, respectively; V_{ref} the reference voltage.

Also, from Fig.1 we have:

$$\bar{V}_t = jx_t \bar{I}_t + \bar{V}_l \tag{10}$$

$$\bar{V}_t = jx_t \bar{I}_t + jx_l \bar{I}_l + \bar{V}_b \tag{11}$$

$$\bar{I}_l = \bar{I}_t - \frac{\bar{V}_t - jx_t \bar{I}_t - \bar{V}_r}{jx_r} \tag{12}$$

Where $\bar{I}_t, \bar{V}_r, \bar{I}_l$ and $\bar{V}_b$ are the armature current, rectifier voltage, infinite bus current and voltage respectively. From eq (10)-(12) we can have:

$$I_{tq} = \frac{\dfrac{x_l}{x_r}\dfrac{M_r}{2}V_{dcr}\cos(\varphi_r) + V_b \sin(\delta)}{Zx_q + A} \tag{13}$$

$$I_{td} = \frac{ZE_q^{'} - \dfrac{x_l}{x_r}\dfrac{M_r}{2}V_{dcr}\sin(\varphi_r) - V_b \cos(\delta)}{Zx_d^{'} + A} \tag{14}$$

And For inverter side:

$$I_{id} = \frac{-V_b \cos(\delta) + \dfrac{M_i}{2}V_{dci}\sin(\varphi_i)}{x_i} \tag{15}$$

$$I_{iq} = \frac{V_b \sin(\delta) - \dfrac{M_i}{2}V_{dci}\cos(\varphi_i)}{x_i} \tag{16}$$

By linearizing eq (1)-(7), (13)-(16):

$$\dot{\Delta\delta} = \omega_b \Delta\omega \tag{17}$$

$$\dot{\Delta\omega} = \frac{(\Delta P_m - \Delta P_e - D\Delta\omega)}{M} \tag{18}$$

$$\dot{\Delta E_q^{'}} = \frac{(\Delta E_{fd} - (x_d - x_d^{'})\Delta I_{td} - \Delta E_q^{'})}{T_{do}^{'}} \tag{19}$$

$$\dot{\Delta E_{fd}} = \frac{(K_A(\Delta V_t + \Delta u_{PSS}) - \Delta E_{fd})}{T_A} \tag{20}$$

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Where:

$$\Delta V_t = K_5 \Delta \delta + K_6 \Delta E_q' + K_{vdcr} \Delta V_{dcr} + K_{vM_r} \Delta M_r + K_{v\varphi r} \Delta \varphi_r \tag{21}$$

$$\Delta P_e = K_1 \Delta \delta + K_2 \Delta E_q' + K_{pdcr} \Delta V_{dc} + K_{pMr} \Delta M_r + K_{p\varphi r} \Delta \varphi_r \tag{22}$$

$$\Delta E_q = K_3 \Delta E_q' + K_4 \Delta \delta + K_{q\varphi r} \Delta \varphi_r + K_{qMr} \Delta M_r + K_{qdcr} \Delta V_{dcr} \tag{23}$$

$$\Delta V_{dcr} = \frac{C_{31}}{C_r} \Delta \delta + \frac{C_{32}}{C_r} \Delta E_q' + \frac{C_{33}}{C_r} \Delta V_{dcr} + \frac{1}{C_r} \Delta I_1 + \frac{C_{34}}{C_r} \Delta M_r + \frac{C_{35}}{C_r} \Delta \varphi_r \tag{24}$$

Substitute eq(21)-(23) in (17)-(20) we can obtain the state variable of the power system installed with the VSC HVDC to be(state space model):

$$\dot{X} = AX + BU \tag{25}$$

And

$$X = [\Delta \delta, \Delta \omega, \Delta E_q', \Delta E_{fd}, \Delta V_{dcr}, \Delta_{I1}, \Delta V_{dc}, \Delta I_2, \Delta V_{dci}]^T$$

$$U = [\Delta M_r, \Delta \varphi_r, \Delta M_i, \Delta \varphi_i, u_{PSS}]^T$$

Where:

$$A = \begin{bmatrix} 0 & \omega b & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\dfrac{K_1}{M} & -\dfrac{D}{M} & -\dfrac{K_2}{M} & 0 & -\dfrac{K_{pdcr}}{M} & 0 & 0 & 0 & 0 \\ -\dfrac{K_4}{T_{do}'} & 0 & -\dfrac{K_3}{T_{do}'} & \dfrac{1}{T_{do}'} & -\dfrac{K_{qdcr}}{T_{do}'} & 0 & 0 & 0 & 0 \\ -\dfrac{K_A K_5}{T_A} & 0 & -\dfrac{K_A K_6}{T_A} & -\dfrac{1}{T_A} & -\dfrac{K_A K_{vdcr}}{T_A} & 0 & 0 & 0 & 0 \\ \dfrac{C_{31}}{C_r} & 0 & \dfrac{C_{32}}{C_r} & 0 & \dfrac{C_{33}}{C_r} & \dfrac{1}{C_r} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\dfrac{1}{L_1} & -\dfrac{R_1}{L_1} & \dfrac{1}{L_1} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\dfrac{1}{C} & 0 & -\dfrac{1}{C} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \dfrac{1}{L_2} & -\dfrac{R_2}{L_2} & -\dfrac{1}{L_2} \\ \dfrac{C_{27}}{C_i} & 0 & 0 & 0 & 0 & 0 & 0 & -\dfrac{1}{C_i} & \dfrac{C_{28}}{C_i} \end{bmatrix}$$

Where $\Delta M_i, \Delta M_r, \Delta \varphi_i, \Delta \varphi_r$ and u_{PSS} are the linearization of the input control signals of the VSC HVDC and PSS output respectively. The linearised dynamic model of eq (25) can be shown by Fig.2. In this figure $K_{pu}, K_{qu}, K_{vu}, K_r$ and K_i are defined below:

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$$K_{pu} = [K_{pMr}, K_{p\varphi r}, 0, 0, 0]$$

$$K_{qu} = [K_{qMr}, K_{q\varphi r}, 0, 0, 0]$$

$$K_{vu} = [K_{vMr}, K_{v\varphi r}, 0, 0, 0]$$

$$K_r = [\frac{C_{34}}{C_r}, \frac{C_{35}}{C_r}, 0, 0, 0]$$

$$K_i = [0, 0, \frac{C_{29}}{C_i}, \frac{C_{30}}{C_i}, 0]$$

It can be seen that the configuration of the Phillips-Heffron model is exactly the same as that installed with SVC, TCSC, TCPS, UPFC and STATCOM.Also from eq (25) it can be seen that there five choice of input control signals of the VSC HVDC to superimpose on the damping function of the VSC HVDC $\Delta M_i, \Delta M_r, \Delta \varphi_i, \Delta \varphi_r$ and u_{PSS}.therefore, in designing the damping controller of the VSC HVDC, besides setting its parameters, the selection of the input control signal of the VSC HVDC to superimpose on the damping function of the VSC HVDC is also important.

Controllability Measure

To measure the controllability of the EM mode by a given input (control signal), the singular value decomposition (SVD) is employed [26-27]. Mathematically, if G is an $m \times n$ complex matrix, then there exist unitary matrices U and V with dimensions of $m \times m$ and $n \times n$, respectively, such that:

$$G = U\Sigma V^H$$

Where

$$\Sigma = \begin{bmatrix} \Sigma_1 & 0 \\ 0 & 0 \end{bmatrix}, \Sigma_1 = diag(\sigma_1, ..., \sigma_r)$$

With $\sigma_1 \geq ... \geq \sigma_r \geq 0$ where $r = \min\{m, n\}$ and $\sigma_1, ..., \sigma_r$ are the singular values of G.

The minimum singular value σ_r represents the distance of the matrix G from all the matrices with a rank of $r - 1$. This property can be used to quantify modal controllability [14, 15]. The matrix H can be written as $H = [h_1 h_2 h_3 h_4]$ where h_i is a column vector corresponding to the ith input. The minimum singular value, σ_{min} of the matrix $[\lambda I - A, h_i]$ indicates the capability of the ith input to control the mode associated with the eigenvalue λ. Actually, the higher σ_{min}, the higher the controllability of this mode by the input considered. As such, the controllability of the EM mode can be examined with all inputs in order to identify the most effective one to control the mode[6].

Design of Damping Controller

The damping controllers are designed to produce an electrical torque in phase with the speed deviation. The four control parameters of the VSC HVDC (M_i, M_r, φ_i and φ_r) can be modulated in order to produce the damping torque. The speed deviation $\Delta\omega$ is considered as the input to the damping controllers.The structure of VSC HVDC based damping controller is shown in Fig.3. It consists of gain, signal washout and phase compensator blocks. The parameters of the damping controller are obtained using the phase compensation technique [6].

Design of Recurrent Neural Damping Controllers

Fig. 2 shows the proposed structure of damping recurrent neural network controller. The RNN structure shown in Fig. 2 includes a recurrent neural network, a training algorithm and a learning parameter updating algorithm. Objective of neural network is to reduce rotor speed deviation to zero. Therefore, $\Delta\omega$ is the primary input to all these blocks. Parameter updating algorithm calculates slope of rotor speed deviation i.e. $\Delta\omega$ and updates learning rate parameter. Training algorithm used in this paper is a well-known Back Propagation. Since the objective is to reduce rotor speed deviation to zero, this block requires current RNN output and $\Delta\omega$ to update the weights. After any step of online training, the output of controller is calculated this is used as supplementary signal. The training process is explained in the following.

The neural network structure is shown in Fig. 3. This is a multilayer structure with one input layer, one output layer and one hidden layer with nine neurons in the hidden layer. Neural network has six inputs. Three inputs are three previous RNN output fed back through unit delays. Remaining three inputs are derived from rotor speed using two unit delays. Two time delays are applied for rotor speed because a third order model is used, which has been shown to be sufficient for study of transient stability [21]. Thus the output of the neural network can be expressed as $z(t) = f(\Delta\omega(t), \Delta\omega(t-1), \Delta\omega(t-2), z(t-1), z(t-2), z(t-3))$. The gains K1, K2 are used to normalization of input and output of controller.

The aim of training is, reduce rotor speed deviation to zero, thus a cost function for training is given by:

$$J = \frac{1}{2}(\Delta\omega^d - \Delta\omega)2 \qquad (26)$$

Where $\Delta\omega$, the actual system output is the rotor speed and $\Delta\omega^d$, desired system output is the zero.

However, since the cost function deviation respect to neural network output, $\dfrac{\partial J}{\partial U}$ is needed to train and calculate the rotor speed respect to weight deviation for Back Propagation algorithm, $\dfrac{\partial J}{\partial U}$ is formed so that

$$\frac{\partial J}{\partial U} \cong \frac{\partial J}{\partial \Delta\omega}.sign(\frac{\partial \Delta\omega}{\partial \Delta U}) \qquad (27)$$

where since calculation of $\dfrac{\partial \Delta\omega}{\partial \Delta U}$ is difficult and require huge computations and data from complete power system, the function of $sign(\dfrac{\partial \Delta\omega}{\partial \Delta U})$ is applied instead of $\dfrac{\partial \Delta\omega}{\partial \Delta U}$. At each time step weight change is calculated using (27) in back propagation algorithm, and then weights are updated using (28)

$$\Delta W_{ij} \cong -\gamma \frac{\partial J}{\partial \Delta\omega} \frac{\partial U}{\partial W_{ij}} sign(\frac{\partial \Delta\omega}{\partial U}) \qquad (28)$$

$$\Delta W_{ij} \cong +\gamma \frac{\partial U}{\partial W_{ij}}(\Delta\omega^d - \Delta\omega)sign(\frac{\partial \Delta\omega}{\partial U})$$

In the online training process, a learning rate parameter c and a parameter r is updated for more adaptability of neural network controller at each time step by (30), that σ is a used parameter at activation function for any neuron of ANN.

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if (30)

$$\Delta\omega(k+1) < \Delta\omega(k)$$

$$\gamma(k+1) = \gamma(k) + a\Delta\omega$$

$$\sigma(k+1) = \sigma(k) + b\Delta\omega$$

else

$$\gamma(k+1) = \gamma(k)$$

$$\sigma(k+1) = \sigma(k)$$

where α , b are scale parameters for conversion of $\Delta\omega$ to change of parameters γ, σ . The overall training algorithm is as below:

(1) At each time step the ANN parameters (γ, σ) change is calculated and is updated.

(2) The training algorithm computes weight change, updates
the weights on neurons and then these new weights are used to compute the new RNN output.

Simulation Results

Power system information is given in appendix A. Constant coefficients in (25) are calcuated according informations who given in appendix B.

For given information ,poles of the VSC HVDC system are:

$$-17.0984 + 6.6503i, \ -17.0984 - 6.6503i, \ -0.1670 + 15.8881i, \ -0.1670 - 15.8881i$$

$$-0.0182 + 3.6842i, \ -0.0182 - 3.6842i, \ 0.7675 + 2.3900i, \ 0.7675 - 2.3900i, \ -1.4115$$

According above ,there are two poles with positive real part and power system is unstable.

Controllability measure

SVD is employed to measure the controllability of the electromechanical mode (EM) mode from each of the five inputs: $M_r, \varphi_r, M_i, \varphi_i, u_{PSS}$. The minimum singular value σ_{min} is estimated over a wide range of operating conditions. For SVD analysis, P_e ranges from 0.01 to 1.5 Pu and $Q_e = [-0.3, 0, 0.3]$. At each loading condition, the system model is linearized, the EM mode is identified, and the SVD-based controllability measure is implemented. For comparison purposes, the minimum singular value for all inputs at $Q_e = -0.4, 0.0$ and 0.4 Pu is shown in Fig.4, respectively. From these figures, the following can be noticed:

- EM mode controllability via is φ_r always higher than that of any other input.
- The capabilities of $\varphi_r, u_{PSS}, M_r, \varphi_i$ to control the EM mode is higher than that of M_i .
- All control signals have low EM mode controllability in low load condition except φ_r .

Testing proposed supplementary controllers

Recurrent damping neural controller and classical lead-lag compensator are used by VSC-HVDC system in different loading condition for linear and nonlinear power system. According results which are obtained from SVD analysis, it

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is obvious that best input for applying damping signal is φ_r. The supplementary controllers are designed according this input and also rotor speed deviation (in synchronous generator as output of system). Changing in mechanical power which is applied to rotor by turbine, can considered as a disturbance for power system. Since synchronous generators operate at synchronous speed, the speed deviation should be zero under normal operating conditions.

Linear system responses

To assess the effectiveness of the proposed stabilizers for linearized power system model, two different conditions are considered according Table.1. Rotor speed deviation and active power for suddenly change in mechanical input power ($\Delta P_m = 0.05$) is shown in Fig.7 and Fig.8. it is obvious that recurrent neural network has better performance toward classical lead-lag damping controller to damp oscillation in system.

Nonlinear system responses

A three-phase fault is the most severe disturbance in a power system and the simulation for nonlinear system is carried out by applying a symmetrical three-phase. This fault occurs at t=25s and cleared at t=25s+ (7/60). In case of a three-phase fault at the infinite bus terminal of the power system, the generator will not supply any power during the faulted condition. Also at t=50s another disturbance (mechanical input power changed about $\Delta P_m = 0.2\,pu$) is applied to the system. Moreover, the system may become unstable during the post-fault period due to the insufficient damping provided by the excitation system. Conventional power system stabilizers (CPSSs) are unable to provide adequate damping into the system. But the designed adaptive recurrent neural controller provides adequate damping to settle the rotor angle, speed deviation, and terminal voltage to their pre-fault values after the clearance of the fault (Fig.9.).

CONCLUSION

In this paper, a novel dynamic model based VSC HVDC is considered and a supplementary recurrent neural controller is designed for improve power system stability and oscillation damping. SVD has been employed to evaluate the EM mode controllability to the four VSC HVDC input. SVD illustrated that the EM mode has best controllability via the fire angle of rectifier. Simulation results carried by MATLAB, show the proposed strategy has fast dynamic response.

Appendix A

The test system parameters are (all in Pu):

Machine and Exciter:

$$x_d = 1, x_q = 0.6, x'_d = 0.3, D = 0, M = 8,$$
$$T'_{do} = 5.044, freq = 60, v_{ref} = 1, K_A = 120, T_A = 0.015$$

Transmission line and transformer reactance: $x_t = 0.1, x_l = 1, x_r = x_i = 0.15$

VSC HVDC: $V_{dcr} = 2, V_{dci} = 1.95, C_r = C_i = 2, L_1 = L_2 = 0.09, C = 0.09$

Appendix B

Coefficients are:

$$Z = 1 + \frac{x_l}{x_r}, A = x_t + x_l + \frac{x_t}{x_r}$$

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$$[A] = A + Zx'_d, [B] = A + Zx_q$$

$$C_1 = \frac{V_b \cos(\delta)}{[B]}, C_2 = -\frac{x_l M_r V_{dc} \sin(\varphi_r)}{2x_r [B]}$$

$$C_3 = \frac{x_l V_{dc} \cos(\varphi_r)}{2x_r [B]}, C_4 = \frac{x_l M_r \cos(\varphi_r)}{2x_r [B]}$$

$$C_5 = \frac{Z}{A}, C_6 = \frac{V_b \sin(\delta)}{[A]}$$

$$C_7 = -\frac{x_l M_r V_{dc} \cos(\varphi_r)}{2x_r [A]}, C8 = -\frac{x_l V_{dc} \sin(\varphi_r)}{2x_r [A]}$$

$$C_9 = -\frac{x_l M_r V_{dc} \cos(\varphi_r)}{2X_r [A]}, C_b = E'_q + (x_q - x'_d)$$

$$C_a = (x_q - x'_d) I_t, K_1 = C_b C_1 + C_a C_6$$

$$K_2 = I_t (1 + (x_q - x'_d) C_5), K_{pdcr} = C_b C_4 + C_a C_9$$

$$K_{pMr} = C_b C_3 + C_a C_8, \quad K_{pPHr} = C_b C_2 + C_a C_7$$

$$x_d - x'_d = J, K_3 = 1 + JC_5, K_4 = JC_6, K_{q\varphi r} = JC_7$$

$$K_{qMr} = JC_8, K_{qdcr} = JC_9, L = \frac{1}{V_t}, K_5 = L(V_{td} x_q C_1 - V_{tq} x'_d C_6)$$

$$K6 = LV_{tq} (1 - x'_d C_5), K_{Vdcr} = L(V_{td} x_q C_4 - V_{tq} x'_d C_9)$$

$$K_{VMr} = L(V_{td} x_q C_3 - V_{tq} x'_d C_8)$$

$$K_{V\varphi r} = L(V_{td} x_q C_2 - V_{tq} x'_d C_7), E = \frac{x'_d + x_t}{x_r}, F = \frac{x_q + x_t}{x_r}$$

$$C_{10} = EC_5 - \frac{1}{x_r}, C_{11} = EC_6, C_{12} = EC_7 - \frac{M_r}{2x_r} V_{dcr} \sin(\varphi_r)$$

$$C_{13} = \frac{1}{2x_r} M_r \cos(\varphi_r) + EC_8, C_{14} = \frac{1}{2x_r} \cos(\varphi_r) + EC_9$$

$$C_{15} = FC_1, C_{16} = \frac{1}{2x_r} V_{dcr} \sin(\varphi_r) + FC_2$$

$$C_{17} = -\frac{1}{2x_r} M_r \cos(\varphi_r) + FC_4$$

$$C_{18} = FC_3 - \frac{1}{2x_r} V_{dcr} \cos(\varphi_r), C_{19} = \frac{1}{x_i} V_{bd}$$

$$C_{20} = \frac{1}{2x_i} M_i \sin(\varphi_i), C_{21} = \frac{1}{2x_i} V_{dcr} \sin(\varphi_i)$$

$$C_{22} = \frac{1}{2x_i} M_i V_{dci} \cos(\varphi_i), C_{23} = \frac{1}{x_i} V_{bq}$$

$$C_{24} = -\frac{1}{2x_i} M_i \cos(\varphi_i), C_{25} = -\frac{1}{2x_i} V_{dci} \cos(\varphi_i)$$

$$C_{26} = \frac{1}{2x_i} V_{dci} \sin(\varphi_i)$$

$$f_1 = [0.5\cos(\varphi_i)I_{id} + 0.5\sin(\varphi_i)I_{iq}]$$

$$f_2 = -[-0.5\sin(\varphi_i)I_{id} + 0.5\cos(\varphi_i)I_{iq}]$$

$$f_3 = -0.5M_i \cos(\varphi_i), f_4 = -0.5M_i \sin(\varphi_i)$$

$$f_5 = -[0.5\cos(\varphi_r)I_{rd} + 0.5\sin(\varphi_i)I_{rq}]$$

$$f_6 = -[-0.5\sin(\varphi_i)I_{rd} + 0.5\cos(\varphi_i)I_{rq}]$$

$$f_7 = -0.5M_r \cos(\varphi_r), f_4 = -0.5M_r \sin(\varphi_r)$$

$$C_{27} = f_3 C_{19} + f_4 C_{23}, C_{28} = f_3 C_{20} + f_4 C_{24}$$

$$C_{29} = f_1 + f_3 C_{21} + f_4 C_{25}, C_{30} = f_2 + f_3 C_{22} + f_4 C_{26}$$

$$C_{31} = f_7 C_{11} + f_8 C_{15}, C_{32} = f_7 C_{10}$$

$$C_{33} = f_7 C_{14} + f_8 C_{17}$$

$$C_{34} = f_5 + f_7 C_{13} + f_8 C_{18}, C_{35} = f_6 + f_7 C_{12} + f_8 C_{16}$$

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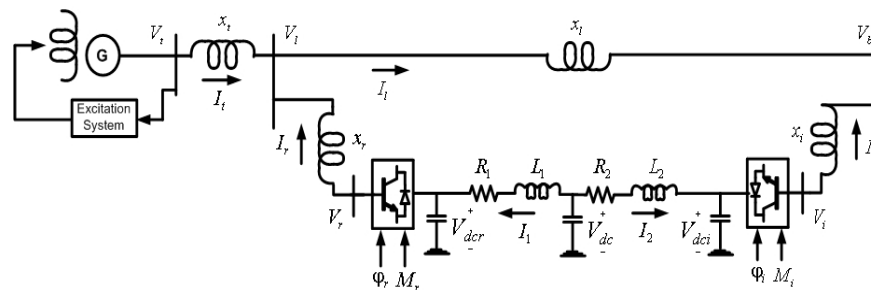
Fig.1. SMIB system equipped with a VSC HVDC
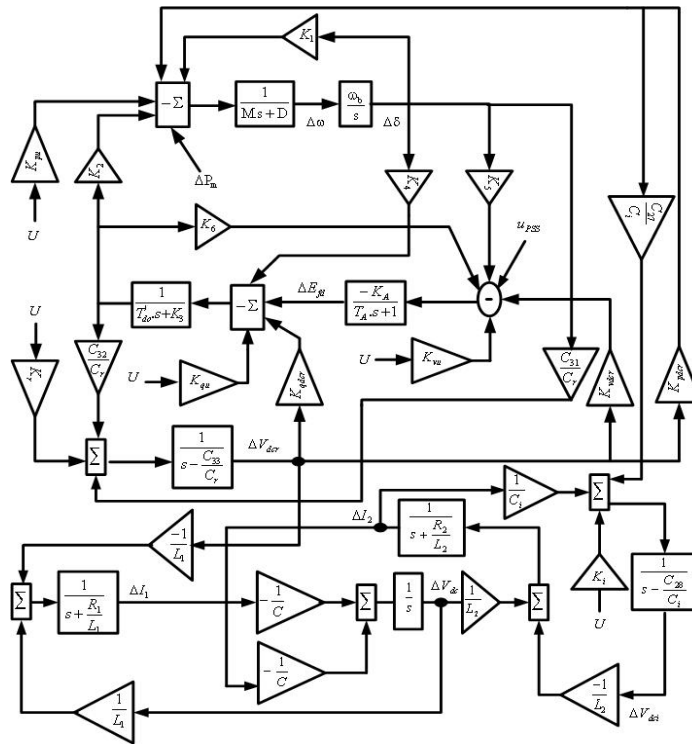
Fig.2 VSC HVDC Block Diagram based eq(25)
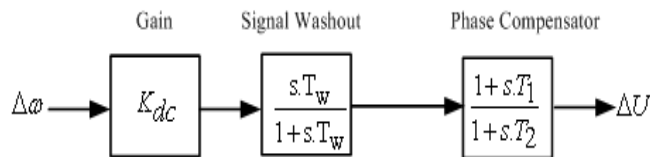
Fig.3. Structure of BtB VSC HVDC based damping controller
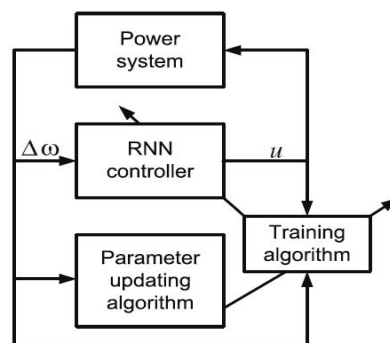
Fig.4 Proposed Recurrent Damping Controller based on VSC HVDC

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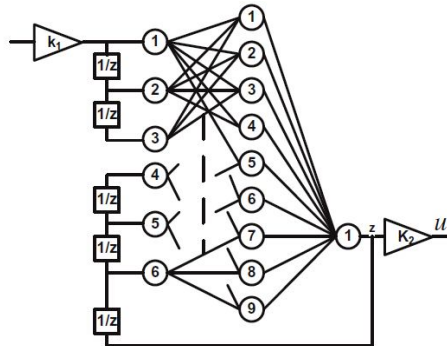
Fig.5 Block diagram of recurrent neural network controller.
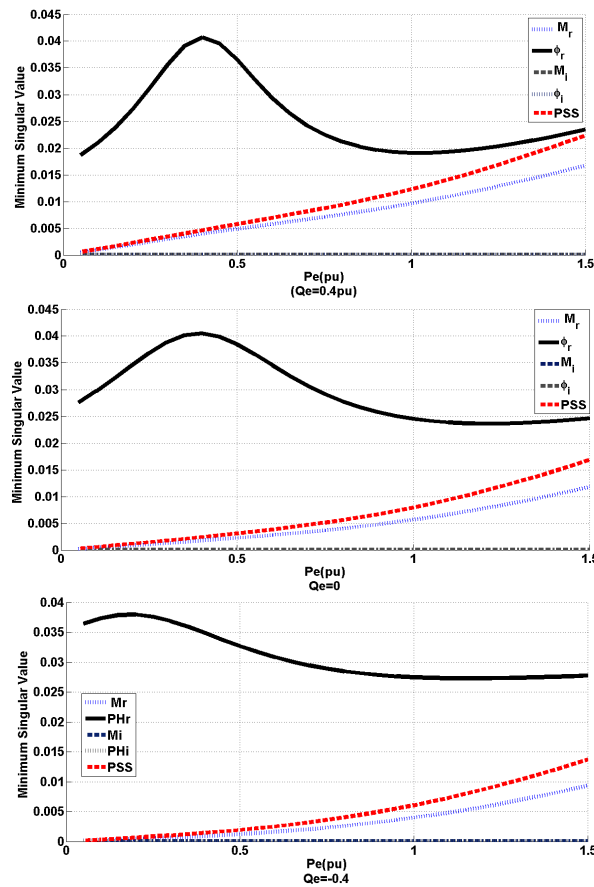
Fig.6. Minimum singular value for different value for Q_e

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(a)Several weights deviation   **(b)Rotor speed deviation**   **(c)Active power of generator**
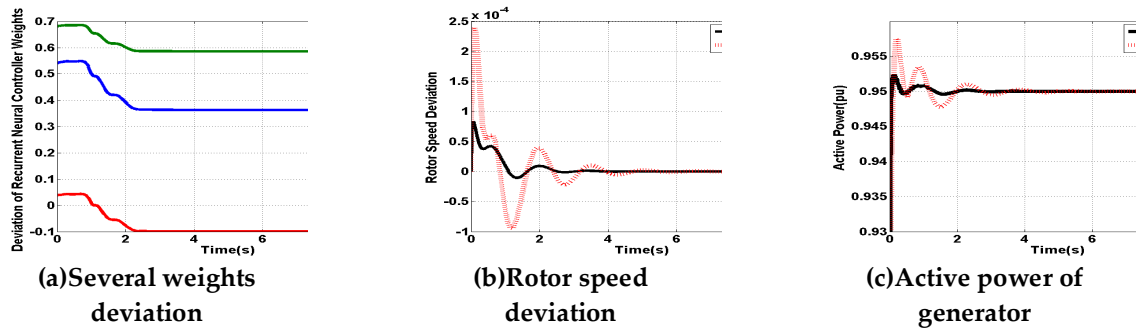
Fig.7 Results for nominal load condition

(a)Several weights deviation   **(b)Rotor speed deviation**   **(c)Active power of generator**
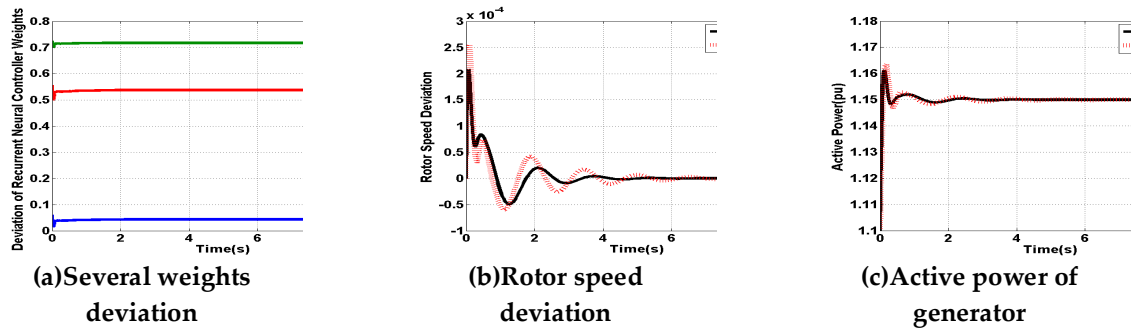
Fig.8 Results for heavy load condition

(a)Generator terminal voltage   **(b)Rotor speed deviation**   **(c)Active power of generator**
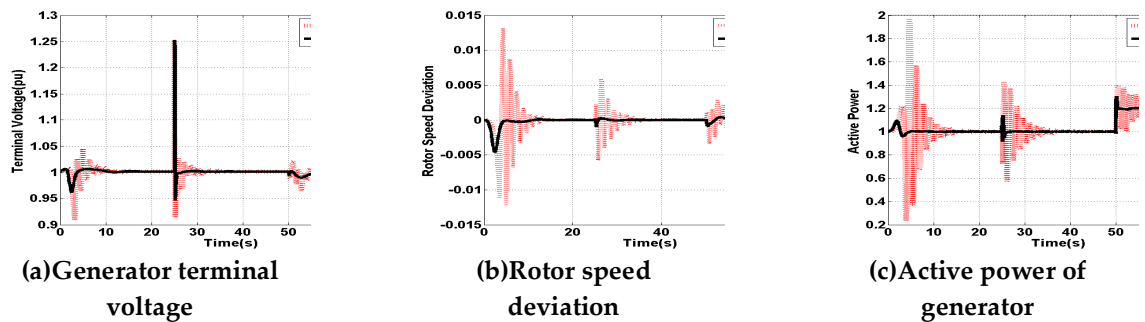
Fig.9 Results for nonlinear system

Table1 : Load condition

Loading	$P_e(pu)$	$Q_e(pu)$
Nominal	0.9	0.1
Heavy	1.1	0.3

RESEARCH ARTICLE

Obstacles to the Development and Use of Information Technology in Companies (Case study: Abnoos Palayesh Co. Tehran, Iran)

Mahdi Moudi* and Seyed Farshad Forghani[2]

Department of Industrial Engineering, College of Engineering, Zahedan Branch,Islamic Azad University, Zahedan, Iran.

*Address for correspondence
Mahdi Moudi
Department of Industrial Engineering,
College of Engineering,
Zahedan Branch,
Islamic Azad University, Zahedan, Iran.
E.Mail: mahdi.moudi1979@gmail.com.

ABSTRACT

In recent decades, modern information technology has a significant impact on the status and performance of many communities, organizations and individuals and Parallel to the tremendous advances have been made in this field, every day over the past the fate of communities, organizations and individuals are dependent on modern technology. Obviously, this situation has become increasingly important for understanding the impact of information technology. Considering these facts, it must be said that information technology is an important determinant of environmental that has a serious effect on the position, function and fate of communities, organizations and individuals. In this paper, the progress of information technology has been studied and analyzed in a company .The research method used in this paper is a descriptive survey that the questionnaire has been used to examine the Obstacles to the development and use of information technology in companies, Then paid to the analysis of data obtained from the clients and staff of Abnoos Palayesh CO. Tehran and inferential statistics were used to examine the research hypotheses of single-sample t test. Finally, some results have been obtained with this study.

Keywords: Information Technology, Information Technology Development, Abnoos Palayesh CO.

INTRODUCTION

The rapid change of environments and organization and technology create the complex competitive environment .such environment create a pressure and motivation of business for organization. The organization must be able to

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use this dynamic environment and could perform appropriate business to increase the use of opportunities and reduce the threats .They could use their abilities and capabilities .This motivation and pressures can be divided in three groups: Marketing motivation, social motivation and technology motivation .It is a kind of tools and solution that organizations are used to face these factors. An important characteristic of this technology in proportion to previous technology is the complex of mutual feature , universal , comprehensive , multichannel , … in the same time and in the same technology .All of technology have been exploited previously (like phone , TV , radio , satellite , fax) were excluded from two or more of these features .But information and communication technology that we call it communication industry revolution have all about the growth of IT in the world we could use the statistics.

Research goal and History

Obstacles to the development and use of information technology in Abnoos Palayesh CO.A research was carried out in England in the year 2000 examining challenges facing development of IT and the results were published in the government's website. This research categorizes main challenges as: Problems facing citizens. Challenges facing private sector, businesses and organizations. Issues related to governments providing services [4].In another research performed in the state of Texas in US, IT development problems were categorized in four groups including geographical problems, economical problems, language barriers and finally disabled difficulties to use IT [2].Tiamiyu studied some concepts related to IT in federal organizations in Nigeria; Such as main problems of effective use of IT in these organizations. The results showed costs of utilization of IT and equipment's constant need for repair are some key problems of utilization of IT[9].

Due to differences between Iranian society and the societies studied in those researches, we must study two countries with similar traditions and customs to Iranian society; For instance in a study performed in Indonesia negative factors affecting development of IT were found to be lack of the following necessary ingredients:Human resources specialized in IT, participation of different sectors, necessary investment on IT, having a standard system, coordination between governmental organizations and required foundation for IT [7].Heeks and his colleagues studied various cases in information systems in health domain [6], government reformation[5], and developing countries and concluded that success or failure of these systems depends on reality's design gap - reality or imagination- , in other words, success or failure of information systems depends on the gap between current realities and hypothesis. Heeks and his colleagues used this model in different areas and gave three ideal samples for this gap which leads to failure of information systems.

In addition to that, in a similar research in Thailand, the negative factors were found to be lack of awareness between citizens, staff and managers of governmental organizations, governmental and nongovernmental centers' limited budget, limiting laws, diversity of organizational systems and procedures, different types of information centers, problems of creating the required foundation for IT such as telephone lines, high rates of illiteracy, limited awareness in the field of IT, the need for large investments and cultural problems[1].

Research hypotheses

- Cultural and social obstacles are hindering the development of information technology in the enterprise.
- Technological and systematic obstacles are hindering the development of information technology in the enterprise.
- Financial obstacles are hindering the development of information technology in the enterprise.

METHODOLOGY

Research's method is one of main factors affecting the research and its results; it often depends on research's goal, subject type, implementation facilities of the research and modified hypotheses. Description type research is a series

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of methods which aim to describe conditions or phenomena being studied [8], and includes collecting information in order to test hypotheses or answer questions relevant to current condition of the subject being studied[3].In the present research, method of survey is descriptive and gauging. In these research library methods such as library discovery tools including books, essays, thesis and digital resources and none library methods like interviews with experts of this corporation and distribution and analysis of questionnaires were employed.

Statistical society of the research

Statistical society for this research includes all managers, personnel and clients of Abnoos Palayesh CO. The statistical sample includes all managers and personnel informed of implementation of IT in the organization and have enough knowledge regarding utilization of IT in Abnoos Palayesh CO. In addition to that, some customers and clients of Abnoos Palayesh CO were chosen for this research as samples.In order to choose statistical samples, due to high number of clients and customers, they were first interviewed and were asked whether or not they received services after implementation of IT in Abnoos Palayesh CO and if the answer was yes, then they received questionnaires.

Sample, volume and sampling method for the research

When collecting samples from a society, the method of sampling and its accuracy is of great importance because conclusion and results depends on the sampling method and its volume to a great extent, in other words the sample must be a good representative of the society so that results can be accurate and reliable.
In order to find sample's volume, best way is using Cochran's method. The statistical sample for this research is 245 people which can be divided into two categories as following:
It contains 200 clients and 45 people from company personnel.

Statistical tests

In this study, the research objectives for test the hypothesis is used T test Single group.
  ➤ hypothesis one test(*Cultural and social obstacles*)

H_0: Cultural and social obstacles are hindering the development of information technology in the enterprise.

H_1: Cultural and social obstacles are not hindering the development of information technology in the enterprise.

RESULTS

Analysis
Results of the test indicates since significance level of 0.000 is smaller than 0.05, we can conclude that median of this test has a significant difference with 3, high and low surface limit of gap are both positive and median is more than the test's sum. Therefore Cultural and social obstacles are not hindering the development of information technology in the enterprise.

  ➤ hypothesis two test(Technological and systematic obstacles)
  ➤ H_0: Technological and systematic obstacles are hindering the development of information technology in the enterprise.
  ➤ H_1: Technological and systematic obstacles are not hindering the development of information technology in the enterprise.

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Results of the test indicates since significance level of 0.000 is smaller than 0.05, we can conclude that median of this test has a significant difference with 3, high and low surface limit of gap are both negative and median is less than the test's sum. Therefore Technological and systematic obstacles are hindering the development of information technology in the enterprise.

- ➢ hypothesis three test**(Financial obstacles)**

    H_0: Financial obstacles are hindering the development of information technology in the enterprise.

    H_1: Financial obstacles are not hindering the development of information technology in the enterprise.

Results of the test indicates since significance level of 0.000 is smaller than 0.05, we can conclude that median of this test has a significant difference with 3, high and low surface limit of gap are both positive and median is more than the test's sum. Therefore Financial obstacles are not hindering the development of information technology in the enterprise.

CONCLUSION

This section examines findings for each hypotheses and recommends suggestions and resolutions for it:

- ➢ suggestions for findings of hypothesis one:
    1. Reduce individual's reluctance to change by raising awareness about advantages of IT in work procedures.
    2. Users of IT feel that utilization of IT decreases their job security and puts their jobs at risk. It is recommended that organization's managers create the appropriate culture in the company to reduce these negative feelings in company.
- ➢ Suggestions for findings of hypotheses two:
    1. Transfer non-central activities to outside of corporation which is called shrinkage.
    2. Planning personnel training and organizational knowledge quality improvement is recommended.
    3. Provide suitable hardware for completion of tasks especially software tasks for example providing latest online PCs to install new software.
    4. Separate organizational structure relevant to IT from duties and change it to process structure by business process reengineering.
    5. Identify problems before starting the IT project, so that problems of utilization and implementation of IT in the company can be scientifically and carefully studied and planned.
- ➢ Suggestions for findings of hypotheses three:
    1. Increase higher management's supervision on implementation of IT projects. Not only this will reduce errors and increase efficiency in long-term, but also it causes costs to go down.
    2. Reduce corporation's costs by preventing implementation of separate projects which are not in accordance with overall plans.

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Table.1.Results of hypothesis one test

Sum of test = 3						
Technical factors	Statistical sum of t	Freedom degree	Significance level	Subtraction of medians	Assurance Gap	
					Low extent	High extent
Hypothesis one	7.668	244	0.000	0.18433	0.1335	0.1989

Table.2. Results of hypothesis two test

Sum of test = 3						
Organizational factors	Statistical sum of t	Freedom degree	Significance level	Subtraction of medians	Assurance Gap	
					Low extent	High extent
Hypothesis two	-6.962	244	0.000	-0.19936	-0.1347	-0.1859

Table.3. Results of hypothesis three test

Sum of test = 3						
Organizational factors	Statistical sum of t	Freedom degree	Significance level	Subtraction of medians	Assurance Gap	
					High extent	Low extent
Hypothesis two	6.309	244	0.000	0.09871	0.0031	0.0572

Bio-prospecting, Bio-piracy, Legal Access Mechanism and Natural Resources of Madhya Pradesh,India.

Balram Singh Yadav *, Sanjay Srivastava and Shinogi K.C.

Institute Technology Management Unit, Indian Institute of Soil Science (ICAR),Bhopal 462038, India.

*Address for correspondence
Balram Singh Yadav
Institute Technology Management Unit,
Indian Institute of Soil Science (ICAR),
Bhopal 462038, India.
E.Mail: balram.bme@gmail.com

ABSTRACT

Bioprospecting is systematic, sustainable and authorized commercial use of biodiversity. The objective of this paper is to explore different bioprospecting aspects, factors and places of Madhya Pradesh region and investigate different possibilities of bioprospecting in these high bio-resources rich regions. The state with highest tribal population, has high traditional and indigenous knowledge with huge availability of bio-resources that are very important intellectual property right (IPR) in respect to both for knowledge holders and for government. These types of intellectual property rights are specified and defined with under current IPR related legal frame works, conventions like Convention of Biodiversity(CBD), international agreements like Trade Related Aspects of Intellectual Property (TRIPS) , Union for Protection of Plant Varieties (UPOV), national laws like Biodiversity Act 2002 (BDA), Protection of Plant Variety and Former Rights Act. 2001(PPVFR) and government authorities like National Biodiversity Authority (NBA), State Biodiversity Board (SBB) etc. So paper explores the possibilities of bioprospecting in Madhya Pradesh under these bio-resource access systems. Paper also focuses some well-known biopiracy cases found in country.

Keywords: Bio prospecting, Bio-piracy, Bio-resources, Biodiversity, Conversion of Biodiversity, Madhya Pradesh.

INTRODUCTION

Every living body has the rights to live in the world and ethically access the available natural resources available in this world. Natural resources are used in the form of food, medicine survival or defense for livings. But there is lot of

variability found in natural resources availability, some regions are rich and others poor. There exist strong ethical, moral and legal rights of the living bodies to use resources, where they are living and surviving from generation to generation. Sometimes knowledge holders /conservers themselves don't know the actual value of their knowledge. Hence, it become necessary to setup system so that every living body can use and enjoy bio resources available in this world and which would provide proper commercial benefits to the residents of that regions.

Developing countries are poor in infrastructure and technology, but in most of cases they are rich in bio-resources and traditional knowledge. Companies, groups and institutions of rich /developed counties always put eyes on developing country's bio-resources for fulfilling requirement of their citizens. Those countries use legal or sometime illegal measures to get the bio-resources or traditional knowledge from the place of their origin. Sometime developing country itself doesn't' have strength to use their bio-resource in their region. . It is possible that country may have very precious resources but it may not aware about it. Situations may occur when one country has huge bio-resource but does not have technology to convert them in proper use, making it exploitable to those who have strength but don't have bio resources. This difference can be minimized with proper international access mechanism of bio-resources so that bio resource holder country gets maximum benefits from their biodiversity with proper conservation and sustainability.

Biological diversity is the variability among living organisms and the ecosystems[1]. The accessing of bio-resource by human beings introduces two words bioprospecting and biopiracy. Bioprospecting entails the search and use for economically valuable genetic and biochemical resources from nature. Lately, exploration and research on indigenous knowledge related to the utilization and management of biological resources has also been included into the concept of bioprospecting.Bioprospecting, if well managed, can be advantageous, since it can generate income for developing countries, and at the same time it can provide incentives for the conservation of biological resources and biodiversity. In addition, it can lead to the development of new products, including new medicines. On the other hand, if not well managed, bioprospecting may create a number of problems, including environmental problems related to unauthorized or excessive exploitation, and social and economic problems related to unfair sharing of benefits or the total absence of benefit sharing- and disrespect for the rights, knowledge and dignity of local communities[2].

There are a number of possible uses of the bioprospecting which have high economic values like food and medicine. Some other commercial uses of plant and animal products like wool and fur for clothing and wood for building construction and fuel. Other plant and animal products used in a number of industries includes from feathers, glues, rubber, different oils, available waxes, starches and dyes. Cultural and aesthetic values are also associated with it. The species and plants available in particular area are their traditional symbols and heritage value as national symbols in the form of folklore and traditions of many cultures. Biodiversity also has educational and inspirational value[3]. Bioprospecting is the effective way for –developing countries for development and place them in front of competitive market of world. The high biodiversity rich country like India should refine their laws to make proper commercial use of their biodiversity regions with conservation of bio resources. These traditional knowledge and bio-resources are protected as an important intellectual property by government under the international agreements and standards of international trade. India's heart state, Madhya Pradesh is reach in biodiversity and full of opportunities to access the biodervisity [4].

Bio-piracy cases in India

Bio-piracy connotes any attempt to acquire proprietary rights over biological resources and its associated indigenous knowledge, or upon product(s) based on them, disregarding the consent and contribution of the holders of such resources and knowledge. Biopiracy also includes accessing the bio-resource by companies without paying proper taxes to government. The biopiracy definition not only stop at the access of bio-resource but also from stealing traditional knowledge , design, folklore, music, dress-design, or any art generated from the tribal.

Indigenous knowledge has been used particularly to facilitate bioprospecting mainly in the field of pharmaceuticals and agriculture. Research-based industries have found it profitable to screen natural resources such as marine waters insects, tropical plants, animals, soils and other species in developing countries. In recent times, the cost of drug development has become astronomical. The pharmacy industry is looking increasingly at medicines and products that have been developed by local communities in older cultures like India, Africa and China where the centuries-old traditions of indigenous healing are still viable and in use. These healing practices and cures are rich hunting grounds for bio pirates. Today, one-fourth of all known medicines are based upon or derived from plants and about three-fourths of these have the same or similar use as identified by the native cultures in their healing practices[5].

The grant of illegitimate patents on products derived from indigenous knowledge would have serious implications on indigenous systems of medicine. A patent grant on any indigenous knowledge would lead to the loss of opportunity for the practitioners of that indigenous knowledge to further develop and commercially exploit the knowledge of the healing properties of indigenous knowledge products. Any further research and development on the healing property of indigenous knowledge products would entail high royalty payments to the patent holder. There are a number of cases where wrong patent is obtained by stealing tradition knowledge.

The Turmeric Patent

The US Patent[6] 5401504 was granted by United State patent office (USPTO) for turmeric to healing wounds. The Council of Scientific and Industrial Research (CSIR) requested the US Patent and Trademark Office to re-examine the patents arguing that turmeric has been used for thousands of yearsforhealingwounds and rashes and therefore its medicinal use was not novel with taking evidence of ancient Sanskrit text and a paper published in 1953 in the Journal of Indian Medical Association[7]. It has taken a long time and very high cost to cancel that patents and proving it back to their right owner[5].

The Neem Patent

European Patent [8] 0436257 titled "method for controlling fungi on plants byte aid of a hydrophobic extracted Neem oil" is granted in 1994. Neem (Azadirachtaindica) is a tree found in India and in the other parts of South and South-east Asia. It is now planted across the tropics because of its properties as a natural medicine, pesticide and fertilizer. A group of international NGOs and representatives of Indian farmers submitted a legal opposition against the patent in 1995. They submitted evidence that the fungicidal effect of extracts of Neem seeds has been known and used for centuries in Indian agriculture to protect crops, and thus, the invention claimed was not novel. The patent was revoked by the European patent office in 2000[5].

Basmati

RiceTecInc, got the Patent (Patent number[9] 5663484) on Basmati rice lines in 1997 with the name Texmati. Government of India has challenged three of the 20 claims of the patents. There was enough evidence on record to challenge three claims. The challenges were made for only some basmati characteristics like starch index, aroma and grain dimension which claimed in those three claims, while novelty of that patent was not challenged. On August 14, 2001, the final decision was handed down changing the title of the invention from Basmati Rice and Grains to Rice Lines Bas 867, RT 117 and RT 121[10].

Atta Chakkis

US Patent [11] 6098905 is published on 2000 to Nebraska-based Company, ConAgra for a method for producing an Atta flour, which is typically used to produce Asian breads such as *chapatti* and *roti*. Hundreds of wheat exporters

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may fall into the trap. It can easily see in that patent that claims made by ConAgra is not have novel innovation in the plant or machinery needed for processing flour, but on the very traditional method for producing Atta. Indians are using the same process from millions of year in wide scales from a number of food cultures and finally it was revoked.

Seed Bio piracy

The patent obtained by developing country in the form of genetically modified and high yielding variety seeds variety became dangerous for the poor farmer of India. Farmers who are practicing their own traditional seeds faced the problem to pay the royalties for his same modified seeds. It can be understand by the one example of Monsanto who developed cotton seed variety as Bt Cotton in 1995. It was claimed that yield output would increaseand improve cotton farmer crop yields returns. With some data company got approval from Indian government. But when a research organization conducted a survey then found it was discovered that in reality bollworm pests attacked Bt crop far more often than compared to simple hybrid and organic cotton crops and found claimed yield production was also wrong [12]. These type of genetically modified drug have also problem of harm to the environment and can affect the biodiversity balance of region [5].

Some other cases of Bio piracy

The developed countries like USA had granted a number of patents which violate India's intellectual property of indigenous knowledge. The formula of syzygiumcumini (popularly known as Jamun), Momordicacharantia (known as bitter gourd bitter melon or *Karela*), Solanummelongena or eggplant (Brinjal) and Gymnemasylvestre (Gurmar) is granted as US patent[13] (US Patent number 5900240). The Brinjal is also one case in which United States based Monsanto following murky allegations of its attempts to "steal" nine indigenous Brinjal varieties and genetically modify them.[14]. Monsanto was assigned a patent[15] (EP 0445929B1) on Indian variety of wheat "Nap Hal" under the simple title "plants" on January 2004. Research Foundation for Science Technology and Ecology along with Greenpeace and Bharat Krishak Samar filed a petition challenging the patent rights. The patent was resultantly revoked in October 2004. Monsanto's worldwide patent application[16] (WO 0018963) for Soybean variety was published on April 2000, to gain control over whole families of soya. European Patent Office granted Patent[17]EP744888 (Corn grains and products with improved oil composition) in the year 2000 to DuPont. It covers all varieties of maize containing more than a certain amount of oil and oleic acid. If the patent was upheld in its present form it would mean DuPont would have a monopoly on a whole range of maize varieties. As a result the European Patent was revoked in total, because it lacked invention.[18] These are some of the cases but the list of biopiracy is very vast. Some of them listed in TKDL website, in which some patents are withdrawn/cancelled/revoked or some claims of those patents are rejected after the long fight against these cases[19].

Madhya Pradesh Biodiversity Regions

Madhya Pradesh is the second largest state of India with largest area cover under forest (about 28% of area of the state).It has vast natural resources, rich agricultural-cultural-social biodiversity, huge Phyto-Faunal -Aquatic Biodiversity and sound traditional knowledge. It is situated at the cross junction of the two hot spots of biodiversity i.e. the Eastern Himalayas and the Western Ghats. It has tropical climate and varied topography support rich biodiversity. Panchvati, Amarkantak and Panna are the three biosphere reserves, 10 National parks and about 25 Life sanctuaries located in Madhya Pradesh. It has contained more than 5000 plant species including 1000 medicinal plants, 500 bird species and 180 fish species. Tribal with highest population in India, are engaged in application& practices of value addition to agricultural and forest produce. They are rich in traditional knowledge and indigenous practices, by the reason of surviving for life, to spend from generations to generations.[4]some of the good examples

of biodiversity as thousands of rice cultivars including local varieties like chino, vishnubhog, kalimoonch are found here.

The distribution of the forest of state is shown in Figure 1. From the total area of state,   11.69 % open, 11.36 modulate dense 2.16 % very dense and 2.08 % scrub forest are present in the state. A big part of state forest is unspecified and not in any focus of government for prospecting[22]. Madhya Pradesh has good river systems with the rivers of Chambal, Betwa, Sindh, Narmada, Tapti, Mahanadi, Indravati, Kanhan, Ken, Pench, and Penganga.Around one third of the state's area is occupied with tropical forests lying with the river Chambal in the north and Godavari river in **the** south. The hilly areas include the Vindhya and Sapura ranges inhabited by the tribal mainly Bhils, Korkus and Gonds. The major forest distribution in the Madhya Pradesh has shown in the Figure 1(b). Madhya Pradesh forests three main kinds of forests are sal, teak and miscellaneous forests. These forests have varieties of flora and fauna[23].

Bio-resources Types

The application of the bio-resource might know by residents of that area, or not known by them but known by the company or organization who seek to explore that resources. Sometime use are not in picture with both residents or seeking company, so some research inputs can put by the company to take out applicability of that resource. If the applicability is obvious like non timber forest, then biopropecting can directly apply. Some of the important non timber forest bio-resources are listed in the Table 1. These bio-resources are applicable for high beneficial and big market industry.

Tribal of the Madhya Pradesh

Highest populated tribal state have rich diversity in their tribal communities, which are widen over in different parts of the state, and shows very different and interesting traditional cultural expressions, lifestyles, customs, religious belief and social- economic conditions [24]. The bio-resources are the part of their different agriculture practices, food, costumes, ornaments, handicrafts, handlooms and even in their religious activities, beliefs, music, songs etc. They have rich indigenous knowledge to use of their bio-resources. The main tribal groups in Madhya Pradesh are Gond, Bhil, Baiga, Korku, Bhariya, Halba, Kaul, Mariya, and Sahariya. Dhar, Jhabua and Mandla districts have more than 50 percent tribal population. In Khargone, Chhindwara, Seoni, Sidhi and Shahdol districts 30 to 50 percent population is of tribes. Maximum population is that of Gond tribes[25]. Different Tribal and their community conserved area are shown in the Figure 2 (b).

Research Activities

Vast research is conducted to identify natural herbal plants and procedures which are already in applications in the tribal communities of Madhya Pradesh by researchers and research organizers. In one research survey found that tribal of Rewa district are using 166 plant species of 69 families, among them, 72 were herbs, 44 were trees, 31 were shrubs and 19 were climbers [26]. The study in Chitrkoot inspected 28 species where 19 species for single disease, 3 for two diseases, 4 for three diseases and 2 for more than four diseases [27]. Those are mainly used as veterinary medicine and some are used in the treatment of human ailments. Surveys in tribal villages of four tribal pockets of Chhindwara and five tribal pockets of Betul districts records 77 medicinal plants being used by the traditional herbal healers (Vaidyas, Ojhas, Guniyas) have been documented from Chhindwara district which are utilized as paste, powder, juice, decoction and extract for the treatment of various diseases of local people of the area [28]. In Pachmarhi Biosphere Reserve, the study has documented a total of 128 ethno botanical species from 10 villages located in the buffer zone [29]. District Chhatarpur found Plants of different 22 families for dental and oral healthcare are found through a systematic research in the district [30]. Bheel and Bhilala tribes of Jhabua District used with 20 species belonging to 17 families in various ailments, such as mouth ulcer, constipation, headache, ringworm earache, jaundice, asthma, and snake bite etc [31]. The local people of Amarkantak used 20 taxa for different 24 diseases

including epilepsy, hypotenstion, sore throat, syphilis etc[32]. In another study conducted at tribal communities of Guna district record on 20 plant species belonging to 18 families, used by Bheel tribes for curing various ailments among human beings and animals[33].

Application of Mahua in different use in medicine and beverage by a number of communities of tribal are available[34]. Eight species of pteridophyes of traditions are obtained at Anuppur and Amarkantak.[35]The systematic review of different flora of state which are used for medical purpose are also indentified.[36] The most populated Bhil tribes of Ratlam district used ethomedicinal plants of 62 species belonging to 57 genera of 40 families for treatment of different diseases.[37]Some edible plants of tropical forest used by tribal are listed in another research with concentrating with forest resources of Baiga dominated forest areas of Dindori district [38].The tribal communities of the Kol, Gond and Mawari of Chitrakoot regions used 28 plants species belonging to 23 families for ethomedicinal are reported which used for different ailments and diseases like malarial fever, pneumonia, skin diseases, dysentery, bone fracture, jaundice, cough and cold and urinary disorders etc [39]. There are 63 species of medical plants which used for different 28 types of diseases are identified from the east Nimar region of state[40]. Another survey of Chitrakoot region in 20 village found 47 plant species, 45 genera and 31 families used in different ailments and disease [39].There are a number of agro-ecosystem related traditions knowledge found in practice are presented in one prior conducted research [41]. Two medical plants used as antibiotic[42] and medical plants used by tribal of Satna district for treatment of gastrointestinal disease and disorders are given in a research [43]. Enthrobotanical study of Vindhya region has given a number of tree species and their parts used in treatment of different disease [44].

Madhya Pradesh Biodiversity board is working well for search different bio-resources and identified value of same. One research project [45] they obtained 46 fish species in aquatic ecosystem of Rewa. In another project[46] at Barge hill area of Jabalpur 210 genera and 281 species are investigated. There are 286 plants which locally used by persons living in the Vindhyan eco-region are find out in a research report [47] Plant diversity of Chambal Region [48] and trends of inland water ecosystem [49] are investigated and identified. Documentation of different ethno medical used plants from tribal communities are also identified [50] The biodiversity of vultures in Kanha Park area is investigated [51]. The investigation at Halali Reservoir, Vidishareveal the occurrence of 29 fish species belonging to 7 orders, 10 families and 15 genera [52] Survey of Flora- diversity at Morena city is also found 21 species, 19 are native and remaining two species are found exotic[53].

Legal Framework for Bioprospecting

Access of any bio-resource and indigenous knowledge is done under proper legal frameworks. Access of biodiversity define as access of genetic and bio-resources to obtain samples of biological and/or genetic material from areas within national jurisdiction lies and it is used for any purposes like research, conservation, or any commercial industrial use. Another term 'Benefit Sharing 'which refers to equitable sharing of benefits with mutually agreed terms, which obtain from using or exploration of that bio-resource or genetic resources [25]. Illegal accessing can be practiced through individual contacts and without proper institutional procedure. Weak law enforcement is the main reason of high unauthorized accessing for high biodiversity countries. Benefits can be tangible or intangible, but it should be fairly shared among all the parties involved. Fees, royalties and profit sharing arrangement are tangible while strengthening of institutional capacity and joint publications are intangible.

The steps involved from access to benefit sharing are described in Figure 2. The applications are given to for public review by government, NGO or any other public body. Based on the Biodiversity committee and local knowledge holder suggestions and inputs it is decided that access is allowed or not. If access granted then benefit which get by proper utilization of that bio-resources are shared among government, local community, researcher and applicant. India has enacted Biological Diversity Act to fulfillment the rules and standards of Convention of biodiversity. The act has created a three tier institutional mechanism-National Biodiversity Authority at the apex based at Chennai,

State Biodiversity Boards in all the states and Biodiversity Management Committees at the level of all local bodies [54]. The BD Act 2002 stipulates norms for access to biological resources and traditional knowledge based on three ways-Accesses to biological resources and traditional knowledge to foreign citizens companies and NRIs based on prior approval of NBA Chennai. According to Section 7 of BD act, any Indian citizen or company can get access by concerned of State biodiversity board. Access and Benefit Sharing includes prior informed consent (PIC), mutually agreed terms and benefit sharing agreements through monetary and non-monetary means [25].

Prior Informed Consent (PIC) & Benefit Sharing

Prior informed consent is a set of administrative procedures for deciding on whether to grant access to bio-resources on define terms. PIC has to be required from the owners of the resources by access seeking body. Article 15, paragraph 5 of Convention of Biodiversity provide that access to bio-resource shall be subject to PIC of the contracting party providing such resources [25]. There must be consent of the relevant competent authority as well as the local community. There must be timings and deadline conditions of uses mechanism for consultation of relevant stake holders.

Benefit sharing is crucial part which is decided by a number of factors like type of access, conditions of access, access time-duration etc. It is decided with equality and fair share with considering points of long-term or near-term benefits, along with considering effects, loss or benefits of local bodies, governments and company. Mechanisms for benefit-sharing may vary depending upon the type of benefits and specific conditions in the country. The benefit sharing mechanism should be flexible as it should be determined by the partners involved in benefit sharing and will vary on a case-by-case basis [25]. Beneficial may include governmental, non-governmental or academic institutions, researcher involved, company and indigenous or local communities.

Convention of Biodiversity (CBD)

The objectives of the convention are conservation of biological diversity; sustainable use of its components and fair and equitable sharing of the benefits arising from the use of bioresearches. The CBD is the first comprehensive global agreement addressing all aspects relating to biodiversity [55]. This intercontinental protocol gave appearance to the novel proposal that the bioprospecting process could yield conservation and development benefits. Laws and other policy measures aimed at securing fair partnerships with researchers, companies and residents. These regulate access of genetic and bio-resources and standardize the sharing of benefits, as well as monetary benefits such as fees, royalties and 'milestone payments' made at key stages in the development process, in addition to the initial fees for samples or grants to cover research [1]. India is a member of CBD, so Madhya Pradesh state's biodiversity is managed under this convention.

TRIPS Agreement and Bioprospecting

Trade Related Aspects of Intellectual Property (1994) agreement outlines several important trade related aspects of intellectual property and its goal to have intellectual property protection that will contribute to technical innovation and the transfer of technology while enhancing social welfare. The agreement provides equal treatment for all trading partners in the WTO. TRIPS set minimum standards for signatory states for protection, enforcement and dispute settlement of intellectual property at national level and international level. They include civil, administrative and criminal procedures for provisional measures and special circumstances related to border measures and business criminal activities [56].

Article 27 of TRIPS which shows the excluding conditions of patentability includes that 'plants and animals other than micro-organisms and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes are not patentable." However, Members shall provide for the protection of

plant varieties either by patents or by an effective sui generis system or by any combination thereof [57]. India signed and modified its intellectual property system according to this agreement. Beside the CBD, TRIPS agreement sets as a multilateral trade agreement related to define standards to access bio-resources.

Biological Diversity Act (BDA Act.) 2002

The Biological Diversity Act 2002 laws have mainly three main objectives first one is the conservation of biodiversity, and second is sustainable use of biological resources and equity in sharing benefits from such use of resources. Recently occurred case in Madhya Pradesh where government order to corporate venture/ companies, corporate association or organization which are engaging in soybean oil extraction should pay the appropriate tax with respect to the effect of Section 7 and 57 Biodiversity Act, 2002. According to the provisions this Act, it becomes obligatory for all the soya bean oil extracting companies to register themselves with their State Biodiversity Boards and share two per cent of their income for environmental protection. Madhya Pradesh is the first Indian state to implement these kinds of provisions in consultation with Madhya Pradesh State Biodiversity Board for levying or sharing the profit [58]. In another case, M.P. State Biodiversity Board Issued all subsidiaries of Coal India Limited, stating that Section 2 (c) of BDA act stating coal as a biological resource because it is a fossil fuel formed when ancient plants get buried in the crust of the earth for millions of years and are converted into peat [59]. State biodiversity Board has also issued notices to other industry like sugar mill, textile mills, food processing, herbal/ cosmetic industries and all other forestry based industries. which are using state's biological resources such as crops as raw material [59].

National Biodiversity Authority (NBA)

The National Biodiversity Authority (NBA) is established by Biological Diversity Act. The NBA is a Statutory and Autonomous Body which performs as a regulatory and advisory function for the Government on different issues of conservative and sustainable use of biological resources and also for fair and equitable sharing of benefits arising out of the using of biological resources. BDA act implemented the mandate by providing system of NBA under the control of central government. It is solving body for issues relating to the conservation of biodiversity [60]. Madhya Pradesh State Biodiversity Board [61] located at Bhopal, but it is needed to enhance manpower and resources to handle this high biodiversity rich state.

Department of Biotechnology [62] **(DBT), Council of Scientific and Industrial Research** [63] **(CSIR) and Indian Council for Agriculture Research** [64] **(ICAR) Initiatives**

DBT, CSIR and ICAR have taken responsibilities to identification, conservation, and promotion of biodiversity by taking a number of measures, programmers, projects and policy implementation on their different specific scientific domain. It includes policy making, project proposing, ensuring sustainable and conservable use of biodiversity. They are trying to avoid cases like basmati Termer and Neem in the future with proper protection to tradition knowledge. But these research groups mainly concentrate on the cases which are conducted on national or international level, but small cases still do not come in lime light. And also less recognized regions like some part of Madhya Pradesh are still not on the focus of these groups.

Traditional Knowledge Digital Library (TKDL)

TKDL is a database containing codified literature from more than 2.97 laths formulations from the texts of traditional medicine systems like Ayurveda, Siddha or Unani.Theknowledgeof these areas is enormous and compiling with all available information. Digitalizing of these information is a big task [65]. TKDL is a maiden Indian effort and is a proprietary and original database. TKDL is available in English, Japanese, French, German and Spanish [55]. TKDL listed about 560 AYUSH[66] drugs that are later licensed [67] under the Indian systems of medicines for Madhya

Pradesh state. The Public biodiversity register (PBR)[68] should take as protective shield for the orally transferred knowledge of the tribal and unwritten indigenous knowledge.

Protection of Plant Varieties and Farmers Rights (PPVFR) Act.

The Protection of Plant Varieties and Farmers Rights Act. Provide rights to three concurrent right claimers- to breeders, to farmers and to researchers. When it comes to Farmers' Rights, the Act recognizes the farmer as cultivator, conserver and breeder. Article 39 of the Act provides nine rights to farmers which the most important in this regard are the right to seed and the right to compensation for crop failure. The provisions on the right to seed specify that farmers are entitled to save, use, sow, re-sow, exchange, share and sell farm produce, including seeds of varieties protected by plant breeders' rights. They are, however, not allowed to sell seeds of protected varieties as branded packages. All the same, this stands as the most liberal legislation to date in this sphere, allowing farmers all the customary rights they previously enjoyed. The Act seeks to protect farmers from exaggerated claims by seed companies regarding the performance of their registered varieties. The breeder is obliged to disclose to farmers the performance of the variety under given conditions. If the material fails to perform according to this information, farmers may claim compensation from the breeding company through the Authority set up to administer the Act [69]. Different indigenous plant varieties are grown and cultivated by the residents of state. The state breeders and farmers rights are protected under the PPVFR Act.

DISCUSSION

Social, economic and technological developments of the Madhya Pradesh are lagging from different other state of the country while it is very far ahead in the bio-resources. The sustainable commercial use of these bio-resources to solve different requirement like medical, food or living and can make a good position in financial development. 'Conservation of biodiversity' is the word, which most of time put break to reach a number of the bio-resources. To protect the identities and culture of any communities or tribal groups, we made a big loss to the other part of the earth-lives by making not available that bio-resource to others. In such cases some few tribal are using that resource while the resource available in the huge amount. Also, a number of old practices are also dying. For example, beside the Ayurveda or any written documents, medical values of different plants and species transfers from the person to the persons orally, it doesn't have any written proves. This Knowledge is going to collapse, if it is not protected. Bioprospecting has made way to protects, to commercially explore and to provide benefits not only to company but also to those entire associate with that, the knowledge holder community which are real owner of that intellectual property, the researcher who identified are conducted research to convert bio-resource to useable, and Government who is supervising and authorizing the access.

Government can promote biopropsecting by government-private partnership. It should happen with good control of biodiversity board. A good research firm to discover valuable bio-resource should be appointed. There should be center of bioprospecting be established at the rich biodiversity regions of state, who are responsible for proper control and promote bioprospecting in that regions District those economic conditions are very poor, which can be improve by establish a relation between the government and tribal. That can be possible with a good intermediate person or any Non-government organization or groups which have the belief of both parties.Access and benefit sharing legal framework under Biodiversity Act some time shows more complexities. Benefits sharing deciding are the crucial part of that procedure; it should remind that rights of tribal and firm should not be violated. Some tribes of state are totally not in the stream line of the world and presence or access of external groups can make a problem for them. Huge efforts has been put by the government through their organizations, laws, policies and councils to search, identify and list the traditional knowledge but more efforts are needed. There are also huge possibilities to mix up two, indigenous knowledge of different bio-resource and new technologies, to get something new innovative outcomes. Traditional knowledge can be made more effective busing latest technology and can be made more

applicable. More promotion to attract different investment capable groups, companies or institutions to invest in the state and takeout the money making bio resource is necessary to reach our country at good economic conditions. State Biodiversity Management Committees have taken good actions. People Biodiversity register is good innovative approach. Villages and tribal of state should make aware to register their biodiversity through PBR. State biodiversity information system has made the biodiversity to available to people. Enhancement of database of TKDL is necessary to cover more area and more rare bio-reources and traditional knowledge of a number of districts. Educational programmers for conservation and protection are good, but the steps taken to promote the bioprospecting are still not satisfactory.

CONCLUSION

Bioprospecting in state like Madhya Pradesh are demand for proper economic development and commercialization and development of that area, and transferring that discovery to other part of the country or world. State's different available bio-resource at different places, with different exploration research activities are collaborated in the paper. Madhya Pradesh biodiversity and prior conducted research to explore tradition knowledge of the tribe are listed. The bio-pirated from developed country always have eyes on the state's rich Intellectual property of indigenous knowledge and Bio-resources, as can be seen as number of latest biopiracy cases covered. Government initiatives under Convention of Biodiversity are good but not enough. The high availability of genetic resources, biological sources in particular regions, can be targeted by a number of unethical businesses of unauthorized persons/companies/ commercial venture without proper sustainable use, PIC and benefit sharing standard. So law should make more reliable for both, the Traditional Knowledge holder and the commercial venture to provide halt on such activities. So bioprospecting and bio piracy related different standards and administrative procedures under different conventions, laws and authority are described in the paper. It analyzed that strong and reformed law implementation needed for against bio pirate. Because there are a number of cases like neem, basmati, turmeric, etc are already occurred and there are a huge possibilities of this type of theft in Madhya Pradesh's bio-resource. Also it is necessary to strengthen the efforts of government for promoting bioprospecting.

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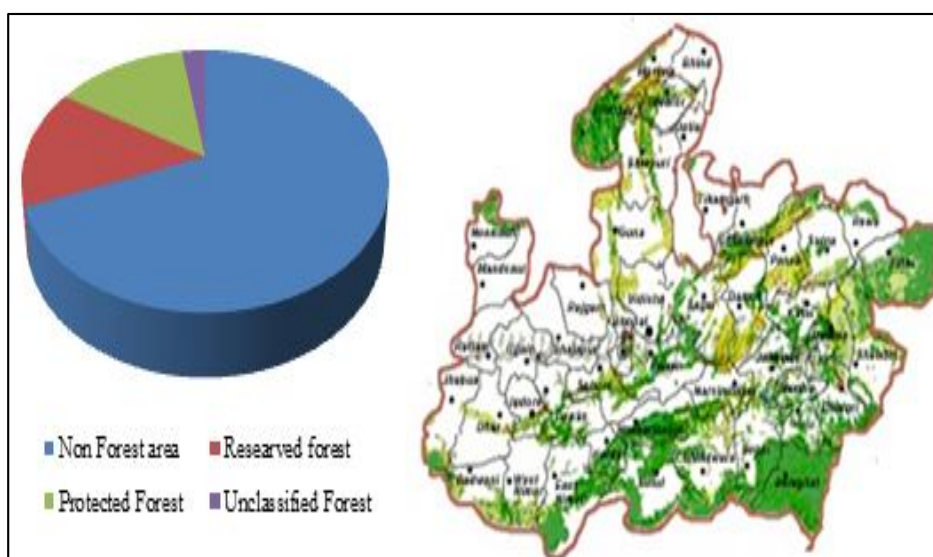
Fig.1 Forest distribution of state [20] (b) Forest Map[21]

Table 1. Industries and Possible Non-Timber Forest Bio-resources [20]

Industry Type	Bio-resources
Medicine	Aonla, Baheda, Kali musli, Safedmusli, Satavari, Shahad, Bahedachhal, Adusa, Gokharu, Ratanjot,Aswagandha, Marorphali, Sankhpushpin, Mahua,Belguda
Edible fruits	Aonla, Ghatbor, Shahad, Chironji,Mangoes, Jamun
Gum	Gonddhawra, Gondsalar, Gondkaraya, Gond babul, Gondkhakra, Gondgodal, Gondkhair,
Commercial	Mahua, Mom
Oil	Kanji, Ratanjot
Beverage	Mahuaphool
Soap	Areetha
Jewellery, sealing	Lac
Beedi making	Tendupatta
Fibre for ropes	Bark of khakra
Cocoons for tassar silk	Kosa/tassar

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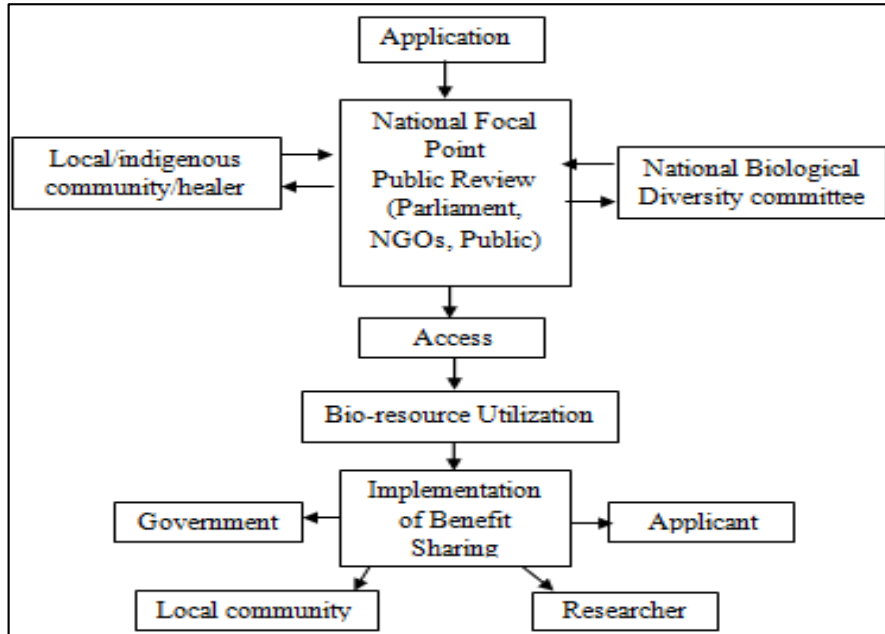
Fig. 2.Access and benefit sharing concept adapted from L. Wijayanti [25]

RESEARCH ARTICLE

Assessment of the Design Situation of Children' Play Space in Amusement Bash Ghardash'Prk of Bojnord City Emphasizing on Security & Peace Creation.

Mahadi Vatan Parast[1]*, Mohammad Motamadi[2] and Fahimeh Memaryani[2]

[1]Quchan Branch, Islamic Azad University, Quchan, Iran.
[2]Department of Geography,Shirvan Branch, Islamic Azad University Shirvan, Iran.

*Address for correspondence
Dr.Mahadi Vatan Parast
Quchan Branch,
Islamic Azad University,
Quchan, Iran.

ABSTRACT

The role of urban furniture in beautifying and delivering services to the city and parks is evident and it is considered as the essential and integral component of the city and parks. Urban furniture can contribute to create high quality spaces and is a tool to provide services to the citizens so it is necessary to organize the urban furniture. Park furniture is one of the most basic requirements to equip parks and it is the main element completingsuch spaces. Due to the multidimensional effects of these elements on park spaces on the one hand and clients' satisfaction on the other hand, it is important to pay attention to the issue of park furniture. The aim of this study is to investigate Besh Qardash amusement park furniture, Bojnoord emphasizing aesthetic elements. In this regard, in addition to the analysis of performance effects of park furniture on user satisfaction, a quality of park furniture is created and presented that will improve the performance of Besh Qardash amusement park, Bojnoord as a public recreational space. A combination of field research and analytical-descriptive method was used and SPSS software was used to analyze data. The results indicate that urban furniture of Besh Qardash Park suffers from a bad situation in terms of aesthetic elements. Studying different range of variables including color, shape and form of furniture, materials used safety, distribution and access in aesthetic part after field visits and analysis of questionnaires completed by users indicated that Besh Qardash park furniture doesn't have a good quality and haven't met the needs of citizens. According to the survey conducted, 57% of users (the majority of them) were dissatisfied of inappropriate materials and lack of safety of the furniture.

Keywords: urban furniture, Besh Qardash, Park, aesthetic elements, Bojnourd.

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INTRODUCTION

Unprecedented growth of urban population and urban development in the present century, have influenced the quality of life of citizens and since urban space is a place where people spend most of their time on it and have maximum relationships with each other, so it is important to arrange the space and provide required amenities and facilities in it.

Meanwhile the impact of green spaces on the quality of life of citizens is significant and one of the elements that can reinforce the effect is park furniture. Park furniture and green spaces are an integral part of urban furniture contributing landscaping and arrangement of green spaces and parks and give identity to them in addition to providing service. Urban space is a part of the urban texture to which public have access physically and visually and it is a context for human activity and social interaction (Pakzad, 2007:1). So there has been always a close relationship between human and his surrounding urban space. In the past decades, designing these spaces had little importance; however, today considering the intensity of urban activities, body components of modern cities aren't compatible with the speed of human movements and heavy pressure of urban life so public spaces and uses don't have required capacity and ability to respond to the needs of accelerated urban life (Zangiabadi et al., 2004:5). Public areas are the most important parts of cities and urban environments in which the most frequent contacts and interactions occur between humans. Such areas include all urban texture to which people access physically and visually (Amirfakhrian et al., 1391: 191). In fact public space is a type of urban spaces in which all citizens have right to be present without any control. Urban green spaces are one of such public spaces in cities. Today, a green space in cities is an integral part of the city and one of its main elements. In the past, the dominant role of green spaces was limited to beautify and landscape the built environment. However today, the function of these spaces in cities has shifted to far broader and more fundamental role (Razavi, 1381: 126).

Although Besh Qardash Park is considered as one of the most important and visited green spaces in North Khorasan province, its furniture (which is studied in this research) is not only inadequate, but also suffer from such problems as poor distribution, inappropriate location, lack of compliance with the required standards and thus safety rule, etc. Since this study is the first step in organizing Besh Qardash Park furniture and there has been no study performed on this topic, so there are certainly failures in the research including in review of literatures on Besh Qardash Park furniture. So this research as the first step have paved the way for other researchers and they can complement this research by introducing other effective indicators in the beautification and improvement of the performance of Besh Qardash park furniture to finally present an ideal park in terms of furniture. Therefore, in this study, urban furniture of Besh Qardash amusement park by aesthetic elements is discussed.

The importance and necessity of research

Urban furniture as dominant components in urban design as a part of the whole city defines urban identity and structure and in viewpoint of sustainable urban design, comfort of citizens is one of the main elements of design. Today designing urban equipment and furniture is so important that even leading architects in the field of industrial design are invited for the design and implementation of urban furniture and equipments. Thus, since urban furniture, especially in areas such as green spaces and parks are known as public areas and the context for social interactions, it not only beautifies and improves the quality of the environment, but also enhance the health and safety of the space (Sobhesahar, 1392: 3).Besh Qardash amusement park is considered as the largest amusement park in the province and due to its many capabilities if it is improved qualitatively and quantitatively, its beauty is reinforced followed by comfort of the citizens.

Review of domestic literature

Shohre Khodabakhsh (2003): in her paper, "urban furniture and citizens" refers to the fact that urban furniture consists of two basic functional and decorative components; if it has both of them, performance and visual needs of the citizens are met. These elements include but not limited to benches, trash, sculpture, lightning, etc. Ali Zangabadi and Nazanin Tabrizi (2004): in their study, "designing and planning urban furniture" refer to the fact that designing, planning and positioning furniture as one of essential elements of cities as correct as possible can largely transform urban spaces into meaningful spaces leading to an increased number of users. To this purpose, they grouped furniture in five categories (recreational-welfare, beautification, services, transport and communication, multi-purpose) and finally provided some designs.

Ahmad Saeednia (2004): In his book entitled "Designing urban spaces and furniture" addressed design requirements about flooring, lighting, fountains, etc. and referred to design principles of urban spaces for the disabled in the last chapter.Mehdi Amel Bafande (2010): In his thesis entitled "The performance of park furniture in the city of Mashhad" at the University of Isfahan, studied performance indicators of park furniture in three parks of Mellat Park, Koohsangi Park and Basij Park. In addition to the analysis of performance effects on users' satisfaction, he compared the performances of above-mentioned parks by performance indicators of park furniture.Khadije Mohammadi Savadkoohi and Azade Azimi (2010): in a paper, "spatial analysis of urban furniture" in Ghaem Park, Sari explained strengths and weakness of planning these elements within the area including failure to properly locate various elements of urban furniture, excessive density of different furniture, environmental perturbations caused by the uneven distribution of the elements.

Fukuhari (2002): in his paper,"design elements of the Cost-effectiveness of street scope improvement, landscape and urban planning" believe that in the first step of research (formulation of evaluation method and generalities related to the research) heuristic method should be used. According to the researcher, in the modern era citizens pay attention to a view of city that maintains its attractiveness with modern designs and warm colors and colorful neon signs with beautiful lighting at night; regardless of the fact that not observing design principles of urban furniture can have negative effects on the mind of the audience.

Bounds (2003): in the introduction of his book, "Olmsted park furniture standards", he noticed that "since the Seattle Municipal hired Olmsted brother sour parks have grown dramatically in terms of quality and extent (acre)". The standards based on which Olmstedt parks furniture was selected are: 1) considering historical character of the park, furniture that is in concert with the park's identity is used 2) Park furniture durability and resistance against climate of the zone 3) ease of repair, maintenance and replacement 4) Price of furniture 5) based on agreed standards with Seattle Park and Recreation Standards Committee.

vicurban (2008) : Vic urban as a representative office responsible for monitoring sustainable development in Australia published an article entitled "Urban design and street furniture manual" at Melbourne Docklands journal which is based on three main sections: 1) Objectives and principles of design: Description of urban design philosophy for Docklands 2) Application: how and where to apply these principles 3) technical and expert points: street furniture and its structural details for Docklands.Krauel (2010): in his book, "urban furniture selection", pointed that benches, lighting, bridges, fountains, etc. are among the elements that are considered by urban planners and designers for designing and equipping appropriately in order to enhance the quality of urban environment.

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METHODOLOGY

This study examines the role played by urban furniture in the performance improvement of Besh Qardash Parkas a public and recreational space and it is a kind of applied research designed according to field research and sampling from park furniture and a comprehensive plan to resolve the problems and confusion that we encounter today in most of public green spaces considering records and documents relating to the design of furniture for attracting visitors.

Data Collection

It is a combination of analytical, fieldwork and documentation methods. In this study, location of the main and aesthetic elements of furniture was specified in the field and the status of each was studied according to the criteria laid down in the research.

Data Collection Tools

Since Besh Qardash amusement park is used by both Bojnourd citizens and various visitors and travelers so total users is not known so the number of 100 questionnaires were distributed randomly among clients in different age groups.

Data Analysis Method

Analysis of the completed questionnaires was performed to write and discuss the results using SPSS and drawing graphs by Excel software.

Research Scope

Besh Qardash is located within six kilometers of southeast of Bojnoord that the access is provided by both path way and roadway.Roadway access is through Boujnourd-Esfarayen Road located in the western part of the complex. Of the road a network along the West- East perpendicular to the main road is branched leading to the parking lot near the plan grounds.Pathway access begins from the nearby town of Bojnoord and continues along the East to the West, which eventually leads to the complex. The road is known as Health Road to the public and passes on its way from surrounding villages and now is used as the main recreational pathway by public.Health Road is the old route of Besh Qardash beginning from Islamic Azad University and in the way passes from the villages of Ghale Aziz, Khdaqly, and Hassan Lu and from the side of villages of Allah Verdykhan and finally ends to Besh Qarsh. Due to beautiful scenery along the way, rehabilitation of the road as a pathway can have a great influence on Besh Qardash Complex (Part Consulting Engineers, 2011:50).

Research theories

1. Aesthetic elements of park
2. flowerpot and pot

In places where it is not possible to plant trees and shrubs directly in the ground, special planting box can be used. These boxes are also used to create a barrier mitigating the effects of slopes and tall walls (Saeednya, 1383: 38).
Generally flowerpots can be divided into three categories:
1. Temporary flowerpot: these flowerpots are used for creating landscapes, temporary sidewalk, traffic barriers, etc.

2. Fixed flowerpot: This either may be fixed in the desired place or may be made too heavy to be transported easily. This is used in different areas of permanent landscaping. Fixed flowerpot should as resistant as possible against environmental damages and does not need continuous care.
3. Movable Flowerpot: they are smaller and can be moved.

It is of note that when designing flowerpot, sharp edges and corners should be avoided. Acute angles (closed) in the form of a pot have no possibility of successful planting (Zangiabadi, 1383: 120).

Waterfront

Water has long played a vital role in human life and lakes and rivers have always attracted humans. In not so distant past when the man used water as one of the components of landscape architecture and urban design, its different effects excited and stimulated human tendency to beauty. Large swimming pools designed during Renaissance and the existence of *Hawz* in Islamic architecture show that beyond its significant role in the culture and civilization, water is rooted in the human psyche and soul. Nowadays water also affects architecture and design and its form of use has changed only slightly and is used in more and more exciting and different forms in the city (Adibi et al., 1384: 75).Urban Service Area of Mashhad Municipality defined waterfront as: " Artificial spaces that create a beautiful landscape with water and are existed as pond, waterfall, fountain etc. "(Vice President of Planning and Development of Mashhad Municipality, 1389: 2).

Statues and Monuments

Symbols and statues usually express artistic reflection of memories, people, events, ideas, etc. In some cases urban elements are dominant as cultural-social symbols with human aspects and in other cases they represent their designer thoughts (Zangiabadi, 1383: 65).Nowadays, those signs of a city are considered significant that can maintain its attractiveness and glares with innovative and modern designs, warm and deep colors and lighting at night regardless of what affects this urban sign designed can have on urban audience and residents minds. So urban signs are a very important issue in legibility of urban spaces and it is also considered as one of the aesthetic factors. Thus it is noteworthy that in addition to legibility and beauty, these factors cause to attract more people into public spaces (Bahmani Kazerooni, 1392: 174).

Now abovementioned elements are examined based on the following indicators:
- Color, shape and form of Furniture
- Materials and consumables of furniture
- Distribution, access and location
- Safety

RESULTS

1. Aesthetic elements in the Park
2. The aesthetic elements of the park by the indicators of color, form and shape of furniture.

As mentioned earlier, in places where it is not possible to plant trees and shrubs directly in the ground, special planting box can be used. In designing the form and shape of flowerpots in Besh Qardash Park, it was tried to avoid sharp edges and corners or acute angles which don't have favorable impact on successful cultivation of plants and use colors that maintain some coordination between them and the environment including flooring. So it can be said that the element has been partially successful in attracting users' attention. However, some of flowerpots aren't considered as aesthetic elements in the Park due to negligence and improper decoration.

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Regarding waterfront and statues found in the eastern phase of the park, it is observed that geometry of the main pond with about 60-70 cm height is irregular and the swimming pool for children has an almost regular shape. It should be noted that since the swimming pool is built in private gardens so it plays a role of waterfront in public parks and in some cases is used for playing and it is circle and regular as seen in the area studied. Statues in the park have a gold color and modern scheme and design, and there is good lighting around them.

There are two other waterfronts in the northern east of the park designed as staircase and good lightening especially at nights gives the park a special beauty.The aesthetic elements of the park by the indicator of materials and consumables.Given the importance of pots and flowerpots in creating a beautiful space in urban and suburban parks, it is important to make them with construction materials that have the ability to withstand against various environmental damages. Since the majority of pots and flowerpots in Besh Qardash Park are fixed and can't be moved, so cement having required resistance against environmental damages was used.As mentioned, there are four waterfronts in eastern and northern east phase of the park the flooring of which are covered with cement. The sides of two main pools and the swimming pool for adults with a height of 20 cm are covered with stone and cement. Two northern waterfronts designed staircase were made of a mixture of stone and cement. A statue and an element can add to the glory of the green space and especially waterfront. There are two elements used in the main pool and children's pool in Besh Qardash amusement Park made of metals and cement coated with gold cover. There is another statue in the eastern part of the park which has been built for the occasion of New Year and is made of metals. One of the main characteristics of the materials used in these elements is their resistance to adverse climates.

Aesthetic elements of the park by the indicator of distribution, access and location

Inherent characteristics of water such as splash of water mixing with light sources for lighting in the evening, reflection of sunlight on the water at daylight giving manifold manifestations, etc. are among factors which make the link of various forms of water (flat, pools, waterfalls, fountains, ponds and a stream of water) with green space inevitable and create memorable and relaxing space for visitors. On the other hand, water statute manifolds the display. According to observations, there are four waterfronts in the eastern and north eastern of the park, including a swimming pool for children, the main swimming pool where a metallic statue is located in the center and the only fountain of the park is located around it, one swimming pool for adults which is not used now. There are two waterfronts in the eastern north as staircase flowing from the top of the mountains around the main pool to the main pool with a water pump. These two waterfronts give special effects to the park with lighting and potting around.

Seven pots and flowerpots distributed around the park are mainly located around the central square and the east entrance. There are also 15in front of the main entrance of the park which is placed linearly. Flowerpots have legs and are fixed. Flowerpots are distributed evenly throughout the park mainly in the central and eastern parts. However, they can be used throughout the park for planting seasonal flowers increasing the potential beauty of the park. On the other hand, the beauty of the park can be contributed by planting different range of flowers in flowerpots (each area of the park has flower pots with specific flowers).

Aesthetic elements of the park by the indicator of safety

Generally, in public spaces especially parks the margins of waterfronts must be specified with fences for the sake of safety for users, especially children. In the area studied, ponds and swimming pools lack of required safety for consumers and it is necessary to consider some measures to enhance their safety. In addition, no special water disinfectant is employed for the swimming pool of children which endangers children's health. Apart from the swimming pools and ponds, other aesthetic elements (flowerpots, pots and statues) are not detrimental to the safety and welfare of the users.

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Questionnaire analysis

Gender

In terms of gender, 50% of respondents were male and 50% were female (Table 1 and Chart 1).

Education

According to the survey, 70% of people had higher education. Education level of respondents was between diploma and postgraduate degrees and the most of them had a bachelor's degree (Chart 2).

Description of indicators by aesthetic elements

Indicator: color, shape and form of furniture: Regarding the aesthetic elements of the park, color and form, 60% rated the form and color of the furniture as poor (Chart 3). Two elements of form and color affect differently on people perceiving urban furniture. Color is perceived more than form, texture and consumables so it has more effect. However, coherent movement of all the elements of a plan toward a harmony with the environment is important and necessary (Azimi, 1390: 9).Colors selected for urban furniture should be such that are eminent and prevent visual disturbance to be created. Urban furniture with soft colors in busy environments and lively colors in neutral environments creates diversity and vitality (Suri, 1390: 21). According to architects and urban planning experts, color is considered as one of the softening elements of an environment can lead to the identification and readability (Ebrahimi, 1393: 4). So considering the above mentioned, it can be said that paying attention to the issue of color and form in designing Besh Qardash park furniture is very important to be able to improve 60% dissatisfaction with the current situation.

Indicator: materials and consumables

Two elements of form and color affect differently on people perceiving urban furniture. Color is perceived more than form, texture and consumables so it has more effect. However, coherent movement of all the elements of a plan toward a harmony with the environment is important and necessary (Azimi, 1390: 9). Colors selected for urban furniture should be such that are eminent and prevent visual disturbance to be created. Urban furniture with soft colors in busy environments and lively colors in neutral environments creates diversity and vitality (Suri, 1390: 21). According to architects and urban planning experts, color is considered as one of the softening elements of an environment can lead to the identification and readability (Ebrahimi, 1393: 4). In connection with this indicator, two questions were introduced in the field of aesthetic criteria. Analysis of the results showed that 58% of users rated the quality of materials and consumables of aesthetic elements as fair (Chart 4) and 38% poor. Thus considering the importance of the quality of materials in citizen safety and stability of the aesthetic elements it is necessary to use high grade cost effective materials.

The results of studying aesthetic elements by the resistance of furniture to adverse climate indicate that 62% of users have evaluated the situation as fair (Chart 5). 32% of respondents were completely satisfied with the materials used and their resistance to weather adversity.

Indicator: distribution, access and location

Determining the mounting location appropriately leads urban furniture to be used better and not pollute the environment (Azimi, 1390: 11).

Positioning the furniture in urban areas correctly is very important and in fact is one of the fundamental factors ensuring the efficiency of the elements. Eventually, the most basic benefits of positioning furniture in urban areas can be summarized as follows:

a) Enhancing the efficiency of urban furniture
b) Increasing the number of users
c) Increasing public satisfaction
d) Reducing unpleasant natural effects
e) Greater stability and durability of furniture
f) Promoting the culture of benefiting from urban furniture (Zangiabadi, 1386: 49).

For this indicator, two questions on the aesthetic field were raised. Analysis of the results indicates dissatisfaction of 63% of respondents with access and distribution of different types of furniture for the aesthetic element (Chart 6).So the situation is rated poor. 65% of respondents rated the number of park furniture for the aesthetic element as fair (Chart 7). So the results obtained indicate dissatisfaction of respondents with distribution, access and number of park furniture that has created many problems for respondents and restricted better use of the whole park for citizens due to improper distribution of furniture.

Indicator: safety

Having a sense of security for users of urban furniture is one of the main provisions in designing these components (Qasemzadeh, 1390: 34). The single question raised for this indicator is in the field of aesthetic. The results (according to Chart 8) indicate that 81% of respondents rated the aesthetic element of furniture connections as poor. The results indicated that only 2% were satisfied with furniture connections and 12% rated it as fair. This shows dissatisfaction of people with furniture connections so the need to pay more attention to it is felt given to the high importance of furniture connections in safety and health of people.

Factors affecting consumers' dissatisfaction with the park furniture

The results indicate that 57% of respondents mentioned poor quality of materials and lack of safety of furniture as factors that influence dissatisfaction with the park furniture. In total, 22% and 7% of respondents mentioned poor access to furniture and not using modern furniture and inappropriate design as affective in this respect, respectively (Figure 9). So considering the results, paying attention to the needs of users in furniture efficiency in urban designing and planning is important and it is recommended to do a survey before designing.

CONCLUSION

The results obtained for the variables and indicators analyzed indicate that most of the sample population who have completed the questionnaire are highly educated (55% have a bachelor's degree) and young (18-30 years). In total, the criteria of access, distribution and location had average to low situation in the aesthetic field. Respondents' satisfaction with the quality of materials used in the park furniture is 58%, which is average to low. Examining the figures obtained from the resistance of furniture against adverse weather conditions indicates relative satisfaction of 62% of respondents. Lack of safety and poor quality of materials were the most important factors of respondents' dissatisfaction with 81%. Therefore, given to the results obtained, the factors of safety, distribution and materials used in the aesthetic field of Besh Qardash Park should be revised in order to obtain maximum satisfaction of visitors. The following recommendations are offered to improve the aesthetic elements.

1. Providing a fence around the park pools to ensure more safety for users
2. Installing a big clock a the main square of the park

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3. In order to more harmony it is recommended that flowerpots in the park to be made of wood
4. More elements embedded in the park to beautify the environment by employing shapes and materials compatible with the spaces within the park
5. Repairing and reconstructing worn furniture including dirty, pale and damaged ones which encompass all elements and furniture in the park whether functional or aesthetic.

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Table 1: Number and percent of respondents by gender.

Total		Female		Male		Gender and Number
Percent	Number	Percent	Number	Percent	Number	
100	100	50	50	50	50	Total
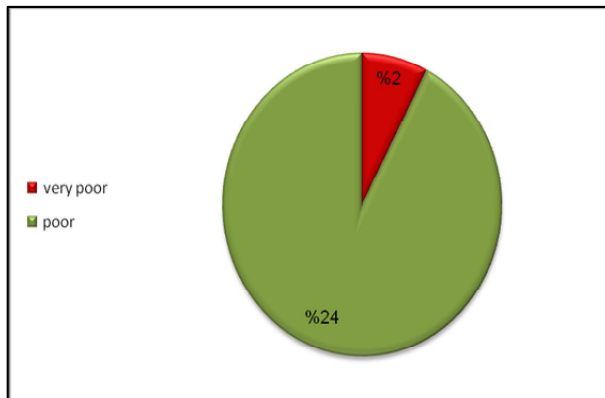
Chart 1: Gender of respondents to the questionnaire.
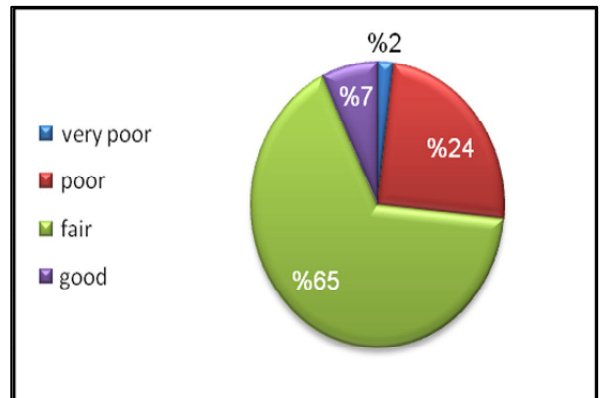
Chart 2: Education level of respondents.
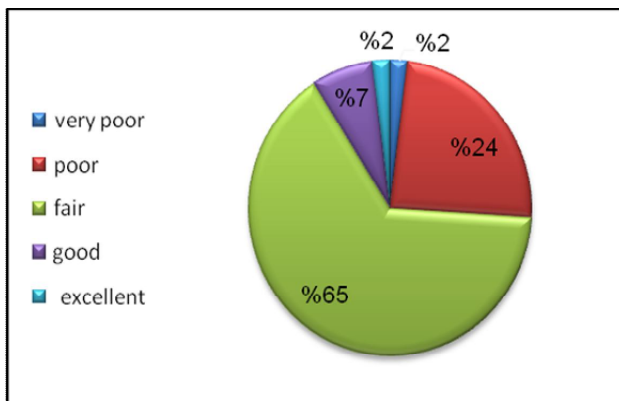
\Chart 3: Aesthetic elements of the park in
 terms of color, shape and form.
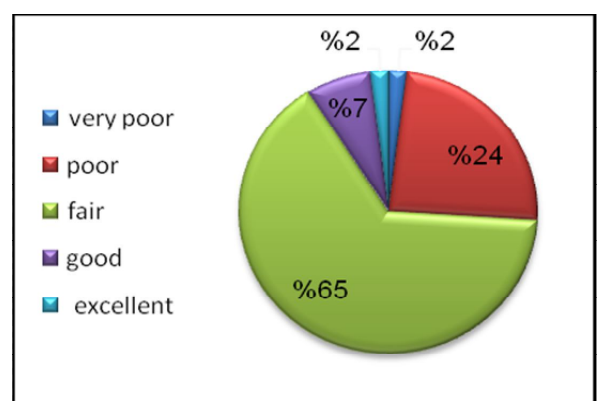
Chart 4: Aesthetic elements by material quality.
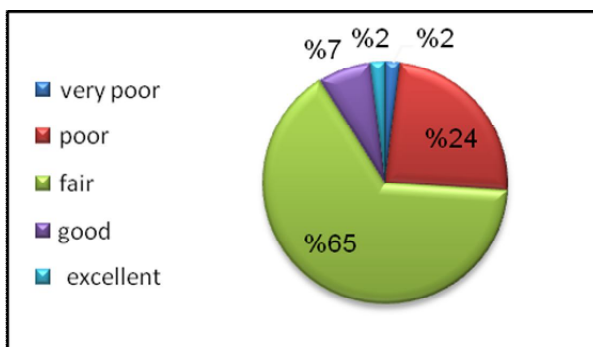
Chart5: Aesthetic elements by resistance of furniture to adverse climate.

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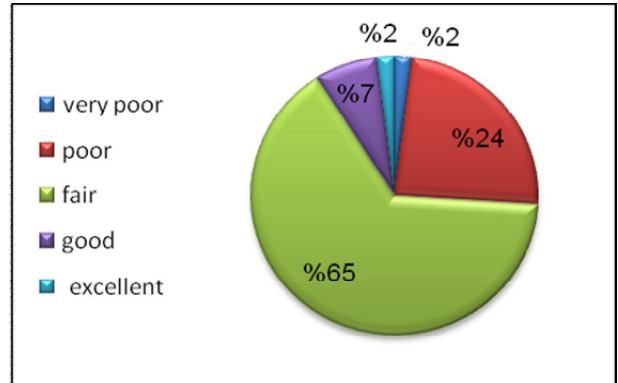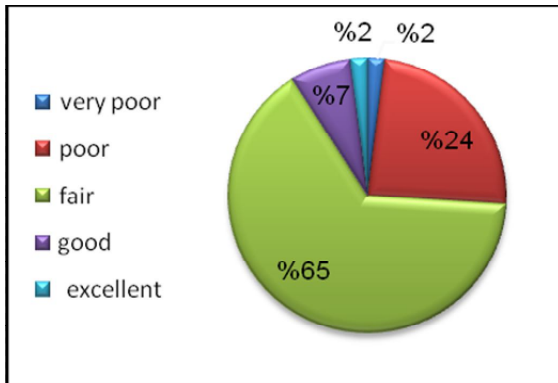
Chart 6: aesthetic elements by access to furniture.

Chart 7: Aesthetic elements by number of furniture.
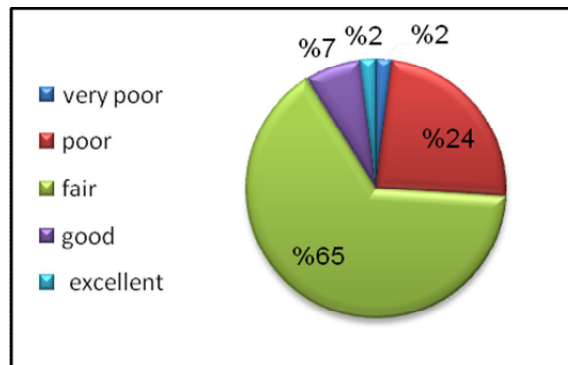
Chart 8: Aesthetic elements by furniture connections.
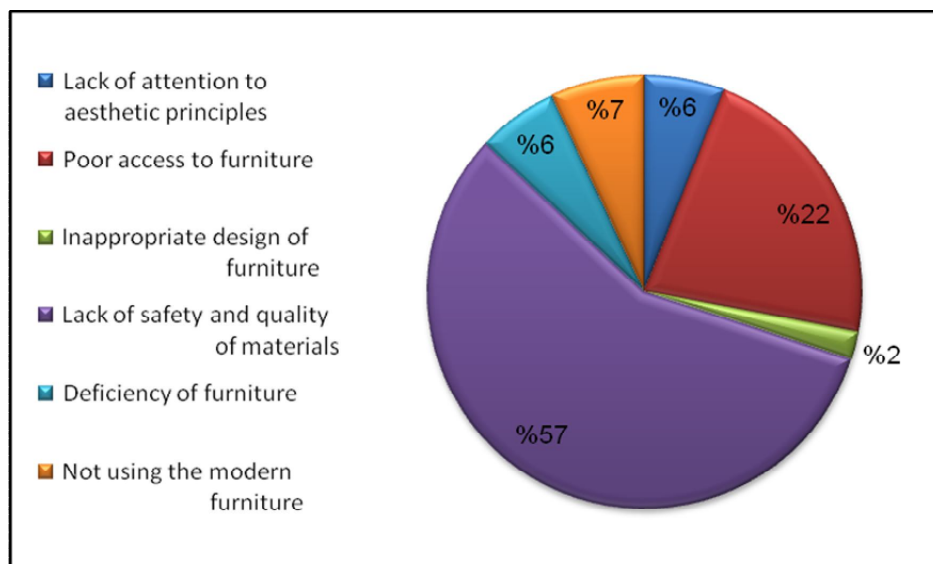
Chart 9: Factors affecting consumers' dissatisfaction with the park furniture.

RESEARCH ARTICLE

A Study on selecting the Optimum Location for Agriculture Bank with GSI and Fuzzy (case study: Bojnurd city)

Mahadi Vatan Parast[1]*, Mohammad Motamadi[2]and Ali Asghar Mammod zadeh[2]

[1]Quchan Branch, Islamic Azad University, Quchan, Iran.
[2]Department of Geography,Shirvan Branch, Islamic Azad University Shirvan, Iran.

*Address for correspondence
Dr.Mahadi Vatan Parast
Quchan Branch,
Islamic Azad University,
Quchan, Iran.
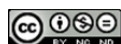
ABSTRACT

Agricultural Bank developmental approaches, especially in the first and second generation term of its setting up , and bank branches development mostly was on following to approach based method to the use of technology based on the principles of clear scientific principles such as using GIS. The studies conducted in circumstance of the main criteria and indicators the effectiveness of using technology based on the clear principles of GIS is useful and also it is necessary. To study, documents and evidence and parameters involved with collective related considerations, shows that the geographical information system and fuzzy logic to locate appropriate branches of banks (the case study is the case is Agricultural bank branches in the Bojonord city-Iran) in area of study can helps   in assessing the distribution of a bank branches of agriculture methods in the city of bojnourd with regard to the neighboring state of recent alluvium access and pathways) bank branches of Agriculture, the position of the bank branches of placing rival, the placing of the security centers law enforcement (police), the placing of relief centers (fires), the position of placing a public park, as well as the integration of two new relatively GIS and fuzzy logic in urban planning in order to achieve the goals and ultimately help public spending cuts and solve the problem of urban traffic in the central nucleus of a large part of the civil service centers (in this study banks)in the central part of the city, to help. On this basis banks using GIS and fuzzy logic case (case study bank have been chosen as research methodology in this study.

The findings of this research have been provided in form of a map of suitable locations for the establishment of the branches of agriculture bank branches in the city of Bojnourd.
Keywords: Location, locating the agriculture bank s branches, Users, GIS and fuzz.

INTRODUCTION

The human always has been tried to chose appropriate place in order to settle down the establishment and in particularly housing with the use of the available facilities in a way to be faced with the minimum confrontation ,risk.The evolution growth of this thought has converted the locating and , location choosing in to the knowledge that thinkers and pundits in this area, consider the principles and scientific rules and basic plan and any location outside the framework of the principles defined resulted in imposing additional costs and overhead. Planning means thinking ahead and, formerly adjustment planning before the events happening. Outbreak and in order to obtain favorable results in matters such as health hygiene, welfare and well-being of happiness of people and, community, (Heraskar, 1997). Due all theses issues it seems to be one of the urban management's necessaries of Bojnourd city is the necessity of planning, with the organizing objective and accurate locating and the various users spaces especially banks.

This main is enjoying of paramount importance i.e. With considering that the city of Bojnourd, as the political administrative centre of Khorasan shomali province today faces with redoubled infrastructure of deficiencies and shortcomings.The matter of locating banks using GIS and fuzzy logic (case study: Agricultural Bank Branches in the city of bojnourd) with the mentioned attitude as subject of this research and therefore in the process of present study after the completion of the initial studies and collecting field data according to each of the influential identified, in whole city of bojnourd in different layers were classified. That regard to the importance of research subject, and the necessity of study and the effectiveness of the economic criteria and standards of physical location, the use of geographical information system in analytical and descriptive method became necessary - with regard to the issue of research and the different capabilities of locating methods, the compilation of geographical information system and fuzzy logic to locate the branches of the bank was used.

In this research, while detailed studying of the issue, the position of the banking activity in locating the branches of the bank was considered and Distribution Jobs and companies as depositors centers, their number issues of manpower and citizens traffic (service recovers) and other existing   potential in the city of that affect the bank and vice versa areas affected by the bank's activities in the country has been considered. .

Problem Statement

In addition to natural factors of fertility, the Increasing growing urban population of the city should be considered due to changing village Settlements in to city on the one hand and the massive migration of villagers to cities from the other side. The Prescription population growth on the levels of user spaces and blatancy of services and   their lack of correct location choosing as two aspects of the problems arising from accelerating growth of urban population. lack of respect to the scientific and expertise principles in locating for urban media services, particularly the banks in the city of Bojnourd in the past and consequently dirhams planning services has been leaded the city of Bojnourd where as the administrative political centre in the province incudes most of the urban population in itself is suffering of incompatible urban land uses, anomalous locating and failure to observe functional hierarchy of urban services.The first step in each of the planning is early diagnosis issues and problems. To determine goals is most important step in planning i.e after identifying the problems and goals and on the basis of opportunities and threats. (Mohamadi Pur, 2003).Hence because of reason always planners, particularly urban gegraphists have been tried much by using strong and effective techniques and tools to provide , appropriate and accurate and consistent with the conditions of the time and space in order to achieve the most suitable solutions to created and ahead urban

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problems and complexes   due to urban population increasing   growth and   finally balancing   in the field of functional urban.

The unscientific development and locate of ' branches and the unbalanced distribution at city level has been caused urban centers and active axis's are mainly engaged in city Central core by banks, in addition to the quality of visual, the quality of the city's functional performance has been strongly affected, and while in some parts of the city where are have upper related population and the potential are divested of having a bank branches.The plurality and the accumulation of bank branches with very little intervals near major business centers and core were civilians travel from   different   parts   of   the   city   center   to   receive   the   banking   services   that   will   have   consequences   of abuse   of economic, social and environmental that as result having followed the increase in traffic, an increase of audio and air pollution and waste of time and the cost of the citizens.

At first, look perhaps it seems that the banks a establish their branches according to the cost and benefit analysis in certain parts of the city, while it is beyond doubt that the security issues, as well as other criterions is effective in place choosing   for the establishment of an effective branches, so the reality is that the locating of the bank's branches in the city of Bojnourd where does not have any appropriateness with municipal zones that causes citizens to face many. The Spatial analysis as an approach in geography that emphasizes on the location radiation study of the phenomenon and the affecting factors (Seifodini, 2002).The geographical information system with a lot of capabilities in the field of information analysis and space combination (location data) and explanatory information (tabling data), can be viable solution in the banks 'branches locating favorably.And in this regard, attention to effects of factors such as   the   population   density ,distance   from   the   main   business   centers (big   stores   and   supper   markets   and ...),   the administrative headquarters, a public parking, banks branches competitor , security centers, relief centers (fire), widening of the land price and ... is all necessary.

Of course, banks with considering cognitive market patterns and marketing Seeks to full identification of market the and   potential   customers   of   their   financial   products   and   services,   and   they   tries   much   to   achieve   more   share   of sources and benefits with the idea that where are our customers, located ?, what is their specifications?, in what areas is better to develop branches and which areas are not suitable for developing and establishment of banks branches and their customers &competitors analysis .But inattention to the distribution of branches in different areas of the city, base on the criteria and scientific methods of locating has been caused the focus and the multiplicity of many banks and financial & credit institutions be placed in three areas ,i.e. :

1. Talghani Street   (between Bazargani square to a hefdeh Sharivar crossroad).
2. Khishi crossroad to charshnbeh bazar crossroad.
3. Imam Khomeini Street (Between Madar square to Baskol crossroad).

On the other hand, it seems to the policy and incentive of the banking system development should be , the scope explanation   of activities and resources optimum sources absorption within the   of context creating necessary conditions for the proper distribution of funds and better and faster serving to a wide range of people in society. However, this issue depends to potentials and regional elasticity. Matching provided services in various fields of economic, social and cultural with master plan of the city would be leading to a better distribution of services and facilities in different regions based on population density,because the aim of one of city detailed plan is to promote services per capita towards quo status and basically to provide needs of citizens, providing facilities includes infrastructure that are established by municipalities and all eventually lead to the dynamism of the city's economy.

Objective

The main objective of this study is to locate the agriculture bank' branches in the city of bojnourd using GIS and fuzzy logic.

Research question

Do the geographical information system and fuzzy logic can be used for agricultural bank branches locating in the city of bojnourd?

RESEARCH METHODOLOGY

The method of this study is analytical- description which is the first of have been determined by collecting information from multiple sources such as alibrary, probing the theoretical arguments field perceptions , interview with experts , maps and documents and finally their analysis then the explanatory method has been used to describe and explain the range of the study and subsequently the the database of geographical information system for research area has been prepared to review the status quo interface (banks) , for the territory, and in the continuation taken help from the analysis method , which in this method with the use of geographical information system (GIS), indicators and criteria have been determined to assess the status quo and analysis and, ultimately, " according to the existing methods in urban planning have been done the necessary analysis.

The collecting information tool in this research is as follows:

- Maps and the information available in the municipality of Bonboard city.
- Llibrary resources in a scientific centers and universities.
- Tables, maps and location data available in statistics and information archive of and urbanization, the General Authority of taxation, headed by the bank and agricultural province. .... . and the harvest in the field of study.
- Maps and the information contained in the municipality bojnourd city.
- Library resources in a scientific centers and universities.
- Tables, maps and data available place information and statistics office of governorery, transportation and urbanization organization, the General Authority of taxation, province superintendence   of agricultural bank. .... .
- Filed observation and perception in the area of study.

The Area of Research

The area of this study is Bonboard city centre, bojnourd city and the Khorasan Shomali province. The naming and building of bojnorod city was attributed to Shri *Toli khan Shdlo* who built this city as his tribe center and in remembrance of his initial ancestors land i.e. Bezhangerd fortress of about 1100   H. GH (1678) of *Chaghor' environs of Said Azerbaijan*. There is an other view in this context that the naming of the city is according to the name of the famous springs i.e. *Gharabagh Bezanjerd* where was murders place of "*prince Hamza Mirza Safavi* "elder brother *Shah Abbas*. It seems the imported assumption of Bojnourd name from western areas of Iran be more significant than other provided opinions about appellation bojnourd (Motavali Haghighi, 2008).

The Bojnord city is located in at a geographical length of 37 degrees and 28 minutes with width of 57 degrees and 20 minutes ,height 1070 meters from the sea level according to Mathematical situations the correct area of the city 's privacy, according to the coordinates has been determined by the Supreme Council of Iranian architecture and

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urbanism is equivalent to 23934 hectares, with an estimated range of (continuous- vast) of bojnourd – discrete,which on base of it , the net area of privacy 2 is 06000 hectares estimated and includes nearly 6.3 times beggar than the level of the range of the city, so that the city of Bojnourd is the the highest area among the towns of the Khorasan Shomali province (Naghash Johan-Pars Avisors Engineers,2010) Fig.1.

Agricultural Bank in Bojnourd

The first branch of agriculture bank' or same representation of industrial and husbandry was established in the province of Bojnourd at same time in 18 statutes of Iran such as Jovin,Jeroft,Rodbar, Quchan,……. During 1950 to 1951 and the representative of Bojonord converted to branch in the 1958 (Agricultural Eexperts, 1382).The development process and set up bank branches of agriculture in the city of bojnourd and other required information of this research has been cleared in the following table 1.

It is necessary to explain that the Aagriculture bank alongside the continuation of development and establishing branches in the city of Bojnourd in terms of the location and equipment in recent years, and particularly in installation of the ATM system and other required actions in direction to make use of technology and electronic banking technology has taken effective steps with aim to improve and easy the level of banking services to customers and profitability increase that installation more than 10 automated teller machines (ATM), and the number of about 200 caller device or pose at city level is best document on this claim.

Group (category) of Agriculture Bank's Branches

According to latest internal ddirectives of the Aagriculture bank's and changes creation in macro structure of bank , managements structure and Agriculture bank's branches have been classified in four groups (class) that of course, Has been divided in three class base on the latest instruction of agriculture's bank branches of in the city bojnourd i.e.:

    1 .The main central branches.
    2. Urban Iindependent Branches.
    3. Rural branches (instructions to the new grouping branches, 2013).

A.The main central branch is a branch that:

- It has high capability of sources absorption.
- It has high capability to pay and granting credits.
- It has huge credit plans.
- It pays all Credits assignment.
- It provides liquidity of other branches of its area.
- It enjoys of high rate of human resources.
- It has expertise chart.
- It provides manpower to applicant branches from available employees.

B) Independent Branch of the Bojonord city

 It will locating and provides services according to massive strategy and planning and determined decisions, at city level.

C) Settled Branches in organization

with regard that agriculture Jahad organization and rural cooperative provide relevant services particularly and specialized to farmers and villagers from other side the activists in agriculture and rural part have been identified as objective population base on initial and massive policies of the Agricultural Bank's establishment in order to provide facilities and banking services so it will be branches locating in order to easy serving to the aforesaid population, in the establishment place of the organizations, which is said to be deployed branches.

D) Rural Branches

This kind of branches are located and steeled in rural area and provide banking service in accordance with the massive policy of the agricultural bank and because of reason that the main part of objective population of this bank are villagers so due to the expertiseing work and observed indicators .

The agriculture Bank's Branches in the City of Bojnourd

In direction to the necessity of the performance evaluation of branches ,recognize and Statuses the functional of the, supervision ggeneral office and branches affairs of agriculture bank declares the main and subsidiary indexes of performance improvement of branches management with related coefficients every year through Executive instruction in order to make recognizable and determinable the grading and rating of Agriculture bank's branches base on changes made at in score of each indicators .The factors such as extending of the resources, the rate of due recipient, the level of facilities payment, electronic services, the rate of borrowing from the Central Bank and a class that branch will be settled in it,. According to this instruction the indicator of receivables receipt and practice, as well as the equipment and resources (customers and the market share), are considered the highest score among all indicators and important factors in determining grade and rate of branches.

Indicators of the performance Evaluation of the Branches Mmanagement

The evaluation of management 'sperformance improvement of branches is done by supervision ggeneral office and branches affairs of agriculture bank regularly   in form of monthly base on the indicators that are monitored supervision ggeneral office and branches affairs every year, that in this regard according to the issued executive order by the General Authority and monitoring of the branches the indicators such as human capital, equipment and resources of (customers affairs and share of the market), profitability, financial discipline, receivables and performance, electronic banking and facilities payment, monitoring on plans and credit operations, the system of electronic exchange, bounced cheques and temporary indicator reselectively has been announced and considered   as evaluation criterions of branches and and ultimately " any decision making related to branches grade and supplies (for customers and market share).

Agricultural Banks 'financial resources are provided from different sources, which includes: Capital , Credits received from the Central Bank, the Credits received from other banks, non- interest loan , Savings, the current governmental and individuals current accounts and other visual and long term deposits and receivables (agricultural experts groups o Iran,2004).The present branches establishment criteria what is certain is that to locate for branches establishment with the issue of the branches grading are two related matter but a part of each other. The most effective and main factors in the location of agricultural bank branches in the past and the present conditions at the level of the city of bojnourd are as follows table 2.

1. Branches Classification.
2. Ownership of property.
3. Competitors Aanalyzes
4 - Ccustomers Aanalysis .
5. An area of space location.

Locating criteria in urban land-use there is no doubt that the location accurate principles determination of various activities in the city of bojonord due to the nature reasons of the urban issues is very difficult. The main objective of the measures series of urban land-use planning is to provide the economic and social welfare for the citizens. To achieve certain pattern of land-use, it is necessary the issues and problems associated with the establishment of the user, the quantity and quality of each of the activity be evaluated. In other words, to determine the location standards of the urban land applications is related to local specifications, the requirements of the citizens and the institutions and bodies stationed in the city.

The most important optimum criteria in determining appropriate location of activates and urban applications can be enumerated as follows (Ziyari, 2011): 1-2 1. Compatibility-2. welfare (including two components of distance and time)- 3. Eefficiency -4.Optimization-5.saftey-6.security- What is GIS? GIS is abbreviation of Geographic Information System stands of computer basic system for the collection, storage, retrieval, update, integration, processing, analyzing, modeling and displaying the geographical data is used in different forms.(Parizkar, 1997).

GIS is a computer system consists of hardware, software, data and applications that are able, to determine the a location data in form of digital, storage, retrieval modeling and analysis and provide in form of text and graphics. (Makhdoom & others, 2001). with the formation of the 1st GIS conference by the International Association of geography -Canada in the 1970, this issue got global aspect and the first texts related to to the geographical science in two volumes and under the title of applications of geographical data published by the Association. (William, 1998). The main characteristics and Application of fuzzy logic .

The fuzzy logic has many applications in the various area of scientific and that,   Following are a few instances: - Controlling systems, is the first and most successful application of fuzzy logic in the field of control.), modeling, simulation, medical recognition of the model, information and knowledge systems.(Includes databases, knowledge management systems, and an expert system and ...) vision of the machine, artificial intelligence, and ... diagnosis.

The main characteristics of fuzzy logic can be summarized as follows:

A.In fuzzy logic painstaking arguments or ordinary logic is a special case of approximate reasoning.
B . Any logical system can be converted into a fuzzy logic.
C. in the fuzzy logic knowledge is considered as a series of fuzzy restrictions or flexible on variables.
D . Conclusion is considered as the dissemination process of these restrictions.
E. In fuzzy logic all issues have a solution that shows the degree of compliance Ataei, 2010).

Site selection criteria for establishing branches using GIS and fuzzy logic.Today, change in the a management perception of the of the organizations and attempt to apply the systematic look at the relevant factors in the efficiency and productivity system has been leaded while considering short and median term programs the strategic long term plans along with dynamics be Agenda component of organization.

In line with this view of systematic transcendental management, many factors and indicators are such as branches classification, ownership of property, competitors analysis, customer analysis, the establishment space area that can be effective and considered for choosing appropriate location for agriculture bank branches.

Therefore, this study was conducted according to the following twelve criteria;

1. Distance towards the branches of rival banks
2. Distance population density
3. Distance towards law police stations.
4. Distance towards land pricing.
5. Distance towards reception centers
6. Distance towards medical centers.
7. Distance towards local markets.
8. Distance towards the administrative centre
9. Distance towards fire centers
10. Distance towards squares and intersections.
11. Distance towards public Parking.
12. Distance towards to supper markets, big bazaars, Aginceies,

based on conducted studies in this research and the equality value assumption of the criteria, while necessary sub-criteria determination for each criteria and ascertain the location situation of each branch separately the value that each branch achieve base on its present location according to the criteria will be determined decisive, and the summery of these results is shown in table 3.

Analysis

According to conducted research and information collected during the study the situation of each branches' location base on each of the twelve criteria has been mentioned in the following table4.At this stage of the research while determining the necessary sub criteria for the branches 'location and information of each available branches valuating table, according to the twelve criteria , the final score table and combined map with regard to the overlapping criteria has been provided as follows table 5&6.

CONCLUSIONS

1. All branches have been established in the core of the city so a considerable part of the city does not covered by existing branches.

2. Areas with very high population density do not have the bank branch, therefore the large section of the population lliving in the region of high density are ddeprived of access to banking services and have to commute to and from the downtown to core of city and consequently, Consequently, follow the increase in accrued expenses on urban management urban management.

3. All existing branches have been located in the hhigh and average price that in this case a lot of investment will be spent to buy property, or will be used with the high cost of rented space.

4. Agricultural Bank branches's geographical radiation does not have any logical and scientific pattern in the city level of bojnourd.

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5. Benefiting from the geographical information system in the optimal locating can meanwhile helping to favorable and optimal distribution of the agriculture bank's branches of and other services to citizens in the city level reduce traffic, audio and air pollution and the gradual erosion sub anatomical city and significant.

6. According to integrated maps caused by overlapping all criteria ranging between Hemat High School and Imam Reza hospital crossing road   is recommended as a appropriate location with high priority for agricultural bank 'snew branches establishment.

7. Geographical inappropriate dispersion of the agriculture bank's branches in the city level of Bojonord is due of heterogeneous physical growth bojnourd because of the urban population daily increasing growth and undevelopment of infrastructure, the weakness of the optimum area distribution servicer centers in the space of service agencies and use of traditional methods of scientific and in the location.

" Finally given that to locate and evaluate the parameters of the whole range of different applications and apply the criteria and indicators for every single one of the bank branches manually and traditionally is hard work and the rate of error and incorrect calculation also will be high, using of geographical information system IS)G)and fuzzy logic that enjoys of empowered scientific and technological structure in direction to the issue of locating, can be of a great help in addition to reduce the errors in locating, save time and cost of study and analysis .

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Table1.Agricultural Banks Establishment' Sitution in Bojnoord City

Number of Employees	Branch Grade	Year of Establishment	Branch Name	Row
20	1	1961	Bojnord(central)	1
4	4	1989	Tavon Organization	2
5	3	2004	Panzdeh Khordad	3
4	3	2005	Johad	4
4	4	2006	Talghani	5
4	4	2007	Hefdeh Sharivar	6
41	------	-----	6 Branches	Total

(Source : Agricultural Bank Supervision,2014)

Table 2.Performance Evaluation Iindexes of Branches' Management

Score	Index Type	Row	Score	Index Type	
70	**Loan payment**	7	30	**Human Capital**	1
20	Monitoring on plans and credit operations	8	200	Resources & - customers affairs and market share (Equipment	2
10	Electronic Clearing System of unreliable cheques	9	140	Profitability	3
40		10	100	Financial discipline	4
			300	Due Collection and implementation	5
100	Provisional Indexes	11	120	Electronic Banking	6
Total scores 100					

Source: (action plan to improve the performance indicators to evaluate
Management's Magazine, 1393

Table 2.Results

Johad organization value	Johad organization Distance	Cooperative organization lue	Cooperative organization distance	central value	central distance	15 khordad value	15 khordad distance	talghani value	talghani distance	Hefedeh sharivar value	Hefedeh sharivar distance	Sub-criteria						Branch Name / Criteria	Row
5	910	3	396	2	144	2	121	1	44	1	82	above 750	500-750	250-500	100-250	0-100	Distance in meter	Rival banks branches	1
												5	4	3	2	1	value		
1	1430	3	703	5	197	4	300	5	33	4	317	1000 above	750-1000	500-750	250-500	0-250	Distance in meter	Major commercial centers	2
												1	2	3	4	5	value		
5	107	1	1334	1	1240	1	1043	2	858	5	170	above1000	750-1000	500-750	250-500	0-250	Distance in meter	Security services	3
												1	2	3	4	5	value		
4	260	5	107	5	113	4	152	5	102	5	90	above 600	300-600	150-300	50-150	0-50	Distance in meter	Squares and intersections	4
												1	2	3	4	5	value		
2	842	3	670	4	466	4	312	5	44	4	282	above 1000	750-1000	500-750	250-500	0-250	Distance in meter	Public parking	5
												1	2	3	4	5	value		
5	60	5	154	5	60	5	44	5	120	5	128	above 1000	750-1000	500-750	250-500	0-250	Distance in meter	Administrative centers	6
												1	2	3	4	5	value		
1	1932	2	806	3	545	3	710	4	450	3	702	above 1000	750-1000	500-750	250-500	0-250	Distance in meter	local markets centers	7
												1	2	3	4	5	value		
3	703	1	1520	1	1423	1	1293	1	1095	3	583	1000 above	750-1000	500-750	250-500	0-250	Distance in meter	Relief centers ((firefighters	8
												1	2	3	4	5	value		

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Johad		Coop.		central		Panzedeh		Talghani		Hefedeh		above 1000	750-1000	500-750	250-500	0-250		criteria	Row
2	845	3	572	5	156	5	228	5	197	4	384	above 1000	750-1000	500-750	250-500	0-250	Distance in meter	Hospitality centers (Restaurants (	9
												1	2	3	4	5	value		
1	1232	4	305	3	651	2	755	3	662	1	1067	1000 above	750-1000	500-750	250-500	0-250	Distance in meter	Health centers ((hospitals	10
												1	2	3	4	5	value		
3	average	3	high	4	high	4	high	3	average	3	average	Very less	less	average	high	Very high	Ratio	Population density	11
												-	-	3	4	-	value		
5	average	5	average	3	high	3	High	3	High	3	high	low	average		high		Ratio	Zoning, land price	12
												-	5		3		value		

Researchers' sources

Table 4.Final evaluation table of location situation of each available branch towards the 12 criteria

Johad Organization	Cooperation organization	central	Panzedeh Khordad	Talghani	Hefedeh Sharivar	branch / criteria	Row
fully favorable	Average	unfavorable	unfavorable	fully unfavorable	fully favorable	Distance towards the branches of rival banks	1
fully unfavorable	Average	fully favorable	favorable	fully favorable	favorable	distance towards business main centers	2
fully favorable	fully unfavorable	fully unfavorable	fully unfavorable	unfavorable	fully favorable	distance towards law police stations	3
favorable	fully favorable	fully favorable	favorable	fully favorable	favorable	distance towards squares and intersections	4

unfavorable	Average	favorable	favorable	fully favorable	favorable	distance towards public Parking	5
fully favorable	fully favorable	fully favorable	fully favorable	fully favorable	fully favorable	distance towards the administrative centre	6
fully unfavorable	unfavorable	Average	Average	favorable	Average	distance towards local markets	7
Average	fully unfavorable	fully unfavorable	fully unfavorable	fully unfavorable	Average	distance towards fire centers	8
unfavorable	Average	fully favorable	fully favorable	fully favorable	favorable	distance towards reception centers(Restaurant)	9
fully unfavorable	favorable	Average	unfavorable	Average	fully unfavorable	Distance towards medical centers	10
Average	Average	favorable	favorable	Average	Average	distance population density	11
fully favorable	fully favorable	Average	Average	Average	Average	distance towards land pricing	12

Sources : Researchers

Table 5.The final Score and status table of the present branches location, according to the criterias overlap.

The final situation due to twelve-fold overlap criteria	Final scores	Sub criteria					Branch name	Code
favorable	41						Hefedeh Sharivar	1
favorable	42						Talghani	2
Average	37						Panzdeh Khordad	3
favorable	41	50.4 - 60	40.8 - 50.4	31.2 - 40.8	21.6 - 31.2	12 - 21.6	central	4
Average	38						Cooperative organization	5
Average	37						Jahad Keshavrzi	6
	------	fully favorable	favorabl		Unfavor	Fully unfarable	Status	

Source: Researchers

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Table 6.In relation to each criterion .

Their status are...	... Percent of all existing branches	Compare to criterion	Row	Their status...	... Percent of all existing branches	Compare to criterion	Row
fully favorable	0		**7**	fully favorable	% 16.7		**1**
favorable	% 16.7	**Distance from centers of local markets**		favorable	0	**Distance from bank branches Rival**	
Average	% 50			Average	% 16.7		
unfavorable	% 16.7			unfavorable	% 33.3		
fully unfavorable	% 16.7			fully unfavorable	% 33.3		
fully favorable	0		**8**	fully favorable	% 33.3		**2**
favorable	0	**Distance from relief centers (firefighters(**		favorable	% 33.3	**Distance from main business centers**	
Average	% 33.3			Average	% 16.7		
unfavorable	0			unfavorable	0		
fully unfavorable	% 66.7			fully unfavorable	% 16.7		
fully favorable	% 50	**Hospitality distance from hospitality centers and restaurants**	**9**	fully favorable	% 33.3		**3**
favorable	% 16.7			favorable	0	**Distance from security centers**	
Average	% 16.7			Average	0		
unfavorable	% 16.7			unfavorable	% 16.7		
fully unfavorable	0			fully unfavorable	%50		
fully favorable	0	**Distance from health centers (hospitals)**	**10**	fully favorable	% 50	**Distance from the squares center and intersections**	**4**
favorable	% 16.7			favorable	% 50		
Average	% 33.3			Average	0		
unfavorable	% 16.7			unfavorable	0		
fully unfavorable	% 33.3			fully unfavorable	0		
fully favorable	0	**Distance based on population density**	fully favorable	fully favorable	% 16.7		**5**
favorable	% 33.3			favorable	50%		
Average	% 66.7			Average	% 16.7		
unfavorable	0			unfavorable	% 16.7		
fully unfavorable	0			fully unfavorable	0	**Distance from Public parking**	

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fully favorable	% 33.3	**Distance from, land-based Zoning**	12	fully favorable	100%	**Distance from administrative centers**	6
favorable	0			favorable	0		
Average	% 66.7			Average	0		
unfavorable	0			unfavorable	0		
fully unfavorable	0			fully unfavorable	0		
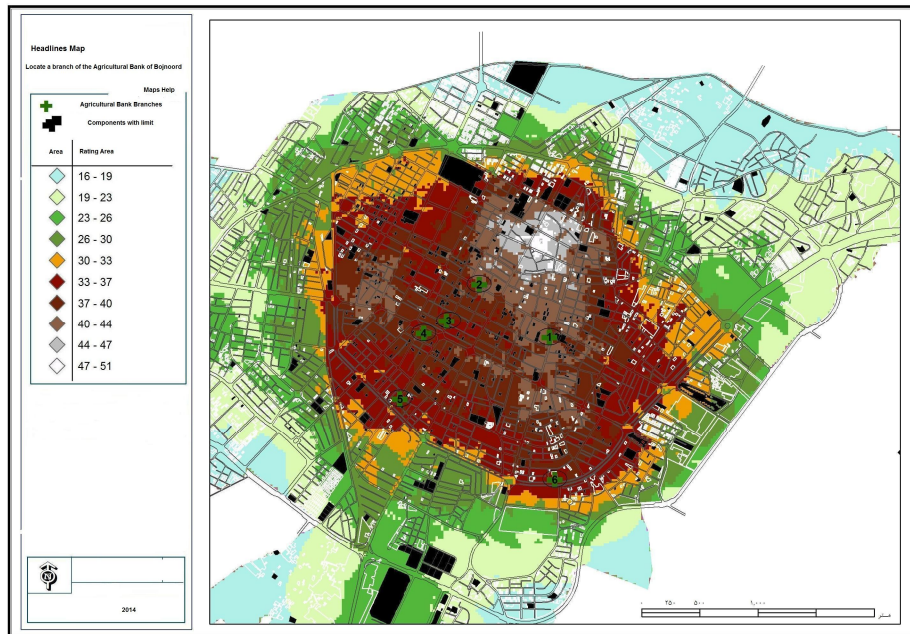
Figure 1.Research Area Map

RESEARCH ARTICLE

Impact of Wheat Procurement Policy on Welfare of Producers and Consumers in Iran

Amir Sadeghi

Department of Industrial Management, College of Management & Accounting, South Tehran Branch, Islamic Azad University, Tehran, Iran

*Address for correspondence
Amir Sadeghi
PhD Student,
Department of Industrial Management,
College of Management & Accounting,
South Tehran Branch,
Islamic Azad University,
Tehran, Iran
E.mail: amir.sadeghi.ie@gmail.com

ABSTRACT

One of the principled policied of Islamic Republic Regime from early days of Islamic Revolution was to legalize the market for basic commodities especially in the field of "wheat, flour and bread". Wheat is one of the most strategic commodities in agriculture which has always been the centere of attention for the government. The main purpose of this research is to study the impact of wheat procurement policy on welfare of producers and consumers in Ira. Due to importance of wheat in consumption patter of Iranian households, this commodity has always been of interest to policy makers. The government subsidizes wheat within the frame work of inexpensive food stuff policy, and also the supportive appraisal policies subsidize production and insurance of wheat products. Government is the exclusive purchaser and vender of wheat in the country. Considering the concrete execution and ever-increasing expenses of plans that support producers and consumers, this article tries to explore the impact of such policies on welfare of consumers and producers. To achieve this goal, a mathematical model has been developed. The enacted policies during 2005 to 2013 are the basis of this research. Results show that the less involved the government is in the structure and supply chain of wheat and the more support is provided for production, the more solid the wheat production would be. Therefore, an approach should be made toward privatization and liberalization of wheat market. But it should be noted that with more appropriate policy makings the market may be directed toward a more dynamic state without wasting the government resources. For instance, it is better to predict the price of wheat in the upcoming year

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with the help of expert economists rather than the government specifying the bargaining price of wheat with a price set as the guaranteed price.

Key words: Wheat, Procurement Policy, welfare, producers, consumers.

INTRODUCTION

Wheat provides for nearly 20% of nutritive calories of people in the world and is considered the main nourishment of 35% of world's population. Bread constitutes the main food of majority of people in Iran and provides for around 45% of consumed energy and nearly 70% of protein required by people especially the low income deciles of society. Wheat is one the most important crops and a strategic product that calls for special attention. According to statistics, the control and monitoring of U.S on wheat production and agricultural crops is way stronger than that of oil producing countries on production of oil. This suggests the significance of this strategic crop.

Assessment of agricultural policies is one of the topics discussed in many economic studies of agriculture (Alston et al, 1994; Hosseini and Sprigs, 1998; Jianak and Folten, 2000; Alston and James, 2002). Any conscious intervention of government in agricultural is called an agricultural policy (Swinen et al, 1998). All economic systems have accepted that the mechanisms of market may not solely accomplish in resolving the economic issues especially in case of optimized resource allocation and fair distribution of incomes. To this end, government intervenes in economic affairs through various measures in order to compensate for failure or inadequacy of market. The purpose of policy making in general is the excessive social redistribution according to targets of policy maker (Alston and Pardy, 1999). There are several means to support the agriculture sector the application of which yields diverse effects on agriculture and other economic sectors of country. Economists have always tried to evaluate agricultural policies (D Gourter et al, 1993; Cola, 1993; Jung et al., 2003; Hosseini and Hassanpour, 2000). In spite of the fact that most supportive measures in agricultural sector apply more than one policy tool concurrently, there are few studies inside and outside the country that have determined the optimized combination of policy tools at the same time. Most conducted studies on supportive policies of particular agricultural crops in Iran have merely discussed the effects due to removal one policy and have not discussed the optimized combination of policy measures in cluding those of Najafi (1997), Bakhshoodeh (2001) and Hosseini (2005). Studies have been conducted in recent years outside Iran where welfare impacts of combined policies are analyzed and conclusions have been made regarding either efficiency or inefficiency of these policies (Gardner, 1992; Mayer, 1993; Muschini and Schochachi, 1994). Bullock and Salhofer (1995) were the first to measure social expenditures resulting from combination of supportive policies. Economists usually evaluate policies through incurred social expenses. They actually compare the welfare consequences of policies with times of no intervention. Since execution of each particular policy would result in different welfare outcomes, the results would be misleading in case welfare outcomes of a policy are analyzed without taking into account the distributive effects of other policies.

That is why this research focuses on impact of wheat procurement policies on welfare of consumers and producers. Aiming at self-sufficiency, the post revolution government has supported the producers of agricultural products through subsidization of inputs. Low price of distribution for fertilizer, pestcides and seeds have been among the supportive policies of government since 1977. Out of entire subsidies allocated to these inputs, nearly 80% belong to chemical fertilizers. Also, an average 80% of wheat insurance premium has been disbursed by the government. Wheat, in form of bread and its other products are the main nutritive element for people of Iran. According to the report by Iran Center for Statistics (2003), average per capita consumption of wheat in Iran is 4.151 kg with this figure equal to 129 kg and 185 kg in urban and rural areas, respectively. Considering the role bread plays in nutrition of most people, the government has practiced inexpensive food policy in form of flour and bread subsidy, designating

considerable sums to annual budget of flour and bread. For example, bread subsidy reached 15,802 billion Rls in 2003.

Currently, the most important supportive policies of government for wheat production are guaranteed procurement, subsidy to production inputs and insurance. Purchasse of wheat from farmers is carried out through a particular system using "cash purchase system of issuing bank" and by means of 14 grain companies and trading services in 31 provinces. The current system of wheat procurement is such that farmers deliver their harvested crops to representative of Ministry of Commerce and receive their income according to enacted guaranteed prices of government.Supportive policies of government are such that annual tariff prices of wheat are constantly increased and variation in global price of wheat does not affect them. Annual increase of tarrifs regardless of effects of global variation and qualitative conditions has doubled the pressure on government with no considerable improvement in essential quality and appearance quality of wheat.

Considering the increased growth in production and consumption of wheat, continuous practice of government policies in the market of this commodity inflicts significant expenses on the government. On the other hand, due to importance of wheat in food basket of Iranian households and agricultural economy of country, it is inevitable to support the producers and consumers of this commodity. Thus, it is of major significance to discuss this issue.

Literature Review

Wheat is among the very first crops domesticated and harvested by humans. History of wheat domesticatin probably dates back to 12000-18000 years B.C, perhaps through collection of wild ancestor seeds of wheat. Herbert Hoover (1934) discussing the importance of bread says:" the first word in war was weapon and the last was bread".
The following wheat types may be procured in countries:
Maximum effective falling number 10%
Maximum ineffective falling number 7%
Maximum moisture content 12%
Maximum moisture in provinces of Gilan, Mazandaran and Golestan is 14% with some regions of Semnan and Ardebil as high as 12%. The Iran Commerece Center approves the 14% moisture for procurement.
Maximum wheat aphid 2%
Maximum grains with common bunt and damaged sprouts with maximum barley and rye mixed with wheat or 6% of moulded and fungus and putrid grains and storage pests and those kinds of wheat without the characteristics of table below may not be procured.

Guaranteed Procurement of Wheat in past and present

The occurrnece of war, loss of foreign exchange reserves, inflation and negative economic effects and increased false currency price would lead to production chaos in industry and agriculture, infrastructure and transport while its negative aspects would be transferred to the post-war period which altogether lead to guaranteed purchase of products agriculture.Some staple crops such as wheat, sugar, corn, rice, pulses and oilseeds, which had a more vital role, received more support in agriculture sector according to this law. In case of wheat which is the staple food of the society, purchase takes place through public companies that are subsets of Commerce Company of Iran in this area by supplying credit facilities for preparation and storage of warehouses and expanding silos that are purchased by the government to support the wheat farmers. Other products covered by the guaranteed purchase have also been supported by foreign exchange resources and time sensitivity when considering purchasing a guarantee under law and government purchases.

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Laws related to guaranteed purchase of staple crops

In this section, we first define consolidated and guaranteed prices for agricultural products in terms of laws and regulations and then their difference is clarified and the laws of guaranteed purchase and weaknesses are discussed.

Consolidated price of staple crops

The basic agricultural commodities became subject to laws enforcing consolidated prices in order to protect consumers and prevent excessive price increase:In the first method, the state holding a monopoly on the purchase and sale of strategic agricultural products such as wheat, the private sector would be prohibited from dealing in the purchase and sale of agricultural goods to consumers and kept the strategic commodities at the low level as widely expected.Since aadopting consolidated price policy would diminish the incentive for farmers to increase production, so government subsidies to reduce production costs and increase the productivity.In the second method determines the state quota of sales, consolidate prices at a certain level and the difference between the fixed price and the market supply price is paid to producers.

Guaranteed price of staple crops

Due to failure to implement policies to stabilize prices of strategic agricultural products in November 1979 the government approved a law guaranteeing the purchase of agricultural products enacted by the Islamic Council.According to this law, the government was required to purchase crops at guaranteed prices before the end of agricultural year and inform farmers of minimum guaranteed price of commodities such as wheat, barley, maize, rice yields of sugar beets, cotton, oil seeds, tea, potato, onion and grains through mass media and the actual cost of production per unit of cultivated area is considered in estimation of minimum guaranteed price.The difference between consolidated and guaranteed prices is in that in cae of guaranteed prices the government is not the leading purchaser of agricultural products and farmers are free to sell their products in the price range, but in case products are not sold due to lack of customers, farmers may sell their products to the government according to the guaranteed price. Government sells the purchased price at a lower value to protect consumers.

Some weaknesses in laws of guranteed price

 As previously mentioned, the purpose of the guaranteed price policy is to balance the production systems and prevent losses. The most important problem of guaranteed price is that it does not meet the goals stipulated in the law. The other part of it was due to the vagueness of the law as guaranteed price policy is a policy based on a predetermined schedule.It has been designed on the basis that if the market price descends below the guaranteed price in harvest season, government would intervene in the product market and buy the product. So overtime, the implementation of this policy created problems.

The first problem was that the price for some products has gone lower than the guaranteed price and the government did not have sufficient funds to purchase those products.The second problem was that the government could not afford to cover the 17 products stated in the law. In other words, guaranteed price for this product was announced, but in practice the market price was higher than the guaranteed price. For example, in case of strategic crops such as wheat products, the government was compelled to buy it from producers. So no more credit to buy would remain to buy other products. Gardening crops such as potatoes, onions and other crops could be reduced to below the guaranteed price, but the government did not have the credit to buy these products.In 1993 an amendment was added to the Act. This amendment prioritized purchasing of strategic products including wheat, rice, barley, maize, sugar beet, cotton, oilseeds, potatoes, onions and beans. Despite this problem, several other products were added to the list of previous products. In other words, the Islamic Council knowing the inefficiency of this law for many products, still added some other products such as raisins, dates, citrus leaf, apple, pomegranate, fig, animal products

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and cocoon to the previous menu. However, priority purchase was considered for strategic products.In 2004, Clause 3 of the guaranteed price law was modified and two other amendments were added. The state was mandated due to amendments to Note 3 to provide for the possible loss of these products through its resources. In other words, during these years, the rural cooperation organization was forced to purchase these products at the guaranteed price, even selling it at a lower price.But it was no credit was considered for it in the budget. The purpose of modified note was the potential loss of their resources to meet the present law.The law would also allow the government to delay payments due to the loss of more than one month, subject to this Act to provide financial resources to delay the payment of each month, the addition of the principal price purchased products proportional increase in commissions term deposits at the beginning of each year by the Central Bank of the Islamic Republic of Iran is determined to be paid to producers that calendar.In 2006, two additional amendments were added to the Act. It was stated in Note 4 to prevent any futures transaction and timely payment of the cost of production, unanticipated funds in the annual Budget Act, a hundred percent allocation to farmers. Note 4: This is due to the addition of credit-related purchases immediately and ensure timely Purchasing agents are available to be assigned to a hundred percent of the funds.The sales process in conjunction with certain products such as wheat was identified because of its buyer, but in connection with the sale of other products were found to be a market for them. Purchasing products, the Central Bank was obligated to purchase the product assurance manager sets the necessary facilities in March each year to determine the agent banks is communicated.

This bill was too vague. Because of inflation, the legislation was unclear. Finally, the inquiry which was conducted by the Agricultural Economics Research Institute of Planning and determined that the inflation rate is based on prices received by farmers.Not guarantee prices are constantly increasing because production costs are increasing every year and compete in the global market is more difficult. Thus, there is support for the belief that the support should be comprehensive. This support is not done only by a guaranteed price policy, but also using other tools, the tools should be used.

There are four economic criteria for determination of prices:
1- Cost of production
2- Equivalent to limit price
3- Exchange relationship
4- Multiple criteria

In the first criterion, the average total cost of production includes the value of inputs consumed, wages and land rents are calculated as base price. The second criterion, the border price equivalent to the cost of transporting goods to the farm and a price-adjusted basis is considered. The third criterion, the exchange relation to the price index (Price Srkhrmn or Price Assurance) by farmers to index of prices paid for production inputs and consumer goods is defined by them.This measure aims to maintain the proper relationship between the price level takes place in agriculture and industry. Calculation of the exchange relationship between the prices of agricultural products, particularly products that they are selling is controlled by the government; those are offered as a free trade relationship is also one of the measures. Finally, the criteria set forth in the above three criteria is presented. Different countries in one or more of the above criteria, the criteria for determining the floor price for the products they use.

Changes in input prices, price trends in the market, product demand and supply, relative prices of a group of products, the impact of price on the cost structure of the industry, the impact on the general price level and price are important factors in world markets.Production cost is the most important factor in all calculations of the price, has an important place. Axis by placing bids in the first measure of the average cost of production and at the same time considering the second and third criteria are set to.

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Determination of guranteed price

Every year in mid May and early June, the production cost tables, income byproducts, insurance, ground rents and value of each crop selected by the Ministry of Agriculture is sent for all provinces.After submitting tables Agriculture Organization of the provinces have the opportunity to maximum within a month, the average real cost of production, income, insurance, rent and yield of crops in their province for Planning Research Institute, Agricultural Economics and Rural Development should be sent to the institution after collecting data while entering information based on experts' meetings with provincial Affairs coordination Office products, vegetation, particularly staple crops, cereals and forage crops, and estimated cost of crop Accordingly, the minimum price would suggest.Vice president of strategic planning and oversight of the Committee for approval after reviewing their prices are based on a Commerce Department. Comments about prices, guaranteed in the presence of the three vice-president, Minister of Agriculture, Minister of Commerce and vice president of strategic planning and oversight will be provided to the Committee. The Working Group with regard to macro-economic issues and the amount of credit, approved prices to be announced.

Procedure of guranteed purchase of wheat

Guaranteed purchase wheat from the 1979 law guaranteed purchase basic agricultural products by the Parliament begun and continues in use today.According to the Ministry of Commerce to buy wheat two-way guarantee, either directly or through a contract with the agent is done. The direct purchase of agricultural companies with direct reference to the shopping centers, the company attempted Delivery wheat and wheat price is paid in cash by the bank.Due to the anticipated purchase of wheat for domestic, regional companies are proceeding towards shopping impassable geographic regions or areas that are far from silos and warehouses to facilitate the participation of farmers to engage in contract Delivery wheat the foreman and buying a code is allocated to each center. Informing regional companies and placards installed in shopping malls, shopping centers, and farmers will be notified.

The system for cash procurement of Mellat Bank

Under the agreement between Government Trading Corporation of Iran's Bank Mellat and the Order of cash crops and Drrastay Newspaper implementation of the goals, plans cash purchase of some crops such as wheat, rice and sugar beet by government trading company of subsidiaries in 1385 in cooperation with Bank Mellat and was conducted through electronic systems.

Statistical software for calcualtion of guaranteed price of wheat

This software calculates the guaranteed price based on cost and revenue items are designed province. The software inputs include cost and revenue side, crop production, acreage and yield per province.The software provides the raw questionnaire provincial centers are different and they may be asked to enter all your information .minister of agriculture, minister of agriculture received data and also to share information about his background, all this information is communicated by him to the presidency.

Wheat procurement system in other countries

The main countries producing wheat production from 2008 until 2011 is described in the following table. According to the above data, it is predicted that in 2011 the total production of 676 million tonnes of wheat and Europe, China, India, USA, Russia, Canada and Australia, respectively, producing 142, 113, 81.5, 56.6, 55, 25 and 24 million tons of wheat production in the seven will be the world's top manufacturer.

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Wheat industry in U.S

Grain trade system in America was built on free enterprise is affected farmers and businessmen in the country's free trade deal with the wheat. 62.8 million tons in 2008 and 56.6 million tons in 2011, the amount of wheat production in America.In three consecutive years 2009, 2010 and 2011, the U.S. ranked third in the world production of wheat and wheat allocated to the top Sarat, indicating the importance of high performance management system governing the country's wheat industry.To provide and protects the interests of farmers associations have been established in the United States. Local farmers, farmers' associations together to form the Association of American agriculture are one of them. This community and the community in collaboration with research institutes and centers, the Association of American wheat has emerged. Indicate that the U.S. wheat industry.

Price determination and procurement system of wheat for U.S farmers
As noted above, the rules governing the trading of wheat in the U.S. economy, shadow-free, which means that the product price is determined by supply and demand and market conditions, and no organization is responsible for setting prices.
U.S. wheat is divided into six different types are:
1- Durum wheat
2- Hard red spring
3- Hard red winter
4-Soft Red Winter
5-Soft white wheat
6-Hard white wheat
To determine the price of wheat, wheat farmers provide the type specified using quality indicators is assessed. After determining the type of wheat, the price of its stock by stock exchanges such as CBOT Chicago Stock Exchange Kansas City KCBt and determined.When the farmer harvests his crop; he can sell it or store it in a private warehouse. The silos or warehouses for grain and representatives Nzrkshavrz he can go and sell your product. Satisfied if the farmer can not sell a product the fee in warehouses to store grain.In the process, the wheat trade in U.S. wheat to flour mills or grain terminals and export movement from place to place is done by wheat traders who may not have seen wheat. Tender and other common ties, rings in U.S. wheat supply chain are specified. Factors such as size, quality, time of delivery, mode of delivery and payment of U.S. wheat are important factors in business. Including agricultural support policies that can be implemented by the government to tax and impose some tariffs and the like can be mentioned.

Wheat purchase procedure in Canada
The farmers harvest their wheat and corn storage silos to offer. At this stage the specified type and quality of wheat along with the delivery of wheat farmers will receive a portion of your money. The delivery of grain and the amount of money received in the form of contracts between farmers and the Canadian Wheat has already been signed. Firstly, the farmer receives a portion of the money that farmers can reduce investment risk because the money is guaranteed by the Canadian government. By convention, the farmer will receive the rest of your money on other stages. Farmers may be able to receive all your money back after the growing season .According to the Canadian Wheat Farmers and timing of payments that are five types of contracts under which they are based on principles that were mentioned.

Wheat purchase procedure in Canada

Among the important factors that determine the price of wheat in Australia, including global supply and demand, product quality, crop type and location of its storage. The reason is that large companies have moved to other places that sell their wheat and wheat delivered to the customer to provide more facilities and the overall cost reduced.Wheat buyers of Australian wheat, especially domestic consumers several ways to meet their requirements

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of wheat and the choice of the non-governmental trade is possible. For example grain mill can provide: To buy directly from farmers, which in most cases payment must be in cash large companies like CBH Ltd to buy in order to remove high volumes of their needs. The cash payment is made to farmers under contracts concluded between buyer and seller. The third largest exporter of wheat in the production of this product been investigated. The two countries, Egypt and Indonesia as wheat importing countries will be examined.

Wheat purchase procedure in Egypt

Egypt tried to distance itself from the wheat industry and the public to the private sector. But to achieve this goal should improvements be made in this sector. Crop type and quality are important factors in determining the value of the world price of wheat in Egypt. The advantages of reform in Egypt can move towards a more dynamic industry, wheat and wheat products with better quality and more desirable pointed out.

METHODOLOGY

First the plotted and mathematical patterns of supportive acts of government are elaborated in order to determine the optimized combination of policy tools and then their effect on welfare of producers and consumers is measured. Assessed policy measures include guaranteed price for producer and disbursement of subsidies to wheat seekers. These are the most important policy making tools applied by the government in wheat market. S and D are the domestic supply and demand functions of wheat. Given a free trade condition and considering Iran as a minor importer, W would be Iran's demand of global market at global price Pw where Qws is the supplied wheat and Qwd is the demand for wheat. Thus, the importer wheat would be equal to (Qwd-Qws).

But government intervenes in wheat market through dofferent methods. One of the measures is to subsidize the consumers. Considering Pc as price of subsidies, the domestic production of wheat is Q1 and demand would be Qd with the import equal to Qd-Q1. Guaranteed price policy along with self-sufficiency programs has led the import of wheat to the least possible amount. That is why the guaranteed price is set at higher level than global price and Pp. At this level, production rate is equal to Qs. With Pp considered as producer's price for wheat and Pc the price for consumers, then the import would be (Qd-Qs).

The result leads to free trade, increased welfare for producers, equivalent to a+b and increased welfare of consumers at e+f+i. Government expenses would be equal to a+b+e+i+f. due tp these policies, a damage of h+g+d+c would be imposed onto society.In order to calculate the area under the supply and demand curves and to estimate the welfare impacts of government policies, it is necessary to appoint a function for supply and demand. According to Gardner (1983), the form of function must be designated such that price elasticity of demand would be constant along the supply and demand curves, the functions of which are exponential.

$$Q_d^1 = a P_c^{\emptyset}$$
$$Q_s^1 = b \Pi_p^{\varepsilon}$$

Qs and Qd are the values of supply and demand of wheat in the functions whileƞ and ε are demand and supply elasticities and Pp and Pc are respectively the disbursed prices by both consumers and producers.
Taking into account the supply and demand functions of wheat, the alteration in welfare of consumers and producers due to adoption of purchase policies are calculated as follows:

$$\Delta CS = \int_{p_c}^{p_w} a p_c^n \, dp_c = \frac{Q_d \left(p_w^{\emptyset+1} - p_c^{\emptyset+1} \right)}{p_c^{\emptyset} (\emptyset + 1)}$$

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Where Pc is the subsidized price of consumers and Pw is the global price of wheat. Also, the variation of welfare of producers is expressed as follows:

$$\Delta PS = \int_{p_w}^{p_p} b p_p^s \, dp_p = \frac{Q_s (p_p^{s+1} - p_{pw}^{s+1})}{p_p^s (s+1)}$$

Where Pp is the purchase price of wheat. Governement expenditure for simultaneous execution of government policies is expressed as follows for inexpensive food of consumers and guaranteed price of producers:

$$\Delta TC = (p_p - p_w)Q_s + (p_w - p_p)Q_d$$

Where ΔTC is the variation in goernment expenses due to practice of guaranteed price policies. In order to transfer income from tax payers to producers and consumers, government has to incur expenses. Average social expenses of income transfer are represented by δ:

$$\Delta TS = (1 + \delta)\Delta TC$$

Where ΔTS shows the variation in welfare of tax payers. Losses due to guaranteed price policies and subsidy to consumers, is the part of welfare taken from tax payers but not adding to welfare of producers Shiraz Universityof wheat.

$$\Delta Lossf = |\Delta TS| - (\Delta PS + \Delta CS)$$

This study seeks to assess the cuurent policies of government. Calculation of average transfer efficiency is one of the trends in assessment of efficiency of policies.

This indicator shows the ratio of increase in welfare of producers and consumers to decrease in welfare level of tax payers:

$$ATE = \frac{\Delta CS + \Delta PS}{|\Delta TS|}$$

Another indicator used for assessment of government policies is the average efficiency of policy:

$$PATE = \frac{\theta_1 (\Delta CS) + \theta_2 (\Delta PS)}{|\Delta TS|}$$

The numerical value of average transfer policy fficiency depends on relative value of policy weights of social groups which may be more than 1. If this indicator is more than 1, the selected policies would yield more social welfare compared to free trade.Income gained by government from tax payers is transferred through the policy of inexpensive food and guaranteed price. Therefore, using the above relationships, welfare impacts and efficiency of dominant policies in wheat market will be determined. In order to determine the optimized combination of policy tools in wheat market, minimized function of social loss is used. Thus the variations of social loss function are minimized and considering the 1θ and 2θ as the weights of welfare, the net loss function of wheat would be:

$$\Delta Lossf - \Delta TS - \theta_1 \Delta CS + \theta_2 \Delta PS$$

Where lossf is the level of loss, ΔPS, ΔCS, and ΔTS are variation in bonus of sonsumers, producers and tax payers, respectively. This is due to execution of inexpensive food policy rather than avoiding intervention and freedom of trade.

$$\Delta CS = (P_W - P_C)Q_{Wd} + \int_{Q_{wd}}^{Q_d} D(Q_d) \, dQ_d - P_C(Q_d - Q_{Wd})$$
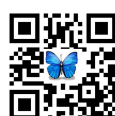
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Where Pc=D(Qd) is the inverse supply function of wheat. Qd is the demand subsequent to inexpensive food policy, Qwd is demand at global price, Pc and Pw.

$$\Delta PS = (P_P - P_W)Q_{WS} + P_P(Q_S - Q_{WS}) - \int_{Qws}^{Q_S} S(Q_S)dQ_S$$

Where Pp is guaranteed price, Qs is the amount of production of wheat despite guaranteed price and Qws is the wheat produced at global price. S(Qs) is the inverse supply function of wheat.

Overall expenses of government for subsidy and guaranteed price policies are according to relationship (5).

$$\Delta Lossf = \left[\left(b\left(P_p^{s+1} - P_w^1 . P_p^s - \frac{1}{s+1}\left(P_p^{s+1} - P_w^{s+1}\right)\right)\right) + a\left(P_c^{\hat{p}} . P_w^1 - P_c^{\hat{p}+1} - \frac{1}{\hat{p}+1}\left(P_w^{\hat{p}+1} - P_c^{\hat{p}+1}\right)\right)\right.$$

The mathematical model with its restrictions is brought in the following:

$$Min\ \Delta Lossf = \left[\left(b\left(P_y^{s+1} - P_w^1 . P_y^s - \frac{1}{s+1}\left(P_p^{s+1} - P_w^{s+1}\right)\right)\right) + a\left(P_c^{\hat{p}} . P_w^1 - P_c^{\hat{p}+1} - \frac{1}{\hat{p}+1}\left(P_w^{\hat{p}+1} - P_c^{\hat{p}+1}\right)\right)\right.$$

Subject to.

(1) $\quad \dfrac{b\left(P_y^{s+1} - P_w^{s+1}\right)}{s+1} > 0$

(2) $\quad \dfrac{a\left(P_w^{\hat{p}-1} - P_c^{\hat{p}-1}\right)}{\hat{p}+1} \geq 0$

(3) $\quad aP_c^{\hat{p}} > 10000000\ ;\ aP_p^s > 13500000$

Target function is studied above. There are three restrictions. The first and second are based on the provision that welfare of producers and consumers would not be negative compared to free trade while the third and fourth are based on demand and supply estimations with 13.5 mil tons produces and domestic demand of 10 mil tons.

Data Analysis

The base year for the calculations in this study in 2005, the first year of the Plan. Guaranteed purchase prices of wheat in the year 2013 to 1870 rials to 10,800 rials has been the purchase price guarantee and Cost per kg wheat flour for the year 2500 was RLS. The production of flour to bakeries that put the price of 127 riyals, 75 riyals from the price paid, the cost of flour and bread flour is 52 rials cost of packaging and shipping.

The production of flour to bakeries that put the price of 127 riyals, 75 riyals from the price paid, the cost of flour and bread flour is 52 rials cost of packaging and shipping.To produce one kilogram of flour mill average 8 $ fee is paid by the government. Mchnyn of feed wheat flour 0/85, respectively. In other words, to produce one kilogram of flour to 1/15 kg of wheat is needed. According to the information provided, if the government, instead of flour, wheat was placed in the hands of consumers, the prices of its companions, was R $ 58 per kilo.

In previous studies, various estimates of the elasticities of supply and demand for wheat is due. In many of these studies, exponential functions to estimate the supply and demand for wheat and only in a few cases, a linear function is estimated. Due to the different estimation methods and different time periods, the estimated elasticities of supply and demand, the differences are very great.The price elasticity of demand for wheat in previous studies range from

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0/03 to 0/81 are located.Price elasticity of wheat supply in the range from 0/05 to 1/1 is located.Since the highest demand for wheat flour, the flour used in this study is an estimate of the elasticity is equal 0/03-. Average elasticity of wheat in previous studies with 0/40 were calculated in this study will be used.To calculate the welfare of producers, consumers and taxpayers Excell software for minimization (Minimize) mathematical model developed above is used Lingo software.

RESULTS AND DISCUSSION

First, it is necessary to assess the effectiveness of current government policies to be evaluated in this market. In the year 2013 the consumer price of 9500 rials, the price of 10,800 rials prices manufacturers worldwide release rate in 2013 amounted to 9366 Rls.For this purpose, the relationships described in the previous section, the welfare changes of producers, consumers and taxpayers and social losses resulting from current policies average index and the transmission efficiency (ATE) calculated.The table below shows the results.

According to Table 1, the welfare of consumers in the current policy with respect to free trade and no government intervention, welfare will be reduced to about 8.25 trillion riyals. The welfare of producers at a guaranteed price policy is reduced to about 0.8 thousand million dollars.Government for the implementation of this policy; a fee equal to 10 thousand billion rials undergoes substance. Welfare Malia Tdhndgan Assuming that the load transfer income equal to zero (0), 0/095 and 0/175, and b, respectively, approximately equal to 1, 11 and 8/11 thousand million dollars and, accordingly, political and social losses resulting from the implementation of this possibility lies on each order of about 1, 2, and 2.8 thousand billion Rials.

CONCLUSION

Studying the existing system in the world can be easily observed that the more the government's role in supporting the body's supply chain and lower wheat production is more widespread, the integrity of wheat production is more.
In fact with tax credits and reduced cost of supporting producers and farmers to be ready to compete with foreign producers. On the other hand, with training courses on modern agricultural science and providing a good seed, increased crop volume and quality. Privacy wheat market has its advantages with which we are referring to some of them.

- Increasing the decision making and authority of farmers
- Entrepreneurship
- Establishment of unions among farmers and their unity for more profit making
- Unions for increase of productivity and quality as a result of increased knowledge and optimized application of resources
- Annual continuity of wheat cultivation and stable trend of production
- Increased competition and improved quality

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Table 1.Wheat Standarad Characteristics

Maximum grain cereals	Maximum other varieies of wheat seeds	Maximum percentage of impurities			Maximum of damaged grains									Maximum Volumetric weight	Level
		Pterygium	Weed seeds		Total impurities	SMUT beads made	Seed rot	Torn grain pests	Heat beans accessed	Discolored seeds in the bud	Sprouted seeds	Broken and shriveled grains	Whole grains damaged		Features
			Non-toxic	Toxic											
2	10	0	1	0	1	0	0	1	0	5	0	2	3/5	78	Lev. 1
4	15	25	2	1	2	5	2	2	2	1	1	5	6	75	Lev 2
7	20	5	5	2	2	1	5	2	5	2	2	9	10	72	Lev 3
10	25	1	1	2	5	2	1	5	1	2	2	14	15	71	Lev 4

Table 2.Wheat Purity in 2010

Useful / Not helpful	0	1	2	3	4	5	6	7	8	9	10
0	3426	3412	3398	3384	3370	3356	3342	3328	3314	3300	3386
1	3391	3377	3363	3349	3335	3321	3307	3293	3279	3265	3351
2	3356	3342	3328	3314	3300	3286	3372	3258	3244	3230	3316
3	3321	3307	3293	3279	3265	3251	3237	3223	3209	3195	3181
4	3286	3372	3258	3244	3230	3216	3202	3188	3174	3160	3146
5	3251	3237	3223	3209	3195	3181	3167	3153	3139	3125	3111
6	3216	3202	3188	3174	3160	3146	3132	3118	3104	3090	3076
7	3181	3167	3153	3125	3125	3111	3097	3083	3069	3055	3041

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Table 3.Main Wheat Producing Countries

	Average 2008-10	2009	2010 estimate	2011 forecast	Change: 2011 over 2010 (%)
EU	141.8	138.5	136.5	142.0	4.0
China (Mainland)	114.2	115.1	115.1	113.0	-1.8
India	80.0	80.7	80.8	81.5	0.9
United States	62.8	60.4	60.1	56.6	-5.8
Russian Federation	55.7	61.7	41.5	55.0	32.5
Canada	26.2	26.8	23.2	25.0	7.8
Australia	23.2	21.9	26.3	24.0	-8.8
Pakistan	22.8	24.0	23.3	24.0	3.0
Ukraine	20.7	20.8	17.2	21.0	22.1
Turkey	19.3	20.6	19.5	19.8	1.5
Kazakhstan	14.3	17.0	10.0	15.6	56.2
Iran Islamic Rep. of	12.4	13.0	14.5	13.2	-9.0
Argentina	10.4	8.8	14.0	13.5	-3.6
Egypt	8.3	8.5	8.5	8.6	0.9
Uzbekistan	6.5	6.6	6.7	6.6	-1.5
World	**674.4**	**684.5**	**653.7**	**676.0**	**3.4**

[1] Countries ranked according to average production 2008-10.
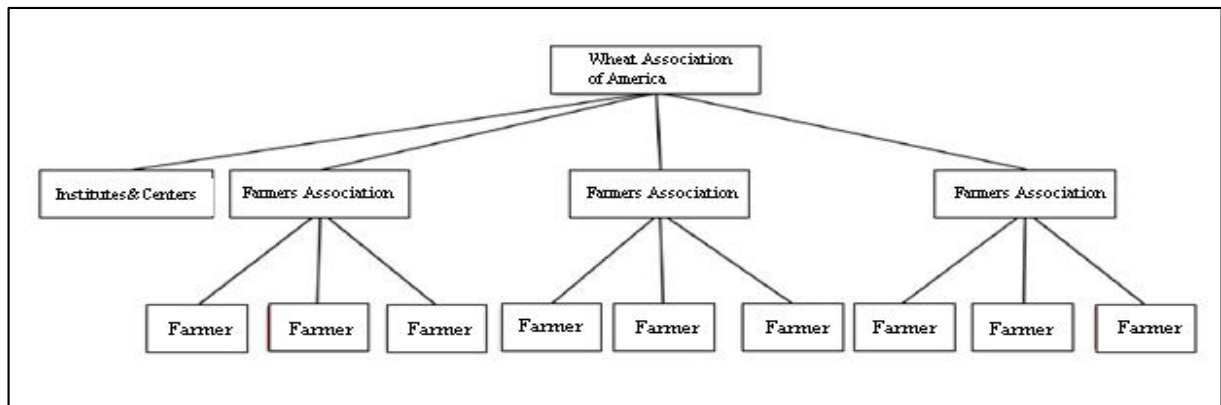
Fig.1.Structure of Wheat Industry in US

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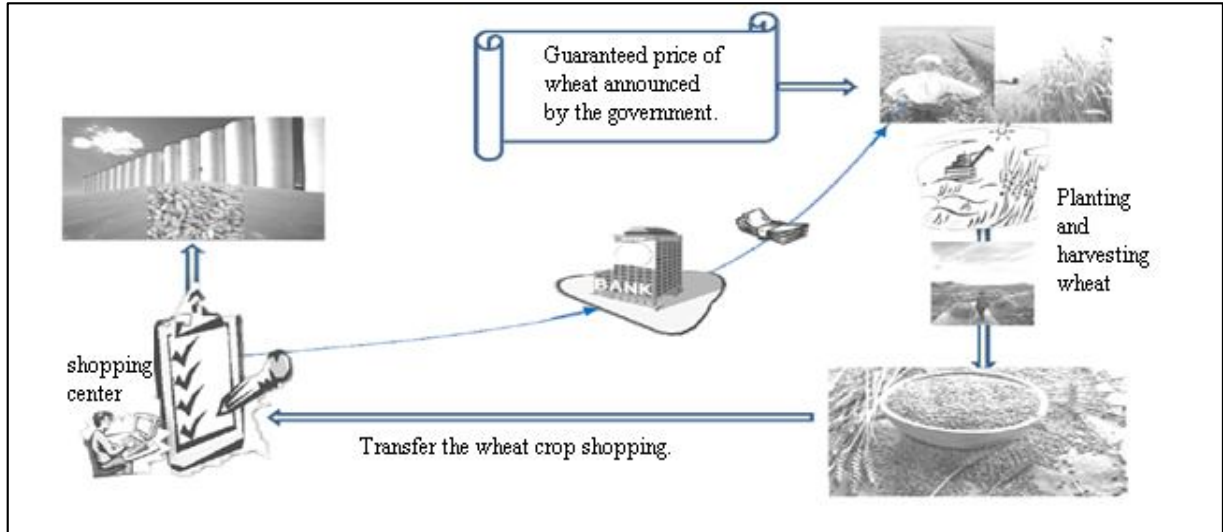
Fig 2: Schematic picture of the purchase process of wheat per year
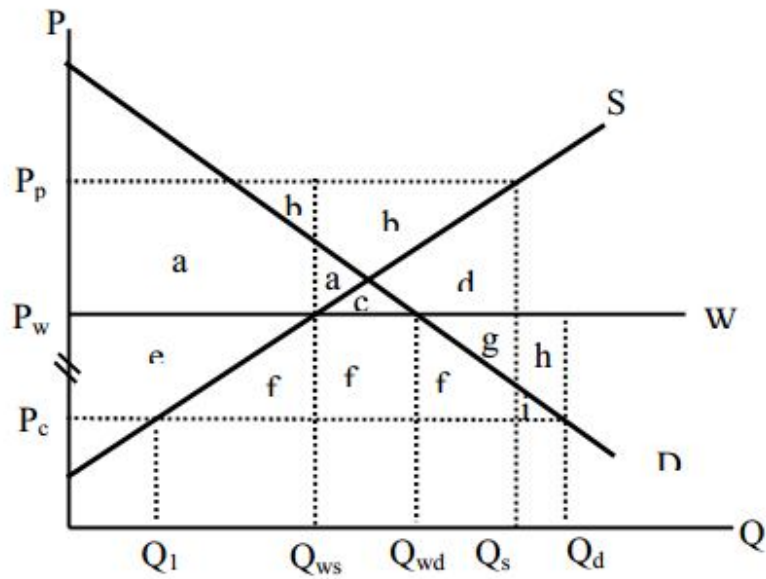
Fig 3. Trade condition and considering Iran as a minor importer

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Table 4.Welfare variations of target groups based on market policies of wheat in free trade market

$\delta = 0.175$	$\delta = 0.0.95$	$\delta = 0$	Load transfer income
-801⁄8	-801⁄8	-801⁄8	Changes in the welfare of producers
-8255⁄9	-8255⁄9	-8255⁄9	Changes in consumer welfare
-10107	-10107	-10107	Government spending
11875⁄7	11067⁄2	10107	Taxpayer welfare
2818⁄1	2009⁄5	1049⁄4	Social losses

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2. Volume with supplement: Shen HM, Zhang QF. Risk assessment of nickel carcinogenicity and occupational lung cancer. Environ Health Perspect 1994; 102 Suppl 1:275-82.

3. Issue with supplement: Payne DK, Sullivan MD, Massie MJ. Women's psychological reactions to breast cancer. Semin Oncol 1996;23(1, Suppl 2):89-97.

Books and other Monographs

4. Personal author(s): Ringsven MK, Bond D. Gerontology and leadership skills for nurses. 2nd ed. Albany (NY): Delmar Publishers; 1996.

5. Editor(s), compiler(s) as author: Norman IJ, Redfern SJ, editors. Mental health care for elderly people. New York: Churchill Livingstone; 1996.

6. Chapter in a book: Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Brenner BM, editors. Hypertension: pathophysiology, diagnosis, and management. 2nd ed. New York: Raven Press; 1995. p. 465-78.

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Biography

Srinivasa Ramanujan (1887-1920)-Great Indian Mathematician

It is one of the most romantic stories in the history of mathematics: in 1913, the English mathematician G. H. Hardy received a strange letter from an unknown clerk in Madras, India. The ten-page letter contained about 120 statements of theorems on infinite series, improper integrals, continued fractions, and number theory. Every prominent mathematician gets letters from cranks, and at first glance Hardy no doubt put this letter in that class. But something about the formulas made him take a second look, and show it to his collaborator J. E. Littlewood. After a few hours, they concluded that the results "must be true because, if they were not true, no one would have had the imagination to invent them".Thus was *Srinivasa Ramanujan* (1887-1920) introduced to the mathematical world. Born in South India, Ramanujan was a promising student, winning academic prizes in high school. But at age 16 his life took a decisive turn after he obtained a book titled *A Synopsis of Elementary Results in Pure and Applied Mathematics*. The book was simply a compilation of thousands of mathematical results, most set down with little or no indication of proof. It was in no sense a mathematical classic; rather, it was written as an aid to coaching English mathematics students facing the notoriously difficult Tripos examination, which involved a great deal of wholesale memorization. But in Ramanujan it inspired a burst of feverish mathematical activity, as he worked through the book's results and beyond. Unfortunately, his total immersion in mathematics was disastrous for Ramanujan's academic career: ignoring all his other subjects, he repeatedly failed his college exams.

As a college dropout from a poor family, Ramanujan's position was precarious. He lived off the charity of friends, filling notebooks with mathematical discoveries and seeking patrons to support his work. Finally he met with modest success when the Indian mathematician Ramachandra Rao provided him with first a modest subsidy, and later a clerkship at the Madras Port Trust. During this period Ramanujan had his first paper published a 17-page work on Bernoulli numbers that appeared in 1911 in the *Journal of the Indian Mathematical Society.* Ramanujan was named a research scholar at the University of Madras, receiving double his clerk's salary and required only to submit quarterly reports on his work. Ramanujan's arrival at Cambridge was the beginning of very successful five-year collaboration with Hardy. Hardy was a great exponent of rigor in analysis, while Ramanujan's results were (as Hardy put it) "arrived at by a process of mingled argument, intuition, and induction, of which he was entirely unable to give any coherent account". Hardy did his best to fill in the gaps in Ramanujan's education without discouraging him. He was amazed by Ramanujan's uncanny formal intuition in manipulating infinite series, continued fractions, and the like: "I have never met his equal, and can compare him only with Euleror Jacobi."One remarkable result of the Hardy-Ramanujan collaboration was a formula for the number p(n) of partitions of a number n. A partition of a positive integer n is just an expression for n as a sum of positive integers, regardless of order. Thus p(4) = 5 because 4 can be written as 1+1+1+1, 1+1+2, 2+2, 1+3, or 4. The problem of finding p(n) was studied by Euler, who found a formula for the generating function of p(n) (that is, for the infinite series whose nth term is p(n)x^n). While this allows one to calculate p(n) recursively, it doesn't lead to an explicit formula.Ramanujan's years in England were mathematically productive, and he gained the recognition he hoped for. Cambridge granted him a Bachelor of Science degree "by research" in 1916, and he was elected a Fellow of the Royal Society (the first Indian to be so honored) in 1918. In 1917 he was hospitalized, his doctors fearing for his life. By late 1918 his health had improved; he returned to India in 1919. But his health failed again, and he died the next year.Besides his published work, Ramanujan left behind several notebooks, which have been the object of much study. The English mathematician G. N. Watson wrote a long series of papers about them. More recently the American mathematician Bruce C. Berndt has written a multi-volume study of the notebooks. In 1997 *The Ramanujan Journal* was launched to publish work "in areas of mathematics influenced by Ramanujan".

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RESEARCH ARTICLE

Zoning and Determining the Status of Soil Pollution in the Area of Choghartiron ore in Bafg city using Ordinary Kriging and Universal Kriging and Comparison of these Two Methods

Reza Molkaraei[1]*, S.AliAlmodaresi[2] and AliRezaYarahmadiBafghi[3]

[1]MSc in Remote Sensing and Geospatial Information System, Civil Engineering College, Yazd Branch, Islamic Azad University, Iran.
[2]PhD Geomorphology, Assistant Professor, Civil Engineering college, GIS&RS Department, Yazd Branch, Islamic Azad University,HesabiBlv, Safaieh, Yazd,Iran,
[3]Assistant Professor Dept. of Mining & Metallurgy Engineering, Yazd University, Iran.

*Address for correspondence
Reza Molkaraei
MSc in Remote Sensing and Geospatial Information System,
Civil Engineering College,
Yazd Branch, Islamic Azad University,Iran.
E.mail: RezaMolkara128@gmail.com

ABSTRACT

Bafg of iron ore mines in the country as one of the most important industrial minerals production has been exploited for a long time and to this day it continues. But with regard to sustainable development and environmental issues, the contaminated areas have not been studied and lack of attention to environmental issues causes irreparable damages to the environment, especially in residential areas. This study concentrates on estimating and modeling of rating Fe, P, S, Zn and Si contents using geostatistical approach. An exploration database was made based on data gathered from 36 samples of soil (0-20 cm depth) which statistical studies were carried out. Directional semi-variograms used to analyze and interpret the spatial heterogeneity of the studied contents. Due to trend existence in spatial raw data of the studied elements, universal kriging method was applied in order to remove the trend.For Si we could not find a good semivariogram, so we used IDW method for estimating this content. The results indicated that the Universal Kriging method is more correct than Ordinary Kriging and that the IDW method is not a powerful method for soil contamination zonation. Results of Universal kriging, showing how the distribution of soil pollution in the area. Resons of Pollution in Stadied zone are due to dispersion of inorganic particles and dispersion of tailings dam particles as well as flowing seasonal streamsthat are flowed through the downward slope (toward residential areas) and western and northwestern winds and vehicles transporting minerals through road. This estimation which has minimum errors, establishes a manner for exploitation and blending plans. Besides, the Soil pollution map and Variance map was

generated.So in the end, Soil contamination computed, and the results indicated that the soil of area of interest has moderate contamination. Infact, soil pollution due to Fe elements is more than the other elements.

Key words: Geostatistics, Ordinary Kriging, Universal kriging, IDW, Soil Pollution estimation, Choghart Iron mine of Bafgh.

INTRODUCTION

Entrance of any external material to water, air, soil, and earth as much as it may change their physical, chemical or biological quality so that causes damage to human or other live creatures such as plants or in other words addition of any materials to the environment so that its natural balance is changed is called pollution. This pollution might be created in any parts of the environment. All of the human activities affect the environment in different ways. Among various processes of mineral activities, exploration process has the least effect on the environment and its effects are restricted to small disorders of surface scales, to establishing access roads and in some more advanced stages to drilling and excavation. Since the effects of mineral operations on environment should be minimum whereas some of these effects are inevitable and they occur in every developmental activity, these effects should be decreased to the minimum amount with a proper management. But during the extraction process, the effects are more severe and irreparable. One of the problems related to the activities of this mine which should be dealt with seriously is contamination caused by dusts in this area.

According to the fact that spatial analysis models in Iran are modern and they have been used for 12 years in European countries such as England as well as the United States, regarding the spatial superiority of this model, a lot of studies have been conducted in this area. The history of air pollution and its discussion backs to the middle ages and even before that. Therefore, air pollution and the established laws in this regard are not considered as a new phenomenon.Nowadays, various consequences of air pollution have led to surveillance and control of air quality as an inevitable issue around the world as the foremost position of the national problems. More than 4000 deaths in London in 1952 due to photochemical fogs is one of the most horrible events that have ever been happened because of air pollution. Also, in 1948 in the United States, air pollution and its stability for 4 days over Donora city of Pennsylvania caused 20 deaths and 14000 sick people in this city.

The present study attempts to put emphasis on the areas affected by the mine activities and to introduce the proper method for estimating the soil pollution.

Choghart Iron Mine of Bafgh

Choghart mine is located 12 kilometers away from north east of Bafgh city, 125 kilometers away from south east of Yazd, and 75 kilometers away from south west of Behabad city. It is on the margin of Iran Desert and its weather is very hot with very little moist. The original height of Choghart mass has been 1286 meters above sea and about 150 meters higher than the area around it. This mine is connected to Tehran through 1000 kilometers railroad, 470 kilometers to Esfahan Steel Company, and 610 kilometers to Bandarabbas through Sirjan (figure 1.1).

Climatic Features of the Studied Region

Air currents are considered as effective factors on the climate of the region. In sum, 5 air currents with different characteristics affect the region's climate and because of the differences in their characteristics, sometimes they bring about abrupt changes in the climate such as the subtropical high pressure of Arezoo, western winds, long

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Mediterranean landing, synoptic systems of external subtropical.According to the above-mentioned cases, the major source of the precipitations of Orumyeh region is the desirable weather which along with migrant low pressure centers penetrates to the region from western geographical sector. The conditions of frequent and connective precipitations are also present in the region during spring and fall seasons.Based on Domarton's classification, the climate of the region is dry. Therefore, during the seasons except spring and fall with the most precipitation in this region and occurrence of seasonal floods, the main reason of displacement of the polluted particles of soil is air currents.

MATERIALS AND METHODS

The data used in the operation of estimating the soil pollution include sample information from ground's surface and the topography maps.

Statistical Analysis

Statistical analysis of the raw data which are used in estimation and recognition of their statistical features especially the nature of data distribution are great help in accurate estimation as well as the analysis of its achieved results (Madani, 1994).In this study, weight percent amounts of the elements, as the most important qualitative parameter of the soil pollution, are taken for statistical evaluation and estimation.Gaussian statistical analysis assumes that the distribution of the data is normal. Prerequisite of some concepts of statistical ground such as using reliability of the hypotheses and sketching variogram are present on the condition of normal distribution of the data (Hasani-pak, 2000). Analyzing the histogram and normality test, it was clarified that the amounts of the two ferrous and silica were near the normal distribution but other elements such as phosphor, sulfur, and zinc were not normal. For normalizing these data, Box-Cox method was used.In order to discover and omit the data out of the row, Box-plot diagrams were used because existence of the out of row amounts in the data causes high increase of errors in estimation (Molayemat, 2012).

According to the results of the carried out tests on the amounts of Fe,it can be declared that the raw amounts of this qualitative parameter have the capacity to be used in geostatistic analyses without the need to statistical transformations.Based on the results of the carried out tests on the amounts of P, it can be showed that the raw amounts of this qualitative parameter have the capacity to be used in geostatistic analyses with the need to statistical transformations. According to the results of the carried out tests on the amounts of Phosphor, it can be declared that the raw amounts of this qualitative parameter have the capacity to be used in geostatistic analyses with the need to statistical transformations.According to the results of the accomplished tests on the amounts of Phosphor, it can be declared that the raw amounts of this qualitative parameter have the capacity to be used in geostatistic analyses with the need to statistical transformations.

Geostatistic Analysis

Variography and Universal Kriging

Varigraphy is the most fundamental part of geostatistics' studies for reserve estimation. Variogram output includes three parameters of nugget effect, effect radius and variogram maximum. Varographyoperation was carried out by application of Arc GIS 10.2 software and in different azimuths. However, on the first step, attempts on modeling each one of these variograms were failed. The reason has been the presence of the trend in the weight percent of the studied elements. In other words, with increase of distance (h), the variogramof the elements is continuously increased and is passed with an almost linear trend from the total variance of the population (figures 16.2 to 20.2).

this phenomenon is appeared on the occasions in which amounts ofthe studied variables have correlation with their spatial coordination and have a trend in that, at first, by application of ordinary kriging method, for elements such as ferrous, phosphor, sulfur, silica, and zinc, some variograms were fitted. After that, because of presence of the trend the universal kriging was used but for silica element, because there was not spatial relationfor data, an appropriate variogram was not found for the data. Therefore, for final interpolation, IDWwas used. Also, for strength of spatial structure a variable from the ratio of C_0 to Still was used in which C_0 is nugget effect and still is the amount of threshold. This ratio is indicative of the fact that how much of the total variability is justified by the nugget effect (the part without structure) (Hasanipak, 2010; Mehdizadeh et al. 2006). The ratio between nugget effect and threshold amount (C_0/Still) is called correlation ratio in variogram and ratios 0.25 and 0.75 are two thresholds for relative intensity of spatial dependence. A variable with ratio of less than 0.25 is indicative of strong spatial dependence. A variable with ratio of0.25 to 0.75 has moderate spatial dependence while a variable with ratio more than 0.75 has a weak spatial dependence (Esmaeilnia et al. 2000).

For fitness of the variogram, this trend needs to be discovered and omitted. All the steps required for this issue is known as universal kriging (Molayemat, 2012). As it was mentioned before, for estimation by kriging method, there is a need for sketching varigram in that by sketching and comparing the varigram in different directions, appropriate searching slopes for the main direction of the individual elements were achieved uniquely and varigraphy operation was carried out in different azimuths so that the most reliable variogram was obtained. This information is shown in table 1.2.

In table 2-1 the ratio of nugget effect on threshold amount for the elements is more than 0.75 that shows weak spatial dependency of these elements. As it is observed, the correlation of silica has found a better condition after omission of the trend. Later on in this article, a more detailed discussion is given about spatial relation of silica. If fitness of a standard model to experiential variogram be carried out well, its results will be as follows:

1. The mean of the errors must be close to zero. This equation is calculated as:

$$(2.1) \qquad \frac{\sum_{i=1}^{n}(\hat{Z}(s_i) - z(s_i))}{n}$$

This equation is achieved from averaging from difference of real values from the estimated amounts (error values) where si is the elements' percentage in the studies areas.

2. Distribution function of errors should be normal.

3. Average standard error (STD) which is obtained by the following formula should be close to zero;

$$(2.2) \qquad \sqrt{\frac{\sum_{i=1}^{n}\hat{\sigma}^2(s_i)}{n}}$$

4. Root mean square error (RMSE) which is achieved by the following formula should be close to zero:

$$(2.3) \qquad \sqrt{\frac{\sum_{i=1}^{n}(\hat{Z}(s_i) - z(s_i))^2}{n}}$$

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5. Root mean square error (RMSE) and Average standard error (STD) should be close to each others.

6. Standardized error which is achieved by the following formula should be close to zero:

$$\frac{\sum_{i=1}^{n}(\hat{Z}(s_i) - z(s_i))/\hat{\sigma}(s_i)}{n}$$

(2.4)

7. Root mean square standardized (STDD) should be close to 1. Based on equation (3.50) we have:

$$\sqrt{\frac{\sum_{i=1}^{n}\left[(\hat{Z}(s_i) - z(s_i))/\hat{\sigma}(s_i)\right]^2}{n}}$$

(2.5)

If this error amount was much greater than 1 it means that variability in estimation would be less than real value, i.e. our geostatistics has downplaying estimation of the data. But if this number is much less than 1 it means that estimation is exaggerated.

8. Mean absolute error (MAE) should be close to zero

9. For accuracy of estimation, it is necessary that Jack Naif error be close to 1.

With having the above nine conditions, our variogram will be acceptable and kriging estimating method could be used for estimation of the region.

Varography Results

Variogram of ferrous (Universal method)

The variogram of the figure2-16for Ferrous, has reflected spatial structures of the region in the best way and has parameters in accordance with Table 2-1.As it is observed from the figure, the appropriate azimuth for variogram is 184 degrees and appropriate searching slope in the main direction for Fe is 43degrees and bandwidth for Lags of this element is 3.375. Thisvariogram has all the 9 mentioned conditions.

Variogram of ferrous (Universal method)

The variogram in figure 2-17 for phosphor has reflected spatial structure of the region in the best way and is in accordance with parameters of Table 2-1.In this variogram, azimuth equals 266.5 degrees and the appropriate searching slope in the main direction for phosphor is 38 degrees the bandwidth for Lags of this element is 3.905. thisvariogram includes all nine above conditions.

Variogram of sulfur (universal method)

The variogram in figure 2-18 for sulfur has reflected spatial structure of the region in the best way and is in accordance with parameters of Table 2-1.
This variogram shows that azimuth equals 85.99 degrees and the appropriate searching slope in the main direction for phosphor is 36 degrees, the bandwidth for Lags of this element is 1.995. Thisvariogram includes all nine above-mentioned conditions.

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Variogram of silica

The variogram in figure 2-19 is for silica. This variogram is shown linear which indicates that there are no spatial relationsbetween the data of the element and geographical position. Therefore, ordinary kriging and universal kirigingcan not be used for estimation of silica element; as a result, IDW method was used for this element.

Variogram of zinc (universal method)

The variogram in figure 2-20 for zinc has reflected spatial structure of the region in the best way and it agrees with parameters of Table 2-1.In this variogram, azimuth is319.9 degrees and the appropriate searching slope in the main direction for phosphor is 66.2 degrees and the bandwidth for Lags of this element is 5.56. This variogram includes all nine above-mentioned conditions.

RESULTS

Spatial distribution (classification) of the elements

Figure 3-1 shows the variance function of the carried out estimation by universal kriging method. As it is observed, the center of the map with black color shows the least amount of variance and ensures the most reliability of the estimation and by getting away from the sampling area, the reliability of the estimation map will be less.

Figure 3-2 shows the map of height changes of the region for the universal kriging. As it is clear, the heightshave reductive trend from northeast to southeast, the direction of southeast to south reductive trend and its slope is descending toward south. In general, from north direction of the image to south the slope of the region has descending trend.

Figure 3-3 indicates the map of spatial distribution resulted Fe from ordinary and universal kriging. In the areas where data variance (fig. 3-1) hasits highest amount, the map has an acceptable accuracy. The less is variance, the more is the error in estimation and there is a need to additional points in those areas so that the desirable and reliable accuracy could be achieved. Here, it should be mentioned that the displacement of Fe happens physically,i.e. this element is moved by the factors such as wind. This phenomenon is indicated clearly in figure 2.38. Movement direction of Fe particles is inthe direction of northwest-southeast winds. The most Fe percentage –accumulatively- is located on the north part of the region that is where the mine is located. It's not surprising that the percent amount of Fe around the mine, because of high anomaly of this metal in this region and dispersion of its particles due to extraction operations is more than the other areas of the studied region. According to the Fe spatial distribution map we can recognize that the movement direction of thesuspended particles of Feis from the mine toward south and south east of the region. The effective factors of this event are wind, approximate height difference of 100 meters from the mine towards city and other factors such as vehicles in transferring these particles toward residential areas,

Figure 3-4. Shows spatial distribution map of phosphor resulted from ordinary krigingand universal kriging. It should bementioned that movement of phosphor occurs in a chemical process i.e. being soluble in water. Therefore, the direction of phosphor movement is in the same direction with general slope of the region which is from north towards south. Also, in some points on the east part of the region, because of topographic accumulation of phosphoron the hillside, the top of the hill has aless grade of this element. The most percent amount of this element in the region is in east, north east, south east and south west. This is because of the anomaly of high phosphorousferrous in the region of iron mine that is an obvious phenomenon and its dispersion in the direction of the region's slope by seasonal precipitation is observed in the spatial distribution map of phosphor. But abrupt increase of this element in surface soil in the North West part of the region is due to accumulation of high

phosphorous iron ore and the creation of storage services of this production in Choghart mine. In North West part of Choghart mine there is tailings dam of the mine on the high phosphorous streak of North West that has been the cause of phosphoric pollutants around its own area.

Figure 3-5 is the spatial distribution map of silica of the region which is resulted from IDW method. Movement of silica has been physically that justifies this event very wellin that the movementdirection ofthe silica particles has been in the direction of wind blowing from north west to south and south east. Existence of tailings dams in the North West part of the sampling areas has been the factor of accumulationof this element in the region and movement of this element toward residential areas.

Figure 3-6 is spatial distribution map of sulfur in the region which is achieved by ordinarykriging and universal kriging method. Movement of sulfur occurs chemically and the image justifies this event clearly. The movement direction of soil pollution with sulfur is in the direction of the region's slope (northern-southern) that indicates this element moves from tailings dam in the west points of the sampling. It is important that the fan shape of this zonation shows that pollution dispersion of soil occurs from its north part where the tailings dam is located. This happens by solution of this element in water and its movement in the direction of the slope of the region. Here, it should be mentioned that existence of gas station near the point number 8 of sampling has caused the increase of this element in the region and it justifies the progress of this element toward west, because gasoline includes sulfur. According to satellite image of the region, a perceptible color change can be observed in this part that demands more studies to investigate whether there is anomaly of sulfur or not.

Figure 3-7 is spatial distribution map of zinc in the region which is the result of ordinary kriging anduniversal kriging. Movement of zinc has been very similar to movement of sulfur which is occurred chemically. The right image justifies this event clearly that the movement direction of zinc particles is shown like sulfur's. Tailings dam in the west area of the sampling points could be the reason of this trend in the region. Using fertilizers in gardens, presence of trees and created artificial heights by human have led to average accumulation of this element. The majority part of the region has average zinc that is very close to the crisis amount. By continuing this process, the possibility of pollution increase in the residential area is very important and preventive ways should be considered to stop entrance of this element from the desert part to the north part of Bafgh city.

Based on the carried out test, the percentage amount of lead in all of the samples was less than %0.01 that was not in the accuracy of the laboratory. During the conducted studies based on three factors of pollution, geoaccumulation index, and pollution load factor, pollution of the studied region has been low to average so that for Fe pollution has been very close to average while for the rest of the elements it has been in the range of low (Malekaraie, 2014). The reasons of this pollution are open extraction of mine and tailings dam in the region.

DISCUSSION AND CONCLUSION

Studies and analyses of this article led to the following conclusions:

1. The most important findings from application of spatial distribution maps of the metals, land use map and geology of the region, show that the major factors of high density of heavy metals in the region are the present mineral materials in mine such as phosphor, ferrous (including storage place of minerals of ferrous that their phosphor percentage is very high and located on the west side of the mine) and waste materials in the mine tailings dam which is on the west side of the mine. Factors such as raining, wind blowing from North West to south and south east, as well as transportation vehicles and loading the mineral materials disperse the materials from pollution sources to the residential regions. According to spatial distribution maps, the risk of pollution has been increased by phosphor and ferrous elements. It should be mentioned

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that the pollution of the region has been low to average and has not been reached to the dangerous rate. However, measures and strategies are needed to prevent the increasing tren of pollution.

2. According to spatial distribution maps, sulfur has unordinary source that is indicative of probability of anomaly for this element in east part of the region. This phenomenon needs more analyses and more precise experiments in the points 5, 7, 20, 21, and 22 in the east part to reach more accurate results.

3. Spatial distribution map for zinc shows that location points 5, 10, and 32 have the most amount of density. In this map, distribution of this elementis in the direction of wind from North West to south east that toward south east the amount of this element is reduced. Based on universal standardsofthe world's unpolluted soils (especially Flojeh city near Iran), this element has not been exceeded from the permissible limitation and it is not worrying (Manta et al. 2002).

4. According to the validity of krigingvariograms, there was not an appropriate method for interpolation of silica; therefore, IDW method was used.

5. Percentage of lead in the studied samples is less than %0.01 which equals 1Mg/Kg, then, less than 3.82 Mg/Kg that will not have pollution and risk for the region.

6. Another result of the study is the fact that increasing and decreasing trends in the elements cause the rejection of the reliability hypothesis and this does not allow the researcher to use kriging method; however, omitting this trend by usage of universal kriging, this geostatistics can be used for estimation of the environmental data.

7. Generally speaking, this study indicates that geostatistics could be effective in estimation of qualitative and qualitative parameters as well as evaluation of soil pollution and if appropriate interpretation is applied, it will be a suitable tool for extractionof spatial structure of data and their anisotropy. On the other hand, the traditional method is inverse-square of distance which lacks the required tools for extraction of spatial structures and takes the environment as isotropic. The difference between these two estimation methods has been indicated in zonation of soil pollution in the region of Bafgh Iron Ore Mine. According to the advantages mentioned for geostatistics method, it is recommended to be used for pollution estimation of soil.

SUGGESTIONS

As there are multivariable methods in classic statistics for estimation,in geostatistics, with co-kriging method estimation can be done based on correlation between various variables. This characteristic could increase the accuracy of the estimations and economize the costs (with less sampling). The areas in which there is shortage of sampling, estimation can be carried out by the help of secondary variables and usage of mutual correlation between the major and secondary variables. When a number of correlated variables are estimated together, based on co-kriging theory, they are in priority in relation to one-variable kriging. Even when the variables are enough available in the samples, combined co-kriging is better than one-variable kriging. It is suggested that for increasing the accuracy of estimation, co-kriging method be used (especially for silica for which an appropriate variogram was not found).

2. It is suggested that the soil of this region be studied regarding other heavy metals such as cadmium, nickel, and chrome.

3. In order to blend remote sensing and geostatistics method by co-kriging to increase accuracy of the estimation, in the areas without earth sampling, satellite images with high resolutions can be used.

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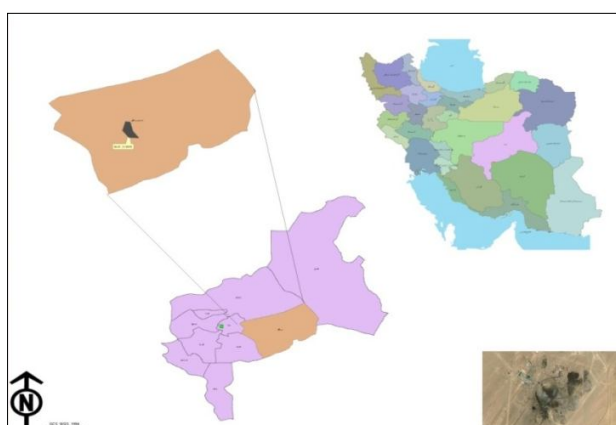
Figure 1.1. Geographical position of Bafgh Iron Mine

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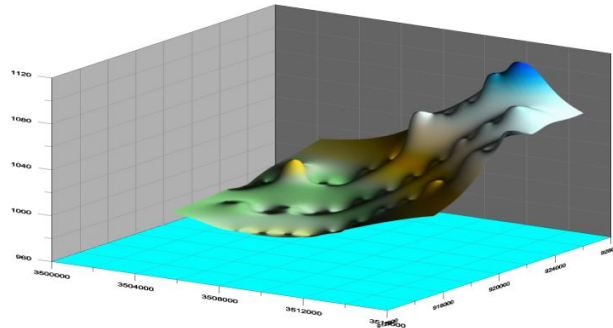
Figure 1-2. Topography map of the region (the mine is located on the top side of the slope and the residential region on the down side)
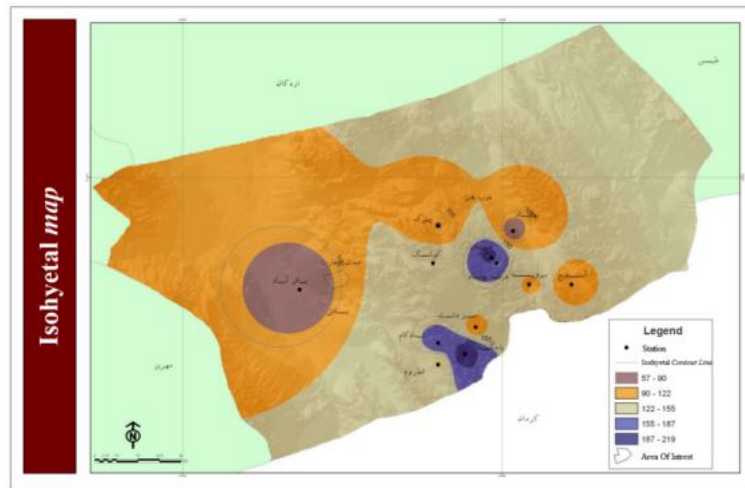
Figure 1-3. Precipitation map of the region
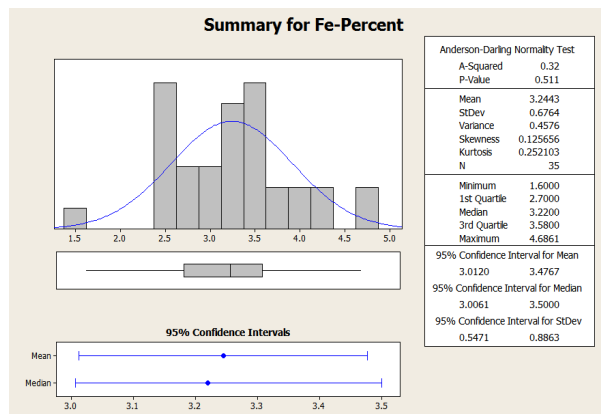
Figure 2-1.Histogram of weight percent of Fe

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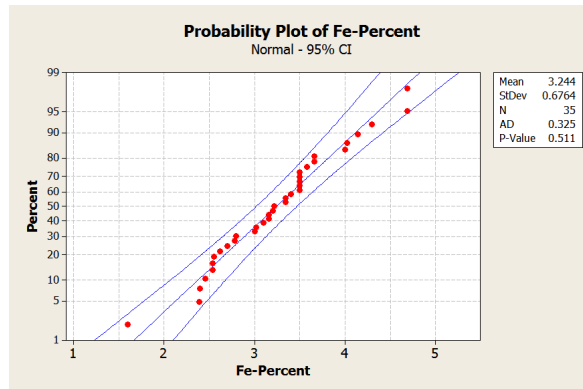
Figure 2-2.Probability function of weight percent of Fe
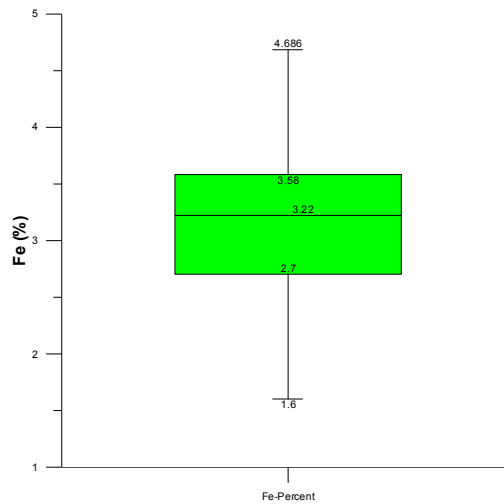
Figure 2-3. Box-plot diagram of amounts of weight percent of Fe
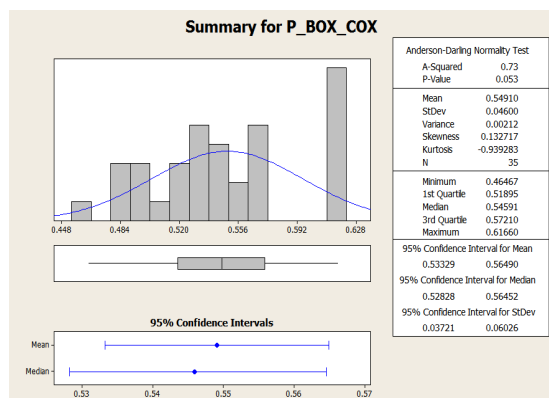
Figure 2-4. Histogram of weight percent of the transformed P

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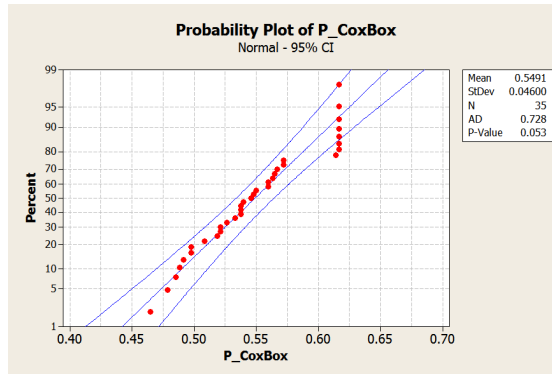
Figure 2-5. Probability function of weight percent of the transformed P
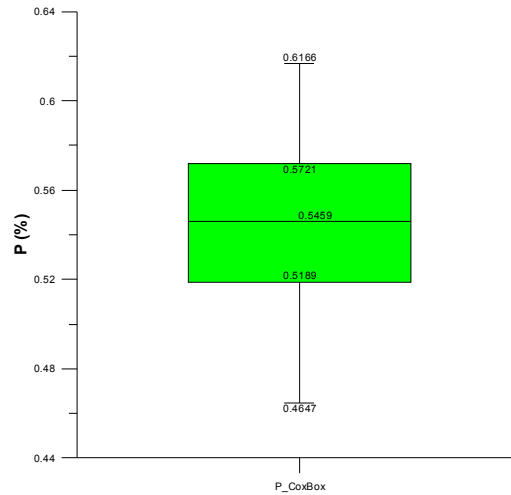
Figure 2-6. Box-plot diagram of weight percent for the transformed P
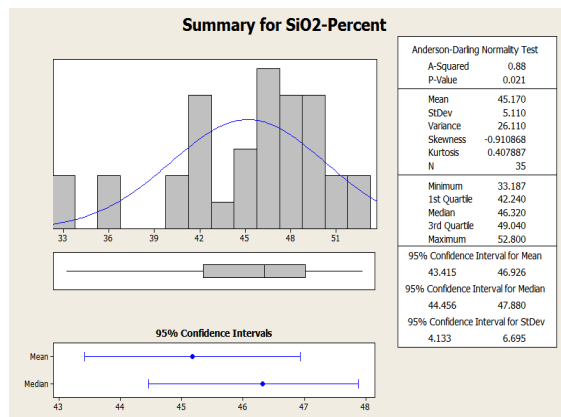
Figure 2-7. Weight percent histogram of Si

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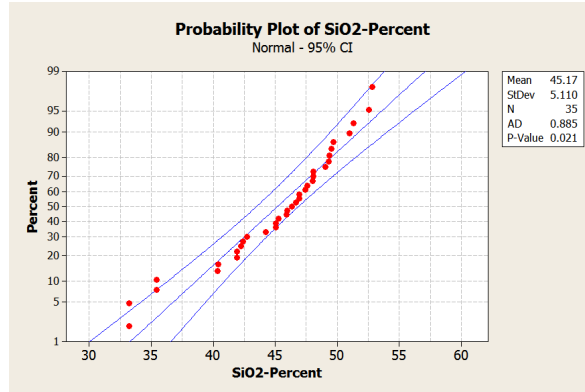
Figure 2-8. Probability function of weight percent of Si
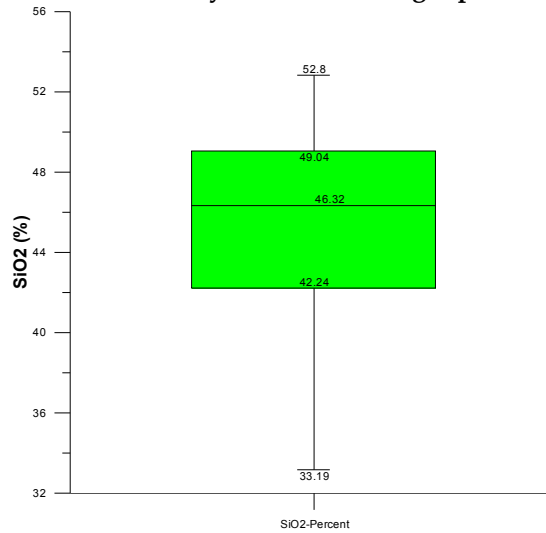
Figure 2-9. Box-plot diagram of weight percent of Si
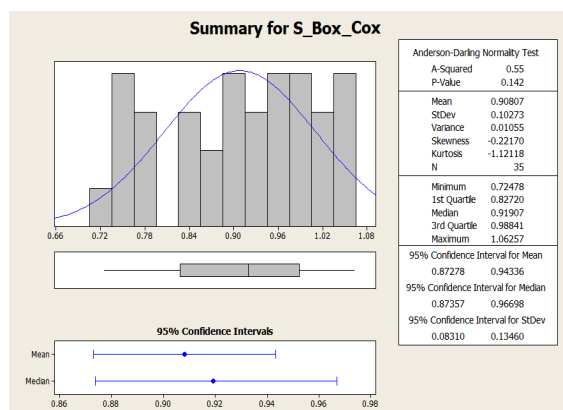
Figure 2-10. Weight percent histogram of the transformed sulfur

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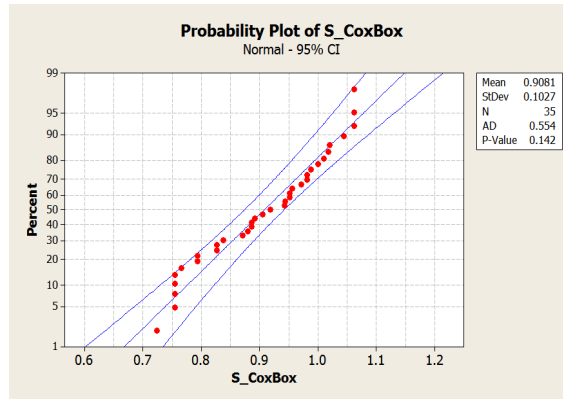
Figure 2-11. Probability function of weight percent of the transformed sulfur
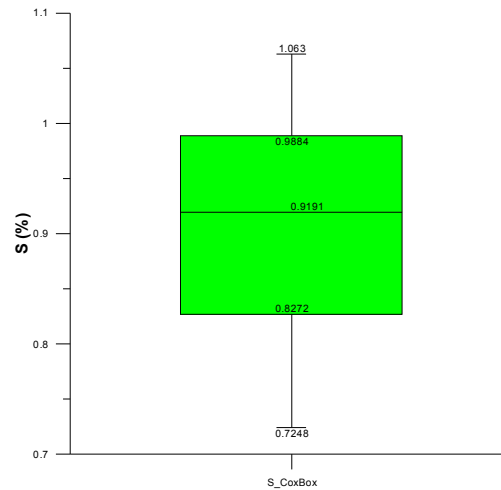
Figure 2-12. Box-plot diagram of weight percent of the transformed sulfur
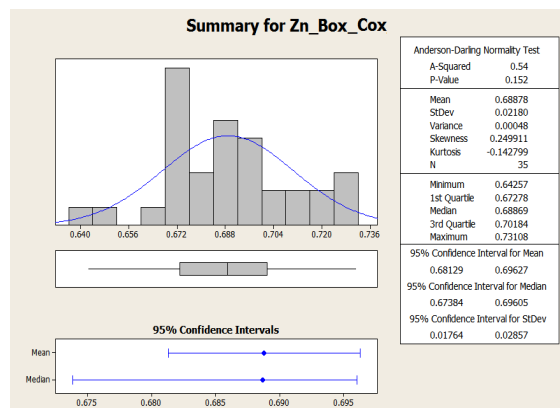
Figure 2-13. Weight percent histogram of the transformed Zinc

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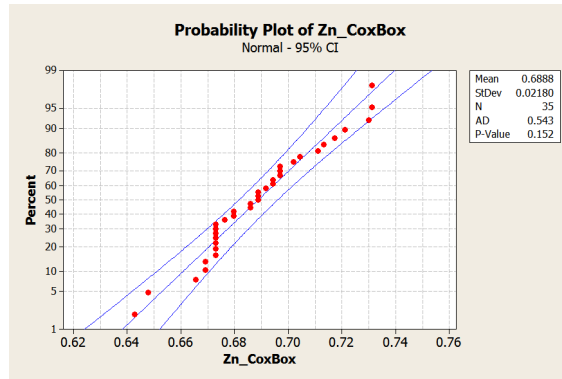
Figure 2-14. Probability amount of weight percent of the transformed zinc
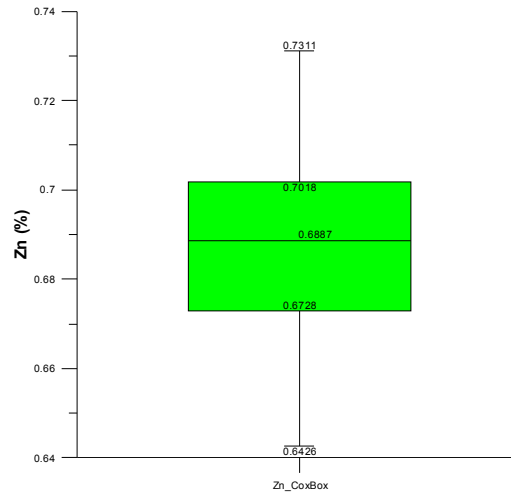
Figure 2.15. Box-plot diagram of weight percent of the transformed zinc

Table 2-1.Variogram parameters in universal kriging for the studied element

Soil factor	Model	Nugget (Co)	Major range	Sill (C+Cu)	Co/C+Co
Ferrous	Gaussian	0.256	10363	0.222	1.16
Phosphor	Gaussian	0.072	16649	0.029	2.49
Silica	Gaussian	17.260	6008	8.295	2.08
Sulfur	Gaussian	0.757	11897	0.340	1.23
zinc	Gaussian	0.021	4846	0.027	0.79

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Table 2-2. Validation parameters of the variogram in universal kriging

Soil factor	Jack Naif Error	Mean error	RMS error	Average STD Error	Mean Stdd Error	RMS Stdd Error	MAE
Ferrous	1.002	-0.032	0.658	0.581	-0.063	1.088	0.516
Phosphor	1.001	-0.0013	0.0314	0.023	-0.176	1.411	0.025
Silica	1.011	0.249	5.730	5.502	0.0213	1.076	4.717
Sulfur	1.010	-0.069	0.539	0.401	-0.317	1.482	0.437
Zinc	1.001	-0.001	0.012	0.008	-0.240	1.484	0.009
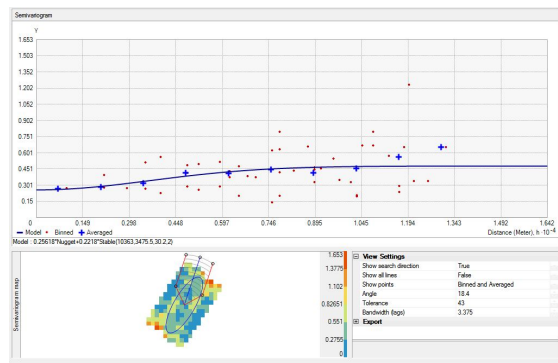
Figure2.16. Variogram in the main direction for data of ferrous index
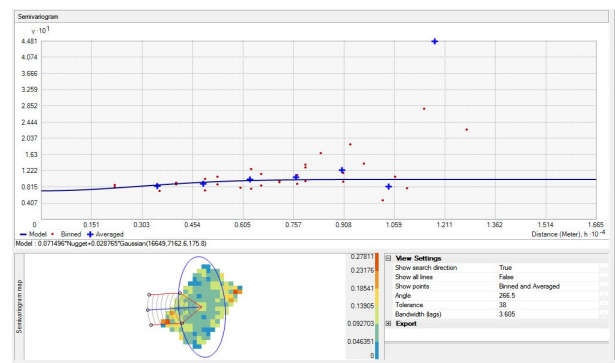
Figure2.17. Variogram in the main direction for data of phosphor index
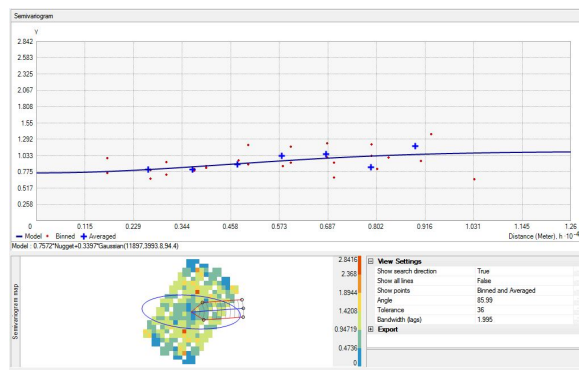
Figure 2.18.Variogram in the main direction for sulfur index data
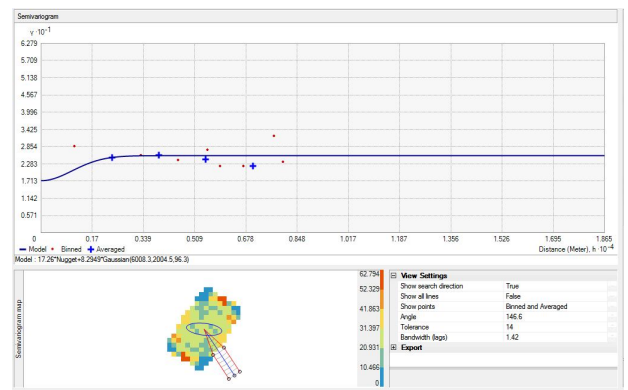
Figure 2.19.Variogram in the main direction for silica data

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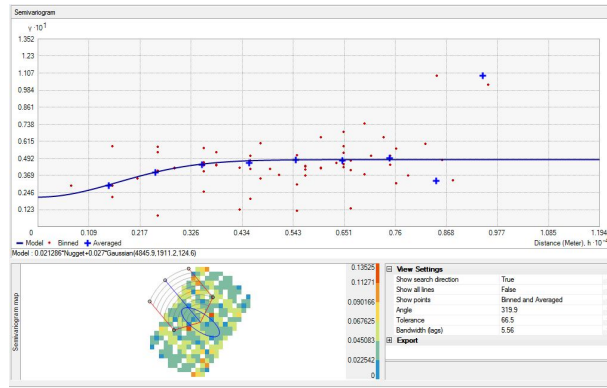
Figure 2-20. Variogram in the main direction for zinc data
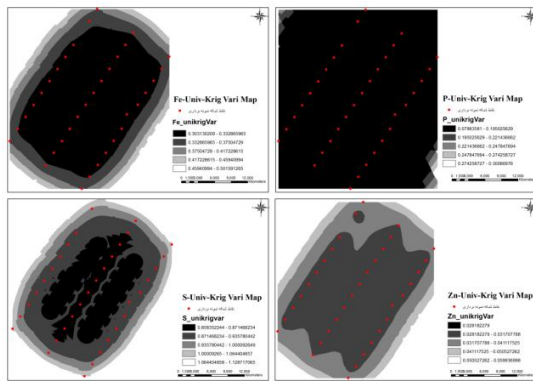
Figure 3-1. Variance function map of estimation data of universal kriging
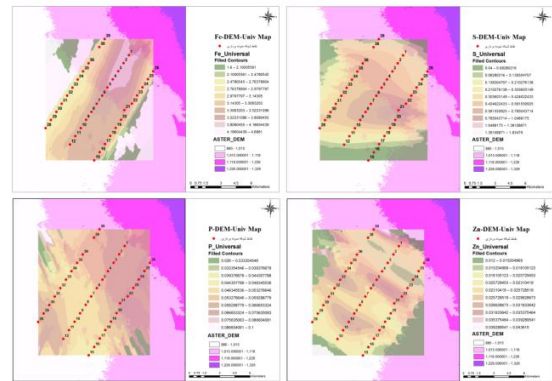
Figure 3-2.map of height changes of the region in universal kriging
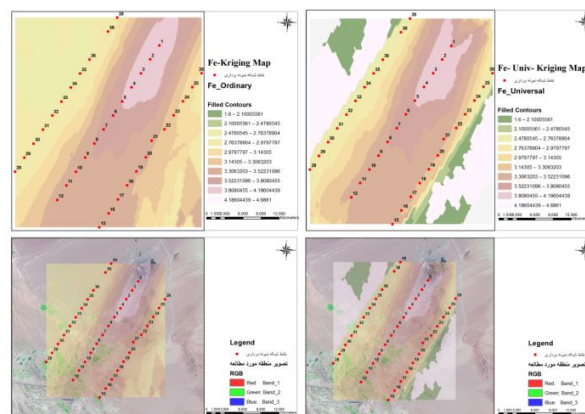
Figure 3-3.Spatial distribution map of Fe (ordinary kriging on the left, universal kriging on the right)

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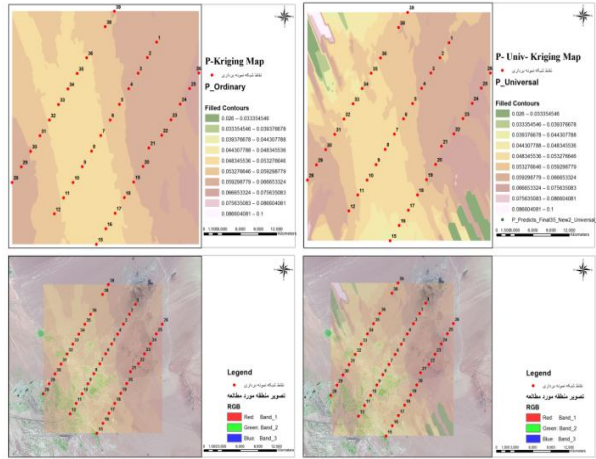
Figure 3-4. Spatial distribution map of phosphor (ordinary kriging on the left, universal krigingon the right)
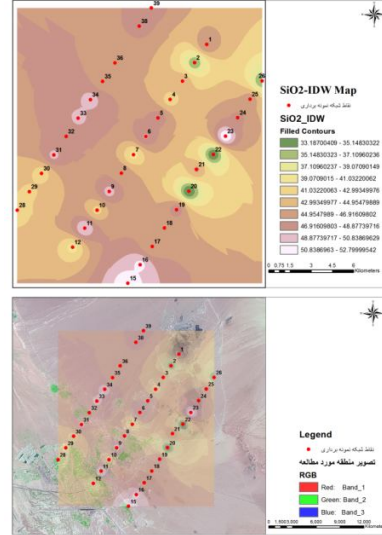
Figure 3-5. Special distribution map of silica (IDW)
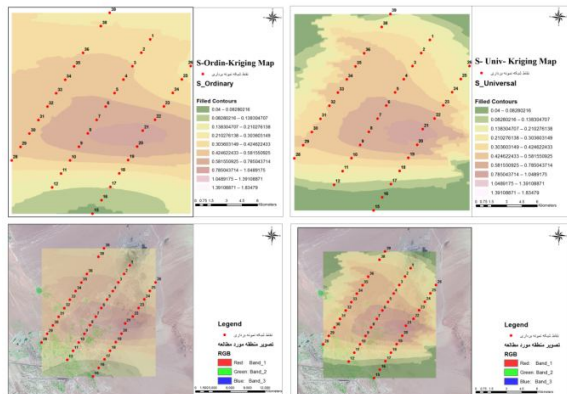
Figure 3-6. Spatial distribution map of sulfur (ordinary kriging on the left, universal kriging on the right)
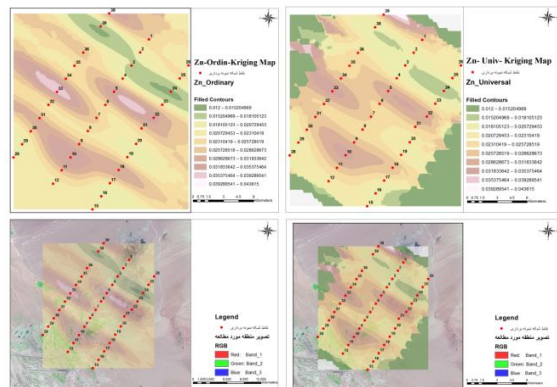
Figure 3-7. Spatial distribution map of zinc (ordinary kriging on the left, universal kriging on the right)

RESEARCH ARTICLE

Soybean as Affected by Zn, Fe, and Mn fertilization (I) : Yield Components

Soheil Kobraee* and Keyvan Shamsi

Department of Agronomy and Plant Breeding, College of Agriculture, Kermanshah Branch**,** Islamic Azad University, Kermanshah, Iran.

*Address for correspondence
Soheil Kobraee
Department of Agronomy and Plant Breeding,
College of Agriculture,
Kermanshah Branch**,**
Islamic Azad University,
Kermanshah, Iran.
E.mail: Kobraee@yahoo.com
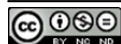
ABSTRACT

In order to investigate the effects of micronutrients on yield components in soybean, two experiments were conducted in a factorial based on randomized complete block design with three replications in Kermanshah at 2010-2011. In this study, treatments includes: three level of Zn (0, 20, 40kg/ha), Fe (0, 25, 50kg/ha), and Mn (0, 20, 40kg/ha). At the end of growth season, five plants were selected from each plot randomly and measured yield components and morphological traits. The results showed that except for number of nods per plant, other yield components were affected by zinc application. 100 seed weight per main stem was not affected by Fe applied, but number of sub branch and 100 seed weight per plant ($P<0.05$) and other traits ($P<0.01$) showing a highly significant difference with iron application. Manganese had no significant effects on number of sub branch, while other evaluated traits were showed highly significant differences at 1% level. The highest number of pod per plant was observed in 40, 25, and 40 kg ha^{-1} Zn, Fe, and Mn application, respectively. Manganese application up to 40 kg ha^{-1} increased seed number per plant by 31.8% compared check treatment (Mn$_0$). Excess amount of iron applied reduced 100-seed weight per main stem, sub branch and plant.

Key words: iron, manganese, soybean, yield components, zinc.

Soheil Kobraee and Keyvan Shamsi

INTRODUCTION

Micronutrients, also known as trace minerals, which are required in small quantities by crops. Micronutrients play a vital role in the growth and development of soybean plant. Deficiency in any one of micronutrients reduces plant growth and crop yields. Soybean is a main source of high-quality plant protein and oil for both humans and animals. According to statistics of the Food and Agriculture organization, the annual worldwide production of soybean grain is approximately 261.5 M t on 102.3 M ha. In Iran, soybean was produced 162698 t on 76076 ha (FAO, 2010). There is positive correlation between essential macro and micro element accumulation and improvement of quality and quantity characteristics of soybean plant. Soybean yield is determined by yield components, which are number of pod per plant, number of seed per pod, and seed weight (Ohashi and Nakayama, 2009). It is very important to understand the formation of yield components and management practices that can be influenced yield components and consequently final yield. Yield components could be used as a criterion for determination of environmental factors limiting crop yield. Soybean production is reduced due to Fe, Mn and Zn deficiency, especially in calcareous soils where availability of these micronutrients is significantly reduced (Khudsar *et al.*, 2008, Caliskan *et al.*, 2008). Ebrahimian and Bybordi, (2011) stated that yield components of sunflower improved by iron application. Goos and Johanson, (2000) emphasized that iron deficiency in calcareous soils is a major problem in soybean cultivation. In addition, yield components of soybean increased by zinc (Khampariva, 1996) and manganese (Singh, 1997) application. Therefore, the main objective of this experiment is to investigation of yield components in soybean when that zinc, iron and manganese fertilizers were used.

MATERIALS AND METHODS

In order to investigation of yield components in soybean when that zinc, iron and manganese fertilizers were used, two experiments were conducted under field conditions in Kermanshah (34°23′ N, 47°8′ E; 1351 m elevation), Iran at two years 2009 and 2010. Every year, Williams [*Glycine max* (maturity group III), supplied by the oilseed company of the Kermanshah Agricultural Administration, Iran], was selected as the experimental material. Soil samples were collected from experimental area at 0-30 cm depth. The results of soil analysis are shown in Table (1).

The experimental design was a 3 × 3 × 3 factorial experiment based on randomized complete block with three replicates. Before planting of soybean, fertilizers were used as follows: 200 kg P2O5/ha and 50 kg N/ha and mixed with soil and land was ploughed once and harrowed twice. Soybean seed was inoculated with *Bradyrhizobium japonicum*. This experiment included 27 treatments that were placed in 81 plots. The plots consisted of six rows, 5 m in length spacing 60 cm apart. The distance between plants within a row was 5 cm and plant density was 333000 plants/ha. The plant density was achieved by over planting and thinning at V3 stage. Usage amounts of fertilizers zinc (0, 20 and 40 kg/ha from ZnSO4 source), iron (0, 25 and 50 kg/ha from FeSO4 source) and manganese (0, 25 and 40 kg/ha from MnSO4 source) were calculated based on plots area surface; next, fertilizers were mixed with soft soil at the ratio of 1: 5 and placed on furrows made manually next to the stacks. At the end of growing season (R8: harvested time) based on (Fehr and Caviness, 1977), five plants were selected from each plot randomly. Number of sub branch, number of node per plant, number of pod and seed per main stem, sub branch and plant were counted for each plot, separately. 100 seed weight in main stem, sub branch and plant were determined by selecting ten random samples from grains harvested from each plot. MSTATC software was used for statistical analysis. Combined variance analysis was performed after Bartlet test for checking uniformity of data variance (*P=0.05*) on targeted traits. LSD (Least Significant Difference Test) was used to compare means and finally, Excel software was applied to construct diagrams.

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RESULTS AND DISCUSSION

The results of variance analysis were shown in Table (2). Based on results obtained, zinc, iron and manganese micronutrients had highly significant effects on number of pod per main stem, number of pod per sub branch, number of pod per plant, number of seed per main stem, number of seed per sub branch, number of seed per plant, and 100-seed weight per sub branch at 1% levels ($P<0.01$). Number of node per plant was affected by iron and manganese application ($P<0.01$) and zinc used had no significantly effect on this traits. Furthermore, iron application had no significantly effect on 100 seed weight per main stem and had significantly effect on 100-seed weight per plant at 0.05% level. Zinc and iron interaction (Zn×Fe) had significantly effects on number of pod per main stem and sub branch, number of seed per main stem, sub branch and plant and other evaluated traits unaffected by this treatment (Table 2). Based on Table (2), except for number of sub branch, number of node per plant and number of pod per main stem, other evaluated traits were affected by Zn×Mn interaction. In addition, Fe×Mn interaction had significantly effects on number of pod per sub branch, number of seed per main stem and sub branch and 100-seed weight per sub branch ($P<0.01$), and 100- seed weight per main stem and plant ($P<0.05$). Triple interaction effects (Zn×Fe×Mn) had no significantly effects on number of sub branch, number of node per plant, number of pod per plant and number of seed per plant, while had significantly effect on number of pod per sub branch at 0.05% level and other evaluated traits at 0.01% levels. The impact of zinc, iron and manganese fertilizers application in the forms of simple and combination on number of sub branch and number of node per plant were shown in Fig (1). The highest number of sub branch was achieved by 20, 50, and 20 kg.ha^{-1} Zinc, iron, and manganese application, respectively. Application of 20kg Zn ha^{-1} increased the number of sub branch (3.4) and this trait reduced with excess amount of zinc (3.2), while, response of sub branch to iron was different, So that iron used to 50 kg per hectare has increased the number of sub branch per plant by 3.4. According to results obtained by Goos *et al.*, (2004) and Zocchi et al., (2007), iron deficiency reduces the growth of soybeans. Although the number of sub branch was not affected by Mn but by taking 20 kg Mn ha^{-1} number of sub branch increased. Ziaeian and Malakoti, (1998) stated that reduce the number of tiller per plant is the result of manganese deficiency. Zinc applied in different levels of iron was shown that there were no different among Zn_0Fe_{50}, $Zn_{20}Fe_0$, $Zn_{20}Fe_{25}$, and $Zn_{40}Fe_{50}$ treatments (3.4 sub branches per plant). $Zn_{20}Mn_{40}$ increased sub branch per plant by 3.5. Interaction effects between iron and manganese on number of sub branch was shown that application of $Fe_{25}Mn_{40}$ and Fe_{50} in different levels of Mn had no significantly effects on this trait (3.4 sub branches per plant). Maximum number of node per plant was achieved with the application of 20, 25 and 40 kg, Zn, Fe, and Mn ha^{-1}, respectively. Also, number of node per plant increased up to 27.4, 27.5, 27.8, and 28.3 with application of Mn_{40}, $Zn_{20}Fe_{50}$, $Zn_{20}Mn_{40}$, and $Fe_{25}Mn_{40}$ treatments, respectively (Fig 1). Ebrahimian and Bybordi, (2011) reported that plant height, stem diameter and seed weight of sunflower significantly influenced by iron application. Zinc and manganese applied up to 40 kilograms per hectare increased the number of pods per main stem, sub branch, and plant. Khampariva, (1996) emphasized that fertilization by zinc increased number of pods in soybean plant. Also the highest number of pod per main stem, sub branch and plant were obtained with 25 kg Fe ha^{-1}, and with further used of iron these traits were reduced, slightly (Fig 2 and 3). The highest number of pod per plant was observed in 40, 25, and 40 kg ha^{-1} Zn, Fe, and Mn application, respectively (Fig 3). With the use up to 20 kg Zn ha^{-1} seed per main stem was reduced, while, maximum seed per main stem was recorded in Zn_{40}, Fe_{25} and Mn_{40} treatments (Fig 3 and 4). The response of number of seed per sub stem to zinc was difference, so that the highest seed per plant was observed in Zn_{20} treatment. In addition, Iron and manganese up to 25 kg and 40 kg ha^{-1} increased the number of seeds per sub branch. Excessive intake of iron was reduced seed number per sub branch (Fig 4). The number of seeds per plant response to Fe application was similar to Zn. The highest seed number per plant was recorded in Zn_{20}, Fe_{25}, and Mn_{40} treatments. Using Zn, Fe, and Mn simultaneously is more effective in increasing grain yield than using them individually (Abdolsalam et al., 1994). Manganese application up to 40 kg ha^{-1} increased seed number per plant by 31.8% compared check treatment (Mn_0). The increase for zinc and iron were calculated 4.2% and 11.0%, respectively. Therefore, the impact of Mn on seed number per plant was more important. These results were similar to Izaguirre-Mayoral and Sinclair, (2009) in soybean, Mahmed et al., (2010) in Wheat, and Jabeen and Ahmad, (2011) in sunflower. The impact of zinc, iron and manganese fertilizers application in the forms of

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simple and combination on 100-seed weight per main stem, sub branch and plant were shown in Fig (5 and 6). Based on results obtained, the effect of Zinc element on 100-seed weight was more than the iron and manganese elements. Erenoglu *et al.,* (2002) stated that zinc deficiency of the major factors limiting crop yield in many parts of the world. Zinc application increased 100-seed weight per main stem, sub branch and plant up to 16.39, 16.14, and 16.33 grams, respectively. In our experiment, excess amount of iron applied reduced 100-seed weight per main stem, sub branch and plant. The utility of iron in soils containing large amounts of iron and manganese are greatly reduced (Murillo-Amador *et al.,* 2006; Ronaghi and Ghasemi-Fasaei, 2008). The highest 100-seed weight per main stem was obtained with $Zn_{40}Fe_0$, $Zn_{40}Mn_{40}$, and Fe_0Mn_{40} treatments (Fig 5). Maximum 100-seed weight per plant was achieved in $Zn_{40}Mn_{40}$ treatment (Fig 6).

ACKNOWLEDGMENTS

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Table 1. Soil characteristics of experimental location

Soil properties	2010	2011
Soil texture	Silty clay	Silty clay
Sand (%)	13	10
Clay (%)	41	41
Silt (%)	46	49
Organic matter (%)	2.3	2.1
pH	7.6	7.4
Electrical conductivity (dS/m)	0.61	0.52
N (%)	0.18	0.14
P (ppm)	9.9	10.1
K (ppm)	563	389
Zn (mg/kg)	0.71	0.83
Fe (mg/kg)	6.2	3.6
Mn (mg/kg)	4.3	4.0

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Table2-Analysis of variance of soybean yield and its components at 2010 and 2011 years

Source of variation	df	MS						
		Number of sub branch	Number of node per plant	Number of pod per main stem	Number of pod per sub branch	Number of pod per plant	Number of seed per main stem	Number of seed per sub branch
Year (Y)	1	0.37^{ns}	30.16^{*}	8.36^{**}	0.56^{ns}	2.85^{ns}	35.09^{*}	38.43^{**}
Zn	2	0.67^{*}	9.24^{ns}	10.55^{**}	38.63^{**}	89.95^{**}	60.09^{**}	32.00^{**}
Y×Zn	2	0.26^{ns}	5.88^{ns}	3.19^{*}	1.29^{ns}	3.72^{ns}	22.13^{*}	2.83^{ns}
Fe	2	0.83^{*}	55.49^{**}	17.85^{**}	31.67^{**}	128.06^{**}	519.95^{**}	296.80^{**}
Y×Fe	2	0.15^{ns}	9.81^{ns}	0.88^{ns}	0.06^{ns}	1.28^{ns}	32.66^{**}	15.08^{**}
Zn×Fe	4	0.46^{ns}	6.46^{ns}	3.78^{**}	8.73^{**}	6.48^{ns}	23.87^{**}	80.92^{**}
Y×Zn×Fe	4	0.12^{ns}	3.44^{ns}	0.23^{ns}	1.35^{ns}	9.06^{ns}	19.35^{*}	12.38^{**}
Mn	2	0.06^{ns}	149.07^{**}	64.65^{**}	32.13^{**}	461.49^{**}	274.77^{**}	411.20^{**}
Y×Mn	2	0.05^{ns}	17.45^{ns}	0.45^{ns}	0.19^{ns}	2.24^{ns}	7.56^{ns}	1.85^{ns}
Zn×Mn	4	0.26^{ns}	7.21^{ns}	0.90^{ns}	5.80^{*}	17.55^{**}	102.32^{**}	214.08^{**}
Y×Zn×Mn	4	0.15^{ns}	3.82^{ns}	0.44^{ns}	0.60^{ns}	1.68^{ns}	6.18^{ns}	9.11^{**}
Fe×Mn	4	0.11^{ns}	6.08^{ns}	0.42^{ns}	7.09^{**}	8.27^{ns}	53.69^{**}	140.96^{**}
Y×Fe×Mn	4	0.06^{ns}	5.99^{ns}	0.17^{ns}	1.77^{ns}	1.47^{ns}	3.56^{ns}	2.91^{ns}
Zn×Fe×Mn	8	0.17^{ns}	6.38^{ns}	5.04^{**}	4.30^{*}	4.74^{ns}	32.24^{**}	51.19^{**}
Y×Zn×Fe×Mn	8	0.08^{ns}	4.58^{ns}	0.94^{ns}	1.71^{ns}	2.15^{ns}	7.49^{ns}	9.23^{**}
Error	104	0.19	6.86	0.76	1.73	4.66	5.66	2.37
Coefficient of variation (%)	-	13.39	10.13	6.54	12.36	8.18	9.82	8.16

-ns, * and **: non-significant, significant at 5% and 1% levels of probability, respectively

Continue of table2-Analysis of variance of soybean yield and its components at 2010 and 2011 years

Source of variation	df	MS			
		Number of seed per plant	100-seed weight per main stem	100-seed weight per sub branch	100-seed weight per plant
Year (Y)	1	4.84^{ns}	0.59^{ns}	0.01^{ns}	0.12^{ns}
Zn	2	79.58^{**}	65.27^{**}	55.16^{**}	65.85^{**}
Y×Zn	2	7.42^{ns}	0.86^{ns}	1.03^{ns}	0.42^{ns}
Fe	2	550.77^{**}	1.13^{ns}	5.06^{**}	1.76^{*}
Y×Fe	2	10.41^{ns}	0.54^{ns}	0.45^{ns}	0.51^{ns}
Zn×Fe	4	79.94^{**}	1.98^{ns}	0.94^{ns}	0.96^{ns}
Y×Zn×Fe	4	16.81^{ns}	0.43^{ns}	0.08^{ns}	0.13^{ns}
Mn	2	4003.12^{**}	12.78^{**}	12.23^{**}	8.76^{**}
Y×Mn	2	125.95^{**}	0.09^{ns}	0.56^{ns}	0.24^{ns}
Zn×Mn	4	73.34^{**}	4.63^{**}	8.15^{**}	3.78^{**}
Y×Zn×Mn	4	11.25^{ns}	0.05^{ns}	0.23^{ns}	0.31^{ns}
Fe×Mn	4	31.89^{ns}	2.29^{*}	2.76^{**}	1.34^{*}

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Y×Fe×Mn	4	25.21^{ns}	0.09^{ns}	0.01^{ns}	0.01^{ns}
Zn×Fe×Mn	8	19.84^{ns}	4.82^{**}	4.78^{**}	4.57^{**}
Y×Zn×Fe×Mn	8	11.92^{ns}	0.46^{ns}	0.33^{ns}	0.13^{ns}
Error	104	19.89	0.83	0.58	0.47
Coefficient of variation (%)	-	7.69	5.28	5.43	4.94

-ns, * and **: non-significant, significant at 5% and 1% levels of probability, respectively
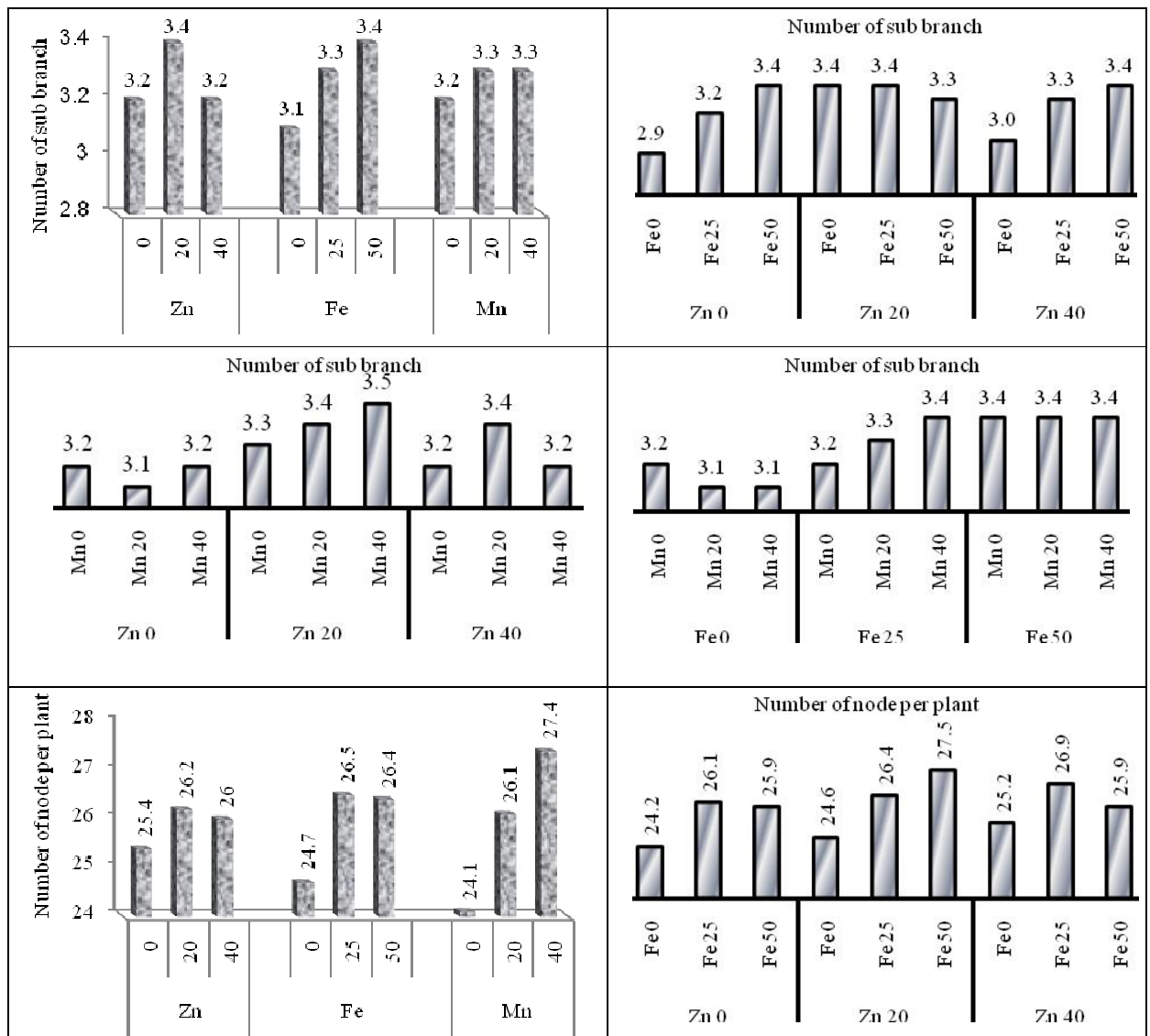
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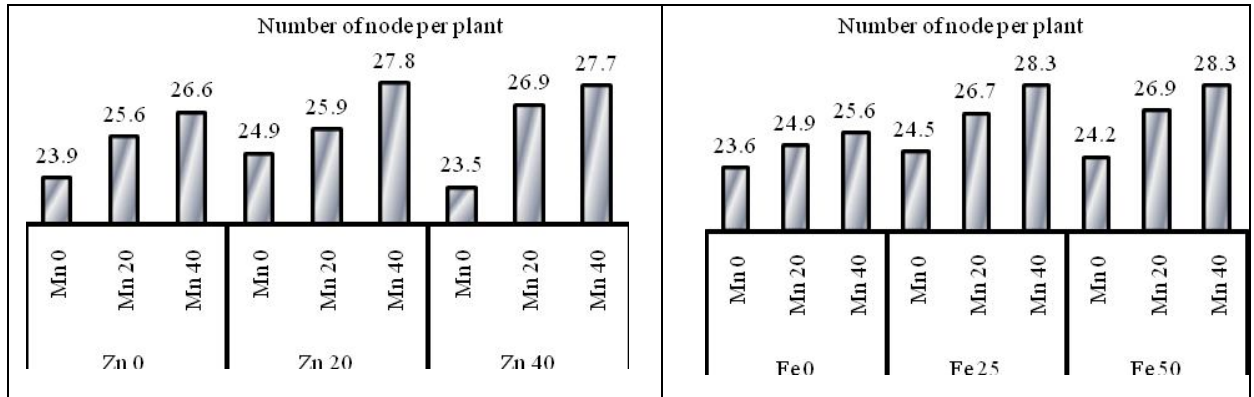
Figure 1- The impact of zinc, iron and manganese fertilizers application in the forms of simple and combination on number of sub branch and number of node per plant.
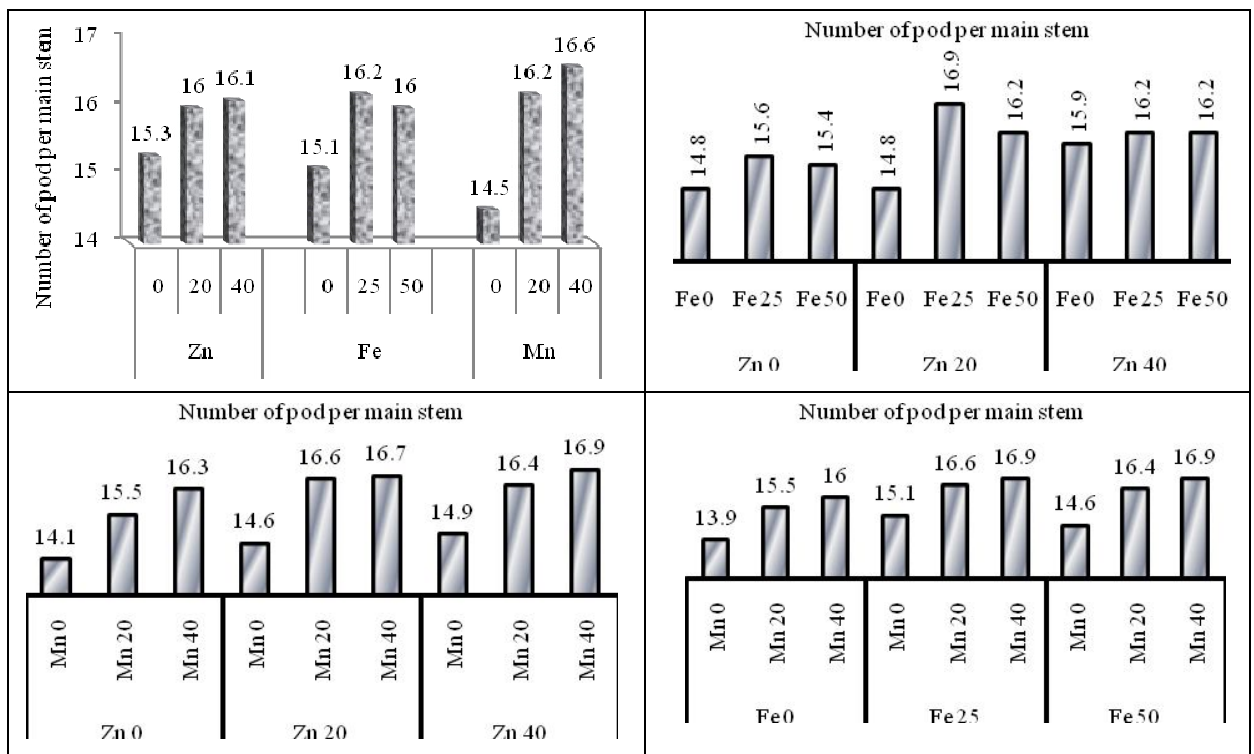
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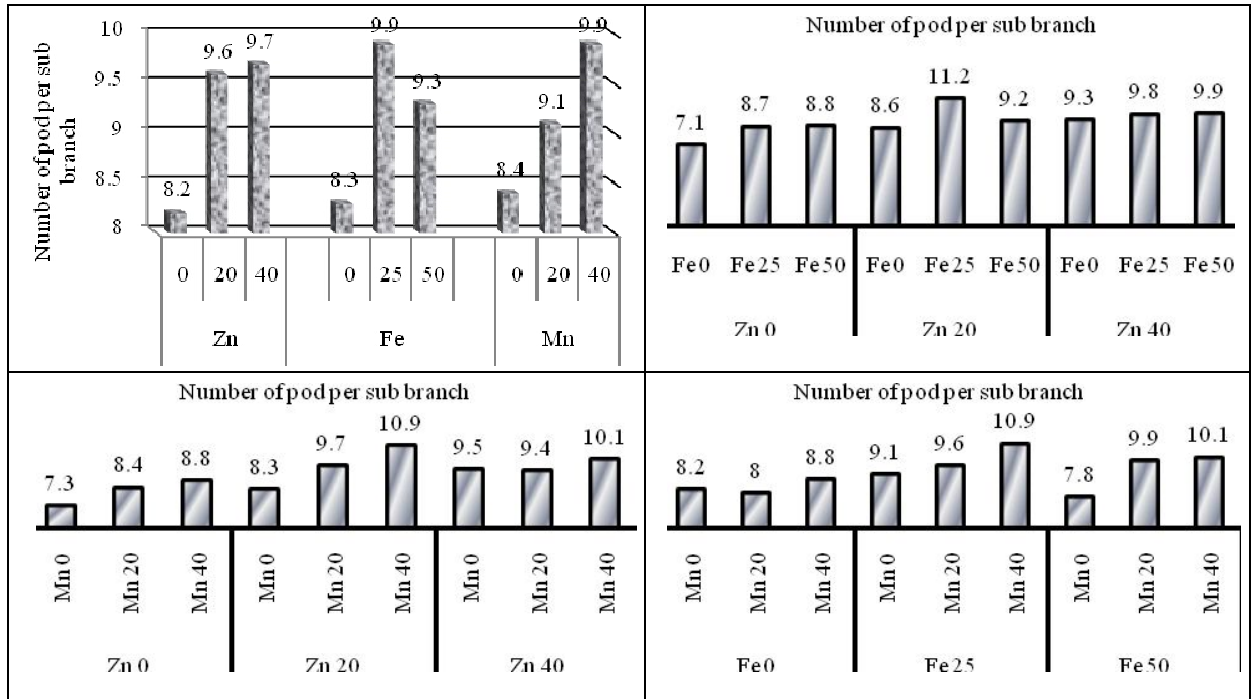
Figure 2- The impact of zinc, iron and manganese fertilizers application in the forms of simple and combination on number of pod per main stem and sub branch.
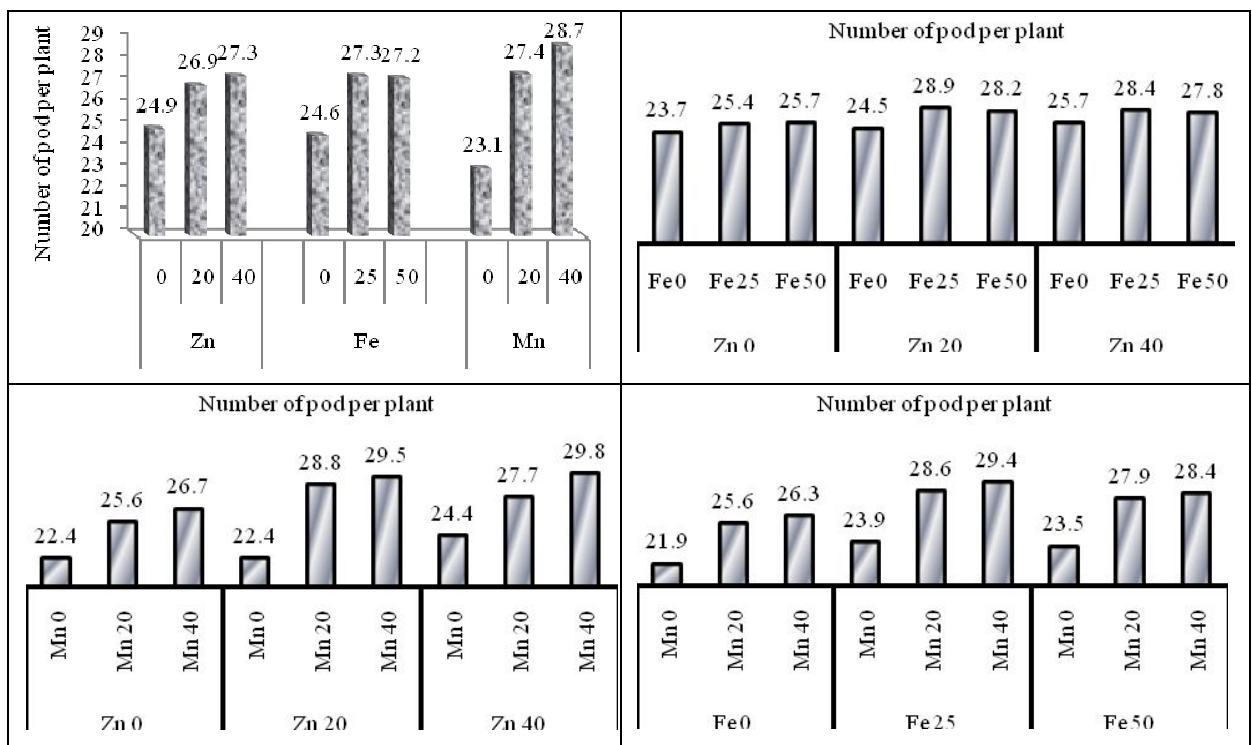
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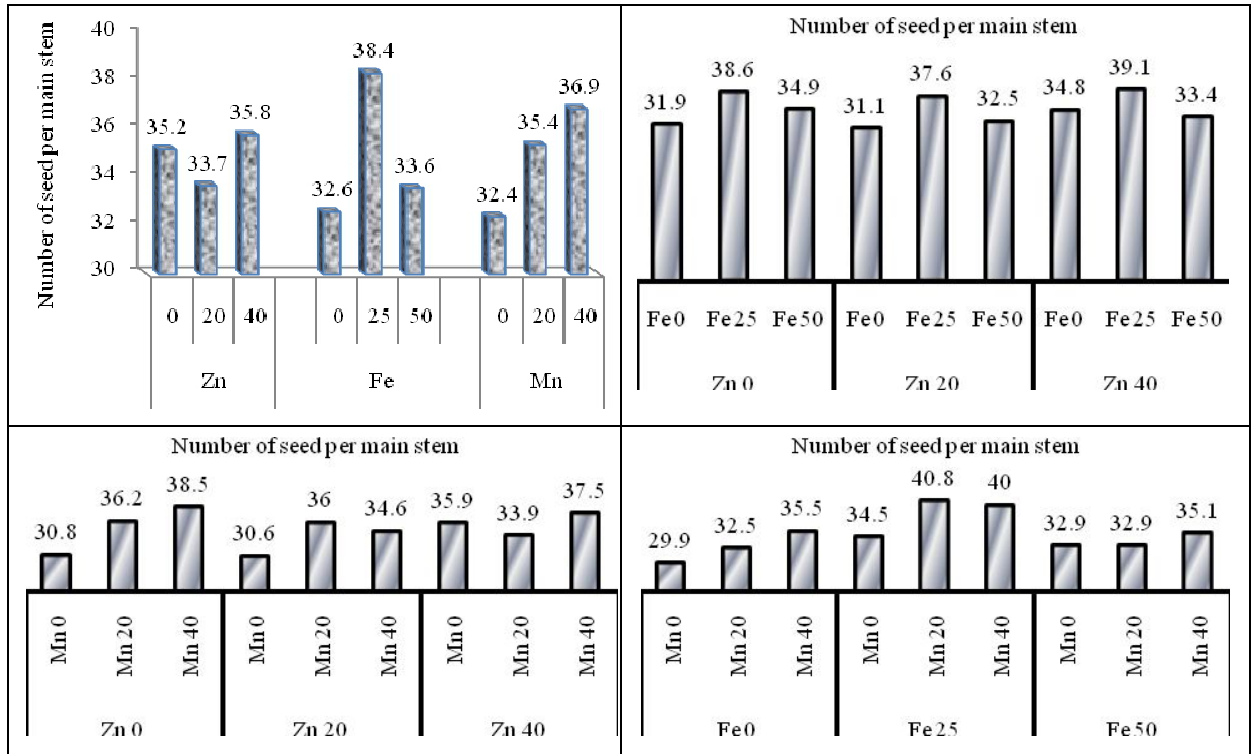
Figure 3- The impact of zinc, iron and manganese fertilizers application in the forms of simple and combination on number of pod per plant and number of seed per main stem.
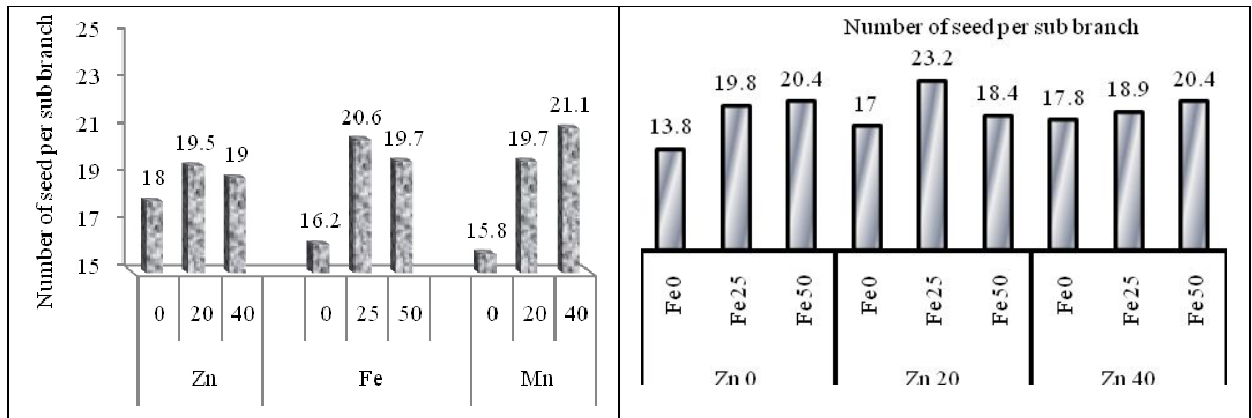
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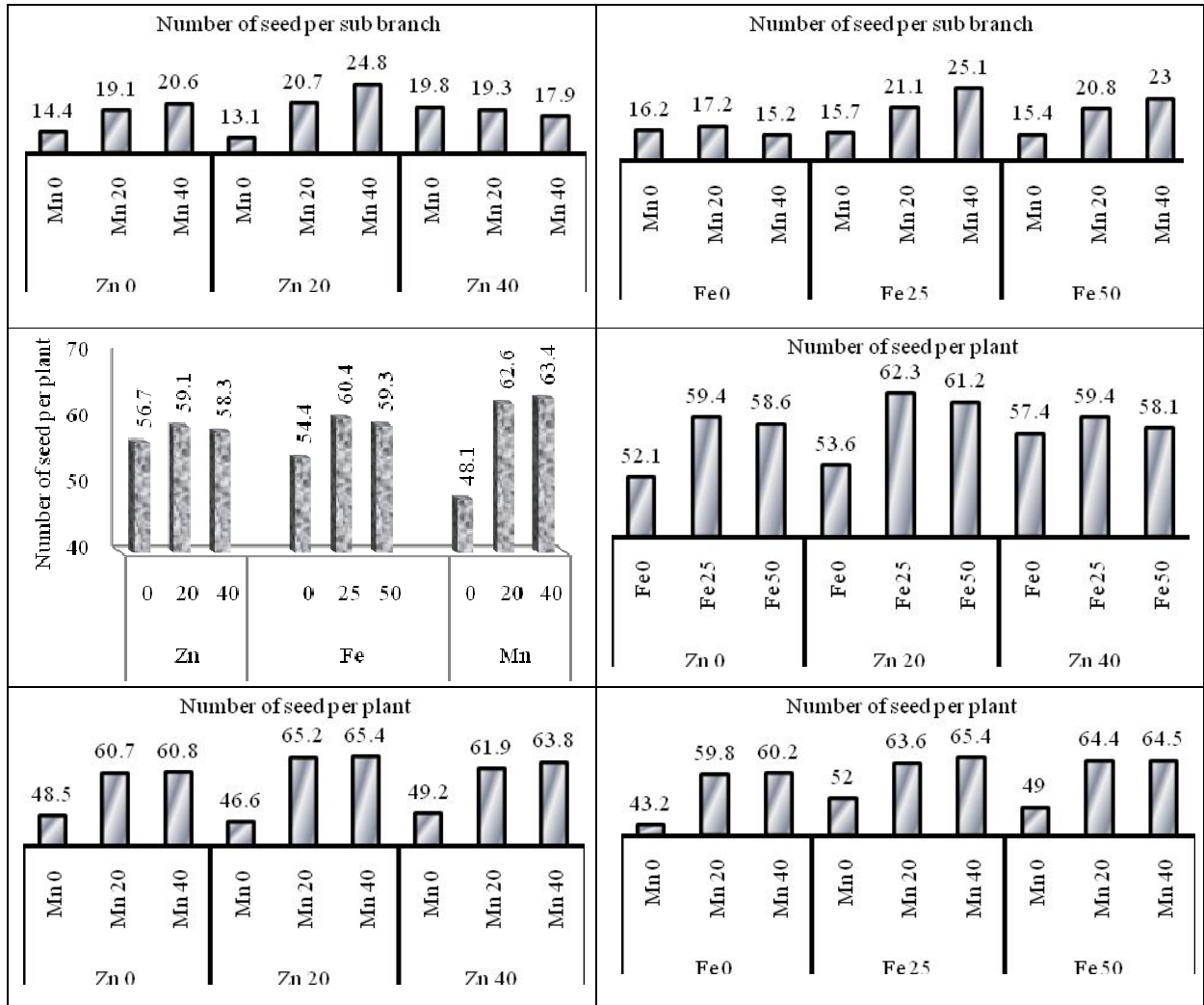
Figure 4- The impact of zinc, iron and manganese fertilizers application in the forms of simple and combination on number of seed per sub branch and plant.
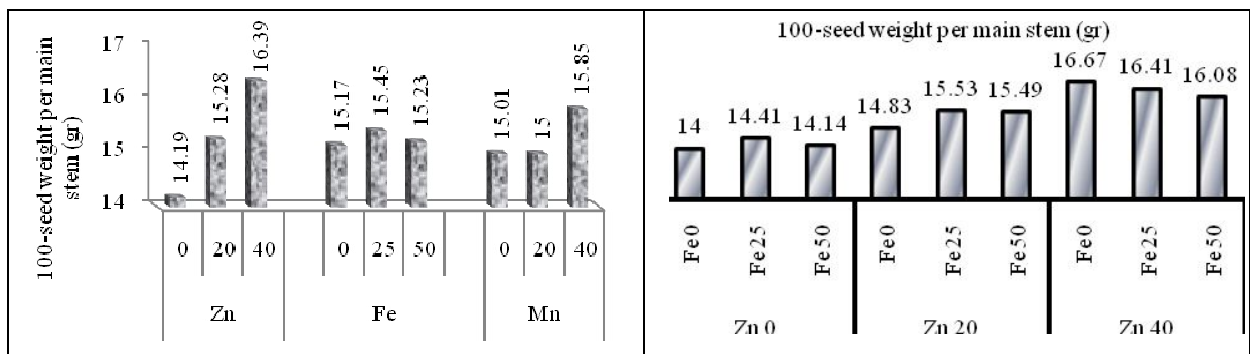
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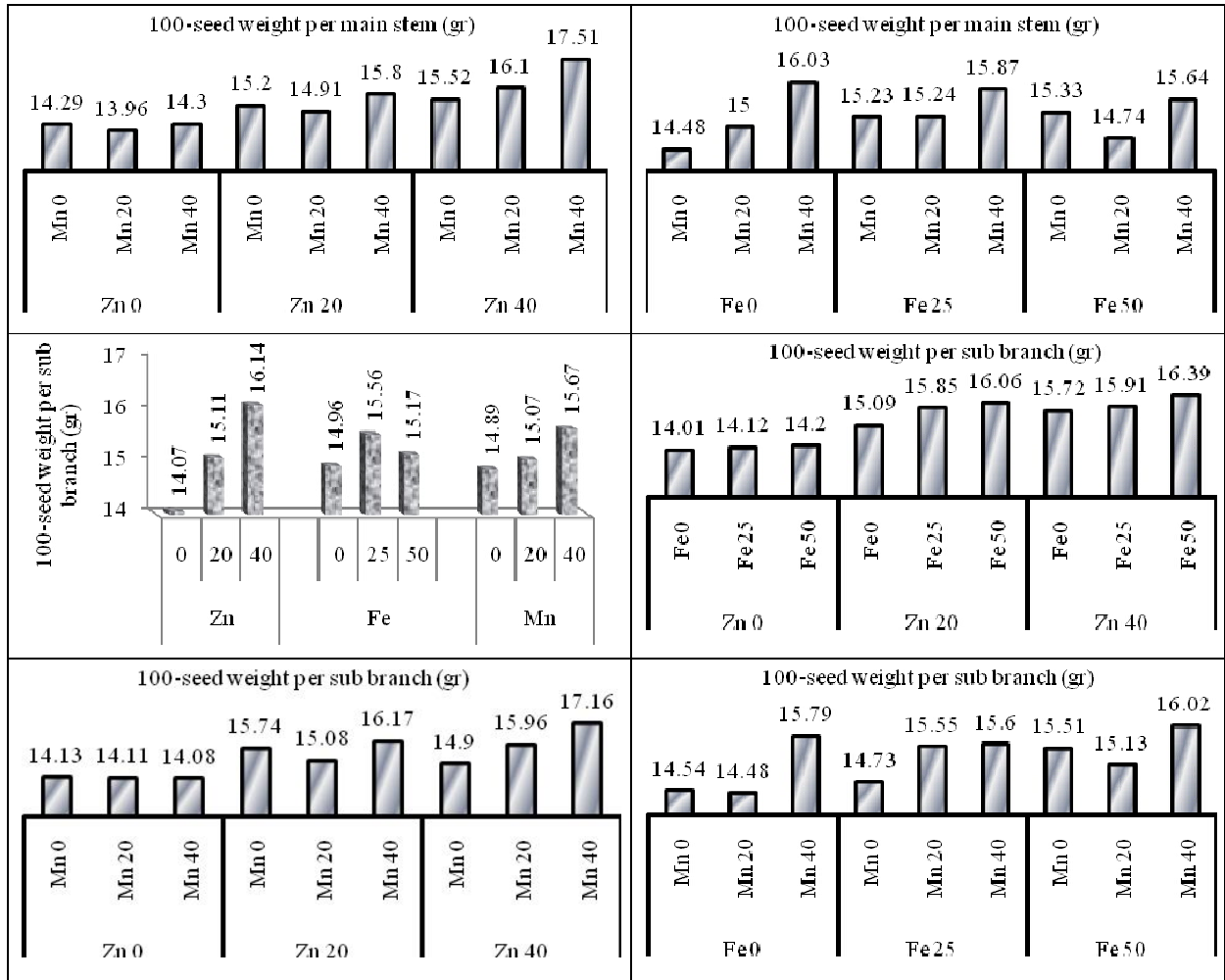
Figure 5- The impact of zinc, iron and manganese fertilizers application in the forms of simple and combination on 100-seed weight per main stem and sub branch.

Figure 6- The impact of zinc, iron and manganese fertilizers application in the forms of simple and combination on 100-seed weight per plant.

RESEARCH ARTICLE

System Engineering and its Application in Aviation Industry-a Case Study in the Iranian Aviation Industry Organization, Iranian Aircraft - 140

Amir Sadeghi[1]* and Shahrokh Shahsavand[2]

[1]Department of Industrial Management, College of Management & Accounting, South Tehran Branch, Islamic Azad University, Tehran, Iran.
[2]Department of Industrial Engineering, College of Engineering, Abhar Branch, Islamic Azad Univeristy,Abhar,Iran.

*Address for correspondence
Amir Sadeghi
PhD Student,
Department of Industrial Management,
College of Management & Accounting,
South Tehran Branch,
Islamic Azad University,Tehran, Iran
E.mail: amir.sadeghi.ie@gmail.com

ABSTRACT

System engineering is a relatively new field of knowledge. During World War II, its main components had a considerable progress (mainly in connection with the development and maintenance of aircraft); because managers of the project found that considering the components of the product as a "separate entity" with its own characteristics, provides different angles of separate elements. Thus, in this paper after a complete introduction of engineering systems and their executive methods, the implementation of engineering systems in the cargo and commercial aircrafts including Iran-140 in aviation industry organization was discussed.
Key words: system engineering, aviation industry, aircraft systems, organization, Iran-140

INTRODUCTION

System engineering is a relatively new field of knowledge. During World War II, its main components had a considerable progress (mainly in connection with the development and maintenance of aircraft); because managers of the project found that considering the components of the product as a "separate entity" with its own characteristics, provides different angles of separate elements. Today, it is widely accepted that the "complex engineering product" ("System"), is analyzed as a hierarchy of "subsystem easier" layers. (This only refers to systems analysis and doesn't have any connection with the internal arrangement of a system).After World War II, various military applications,

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various spacecraft, nuclear power plants, etc. (i.e., products with higher reliability and safety requirements), make it necessary to separate "engineering systems " in the field of engineering with the methods, techniques, tools, special rules, etc. and distinguish this field from other field of knowledge. It seems that the evolution of system engineering was started in the late 1950s [1].Since the late 1960s, system engineering standards were recognized as a distinct group and related ISO and IEEE standards were named as "system engineering" standards. (It is worth noting that, nowadays system engineering standards have been combined with software engineering standards more and more, because the new systems are "software" or "software-based", system engineering processes are similar to software engineering processes and virtually no technical system exists without a large amount of software). However, some "older" standards of IEEE are related to "IT" category.Usually when system engineering (or other engineering) be discussed in the literature, a set of processes, activities and tasks is presented. But this is only one "dimension" of project management, there are two other dimensions: (1) tangible outputs to use and produce and (2) used individuals and tools. Each organization of engineering systems has the potential to create a system (or other products). Management of "Capability Portfolio Management" will allow the organization to coordinate required capabilities with potential projects (investments). Most management processes of "capable basket" are more complex than that be used by inexperienced managers. System will be developed by engineers who have been trained for it. Potentially, there could be different educational approaches[2].

Statement of the problem

Simply, system engineering is an engineering approach which systematically considers all aspects of a project in making design choices. More specifically, scientific and engineering application of system engineering are, A) conversion an operational need into a description of system performance parameters and a system configuration through the use of a flow definition, synthesis, analysis, design, testing and evaluation, B) integration of related technical parameters and ensure compatibility of physical, functional and program interfaces in a manner that optimizes the total system definition, C) integration of reliability, maintenance capacity, safety, viability, human aspects and other functions into an overall engineering. From the above definitions, it is deduced that system engineering is applicable at all levels a project and all levels of a design as a methodology (e.g., systems, subsystems, components). The success of spaceships is complex and spacecraft projects largely depends on the system engineering process that is properly designed and managed at all levels is used. Thus, in this paper system engineering is expressed in an overview and then in the next section the implementation of the system engineering have been investigated in the aviation industry, including cargo aircraft and commercial aircraft (Iranian - 140, (Anotnov an-140, Anotnov an-158)) and finally, other techniques and applications of system engineering is expressed in aviation and aerospace industry[1].

Literature of the subject

System engineering is a continuous and workflow process within a feedback mechanism. This mechanism is used throughout the life cycle of a project to ensure the best possible architecture system and design. A system consists of two or more applications that must work together to achieve a common goal. Functions of the system engineering activities are also used in the design of subsystems and system components. Popular chart of system engineering which is known as the graph V is given in Figure 1.Total activity in system engineering is a set of processes. In figure 2, the main system engineering activities, and feedback processes that contribute to the development of the system, is shown. Each process begins with an input (usually a request) and keeps on going in the context of the mentioned functional analysis, so that a decision be made about what should be done (definition and allocation requirements), so above requirements be met. After deciding what to do, decision will be made through a composition process (defining the concept and basic design). This is done through a process of decision making regarding the selection of an alternative approaches. Then the best way will be applied with detailed planning, production, validation, so that the mission be done or initial requirements (or the current version of requirements) be met. Throughout this collection feedback, processes are prepared from each previous stage and new acquired information is used to refine

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the mentioned results and products[1].If project initially passes the initial control gates in the process incompletely, likely the specified requirements and plans should be repeated in next development processes and leads to an increase in application development time and development process costs. This event occurs when these experts do not use in the initial stages and as a result, leads to the adoption of requirements that can't be realized and also leads to the selection of design concepts that can't be implemented, tested, repaired and operated. Implementing concurrent engineering is an approach for eliminating the aforementioned works on the development of the project. In figure 2, the main system engineering activities, processes and feedback is shown that contribute to the development of the system[3].While the overall system engineering process should include overall project management and engineering organizations, other key system engineering activities are essential. These key activities of system engineering can be divided into six functional groups that will be discussed in the next section. In practice, specific duties tend to overlap, and this is due to the parallel time and rotational phasing of the tasks done. In figure 3 phasing the functions of system engineering is depicted throughout the system life cycle[4].

System Engineering in Aircraft System

A modern aircraft without a doubt is one of the most obvious and the most powerful example of a "complex system". In fact, a modern aircraft is formed of different elements with different technologies (structural, mechanical, electrical, electronics, fluids, etc.). Each component performs a specific task and all elements are harmoniously combined to form the overall system. In addition, aircraft is a very important system, due to quite obvious safety reasons and the importance of its mission and high costs and finally, because of its long life cycle[5].For example, let's assess the Alenia C 27 J-8 cargo plane. Its mission statement is: "The transfer of a cargo from point A to point B given through the flight". At first glance, aircraft can be known as a separate entity which can perform a specific task, but with analyzing the details, it seems that aircraft is made up of several parts, all of which are harmoniously combined and simultaneously work to accomplish a mission. For example, consider figure 5. Various items such as wings, fuselage, horizontal and vertical tail, engine compartment and undercarriage butterflies and wheels (when the aircraft is on the ground) can be easily removed. With a closer look at the aircraft, other items can be identified or at least imagine, such as structural elements, engines and various mechanical engineering, electronics and fluid, which can be related with various technologies on aircraft.

Considering the functional decomposition of the aircraft, it is clear that (in the aircraft as a complex system) at the first physical level of the tree, there is no separate items, but also a group of items are combined for the for designated specific tasks. By examining a careful approach from the perspective of terminology, these items should be identified as "sub-systems". However, in practice, all major components of the aircraft physical tree (as shown in Figure 5 as a sub-system), commonly are defined as "systems" (For example, such as electronics, fuel systems, landing gear systems, etc.), because they bring together many different devices. This ambiguity confirms the general characteristics of the systemic glance to the complex system based on that the concept of system can be applied at various levels. Thus, the aircraft system is formed of n "subsystem" which can be viewed as "systems" which consist of a combination of different equipment. In order to sub-divide each sub-subsystem which consists of several devices, another level of segmentation can also be provided (Figure 4).Figure 4 shows systems physical tree (i.e., more correctly, "subsystem" of the system) electronic devices of a modern cargo plane. Due to its high complexity and large number of performed tasks, electronic devices system are decomposed to several system (to put it more correctly, "sub-subsystems") that should do various tasks. In particular, in the example shown in Figure 6, there are four systems which do these tasks: Navigation functions (navigation system), flight controls ("flight control system and autopilot"), communication ("communications system") and identification ("radar system"). Concisely, only the radar system is shown in figure 5 in details. There are two types of radar: Meteorological radar and altimeter radar. Both of these radars are related with a combination of radar screen and the corresponding processor. Finally it should be noted that the equipment (at least complex equipment) are not separate entities, but they can be decomposed to more modules which usually are a line replaceable modules units (LRU). This means that they can be immediately

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replaced at work, in order to reduce aircraft downtime for maintenance[6].Please note that in the rest of this section, sub-systems due to the above mentioned reasons, is called system.

Developments and trends in the aviation system

Before presenting the methodology, description of developments and the total trend of the aviation system are helpful. Here, only the major systems on the aircraft Medium/Large are examined.Figure 6 shows the major systems of a cargo plane, and all their interactions (especially in terms of energy exchange). By investigating figure 6, it can be seen that:

A) Structures and engines have been considered in the aircraft systems analysis (although they are not investigated in this study) which are considered for aircraft conceptual design, usually in traditional approaches.

B) In particular, both engines which are responsible for aircraft propulsion and (where available) Alternative source of energy Auxiliary-APU power unit has been considered in the analysis of aircraft systems as an alternative source of energy for motor, because except that are own system, due to the physical interface and because of its size is perfectly related weight and aerodynamic characteristics of aircraft. It has strong relationships with other aircraft systems, which in turn greatly influences all other systems of an aircraft.

C) The fuel system is directly linked to the engines and APU, because it provides the possibility to operate properly. The same is true for starting the engine [1].

D) Considering that the electrical systems, hydraulics and pneumatics basically do a work, it is more logical to design aircraft's systems for only electrical system (Because there are items on the aircraft, which only can be fed with their electrical power such as lamps, electronic devices, etc.). This approach is provided from the very successful trend known as "all electric aircraft", which (in comparison with traditional aircraft) in terms of simplicity and rationality has a few benefits. There are other intermediate solutions such strategies known as "more electric aircraft" in which the engine power at first only is converted electric power and partly hydraulic power or pneumatic power[1].

Aircraft conceptual design

Considering the whole presented process in figure 10, it is clear that the main importance of the conceptual design stage (Antona et al., 2009) is the ability to create the basic idea of the new product. The basic idea of the following product shows[1]:

A) Architecture options mean definition of the total architecture of the product in term of shape and type of the main elements and the bilateral position of elements. It should be noted that the various options create a very large set of combinations which are all potentially possible and then they will be compared to choose the best option. To clarify, let us consider a new middle plane. Possible options for the layout architecture which can be expressed as follows:

Engine type: for example, advanced turbofan with high bypass ratio and advanced turbofan with very high bypass rate;

- Number of engines: for example, two engines with high propellant or four engines with lower propellant;
- Status of engines: for example, in the engine compartment and with a direct connection to the wing or the tail;
- Definition of all predicted systems without entering into the details of any of them.

B) Quantitative options, means the initial definition (please note that the approximation in the space, even at this stage should not exceed 10 to 15% of final value) the most important characteristics of upcoming products like size, weight and performance. At this stage of the design process, upcoming products are considered as a unique system. As far as it is related to sub-systems, they are only predicted, but still can't be classified at this stage, although it is possible to estimate their weight beforehand by a conventional top-down approach as a percentage of the total weight of the system.

After creating the concept of the future product, the level of detail is so low that the production process can't be started. In order to enter the production phase, upcoming product design should convert from the conceptual design to the initial design and finally convert to detailed design. But this evolution requires multiple sources of time,

human resources and undoubtedly financial resources and it can't be pursued until the basic idea of upcoming product detects possible and competitive at the end of the conceptual design stage. It should be noted that the conceptual design stage is also called "feasibility study" or "feasibility stage"[2].At the end of the conceptual design stage, we have a basic idea about future product that can't be produced, but surely it can be assessed and compared with other potential competing products (which may already exist or are being developed).Thus the conceptual design phase is very important, because:

- Based on the conceptual design, decisions can be made about start and not start the next costly design activities
- Options that have the greatest impact on future product (i.e., the system architecture and the main characteristics such as size, weight, performance, cost, etc.) are obtained during the conceptual design phase (Figure 11).

Implementation of System engineering in the Iran-140 aircraft in the aviation industry organization

Anotnov 140 is a regional passenger aircraft with has the ability to carry 52 passengers, which is developed to replace Anotnov 24. Anotnov announced the development of the An-140 in 1993. The first An-140 prototype was made on June 6, 1997 and on September 17 the same year its first flight out was done. The second prototype was completed in 1998 and the first standard aircraft An-140 flew in 1999. This aircraft is provided based on the aviation certification of the United States and Europe and also Russia.The original version of the An-140 uses two engines manufactured by Al-30 engines Sycz. Each one has 1839 kilowatts power. While PW127A engines manufactured by Pratt & Whitney Co. with 1864 kW power can also be selected. Aircraft cabin can accommodate 52 people in each four rows. In the rear, passengers can be integrated as a staircase, while on the front right side allows to carry cargo. The back of the cab is dedicated to the kitchen and the bathroom and putting a coat. Construction of the initial prototype An-140 with an An-140-100 was replaced in 2003 with a greater wingspan and a greater range rather than (300 km) to the An-140. In future, other versions, such as An-140T would be kind of trolleys that are larger in the rear; An-140 VIP, which is essential for transporting persons; An-140 MP who will be the special maritime patrol.

In 1996, Anotnov signed an agreement with a HESA in Iran in which it allows to build the An-140 with the name of the Iran 140. Initial prototype of 140 pieces will be made by Anotnov supplies. In the next samples, it will be combined with an upgraded aircraft's standards. The maximum speed of Iran 140 is 575 kilometers per hour. 2100 km range with a 52 passengers; range with a 6000 kg payload and a speed of 520 kilometers per hour (economy rate) is 900 km. The maximum takeoff weight of Iran 140 is 19150 kg.

The profile of Iran 140

Propulsion two engines with 2,500 bhp power TV3-117VMA-SB2
The maximum load capacity is 6000 kg.
Passenger capacity is 52 passengers.
Patrol speed id 520 to 575 kilometers per hour.
Flight ceiling is 7200 meters.
Operating range is 2100 miles with 52 passengers, 3,700 miles with 33 passengers.
The distance of the required runway is 1350 m.
2 cockpit crew
1 flight attendant

Commercial aircraft (passenger, military) is considered as a "systemic set of systems". Evaluation of commercial air transport, air transport systems in the world is a large field to provide valuable perspectives to create the boundaries for the primary systems (systems of commercial aircraft). This analysis will offer a fresh perspective on the external

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input to the system to determine the conditions and peculiarities of commercial airline aircraft.In the realm of commercial aircraft, air transportation system is the world's highest level. As showed in figure 14, the world Air Transportation System (WATS) consists of three products:

- Anything that flies (commercial aircraft, military and other planes).
- Place to leave - or go back to (airports and other startup items)
- Traffic Control (commercial, military and private / other traffic control)
- Cases where people and goods are in control.
-

The next system - commercial air transportation system - including a series of products of air transportation systems in the world. Commercial Air Transportation System (CATS) includes:

- Commercial airplanes (passenger, cargo and aircraft, both passenger and cargo)
- Airport (motion levels / landing and airport facilities).

Air-Commercial traffic control

A view of the world air transport system and its relationship with commercial air carriers and commercial aviation system (CAS) is shown in Figure 14.(World Aviation Systems- Whatever that fly(Commercial aircraft- Military aircraft-Other aircraft) – Back to (Airports- Other places)- Graphic designers- (Commercial aircraft traffic control-Military aircraft traffic control-Personal aircrafts)- World aircraft transport systems-(passenger aircraft- Cargo plane-both of them)- Airports-(Land levels- Airport facilities)- Commercial aircraft traffic control- Systems of commercial aircraft such as Anotnov)For commercial aircraft systems "external environment" includes air transportation system in the world and the commercial air transportation system. It also includes airline customers, external vendors, and regulatory agencies that sets conditions for the "final-product" and a processing system that the product is manufactured.

For political reasons, security and other reasons, commercial establishments within the territory of a commercial airliner comply with a relatively coherent set of security standards around the world. As a result, an aircraft as part of cultural is developed, produced and operated as a legal and societal barriers imposed by the commercial air transportation system. American Federal Aviation Administration (FAA), Joint Aviation Authorities (JAA) and other organizations around the world determine that, which aircraft can legally fly it in the air under various legal jurisdictions. Policies and procedures, standards and specifications, guides, transportation, technology and culture of air transport, business aviation system are all the factors that influence them.

Commercial aircraft - our primary final product - of an economic point of view includes separate commercial entity. EIA-632 standard provides a model as "field of application" which suggests external factors, institutional and commercial potential, by mediation of the projects. As EIA-632- EIA standard states, systems and their products work with organizations and personnel who use the products with other agencies that provide inputs to the system. But parts of the system are not under development and don't control by the developer. Interactions and mediating between production systems and their external operating environment can influence the realization of the used process for system engineering projects. Changes in system performance will be affected by the system's ability to respond to changes in its operating environment. "The application of pattern" 632- EIA standard is shown in Figure 14[7].

Although "field of application" standard 632- EIA provides an overall view of the system, but is also represents a snapshot in time. This would be very helpful in the realm of a commercial airliner to have a comprehensive look at the aviation system, particularly with regard to the overall environment. This case provides a solution of project

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activities that is distributed over time, within a framework. The Venn diagram is shown below of this system in figure 15.

1) Final product system (aircraft)
2) Aircraft production system (final-product)
3) Total area (in which the final system works)

The systems for commercial aircraft, "external environment" includes air transportation system in the world and the commercial air transportation system. It also includes airline customers, external vendors and regulatory agencies that constitute the conditions for "final-product" system and processor system in which the product is produced within it.For political reasons, security and other reasons, the main commercial establishments within the territory of commercial aircraft, complies with a relatively coherent set of security standards around the world. As a result, aircraft as part of cultural is developed, produced and operated as a legal and societal barriers imposed by the commercial air transportation system. American Federal AviationAdministration (AFAA), Joint Aviation Authorities (JAA) and other organizations around the world determine that, which aircraft can legally fly it in the air under various legal jurisdictions. Policies and procedures, standards and specifications, guides, transportation, technology and culture of air transport, business aviation system are all the factors that influence them.

CONCLUSION

In this paper, the system engineering and its application in aviation industries were investigated.Then, implementation of system engineering in the cargo and commercial aircraft, including Iran-140 in the aviation and aerospace industry was evaluated as an example. The results have shown the need for applying system engineering in all complex and defense projects. In future studies, this vast knowledge can be examined and used in other defense projects.

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7.http://www.iacp.dvo.ru/english/institute/institute.html
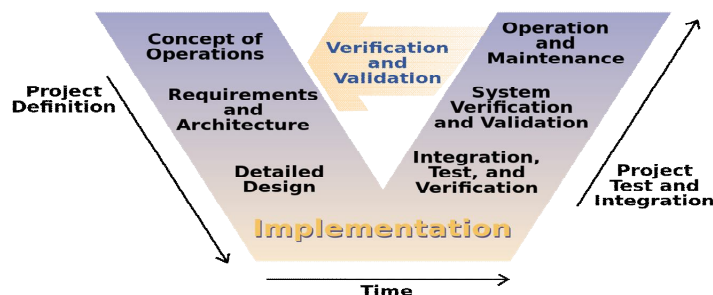
Figure 1. V-model of the System engineering [3]

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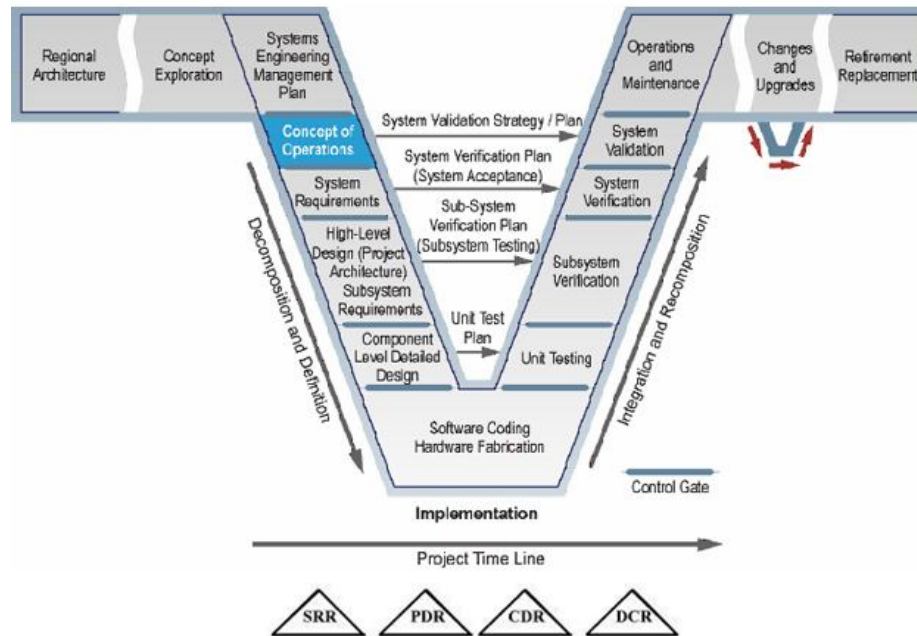
Figure 2. SRR (System Requirement Review) ---- PDR (Preliminary Design Review) CDR (Critical Design Review) ---- DCR (Design Certification Review) ---- FRR (Field Readiness Review)
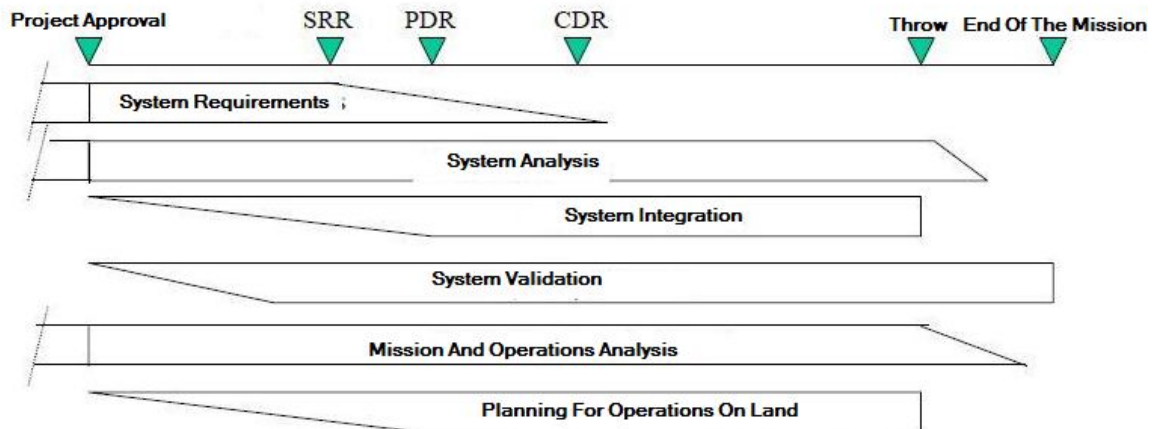

Figure 3. Phasing the functions of system engineering
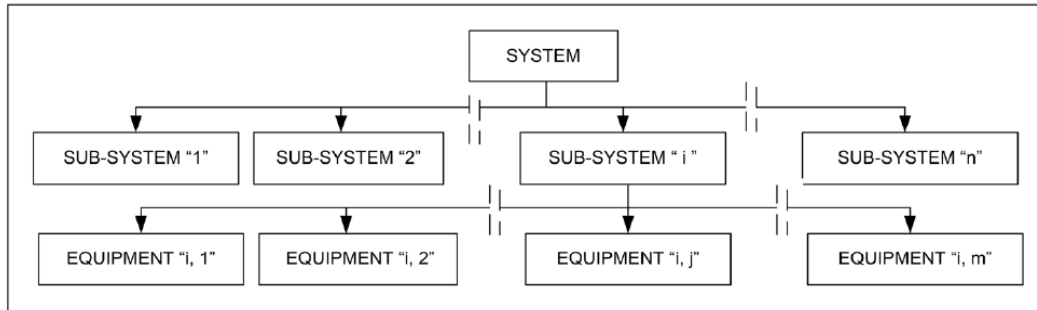
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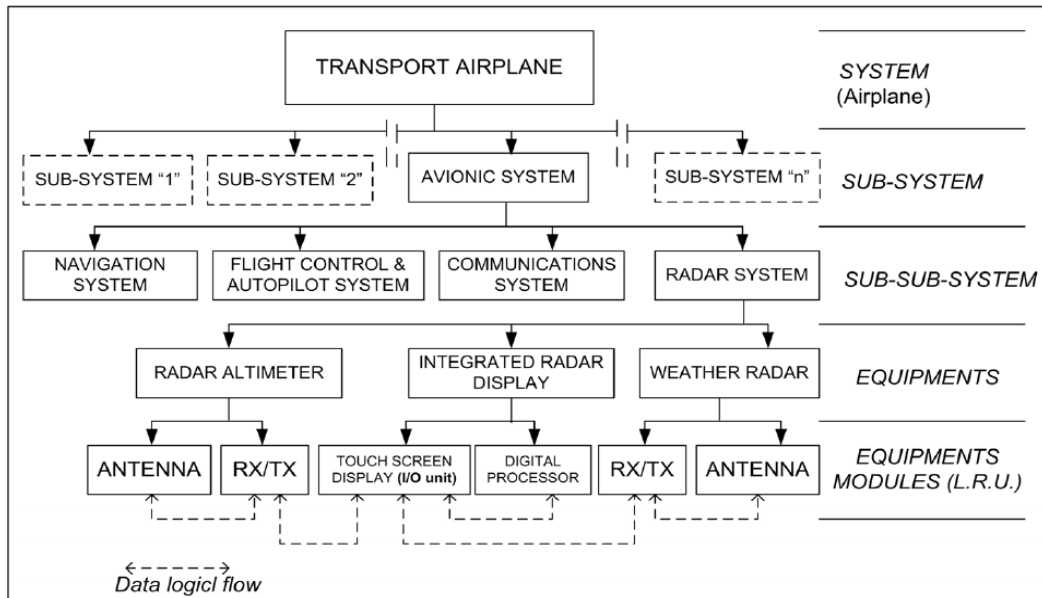**Figure 4. Terms of the system glance in relation to the physical aircraft tree**

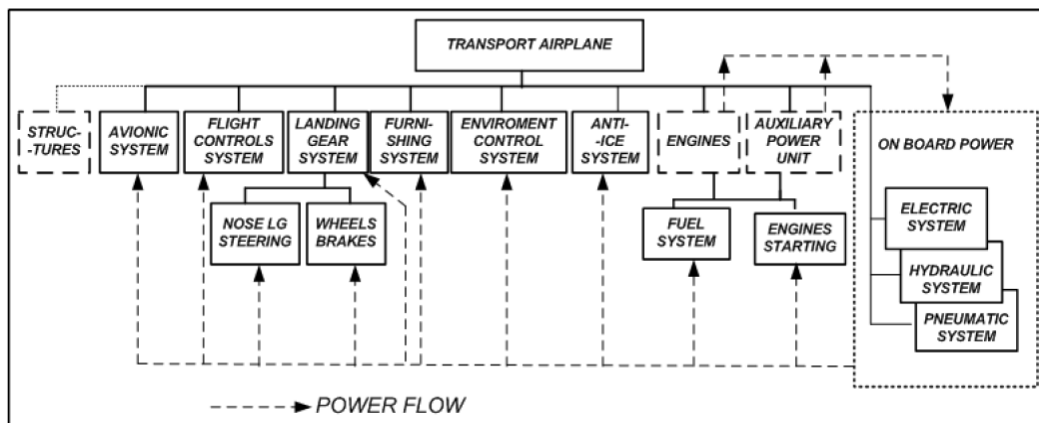**Figure 5. Physical tree of electronic devices systems for cargo plane**

Figure 6 .Cargo aircraft systems and sub-systems

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SYS	FUNCTIONS PERFORMED	SYSTEMS CONFIGURATIONS	NOTES
FLIGHT CONTROL SYSTEM	To modify aerodynamic actions on airplane (by changing its shape), in order to guide and control flight trajectories and to navigate (primary flight controls). To modify aerodynamic characteristics when necessary (secondary flight controls).		The modern flight control system is normally based on digital signal transmission (Fly-By-Wire) and on hydraulic or on electric power (following new trends of All Electric Aircraft). The system design is mainly based on actuator design, considering the possible solutions of hydraulic, electro-hydraulic and electric actuators.
SYS	FUNCTIONS PERFORMED	SYSTEMS CONFIGURATIONS	NOTES
LANDING GEAR (NLG Steering MLDG Wheels Brakes)	To allow the airplane to move on ground. To support the impact at touch-down. To allow extension and retraction of the system. To steer the nose landing gear. To apply the brake on main landing gear wheels.		Also for this system, after accomplishing the architectural design (to be carefully integrated with the whole aircraft configuration), the typical design activity consists in sizing the actuators. Also in this case the actuators can be hydraulic (that is the state-of-the-art), electro-hydraulic and electric.
SYS	FUNCTIONS PERFORMED	SYSTEMS CONFIGURATIONS	NOTES
FURNISHING SYSTEM	To guarantee a pleasant and comfortable journey to the passengers, providing them with all services required.		In a very preliminary approach, all several systems connected to the furnishing system can be simply considered by the point of view of weight and as power users.

NLG Steering
MLDG Wheels Brakes

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SYS	FUNCTIONS PERFORMED	SYSTEMS CONFIGURATIONS	NOTES
ENVIRONMENT CONTROL SYSTEM	To provide all people onboard the aircraft with correct values of air total pressure, partial O₂ pressure and temperature.		Two kinds of CAU can be envisaged: "vapor cycle" and "air cycle". If the CAU output temperature of the air is < 0°C, it is mandatory to introduce it in the cabin, after mixing with re-circulated cabin air.
SYS	FUNCTIONS PERFORMED	SYSTEMS CONFIGURATIONS	NOTES
ANTI-ICE SYSTEM	To avoid problems due to ice formation of the airplane external surfaces.		Apart from the anti-ice or de-ice actions illustrated in the figure beside, please consider the electric ice protection of hinges, compensation horn, small sensors, windshields and propellers.
SYS	FUNCTIONS PERFORMED	SYSTEMS CONFIGURATIONS	NOTES
FUEL SYSTEM	To perform pressure refuelling, allowing tanks venting. To store onboard all fuel necessary to engines and APU and to feed them when requested.		This system greatly affects aircraft configuration because of the extension and great volumes of its tanks. The booster pumps are usually electrically driven.

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Figure 7,8,9,10. Functions, types and main characteristics of internal systems

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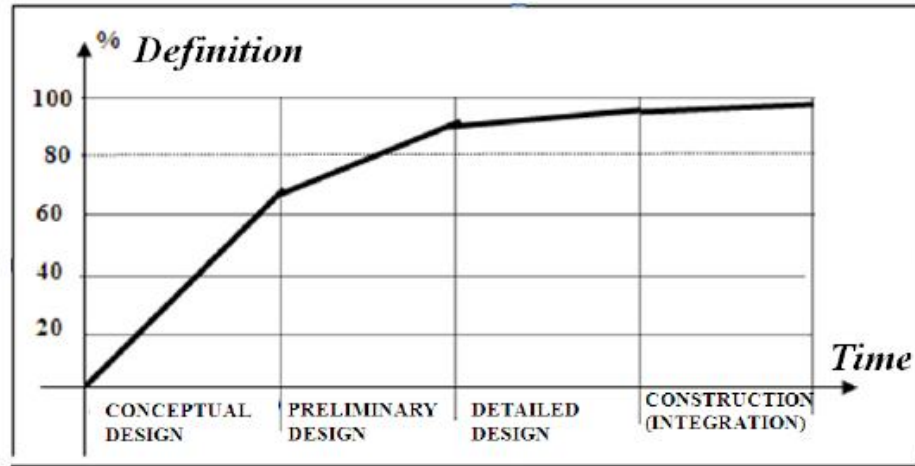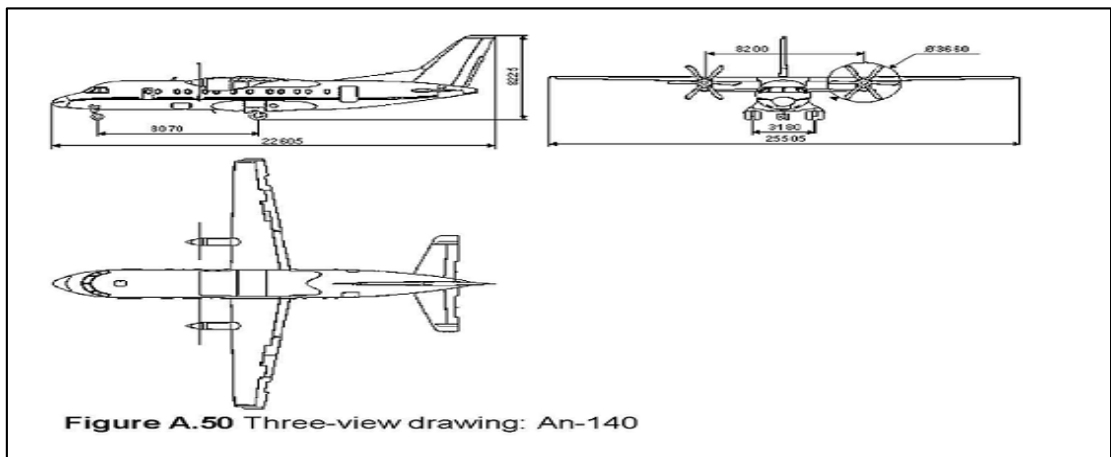**Figure 11: Importance of Conceptual Design**

Figure 12. Three different views of Iran-140

Figure 13. Iran-140 aircraft

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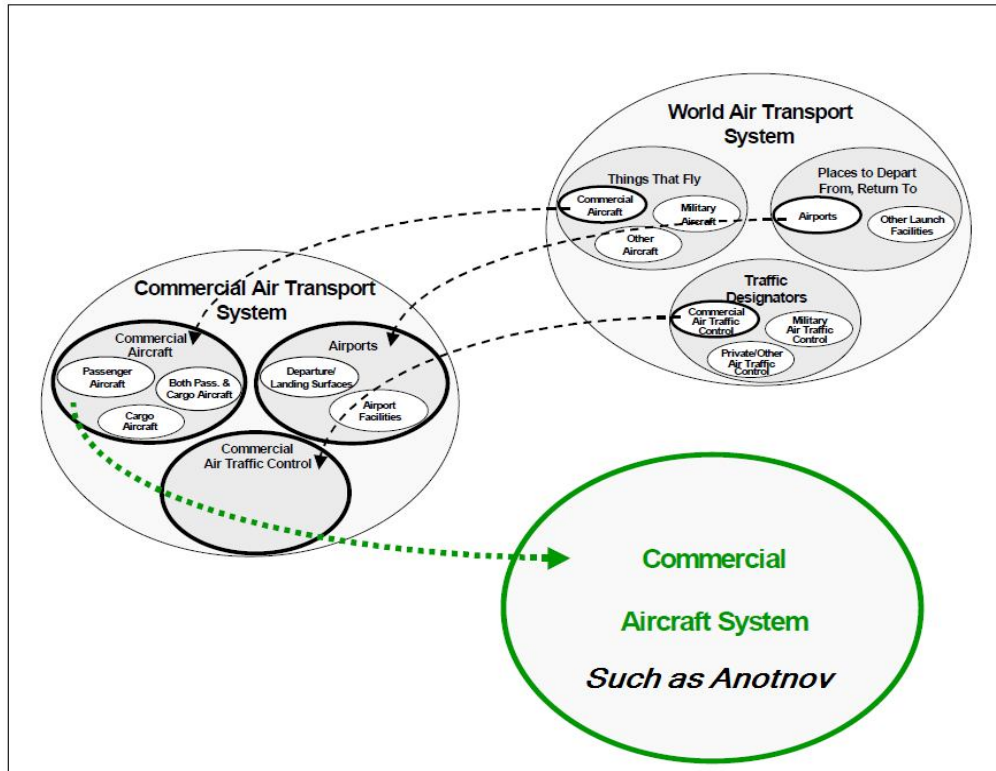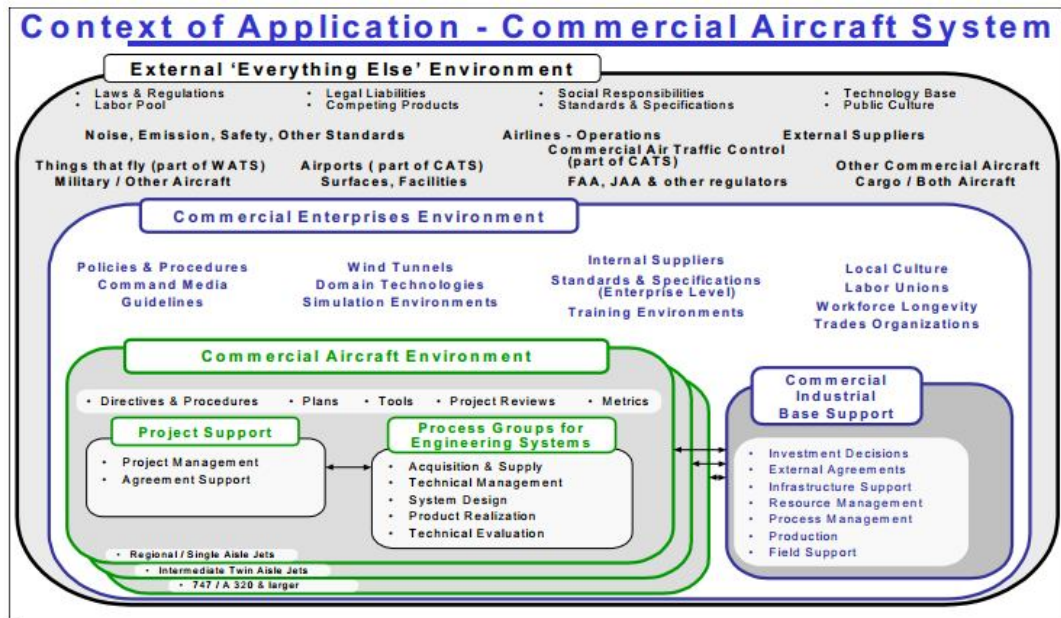**Figure 14. Routing components from WATS to CATS to CAS[1]**

Figure 15. Applying a system engineering in commercial aircraft[1]

RESEARCH ARTICLE

Surveying the Relationship between Ability Prescription and Creativity Case Study: Employees of Technical–Vocational Schools in District 1 of Alborz Province.

Shirin Pilevar[1] and Shahram Hashemnia[2]*

[1]MA degree in strategic management, Department of Management, Payam-e-noor University, Alborz, Karaj, Iran.
[2]Department of Management, Payam-e-noor University, Teharn, Iran, Mailbox 19395-3697.

*Address for correspondence
Dr. Shahram Hashemnia
Assistant professor, Department of Management,
Payam-e-noor University,
Teharn, Iran, Mailbox 19395-3697.
E.mail: shirin_pilevar@outlook.com

ABSTRACT

The purpose of this study was to evaluate the relationship between ability prescription and incidence of creativity, among the employees of technical-vocational schools in district 1 of Alborz province. This study was a descriptive-correlation study and the 342 people statistical population includes 320 teachers and 22 managers, in which the contribution of teachers to study 170 people and managers 12 people were selected with using calculations and stratified random sampling. In order to collection data, in proportion to the subject, Spritz empowerment questionnaire and Torens creativity questionnaire were used which were approved by the professors. The findings indicate that there is significant relationship between empowerment and incidence of creativity.

Key words: Empowerment, creativity, ability prescription

INTRODUCTION

Undoubtedly, employees and human resources are considered as a critical resource of each organization. One way to achieve the goals of each organization is effective management of this valuable resource with other resources of the organization. Especially, when the organizations make changes to deal with the challenges, consequently developments must also be made within the organization. So, efficient human resources indicate their importance. Obviously, this requires high ability in employees to adapt to environmental and organizational changes. Empowerment is a new and effective solution to pass through the difficult stages of change. Thus, if an organization wants to maintain its success and leadership and not to fall behind its competitors, despite the rapid pace of change,

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having a skilled and creative workforce with high motivation seems to be necessary. The organizations will achieve to success in this field, if they create a proper ground for new ideas in employees in compliance with the conditions in order to enhance their capabilities along with environmental changes. Since the teachers are the most important causes of change in education and the realization of the creativity and transformation in the field of practical applications including technical-vocational is more than other fields. That is why the evaluation of employees' perception of technical-vocational schools from ability and its impact on their creativity and thus achieving to the education goals is important. This undoubtedly, follows significant development in the evolution of education. So, given the importance of the empowerment of individuals, having an excellent and efficient workforce is definitely a competitive advantage and requires a lot of time and expense and given that employee creativity in efficiency and consequently achieve to organizational goals has a significant role, this issue deserves further reflection that, is there a relationship between empowerment and creativity of the people or not?

When the managers of the organizations want to think about improvement, undoubtedly their main duties will change. Research shows that the traditional management means "planning, organizing, monitoring and controlling" towards an approach called "LEAP", that they are the first of (Leadership- Empowerment- Assessment- Partner) (Aghayar, 2006).History of the first definition of empowerment refers to 1788, in which people consider empowerment as delegation of authority on organizational roles. This empowerment is described as acceptance of responsibility or in other words "accountability". "Grove" in 1971 refers to the current definitions of empowerment that involves delegation of legislative power, delegation of authority, mission assignment and empowering.

In 1990, "Gandez" conceptualized the empowering as making decisions. But "Zimer Man" in that year refers to easiness and abstention of providing definitions and he believes that the definition of empowerment is easy when we consider it without terms such as helplessness, powerlessness and alienation. Empowerment so far literature had great changes, so that finally "Lee" in 2001 stated empowerment as a context to increase discourse, critical thinking and activity in small groups and refers that allowing for movements in the exchange, sharing and refining the experience, thinking, seeing and dialogue are the main components of empowerment. (Nader, 1386: 66).Also, researchers have proposed other definitions of this concept that are pointed out here. According to "Rapili" empowering is: A concept, a range of behaviors, an organizational plan.

1. As a concept, empowering is authorization in making decision for subordinates.
2. As a range of behaviors empowering is sharing autonomous groups and individuals in determination of their vocational fate.
3. As an organizational plan empowering is more opportunity to release the entire work force, improving and applying the skills, knowledge and abilities of their potential, for the good of themselves and their organizations. (Fruits, 1: 1381)

Quinn and spreitzer in 1997 provide empowerment in two views: mechanical view - organizational view
   i- Mechanical view: managers and researchers believe that empowering is the authority to make decisions within certain boundaries and responsibility divestiture to individuals to assess their own work.
   ii- Organizational view: In this view, researchers believe that empowerment is risk-taking ability, develop and create change, understanding the needs of employees, making teams to encourage people to work collaboratively and to verify the performance. (Raziei, 1384:10.

Creativity: Scientists have offered broad definitions of creativity, each of which can take a picture of it. But in general it can be said that creativity is: Using mental abilities to create an idea or a new concept (Kaiser; 1986: 4).Creativity from the perspective of various science topics including philosophical, psychological, social and ecological cases has been investigated (Goudarzi, 1387: 112).Creativity can be seen as a new and non-traditional look and ability to detect and diagnose problems that others can't identify and provide new and effective ways to fix it (Politis, 2005: 182). Different definitions show that creativity involves the following:

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i-   The ability to see things with a new look.
ii- Learning from past experiences and relate this learning to new situations.
iii- Flexible thinking and break the constraints.
iv- Using non-traditional methods to solve problems.
v-   Steps beyond information.
vi- Creating something unique or original.

Mac Keller believes that every creative thought has outside sources that may be far or near, conscious or unconscious. Creativity is not created in a vacuum. Creative factor in conjunction with outside sources can also get the information and re-organize the resources. For this, we will need the following:

A.   Skills and abilities necessary to actualize up ideas.
B.   Set of knowledge and understanding to explore and find new combinations.
C.   Attitude and readiness that enables us to accomplish the task to continue the idea., in other words non-associated relationships between things that are already in such a way that be both significant and new for the person.

In explaining the topics of Guilford and Torrance creativity, the four elements are discussed which have educational nature and include: fluidity, flexibility, originality and elaboration of detail.

Fluidity deals with quantify and the number of ideas. It means that it depends on the power to produce ideas and abundant answers. Flexibility deals with diversity of ideas or in other words, the ability to change the direction of thought or the ability of different ideas, the initiative component to being unique or unusual ideas and the ability to generate innovative ideas and the component of extending details assesses the ability to attention to detail related to an idea (Pirkhaefi et al, 1388: 61 -51).It is worth noting that in this study, above dimensions were measured by Torrance questionnaire on the topic of creativity. In fact, nowadays, all organizations require fresh ideas and opinions for their survival and continuity of the formation, so that they get new ideas to ensure their dynamics, otherwise they will be doomed. Nowadays novelty seeking and the creativity and innovation in organizations as a strategy for the implementation of its operational environment is a complex situation. The motto ((hell, if you're not creative)) for enterprises nowadays is a serious warning. (Alvanni; 2007: 229).In the early 1950s onwards, Traditional belief and unscientific notion of creativity as a genius, gave its place to a new vision resulting from systematic research and creative experts, including Taylor, Maslow, Barron and Altshuler. According to this vision, creativity: is potential and universal talent and can be used to identify the factors affecting it, it will grow and flourish (Zarghami, 1390).

Ability and creativity: Amabil believes that the creative skills as a dimension of empowerment are inevitable. That person should be able to apply the knowledge gained from experience and training to perform the tasks. These skills through the application of knowledge help to produce creative ideas (Ford and Etal; 1998).As mentioned above, when employees have creativity in their workplace and in this way they provide fields of growth and development. It would undoubtedly be of interest to managers. Therefore, they feel their ideas have been considered and they are valued. As a result, they feel competence and ability. (Geff & Etal; 1998)In a study by Damani entitled "Surveying the relationship between empowerment and creativity with job burnout among primary teachers of Iranshahr", he found that there is a direct relationship between teacher empowerment and creativity. This means that with increasing capacity, creativity also will increase (Damani; 2010).As we've heard, creative employees are the competitive advantage of any organization. A transformational leader can achieve to creative employees by stimulation and encourage to provide the development and progress of their organization. But there are contradictions in the empirical findings suggest that the relationship between transformational leadership and employee creativity is more complex than a simple direct relationship. This means that dependence on the leader as a mediator, can be an obstacle to creativity. It has been proposed that, empowerment as a moderator factor is able to reduce the negative consequences of dependence and it will change the outcome of individual creative performance. In other words,

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empowerment is a way to strengthen the relationship between creativity of individuals with a transformational leader (Krell; 2013: 7-14).More recently, researchers have examined the concept of "constructive deviance", which is called as behaviors based on "leaving group norms". The term of "constructive deviance", includes several different behaviors, which include:Autonomy and authority to act and the subsequent creative performance, conventional and unconventional social behavior, anti-role behavior in organizations, etc. thus, we propose three mechanisms for greater coordination between these behaviors to constructive deviance: 1. intrinsic motivation. 2. Commitment. 3. Empowering employees. In explaining this, it can be said that, despite the constructive deviance, will the members of the organization be able to move towards the goals of the organization without the benefit of adequate mental health resources, solely on the basis of their motives? Researches has shown that, without some form of mental enrichment and cognitive and psychological empowerment, employees won't be able to compensate and create a balance between leaders' supports, constructive deviance and balanced group norms. So that, among the proposed mechanisms, transformational leadership, that is the source of intrinsic motivation and empowerment is more successful than other mechanisms which deals with one of them, in promoting constructive diversion (Vadera, 2013: 1221-1276).

Hypotheses

The main hypothesis: There is a significant relationship between empowerment and creativity in the member of the mentioned organization.

Sub-hypotheses:
- There is a significant relationship between feelings of competence and creativity in employees.
- There is a relationship between effectiveness and creativity in employees.
- There is a relationship between sense of autonomy and creativity in employees.
- There is a relationship between a sense of duty (being targeted and valuable) and creativity in employees.

METHODOLOGY

Research method in this study was descriptive-correlation and the purpose of which was to provide applied research and in terms of the time involved in research is a case and field study. Also, the nature of this research is to examine the notion of a direct relationship between the perceived psychological empowerment and creativity in employees, which is done in the the field of organizational behavior and human resources. For this reason, the effect of different dimensions and components of empowerment and the incidence of creativity have been studied and explored in this study.Total population in this study in the studied year (92-93) is inquired equal to n=342 from Informatics Centre of Education Alborz Department in region 1. Using the calculation formula below, the sample size was n=182 and after distribution of 182 + 20 questionnaires to increase internal validity, 185 acceptable questionnaires were returned. The method of calculate the sample size is as follows:

$$n = \frac{Z^2 \cdot P \cdot Q \cdot N}{D^2 \cdot (N-1) + Z^2 \cdot P \cdot Q}$$

Where, given the 95% confidence level, D=5% is intended and considering the possibility of the average P,Q=50%. By referring to the table of normal distribution, the value of Z = 1.96 is obtained. This value was distributed using stratified random method among the teaching colleagues and managers.

Class A is obtained through a = 320 teacher (student) and class B is obtained through from b=122 managers. B+a=m=342 and n=185, thus, the contribution of each class is calculated as follows.

The number of surveyed teachers (student) $A = n \cdot \frac{n}{m}$ =173

The number of surveyed managers B= $m \cdot \frac{b}{m}$ =12

Data collection methods

Data collection method in this research includes: 1. Library studies 2. Questionnaire.

Library studies for more information about the field of research history and literature and also the use of articles, books and dissertations on the Internet; using questionnaires to assess abilities and creativity.

A- Torrance Questionnaire (1979) was used to measure the creativity, which includes 40 items and each item consists of five Likert scale options. Dimensions of creativity in the questionnaire are: fluidity, flexibility, originality and elaboration in detail which are previously have been investigated in detail. To achieve the result of the test, the Torrance test has been used to interpret the table. It should be noted that Yousefi Miandehi (1389) has achieved to 90% creativity reliability using Cronbach's alpha coefficient and Moslem Salehi (1391) has achieved this 86% in another study.

B- To assess the ability, Spritz empowerment questionnaire was used, which consists 12 items and four dimensions of significance, competency, autonomy and effectiveness in the Likert scale. Dimensions of Empowerment previously are investigated. Salehi (1391) has achieved to 89% Cronbach's alpha of the questionnaire and Elham and Raheleh Hosseini have achieved to 84% in a similar study, which indicates the reliability of the questionnaire. Meanwhile, the Likert scale has been adjusted as follows: Strongly agree = 5, Agree = 4, No idea = 3, Disagree = 2, Totally disagree = 1.

It is noteworthy that, some corrective comments of a number of advisor professors were applied to determine the validity of the questionnaire, despite their standardization. To measure the reliability of the questionnaire, at first 30 members selected and questionnaires were distributed among them. Then, using spss software, the Cronbach alpha coefficient were obtained 81% for empowerment questionnaire and 84% creativity questionnaire.

Cronbach's alpha: r = $\frac{j \cdot (1 - \frac{\sum s_j^2}{s_2})}{j-1}$, j: number of questionnaire's subset of questions, s_j^2= the variance of the j-th subset, s_2 = variance of the test.

Statistical methods

Since, in this study, studied variables were measured quantitatively, the results of the measurement variables and surveying their interactions based on statistical methods are analyzed. In this research, first using SPSS software package in the section on descriptive statistics, the average and standard deviation are calculated. Then, collected data were analyzed using Pearson and Spearman correlation test. Similarity of obtained coefficients from Pearson and Spearman methods increases the reliability of the obtained results.

RESULTS

According to the table1 and graph1 of the frequency of gender, 73% were males and 27% were women. As the table 2, highest level of education is bachelor's degree (64%), then those with post-graduate education (31%) and associate degree is lowest level of education among the participants (5%).Teachers with experience between 15-10 years accounted the largest number (63%) and teachers with over 20 years experience were the lowest number (12%) in table3. According to the frequency table4, between the components of empowerment, significancy had the highest average, minimum score 3 and maximum 15 were obtained. Ability was from 21 to 60 and its average was 48.41. According to the table of questionnaire analysis (37-48 moderate and higher), it can be said that, samples have

relatively high empowerment. Interestingly, the average of empowerment in managers was 48.22, which is slightly lower than total average empowerment. As can be seen in the table 5, the average of creativity in the subjects was 7.032, according to the table of questionnaire analysis (0-19 moderate), it can be said that, samples have relatively low creativity.

Pearson coefficient analysis

0-0.2 Weak, 0.3-0.6= Moderate, 0.7-1=strong. Given the values of the two tests, there is a strong correlation between the two variables. And, since the sig = 0, the hypothesis is approved and there is a direct relationship between empowerment and creativity. Also positive sign of the coefficient indicates that the relationship is direct. This means that, it increases with increasing the one another, and vice versa.

Sub-hypotheses

There is a relationship between feelings of competency and creativity in teachers (instructors, and managers) of technical-vocational high schools.

The results of the sub-hypothesis suggests that, despite the approval of all four sub-hypothesis correlation of each of the four components of capability and creativity are not the same and average impact on the creativity aspects of their empowerment is about 0.52.

SUGGESTIONS

To strengthen the numerous dimensions of empowerment in teachers of vocational-technical schools, first it is necessary to reinforce the transformation and moralization mood in managers. Because, achieving to empowerment perception by employees, definitely will follow the developments in the organization and tolerance of these changes requires management who has a comprehensive approach and a higher threshold than its consequences. Also, given the strong verification of relationship between autonomy and creativity, it is essential for the managers to be trained in the areas of motivation, establishing a secure environment with more authority for employees and acquire skills which resulted in an understanding of the abilities and commitment of teachers to schools so that managers believe that the teachers are not only responsible for doing their job properly, but also in the field of making changes in teaching and learning with new and exciting ways and creativity of students, they have responsibilities. In addition to creating a sense of competency in people is the true to revere their competency with proper reward system, based on individual performance, and give more opportunities for creative behaviors with create a welcoming environment.On the other hand, to strengthen the ability, TQM or "quality control" of various aspects of the organization can be implemented; the abilities of individual with sufficient authority to the people and the ability groups to solve problems and also creation of autonomous groups of teachers to strengthen collaboration and simultaneously preventing the chaos.

Strengthen the creativity requires several changes in organizational culture and institutionalize the creativity and implementation of programs and use of creative and innovative ideas. Many techniques have been proposed in the context of boosting creativity. Some of them are mentioned.Brainstorming, modeling the nature of which is used in science communication, nominal group techniques, suggestion box and the use of TMS. About TMS (Talent Management System), researchers introduced it as management system and development of talented employees which includes the identification of talent, maintaining and strengthen the talents and potential exploitation of children (F. Pour, 1388: 1).

In the following, practical suggestions to enhance creativity and giving adequate opportunity to the people should be considered. Because, seepage of a new idea can't be expected to be like solving predetermined and repetitive

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problems in a short time range. Having enough and not necessarily infinite time for creativity will strengthen the motivational and dynamic environment for employees and can be helpful to create new ideas to the attention of the employees.In addition, trust of managers in organization to creative employees and teachers, means assuring them about doing their work tasks, along with it, testing their new ideas can be a kind of constructive support to create a dynamic and growing environment among schools, especially technical and professional schools.

CONCLUSION

Obtained coefficients indicate that, in this population autonomy have the highest effects on the creativity in the studied population.However, due to the direct relationship between ability and creativity, the necessity to implement the different aspects of ability becomes more evident more specifically delegation to employees of the collection. Since all of the organization's employees tend to be the most useful for organizations, they may make initiatives, which will be considered beyond the capacity of the organization in the first place. If sufficient authority doesn't be given to these people from the relevant managers, these innovative and creative ideas will be suppressed and the opportunity for growth and incidence those from the others will be denied. Confirmation of the second hypothesis suggests that, feel of effectiveness in organizations can provide the groundwork for the incidence of their creativity. Perhaps the evaluation and assessment of the performance of the people can be assessed by their effectiveness and crystallize this feeling in them to do creative actions to influence and control events in their respective organizations. On the other hand, competency of employees based on a good skill to perform the task, can encourage people to find new and creative ways to meet the modern challenges. To create more skilled and stronger feelings of competency, holding courses for increasing the personal knowledge and skills will help to strengthen this aspect of ability and motivation to find innovative ways to do a better job and achieve the organizational goals. In This research, it seems that, although the studied subjects in third population consider their job worthwhile and they perform their works purposeful, and in other words they well understood the sense of significance, this aspect of ability hasn't have noticeable effect on their creativity. But it doesn't mean to neglect this dimension of ability. Because, sense of significance increases the commitment and desire to achieve the goals of the organization and cab be the infrastructure of other aspects of ability; because, if commitment do not be estimated in their mind toward the organization, they can't lead their activities towards more beneficial effectiveness in the organization. Also, the need for autonomy emerges in the people when sufficient desire be emerged in them to achieve the successful prospects of the organization. For researchers who are pursuing this issue in the future, it is suggested that, given the importance of human resources, they provide solutions to explain the specific pattern as an organizational plan to Empower the employees and as the psychological dimensions of empowerment were examined in this study, they pay greater attention to behavioral impact and dimensions and also they provide ways to understand and implement an organizational approach to the abilities. In addition, organizations need to find a way to institutionalize to creatively solve problems. For this purpose, the consequences of creativity and ability in organizations should be studied.

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Table 1. Prevalence by Gender

Gender	Number	Percentage
Female	50	%27
Male	135	%73
Total	185	%100
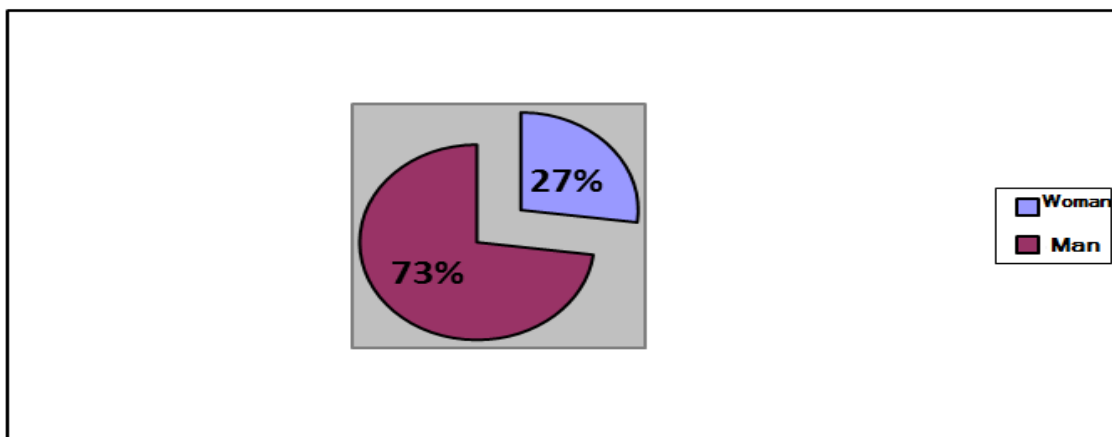
Figure 1

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Table 2. Prevalence by Education

Education	Number	Percentage
Associate degree	9	%5
Bachelor	118	%64
Higher than Bachelor	58	%31
Total	185	%100

Table 3. Prevalence by work experience

work experience	Number	Percentage
Less than 5 Years	29	%16
5-10 years	46	%25
10-15 years	63	%33
15-20 years	25	%14
More than 20 years	22	%12
Total	185	%100
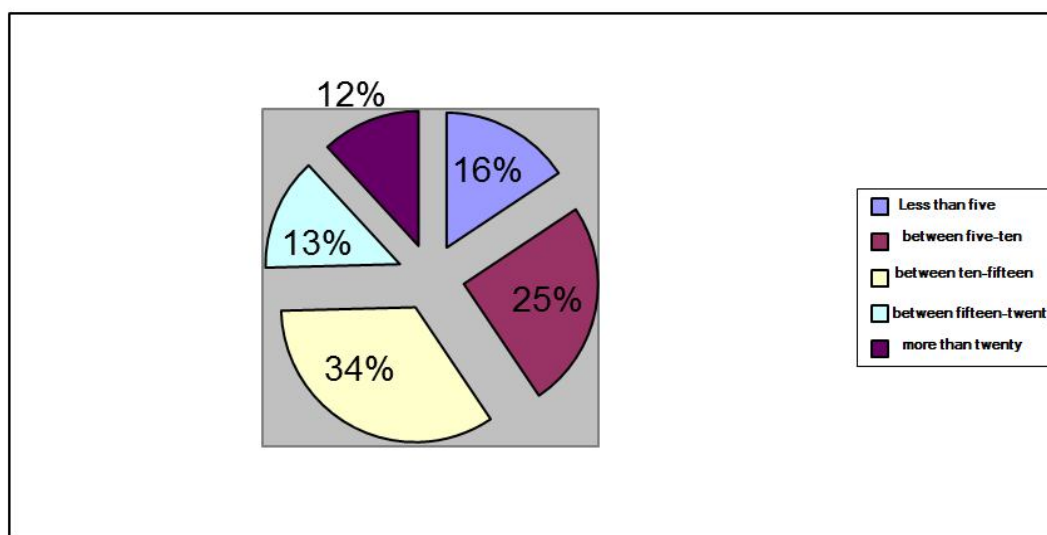
Figure 2

Table 4. Prevalence by work experience

	Number	Average	Mode	Median	Variance	Standard deviation	Minimum	Maximum
Competency	185	12.713	12	12	3.825	1.955	7	15
Autonomy	185	11.651	12	12	5.949	2.439	5	15
Effectiveness	185	11.659	12	12	5.052	2.247	5	15
Significance	185	13.345	15	14	4.195	2.048	3	15
Ability	185	48.410	48	49	57.819	7.603	21	60
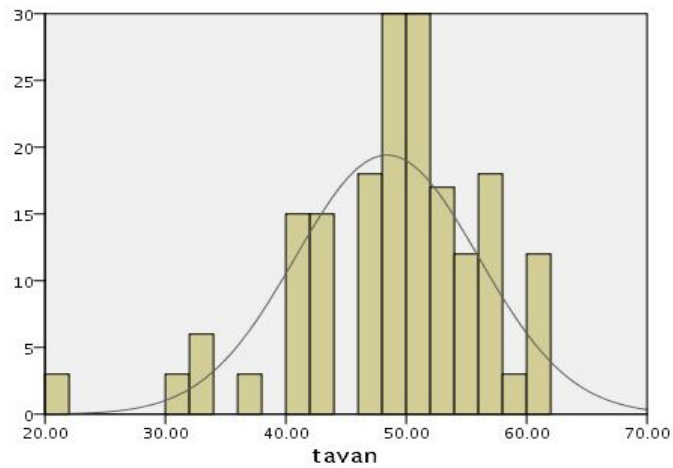
Figure 4. Histogram of ability in subjects
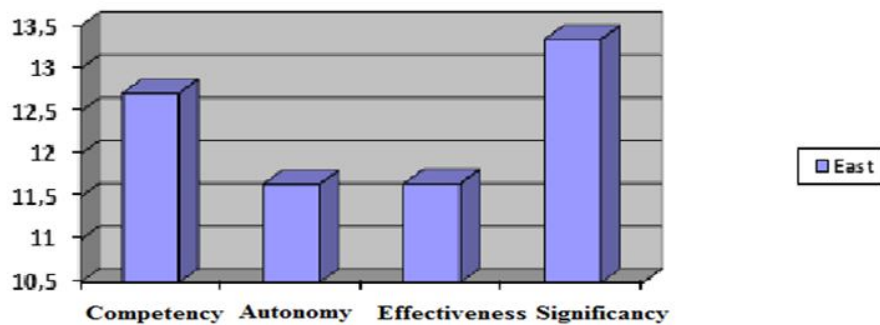
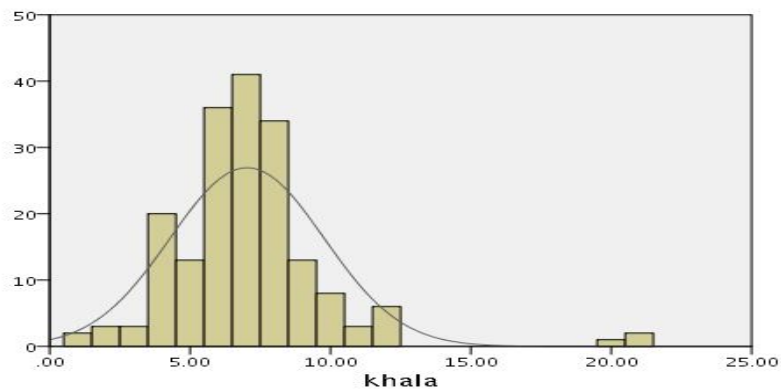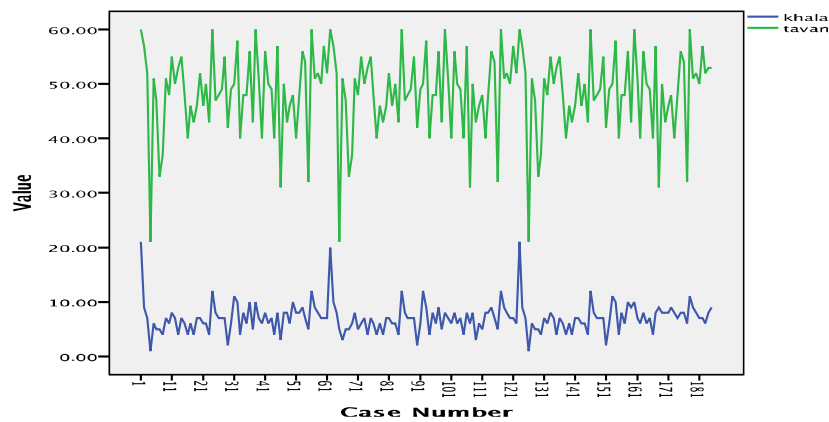**Figure 4(a). Columnar show of the perceived ability of the components**

Table 5: the creativity of the subjects

	Number	Average	Mode	Median	Variance	Standard deviation	Minimum	Maximum
creativity	185	7.032	7	7	7.499	2.438	1	21

Figure 5. Histogram of creativity in the subjects

Figure 5(a). Comparison of distributions of two variables creativity and empowerment

Table 6 Correlation coefficients of variables

Statistical Indicators	Pearson correlation test		Spearman correlation test	
	Pearson coefficient	Sig Significance	Spearman coefficient	Sig Significance
Ability	0.611	0.00	0.654	0.00

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Table 7: Evaluation of components of competency and creativity

Statistical Indicators	Pearson correlation test		Spearman correlation test	
	Pearson coefficient	Spearman coefficient	Spearman coefficient	Sig Significance
competency creativity	0.517	0.00	0.571	0.00

*Pearson coefficient of 0.517 with a positive sign, indicates a direct relationship between competency and creativity. Thus, secondary hypothesis is confirmed.

Table 8. Evaluation of components of autonomy and creativity

Statistical Indicators	Pearson correlation test		Spearman correlation test	
	Pearson coefficient	Spearman coefficient	Pearson coefficient	Spearman coefficient
autonomy creativity	0.596	0.00	0.660	0.00

*Pearson coefficient of 0.596 (moderately strong) with a positive sign, indicates a direct relationship between the two variables. Hypothesized relationship between the sense of autonomy and creativity is approved.

Table 9: Evaluation the relationship between effectiveness and creativity

Statistical Indicators	Pearson correlation test		Spearman correlation test	
	Pearson coefficient	Spearman coefficient	Pearson coefficient	Spearman coefficient
effectiveness creativity	0.557	0.00	0.576	0.00

* Pearson coefficient of 0.557 (moderately strong) with a positive sign, indicates a direct relationship between the two variables. The above hypothesis is thus confirmed.

Table 10: Evaluation the relationship between significance and creativity

Statistical Indicators	Pearson correlation test		Spearman correlation test	
	Pearson coefficient	Spearman coefficient	Pearson coefficient	Spearman coefficient
significance creativity	0.383	0.00	0.369	0.00

* Pearson coefficient of 0.383 (moderate) with a positive sign, indicates a direct and significant relationship between the two variables. This hypothesis is also confirmed.