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RESEARCH ARTICLE

Relative Toxicity of some Insecticides against the Greenhouse Whitefly *Trialeurodes vaporariorum* (Hemiptera: Aleyrodidae)

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ABSTRACT

Relative toxicity of imidacloprid, acetamiprid, thiamethoxam, diflubenzuron and two Horticulture Mineral Oils viz., SERVO and ESSO were evaluated against the second instar nymphs of the greenhouse whitefly, *Trialeurodes vaporariorum* Westwood infesting tomato under laboratory conditions. All the test insecticides and HMO's caused significant and dosage dependent mortality. The LC_{50} values calculated for imidacloprid, acetamiprid, thiamethoxam, diflubenzuron, ESSO and SERVO were 0.016, 0.019, 0.041, 0.067, 0.28 and 0.35 per cent, respectively. LC_{90} for these insecticides were 0.20, 0.23, 0.34, 0.53, 2.65 and 2.74 per cent, respectively. On the basis of these studies imidacloprid was found to be the most toxic insecticide followed by acetamiprid, thiamethoxam and diflubenzuron. Among HMO's, ESSO was comparatively more effective against the greenhouse whitefly but caused phytotoxicity at 1% concentration whereas SERVO caused phytotoxicity at 1 % and 0.5 % to tomato leaves under laboratory conditions.

Key words: Insecticide, *Trialeurodes vaporariorum*, toxicity

INTRODUCTION

Growing crops in greenhouses is faced by several challenges, among them, the infestation by pests and diseases is the fore for most which not only reduce the quantity of the product but reduces the yield to a greater extent. Among

these the greenhouse whitefly *Trialeurodes vaporariorum* Westwood (Hemiptera: Aleyrodidae)is the most serious (Van Lenteren and Noldus, 1990). Whiteflies feed voraciously on the plant sap and in sufficient numbers, cause leaf drop and prohibit the maturing of fruits. They produce sticky honeydew which damages crops and serves as a substrate on which sooty mould (a black fungus) grows, thereby prohibiting normal respiration of leaves, reducing photosynthesis and rendering plant products unattractive. In addition to damage caused by direct feeding pressure, whiteflies transmit plant viruses also (Gerling, 1990). There are different pest control tactics, but the most common and quicker one is that of chemical control which is generally adopted by our farming community. Among these neonicotinoids are the insecticides with wide spectrum effect against sucking and certain chewing insect pests (Jeschke and Nauen, 2008). On the other hand, HMO's are widely used against the pests of orchards, yet their use in vegetable crops are limited. Horticultural oils (e.g., SunSpray) are one of the most effective whitefly controls available for use on house plants. Applied as dilute sprays (e.g., 2 percent), they smother the immature forms and eggs (http://www.ext.colostate.edu/pubs/insect/05569.pdf). In view of this the present studies were undertaken to evaluate the efficacy of some neonicotinoides (imidacloprid, acetamiprid, thiamethoxam), diflubenzuron and HMO's against the greenhouse whitefly so that the information thus gathered may be utilized in managing the population of this pest.

MATERIAL AND METHODS

Raising of stock culture:A stock culture of the greenhouse whiteflies was raised under laboratory conditions on tomato plants, which were planted in earthen pots (25 cm X 20 cm) and plastic cups (7 cm X 7.5 cm). Six insecticides viz., imidacloprid (Midas 17.8 % SL), acetamiprid (Pride 20 % SP), thiamethoxam (Actara % 25 WG), diflubenzuron (Diflubenzuron 20 % SC) and two HMO's (ESSO and SERVO) were evaluated for their toxicity against the greenhouse whitefly**.** Stock solutions of 0.1 % of each insecticides and 1 % of HMO's was prepared. Desired concentrations of the test insecticides were prepared from the stock solutions.

Intrinsic toxic studies: The intrinsic toxicity of the test insecticides was evaluated under laboratory conditions against the second instar nymphs of the greenhouse whitefly. The bioassay was carried out as per the procedure given below:

Tomato leaves having second instars of greenhouse whitefly were dip-treated in each test concentration for 30 seconds. Treated leaves were then air dried and placed on a filter paper in petri plates. A cotton boll soaked in water was placed at the base of each filter paper for hydration of leaves (García-Mateos et al., 2007). For each concentration, 5 replicates were prepared along with an equal number of replicates in untreated (emulsified water, 0.05 %) control. The mortality data were recorded after 48 hours.

Concentration-mortality relationship data for the nymphal stage was calculated by recording the mortality range of 20-80 per cent for each insecticide. The LC_{50} and LC_{90} values were calculated by subjecting the mortality data to probit analysis (Finney, 1971) after applying Abbott's correction (Abbott, 1925).

Phytotoxic studies

Phytotoxicity studies of HMO's with imidacloprid and acetamiprid on tomato leaves was recorded to evaluate their individual and combined effect on the tomato and gerbera plant. A stock solution of 0.1 % of the test insecticides and 1 % HMO's was prepared and further dilutions were made as per the desired concentrations. Symptoms were observed after 24 hours and 48 hours.

RESULTS AND DISCUSSION

Intrinsic toxic studies : The studies revealed that imidacloprid when applied at 0.1 %, 0.05 %, 0.025 %, 0.0125 %, 0.00625 % and 0.00312 5% by leaf-dip method resulted in 82.69, 72.01, 61.03, 50.80, 39.30 and 25.39 per cent mortality, respectively of greenhouse whitefly nymphs. In control, where nymphs were treated with emulsified water (0.05 %) only 11.04 per cent mortality was recorded. After correcting the mortality data and subjecting to probit analysis LC_{50} and LC_{90} values of 0.016 % (fiducial limits: 0.011 and 0.022 % conc.) and 0.20 % (fiducial limits: 0.10 and 0.36 % conc.) respectively. Acetamiprid at concentration ranging from 0.003125 to 0.1 % killed the treated insects in concentration dependent manner from 25.39 to 81.69 per cent. On subjecting the data to probit analysis, the LC_{50} value was calculated to be 0.019 % with fiducial limits of 0.013 and 0.025 %. The LC_{90} value was 0.23% with fiducial limits of 0.12 and 0.46 %. The nymphs when treated with thiamethoxam at concentration varying from 0.00625 to 0.2 % gave dosage dosage dependent mortality of 21.26 to 85.28 per cent as against 11.04 per cent in the control. Probit analysis of the data revealed that LC50 and LC 90 values of thiamethoxam were 0.041 % (fiducial limit: 0.031 and 0.054) and 0.34 % (fiducial limit: 0.20 and 0.58), respectively. Diflubenzuron at concentration varying from 0.0125 to 0.2 % gave dosage dependent mortality of 25.45 to 81.42 per cent. After correcting the mortality data using Abbott's correction and subjecting to probit analysis, a median lethal concentration of 0.067 % (fiducial limit: 0.051 and 0.089 %) was obtained. The concentration of diflubenzuron required to kill 90 per cent of the test population was 0.53 % (fiducial limit: 0.28 and 0.98%). Among Horticulture mineral oils, in SERVO, mortality ranged from 23.13 to 74.53 % at concentrations varied from 0.0625 to 1.00 %. the LC_{50} value was calculate to be 0.35 % (fiducial limits; 0.27 and 0.47 %) whereas, LC_{90} value was 2.74 % (fiducial limit: 1.41 and 5.37 %). ESSO when applied at concentration range 0.0625 to 1.00 % resulted in 25.48 to 76.69 per cent mortality of the nymphs of T. vaporariorum. On subjecting the data to probit analysis the LC_{50} and LC_{90} values were 0.28 % (fiducial limit: 0.20 and 0.39 %) and 2.65 % (fiducial limit: 1.23 and 5.62 %), respectively (Figure1). Taking the toxicity of SERVO as unity (1.0), the relative toxicity of imidacloprid, acetamiprid, thiamethoxam, diflubenzuron and ESSO was 21.9, 18.4, 8.5, 5.2 and 1.3, respectively.

Phytotoxic studies of HMO's revealed that SERVO caused phytotoxicity with acetamiprid and imidacloprid at the concentration of 1 % oil + 0.1 % insecticide and 0.5 % oil + 0.05 % insecticide. ESSO caused phytotoxity only with imidacloprid at the conc. of 1 % oil + 0.1 % insecticide (Table 2). No phytotoxic effect was observed at LC_{50} value of these insecticides.

The studies on the evaluation of these insecticides revealed a variable response against the second instar nymphs of whitefly which may be due to the variability in neonicotinoids characteristics influencing the movement in plant tissues such as water solubility which greatly affecting their toxicity especially against those insects having piercing and sucking mouth parts such as whitefly (Cloyd and Bethke, 2011). The present studies find support with those of Muhammad Amjad et al., (2009) who reported that acetamiprid (Megamos 20 SL) was the most effective insecticides against the cotton whitefly, Bemesia tabaci at recommended dose (150 ml/acre) followed by imidacloprid (Conifidor 200 SL) and thiamethoxam (Actara 25 WG) with 250 ml/acre and 24 gm/acre recommended dose, respectively. AL-Kherb (2011) studied three neonicotiniodes viz., acetamiprid, imidacloprid and thiamethoxam at 10 ml, 10 gm and 10 gm active ingredient $100L^{-1}$ against the immature stages and adults of B. tabaci. which showed that these insecticides significantly suppressed the population of immature stages and adults of whitefly, on plant leaves. Thiamethoxam showed the highest rates of efficiency against whitefly and immature satges followed by imidacloprid and acetamiprid. Ali et. al., (2005) evaluated the efficacy of insect growth regulator, neonicotinoid and other insecticides against whitefly. Among these Bufrofezin was effective against the nymphs of whitefly while acetamiprid, difenthiuron and imidacloprid were effective against the adults of whitefly. Thus present studies thus revealed that synthetic insecticides were more toxic to the greenhouse whitefly as compared to HMO's. Imidacloprid was found to be more toxic than other synthetic insecticides whereas, HMO's were comparatively less toxic.

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Table 1. Intrinsic toxicity of horticulture mineral oils and some other insecticides against greenhouse whitefly.

Name of Insecticide	Formulation	LC_{50} (Fiducial limit)	LC_{90} (Fiducial limit)	Regression equation	Relative toxicity
Imidacloprid	Midas17.8%SL	0.016 (0.011 & 0.022)	0.20 (0.10 & 0.36)	Y= 3.58 + 1.18X	21.90
Acetamiprid	Polar 20%SP	0.019 (0.013 & 0.25)	0.23 (0.12 & 0.46)	Y= 3.53 + 1.16X	18.40
Thiamethoxam	Maxima 25%WG	0.041 (0.031 & 0.054)	0.34 (0.20 & 0.58)	Y= 2.76 + 1.39X	8.50
Diflubenzuron	20%SP	0.067 (0.051 & 0.089)	0.53 (0.28 & 0.98)	Y= 2.39 + 1.43X	5.20
ESSO (HMO)	Tata Relice	0.28 (0.20 & 0.39)	2.65 (1.23 & 5.62)	Y= 1.76 + 1.32X	1.30
SERVO (HMO)	Servo	0.35 (0.27 & 0.47)	2.74 (1.41 & 5.37)	Y= 1.33 + 1.44X	1.00

Table 2: Phytotoxicity effect of HMO's alone and in combination.

Test solutionz	Concentration	Symptom after 24 hrs.	Symptom after 48 hrs.
Imidacloprid + SERVO	0.1% + 1%	Phytotoxicity	-
	0.05% + 0.5%	Phytotoxicity	-
	0.025% + 0.25%	-	-
	0.0125% +0.125%	-	-
Imidacloprid + ESSO	0.1% + 1%	-	Phytotoxicity
	0.05% + 0.5%	-	-
	0.025% + 0.25%	-	-
	0.0125% +0.125%	-	-
Acetamiprid + SERVO	0.1% + 1%	Phytotoxicity	-
	0.05% + 0.5%	Phytotoxicity	-
	0.025% + 0.25%	-	-
	0.0125% +0.125%	-	-
Acetamiprid + ESSO	0.1% + 1%	Phytotoxicity	-
	0.05% + 0.5%	-	-
	0.025% + 0.25%	-	-
	0.0125% +0.125%	-	-

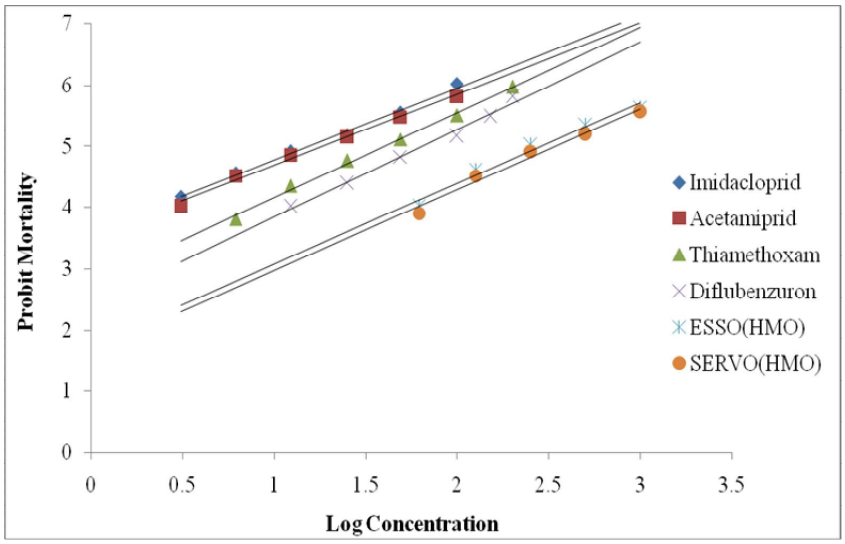

Figure 1. Log concentration-probit mortality response of nymphs of *T. vaporariorum* to tested insecticide

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RESEARCH ARTICLE

Identification and Ranking of Effective Factors on Size of Project Buffer in Critical Chain Approach using Decision Making Techniques (Case Study: Road Construction Project)

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ABSTRACT

The primary objective of the present research involves identification of the factors influencing the project buffer size in CCM and ranking them through multivariate decision-making techniques. Therefore, the road construction projects conducted by Abadgaran Company were selected as the case study. The statistical population includes all employees and technical specialists at the foregoing company that amounts to 92 individuals based on the data offered by its Personnel Office. Due to the limited population size, all-count method was applied instead of sampling. To identify the factors and indices, from past studies, library studies and interview with experts group and also for their confirmation, confirmatory factor analysis methods were used. The main data collection tool involves a questionnaire, whose validation was confirmed through face and construct validity. Its Cronbach's alpha was also calculated as 0.928, denoting the reliability of the measurement tool. The research applies some tests including Bartlett's properties of sufficiency and statistical tests for checking the sample size sufficiency, Student's t-test for index confirmation, and confirmatory factor analysis (CFA) method to check the fitting model. For weighting and ranking the factors, analytic process (ANP) was used. The results showed that

the factors influencing the project's buffer size in road construction projects, in order of priority, are equipment; materials; labor force; data management, supervision, and flow; detailed design problems; delays; site operation conditions; and project specifications. Finally, the results from ranking the factors through analytic process and Friedman test were also compared.

Key words: critical chain method; project's buffer size; confirmatory factor analysis method; analytic process; Abadgaran Company.

INTRODUCTION

Non-completion of the project in determined time period specified prior to the project is among the greatest organizations' problems in conducting a project. This issue causes different problems such as increase in credit and variable costs of project in comparison with the predicted costs or lack of completing the project and delivery to the employee, lack of performing promises and reduction of the credit of project revenues (Kuchaki, 2010). Principally, the uniqueness of the project leads to uncertainty in project and following that lack of delivery of the project on time. Uncertainty related to the time of conducting any project is one of the substantial reasons for project requirement to management. In other word, uncertainty management is one of the most important project managers' activities as a result of which they can complete the project in time and more reliably. In project control and planning methods (e.g. Gantt Chart, Critical Path Method (CPM), PERT and GERT) it is attempted to eliminate this deficiency by increasing the time of every activities which, of course, causes different problems such as increase of variable costs and work in process. So, in order to achieve a different consequence and obtaining a rapid process a new approach would be needed (Long & Ohsato, 2008). On one hand, considering the studies and researches conducted on relationships and models proposed for estimation of buffer size in critical chain approach, it was observed that majority of researchers in their research only identified some of the factors as effective variables on buffers size considered regarding the earlier researches and their personal opinion and integrated such factors simply in project and food buffers size calculating formulas disregard of their weight of importance. However, in fact, some of the factors are more effective and others are less effective on buffers size (particularly project buffer) and determination of the overall time for project conduction. Therefore, using decision making techniques and considering entire effective factors in determination of the project buffer, one must give more weight to some factors and less to others considering the different effectiveness of such factors (Yang Lixi et al. 2009). Goldrat in his last book "critical chain", 1007, explained the management principles based on restrictions theory. Overall, the critical chain concentrates on the restriction of project which blocks the path to achieve goals (Tukel et al. 2006). Indeed, the critical chain approach is a novel method for project management which, considering uncertainties and restrictions, makes use of entire resources in order to eliminate undesirable effects and restrictions. The purpose of this approach is to complete the project on time using the certain budget and purpose predicted such that the resources are optimally consumed (Pour Mohammadi et al. 2008). Yang & Fu (2014) in their research, investigated the chines automotive industry particularly R&D projects in this industry with regard to the critical chain. In their research variables such as strategic return (confirmation if strategies of firms, promotion of organization competitive behavior organization management capability promotion, organization technology advancement and organizational brand promotion), operational return (improvement of organizational efficiency, customers' satisfaction improvement and operational costs reduction) project urgency (external and internal urgencies), financial return (financial performance and present net value) and critical chain performance (consumed buffer size and injected buffer amount to project) were studied. Also in other research, Wang et al (2014) considered a multi goal model for scheduling several projects based on critical chain principle. In their research conducted in china, uncertainty in project critical chain, completion rate and different project goals achievement for all projects were considered. Multiple goals considered in order to model in this research included overall time to complete the projects and financial costs of project. These researchers made use of GA in order to solve their model which is an NP-Hard model. The results indicated that making use of such multi-foal models along with GA would provide more justified and optimal local solutions. Russell et al. (2013) in their research, focused on

the temporal buffers in construction projects. The researchers in this paper added the temporal buffers to the time of construction activities in order to prevent from variability or uncertainties in construction project. The main goal of this research was to identify the factors with the highest effects on temporal buffers of construction projects. Therefore, to identify these factors, 180 construction projects were investigated in USA. The findings were helpful for construction managers in considering the effective factors on temporal buffers and their time amount.

The main issue in present article is to identify the effective factors on critical projects buffer size and their ranking in critical chain approaches using decision making techniques. In this regard, a present paper is seeking to answer the following questions:

What are the effective factors (criteria) on project buffer size in road construction projects?
How these factors are identified and confirmed?
How much is the factorial load of the identified factors?

Using grid analysis, how is the weighting and ranking of the factors effective on road construction project buffer size by information obtained from a group consisting 15 experts experienced and the service background over 15 years in road construction?

Using Friedman's test, how is the ranking of the factors effective on road construction project buffer size by information obtained from a group consisting 90 technical experts and employers of Abadgaran company?

What is the place of each effective factor on project buffer in road construction project using grid analysis techniques and Friedman's test relative to each other.

According to the investigations on and interviews with planning and project control experts it was determined that in project critical chain there are tangible and intangible effective factors in determination of buffers size and particularly project buffer which was not analyzed and investigated in such a collective manner in earlier researches and articles and some of the factors were studied. Also, in order to determine the weight or degree of importance of these factors, multi-indices decision making techniques were not used. Thus, in present article the effective factors on project buffer size were identified in critical chain approach and were ranked using decision making techniques.

METHODOLOGY

Present article is applicable in term of purpose and it is descriptive in term of data collection method since it is investigating the present situation. The main variables of this research include 8 factors (sets) each of which has their index. Table 1 lists the effective factors on project buffer (critical chain) in road construction projects.

The research population is all of the employers and technical experts of Abadgaran company as 90 personnel. In this paper, considering the congruency and limitation of population census method is used. Also, 92 questionnaires were distributed which finally 90 were used in order to analyze. The designed questionnaire included 3 items:

Attendant's letter: in this section the purpose of research was the necessity of respondent's cooperation in order to give required data and how to respond to the items

General items: in this section it is attempted to gather the demographic and general information about respondents

Indices and criteria identification and evaluation specialized items: this section includes 38 specialized items related to the effective indices on project buffer in critical chain approach

In order to obtain the tests' validity in this research the test items were investigated and their ambiguities were eliminated using experts' comments and guidance which explains an acceptable content validity of test. Then, the structure's validity confirmation was done using supportive factor analysis, Scree diagram and KMO index. Also, in line with reliability of the mentioned questionnaire, the amount of reliability coefficient was calculated by Cronbach's Alpha which is 0.978 for all items and id higher than 0.7 and indicates that the questionnaire is reliable.

Research stages

The followings are definitions of the stages, respectively

Review on the generalities of project management and a history of conventional project scheduling methods, introduction and identification of critical chain approach, buffer concept and types' definition and a review on grid analysis technique and introduction to SUPER DECISION software.

Identification and determination of factors and indices effective on project buffer size in road construction projects (determination of criteria and sub-criteria): in this stage, the researcher made use of library sources, documents, articles, foreign and domestic research backgrounds and interview with employers and technical experts of the Abadgaran company and their confirmation in order to identify and determine the effective factors and indices on project buffer size in road construction projects and finally the factors and indices would be determined and identified using used sources and the authors' final deductions.

Questionnaire design considering factors and indices determined in previous stage and confirmation of validity and reliability by a group of experts (15 out of 19 experts experienced over 15 years) experiences in road construction projects.

Distribution of questionnaires among the population including employers and technical experts of Abadgaran Company (90 persons) and implementation of T-student tests in order to validate or reject the factors and indices (criteria and sub-criteria) determined.

Making use of factor analysis in order to make sure of efficiency of the population/sample size and applying the supportive factor analysis in order to analyze the supportive factor models and investigation of the models fitness

Selection and making use of Friedman's test to rank supported factors from perspective of employers and technical experts of Abadgaran Company

Selection and making use of grid analysis technique to solve the problem and grid of research main variables: in this stage, the grid analysis is used to rank the supported factors in 15 experience experts' view with over 15 years of service in the company

Comparison of the results obtained from ranking of criteria (factors) by Friedman's test and grid analysis process (INP).

Research conceptual model

In this section, researcher provides the research conceptual model considering the foreign and domestic research backgrounds and interview with employers and technical experts of the Abadgaran Company and the author's deductions and confirmations of the team. In analysis section using data obtained from the group of employers and technical experts (including experienced experts) of Abadgaran Company and supportive factor analysis of model dimension path, the conceptual model was confirmed and then the effective factors on road construction project buffer size was ranked. Figure 1 indicates the conceptual model.

Information analysis method

In order to analyze the data obtained from population, the descriptive and inferential statistics and SPSS software, version 19 are used. Also in order to analyze the factors, SPSS software, version 19 is used and in order to test the model fitness and structural equation model in supportive factor analysis the AMUS, version 22 is used and for network project analysis the SUPER DECISION software, version 2 is used. Based on the results of research theoretical basics investigation, the effective factors on project critical chain particularly on project buffer in road construction projects including: project features, delays due to project, detailed design difficulties, project labor, project used equipment, project material used, site working conditions, information flow, management and supervision which is the vein of the project were analyzed. In order to validate or reject any item (index) from the distributed questionnaire in population (90 persons) in order to investigate the population the parametric T-student test is used.

As it is seen from table 2, as the significance level of T-student test for each item is less than 0.05, then the null hypothesis, H_0, is rejected and H_1 is accepted. In other word, based on T-student test, each of the indices is confirmed. After correlation and path analysis tests and determination of criteria and sub-criteria it is necessary to determine the relationship between factors. To do so, the team comments of experienced experts with over 15 years of service are used. Both criteria and sub-criteria have internal dependency. Therefore, due to existence of internal dependency (feedback loop) between factors, there is network structure. The research problem can be considered a network structure in other word and the network analysis would be used in order to weight and ranked the factors. The network analysis process is a more general method than hierarchical analysis process. In the hierarchical analysis the options are independent of criteria, but in network one this limitation is eliminated and there is possibility for the elements in one set (criteria interdependency or on options) to be dependent on elements in different sets (dependency of criteria on options). In general, it can be stated that the hierarchical structure in the later method is linear and the levels are ordered based on ascending or descending and each level is in relationship with upper and lower levels directly and this is the weakness of hierarchical structure, but in network analysis this difficulty is eliminated and the structure is defined as a network and the dependencies which in a decision making have joint options and criteria are explained as networks (Saaty & Vargas, 2006). Figure 2 indicates the project network structure and main research variables.

RESULTS

The results obtained from data descriptive analysis indicated that

From gender viewpoint, 82.2% of the respondents were males and 17.8% were females

The results of descriptive analysis of the education of the population indicated that 8.9% have diploma, 28.9% have Associate degree, 45.6% have B.A and 16.7% have M.A degree. Therefore the studied population is in desirable level of academic education.

The results of descriptive analysis based on the job experience indicated that 13.3% have less than 5 years experiences, 20% have 5-10 years of experiences, 36.7% have 10-15 years of experiences, 21.1% have 15-20 years experiences and 8.9% have over 20 years of experience. Therefore, the population's job experience is suitable.

The findings of the factor analysis indicated that the factorial loads of entire indices is more than 0.5 and the factor analysis would performed for the selected model emphasizing on all statements (all items of questionnaire about the effective factors in critical chain project in road construction project).

As it is seen from table 3, results of Friedman's test and option ranking indicated that all criteria or factors are of different ranks. In this test on view of 90 experts of Abadgaran Company, materials are first, equipment is second, project labor is third, information flow and management is 4th, detailed design difficulties is 5th, delay is 6th, site working condition is 7th and finally the project features is in 8th rank

As seen from table 4, results of network analysis indicated that the most important factor in 15 experienced experts' view in company is project equipment with weight of 0.20710 is in rank 1, materials with weight of 0/1818781 is in rank 2, labor with weight of 0.15407 is in rank 3, information flow, management and supervision with weight of 0.14062 is in rank 4 and finally the project features with weight of 0.05463 is in rank 8.

Finally, table 6 compares the ranking results of both methods (Friedman's test and network analysis process). As it is seen from table 6, ranks obtained from both methods are the same and the only difference between them is in fifth factor (project equipment) and sixth factor (project materials) whose ranks are replaced. Therefore, considering the obtained ranks, it can be stated that the employers and experts views in this company are to large extent in line with the experienced experts with experience of project control in this company related to effective factors in project buffer in critical chain approach and there is negligible difference between their views.

DISCUSSION AND CONCLUSION

In a research by Ashtiani et al. in order to determine the project buffer size the critical chain was used applying environmental indices. The environmental indices included: contractors, providers and financial supporters and importance of their performance in the completion of the project on time which is in line with the 3rd rank of the project, i.e. project labor and the involved personnel in project as well as the 4th rank, i.e. information flow, management and supervision. Also, their research weighted the factors in line with the present research. In other research by Dashti Naser Abadi & Ahmadi Nejad, the critical chain and restrictions theory were used as present paper. Also in a research by Qalami et al. the criterion such as resource limitation is pointed out which in present research was explained in form of site working conditions. In a research by Mahmudi & Chaharsoqi, the list of activities were explained in order to make the effects and factor role such as human force more tangible which in this research is explained in form of project labor and is in line with the research results. During the investigations conducted and results obtained from present research, the ranking of effective factors on project buffer size in road construction project are as:

- Material
- Equipment
- Labor
- Information flow, management and supervision
- Detailed design difficulties
- Delays
- Site working conditions
- Project features

SUGGESTIONS

Project critical chain management affects directly 5 branches of project management science: project time management, project cost management, project area management, project integration management and project risk management. So, it is suggested to the organization to focus specially on such areas, since other areas can be merged uniformly. Buffer management includes being aware of buffers state every time and holding buffer management meetings, meetings in which projects decision making and effective individuals investigate the buffers state and if necessary, make decisions in order to economize and making optimal use of buffers and it would be possible and feasible to access rapidly the information using buffer critical chain scheduling.

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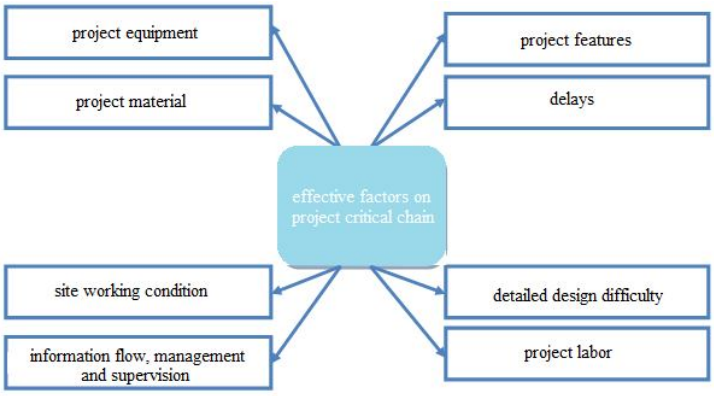

Figure1. Research conceptual model (reference: researcher)

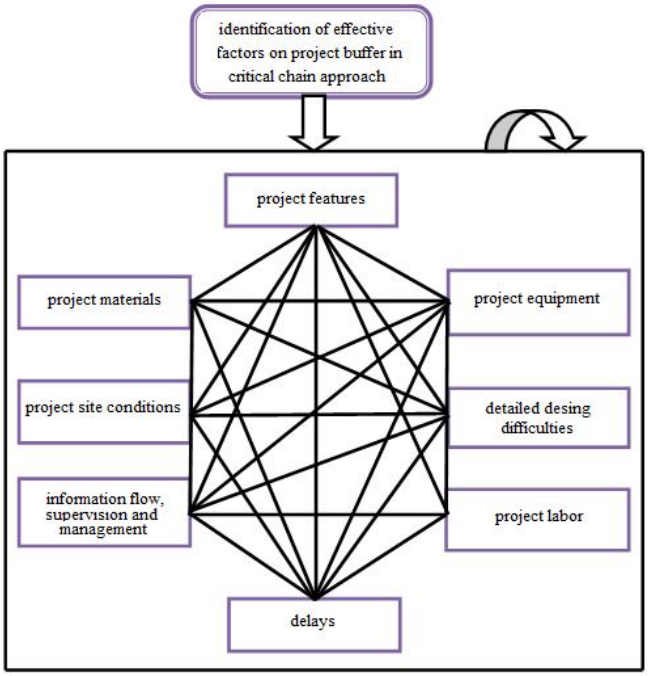

Figure2.project network structure and main research variables (factors) (reference: researcher)

Table1. Effective factors and indices on project buffer (critical chain) in road construction projects

Index	Index No	Factor (set)	Factor No.
Contraction type	1	Project specifications	1
Contraction time period	2		
Project size	3		
Project complexity	4		
activities complexity (difficulties, nature of works)	5		
Firm size	6		
Delay in obtaining necessary permissions	7	delays	2
Prerequisite activities completion time	8		
Rework due to the quality	9		
Inspection delay	10		
Low quality of design	11	Detailed design difficulties	3
Documents quality	12		

weak performance due to the weakness in project site	13		
Strict necessities during design	14		
Quality control requirements	15		
low degree in repetition of activities (type and uniform activities)	16		
Reliability of labors	17	Project labor	4
Availability of labors	18		
Lack of availability of expert labors	19		
Labors' low motivation	20		
Language, ethnical and cultural problems with labors	21		
Availability of equipment	22	Projects equipment and facilities	5
Reliability of equipment	23		
Equipment's efficiency	24		
Time needed for fixing in case of technical breakdown	25		
Time needed to replace in case of technical breakdown	26		
Deficient materials	27	Project materials	6
Low quality or ill-conditioned materials	28		
Arrivals of the required materials early or late	29		
Site or workhouses' undesirable condition	30	Site working conditions	7
Difficult accessibility to site	31		
site materials logistics and transportation type	32		
The distance between project site and site of required material	33		
Correct procedure of project information flow	34	Information flow, supervision and inspection	8
Capability of holding negotiation between beneficiaries	35		
Trust among the senior managers of beneficiary firms	36		
Coordination and communication between beneficiaries	37		
Project working site change	38		

Table2. Calculation of amount of T-student in order to validate the effective indices on project buffer in road construction projects

State	Sig. level	Value of t	Research items	Item No.
Index validated	0.000	4.736	Contraction type	1
Index validated	0.000	8.738	Contraction type	2
Index validated	0.000	8.796	Contraction time period	3
Index validated	0.004	2.683	Project size	4
Index validated	0.003	2.741	Project complexity	5
Index validated	0.101	2.362	activities complexity (difficulties, nature of works)	6
Index validated	0.009	2.660	Firm size	7
Index validated	0.001	3.294	Delay in obtaining necessary permissions	8
Index validated	0.000	10.131	Prerequisite activities completion time	9
Index validated	0.000	9.244	Rework due to the quality	10
Index validated	0.000	13.872	Inspection delay	11
Index validated	0.000	8.301	Low quality of design	12
Index validated	0.002	6.847	Documents quality	13
Index validated	0.000	2.980	weak performance due to the weakness in project site	14
Index validated	0.000	8.207	Strict necessities during design	15
Index validated	0.000	8.163	Quality control requirements	16
Index validated	0.000	6.840	low degree in repetition of activities (type and uniform activities)	17
Index validated	0.000	13.156	Reliability of labors	18
Index validated	0.000	9.493	Availability of labors	19
Index validated	0.000	15.381	Lack of availability of expert labors	20
Index validated	0.000	8.287	Labors' low motivation	21
Index validated	0.000	11.417	Language, ethnical and cultural problems with labors	22
Index validated	0.000	12/107	Availability of equipment	23
Index validated	0.000	9.549	Reliability of equipment	24
Index validated	0.000	11.615	Equipment's efficiency	25
Index validated	0.000	15.053	Time needed for fixing in case of technical breakdown	26
Index validated	0.000	10.108	Time needed to replace in case of technical breakdown	27
Index validated	0.000	14.139	Deficient materials	28
Index validated	0.000	9.519	Low quality or ill-conditioned materials	29
Index validated	0.000	3.513	Arrivals of the required materials early or	30

			late	
Index validated	0.000	5.568	Site or workhouses' undesirable condition	31
Index validated	0.000	3.533	Difficult accessibility to site	32
Index validated	0.000	3.255	site materials logistics and transportation type	33
Index validated	0.000	9.041	The distance between project site and site of required material	34
Index validated	0.000	4.938	Correct procedure of project information flow	35
Index validated	0.000	11.508	Capability of holding negotiation between beneficiaries	36
Index validated	0.000	8.543	Trust among the senior managers of beneficiary firms	37
Index validated	0.000	15.218	Coordination and communication between beneficiaries	38

Table3. Summary of results obtained from supportive factor analysis of model and criteria dimensions

RMSEA	NFI	CFI	RMR	AGFI	GFI	df	Chi-Square	Factor (criterion)	No.
0.057	0.9 ≈0.894	0.973	0.106	0.903	0.958	9	11.576	Project features	1
0.000	0.972	0.999	0.054	0.958	0.992	2	1.573	Delays	2
0.08	0.978	0.989	0.029	0 ≈0.891	0.978	2	3.833	Detailed design difficulties	3
0.000	0.980	0.999	0.022	0.955	0.985	5	3.265	Project labor	4
0.000	0.999	0.999	0.002	0.988	0.999	2	0.031	Project equipment	5
0.07	0.946	0.967	0.038	0.9 ≈0.872	0.974	2	4.589	Project materials	6
0.000	0.944	0.999	0.041	0.978	0.996	2	0.813	Site working conditions	7
0.000	0.971	0.998	0.029	0.950	0.990	2	1.733	Information flow, management and supervision	8
0.061	0.905	0.939	0.090	0.896	0.927	20	26.613	Final model	9

Table4. Results of Friedman's test

Rank	Rank average	Factor (criterion)	Factor No.
8	3.19	Project features	1
6	3.73	Delays	2
5	4.64	Detailed design difficulties	3
3	4.86	Project labor	4
2	5.66	Project equipment	5
1	5.80	Project materials	6
7	3.32	Site working conditions	7
4	4.79	Information flow, management and supervision	8

Table5. Final weight of factors in limit SUPER MATRIX

Rank	Rank average	Factor (criterion)	Factor No.
8	0.05463	Project features	1
6	0.08869	Delays	2
5	0.10109	Detailed design difficulties	3
3	0.015407	Project labor	4
1	0.20710	Project equipment	5
2	0.18781	Project materials	6
7	0.06599	Site working conditions	7
4	0.14062	Information flow, management and supervision	8

Table6. Ranks obtained from Friedman's test and network analysis techniques

Network analysis obtained ranks	Friedman test obtained ranks	Factor (criterion)	Factor No.
8	8	Project features	1
6	6	Delays	2
5	5	Detailed design difficulties	3
3	3	Project labor	4
1	2	Project equipment	5
2	1	Project materials	6
7	7	Site working conditions	7
4	4	Information flow, management and supervision	8

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RESEARCH ARTICLE

Analysis of the Implementation Quality and the Impact of Rural Guide Plan in Border Villages (Case Study: Sistan Region)

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ABSTRACT

The rural guide plan is one of rural civil plans that can have a fundamental and comprehensive role in the development of infrastructure in rural areas and it can improve the public facilities and welfare and the lives of the villagers based on its potentials and capabilities. With this perspective, this study also analyzes the quality of implementation of the rural guide plan and it will consider the rate of effectiveness of implemented projects in villages in the border area of Sistan. The statistical community of this research concludes all villages that the rural guide has been implemented in it (56 villages) and the sample community concludes villages that at least 5 years have been passed since the implementation of rural guide plan. Based on what was said, 30 villages were determined as sample villages and then 371 families were determined as sample volume according to rural families residing in the sample villages and Cochran formula. The data was gathered through families questionnaire and field observations forms. Statistical and spatial data were analyzed by using SPSS, ArcGIS software. The results of the study showed that 46/66% of studied villages are at an inappropriate level and the 13/33% of them is at the appropriate level in terms of the quality of implementation. Other finding of the research also shows that most influence of the rural guide has been in housing dimension and in the opening or renovation of rural road network.

Key words: Rural guide plan, Quality of implementation, Village, Region of Sistan

INTRODUCTION

Attention to the villages, reconstruction and development and improve the quality of residential environments and recovering the rural environment is one of the basic functions and infrastructure actions in the construction of the country that can prevent uncontrolled migration from rural to urban areas and it can be a solution to complex problems such as intercity network, traffic, transportation, heterogeneous development of cities and the creation of new towns. The rural guide plan is one of the most important actions that have been done in this regard. The study of the villages of the country and rural housing typology was established by institutions such as the Building and Housing Research Center, Housing Foundation, Construction Jihad in the early years of the 60s and thereby a modern and comprehensive program was provided about it and the Islamic Revolution Housing Foundation became executor of the projects. The first projects for rural physical organization in 1983 as the case studies in some provinces were prepared; the obtained experiences from these project were led to an extensive and comprehensive program for rural planning of rural guide plans in Iran in 1988 (Ahmadi, 1995, 14). This project has been prepared to more than 16,440 villages and has been implemented in more than 7670 villages from 1988 until the end of 2006.

The rural guide plan enters into the village system as an external variable, it will effect on the structures of village, and these structures include the physical, economic, social and ecological dimensions of the village. The rural guide plan is a part of rural development process based on the change of physical structure because the main goals of the project can be summarized in the form of external or structural rural changes. So the development cannot be achieved just by this changes format but it only leads to the desirable condition of different dimensions. The rural guide plan is one of the rural development plans that can have a widespread basic and fundamental role in the development of rural areas. Using its potentials and capabilities, this plan can be the background for improving of public facilities and welfare, such as rural housing reconstruction, new roads and residential spaces, better living conditions and participation of rural people

Due to geographical diversity and different socio-economic conditions of rural areas, the successes of the implementation of these plans are different in villages and assessing the quality of their implementation is one of the most important actions in this area that could help the sustainability of these plans. In fact, it will be led to awareness of the views and opinions of experts and it will be led to identify strengths and weaknesses of projects and development programs. In this context it is essential to note that many of rural development projects will not reach to the stage of implementation quality and reviewing. Therefore, rural developers will be rarely informed from its short-term and long-term outcomes. With this view, the present study is to answer this main question that how the quality and the effectiveness of conducting projects in different villages in Sistan.

The theories and the history of the research

Many of the researchers and experts have considered the activity Scope in the field of rural development in five major dimensions; they are natural resource management, rural development and physical infrastructure, human resource management, agricultural development and the development of non-agricultural activities (Gibson et al, 2010: 238). Among them, the provision of facilities and physical infrastructure and physical rehabilitation and development of rural space is an essential component of rural development plan (Liu, 2007: 564). In Iran, as in many countries of the Third World, rural civil seemed meaningless without attention to plans that would organize and lead the physical structure of the village. For this reason, the Parliament in December 1983 obliged the government to submit a bill to parliament in order to improve the physical situation of the villages (Kalantari and Khajeh Shah Kohi, 2002:73). In this regard, the Islamic Revolution Housing Foundation was in charge of the preparation and implementation of the rural guide plan in the country since the beginning of the third program of socio-economic development. In addition, after the formation of village managers based on the constitution, institutions and organizations of village managers, this organization was obliged to cooperate with the Islamic Revolution Housing

Foundation in preparing and implementing the rural guide plan (Azizpour and Hosaini Hasl, 2011:45). According to the disorder of physical conditions and poor quality of rural housing and improper disposal of sewage and surface water systems, network infrastructure and service development and the spread of motor vehicles in the face of passages, the necessity of implementing such programs has been doubled to reform rural contexts (Rezvani, 2004:151). This plan seeks to achieve the establishment of the development of rural areas according to the cultural, economic and social conditions, Provide equitable facilities, conducting physical condition of the village, providing improved housing and environmental services and public facilities, improve the economic situation of the country, improving the quality of the countryside, create a logical fit between the population and the various residential functions, products, services needed in rural areas, control and monitoring of the physical development of the village, creating the field of disaster risk reduction and create the conditions for the issuance of title deeds to residential real estate in the village (Mavlai Hashjin, 2007: 113). Various physical development projects carried out in the villages based on the rural guide plan that some of most import of them are: construction and modification of sidewalks, streets and squares network, developing green spaces, rivers and canals for water reform and coverage in rural areas, construction and completion of flood and flood inversion, preparation of pre-provided land for future development of the village, the construction and completion of the network sewage disposal and etc (Azizpour and Hoseini hasl, 2008: 43).

Sifird and Bojora (2011), in their study about the problems and challenges of achieving rural development, they have considered the financial problems and low levels of villagers' knowledge about rural development plans as the most important challenges of physical development of the village.

Lang and et al (2012), assessing physical development in rural areas of China, they know weaknesses in government policy and a lack of sufficient incentives for the development of villages, imitating from urban plans and the elimination of traditional fabric of the villages, lack of financial resources for the implementation of plans and projects of physical development as the most important problems and barriers of implementing of physical development plans.

Valencia (2012) analyzes the public participation in rural guide plans and he believes that the public participation in rural development programs will improve the effect of the rural guide plan and their satisfaction of the plan. Their participation will also cause their commitment to implement the plan.

Yasis and et al (2014) study the rural development according to the firms between the villages in Italy. At the end, they have concluded that these firms play an important role in rural development.

Loizo and et al (2041) have studied the role of fishing in the rural development in Greece and the results show that it has caused the development of employment and income in the short term and affect the development of villages to some extent, but some infrastructure measures should be done in this area.

Moasavi Ghahdirijani (1995) has evaluated the social impacts of rural sanitation plans in Isfahan. The results of the research show that the sanitation has not had any role in supplying and providing of facilities and services in rural areas and villages have had the possibilities and services before sanitation generally and the villagers' participation is low in various aspects of the sanitation implementation.

Azimi and Jamshidian (2005) have studied the physical impact of the rural guide impact in rural housing in west of Gilan. The results of the research show that the rural guide plan implementation has improved the people life relatively and the hope of staying has been increased in villages that this plan has been implemented.

Mozafar and et al (2008) have studied the impact of the rural guide plans on environment of villages of Iran. According to the obtained results it can be pointed to the lack and defect of environmental studies during the preparation of plans and also not predicting of the effects of the ten projects on the natural environment and rural environment, during production and then the plans implementation.

However, two decades have been passed from implementing of the rural guide plan in rural areas in Iran and according to the importance of the rural guide plans and its multiple effects in different aspects of rural life, several studies on the evaluation of the implementation of the rural guide plans have been conducted on rural life. According to the history of the research, considerable research has not been done in connection with the evaluation of the implementation of such projects.

Area of study

Sistan region with an area of 15,197 sq km in the geographic range between 30°C and 5 minutes to 31 degrees 28 minutes latitude and 60 degrees 15 minutes to 61 degrees 50 minutes longitude in southeastern Iran and the northern part of the province Sistan and Baluchestan by about one eighth of the total area allocated to the province. Average annual rainfall in the region 6/59 mm, mean annual temperature of 22°C and the average annual relative humidity is 38.

METHODOLOGY

The descriptive-analytic method has been used in this research. The documentary and library methods have been used for studying theoretical framework of research and field studies and questionnaires have been used for assessing the quality and effectiveness of rural guide plans in villages of Sistan region. The statistical community in this research concludes all villages that the rural guide plan have been implemented in them and the sample community concludes all villages that at least 5 years have been passed since the implementation of rural guide plan. Based on what was said, 30 villages were determined as sample villages (figure 1).

For estimating the sample volume in rural families, Cochran formula with confidence level of 95 percent and probability of error of 5 percent has been used. Accordingly, to complete the questionnaires and assessment of the rural guide plan impact, 371 numbers of heads of rural families were questioned in a simple random sampling. In this context, in the context of field studies, wide range indices (Table 1) in the form of household questionnaire forms and field observations have been investigated. To analyze the data, the capabilities of ArcGIS and SPSS software have been used.

RESEARCH FINDINGS

According to research results, among the 30 studied villages 13/33 percent of villages have an appropriate situation In terms of quality implementation indices and its reasons can be technical rules on the construction of housing and roads network (upgrading and retrofitting of housing against the earthquake, the slope of roads suitable for the disposal of surface water, observing the wide sidewalks of the village, the quality of pavement and infrastructure asphalts in rural roads) and appropriate locating of services and commercial spaces. In this group of villages, the high level of villages manager participation in the plan and the allocation of financial resources and enhance the quality of implementation of the plan has increased the quality of implementation. In addition, the residents of these villages are the people with strong tribal links that have completely cooperated with authorities of the Housing Foundation in the implementation of plan. For example, families in these villages before the plan implementation, with the active participation in the project in the villages, have divided the labor and have cooperated with the

Housing Foundation. In these villages, each of the streets and passageways have been divided between families and labor force supply any of the streets and roads is upon the number of households in the same streets and passages. In addition, residents of the villages in the financial cost of the project have had active participation.

The study of the distribution of villages in Sistan in terms of the quality of implementing of the rural guide plans shows that the villages with poor-quality implementation are mainly scattered in parts of the Northeast, Central and West parts of the study area (figure 2). Among villages with poor quality of plan implementation, the impact of location and lack of empathy and collaboration of villages of Sefidabeh is remarkable for implementing the plans. These villages where are located in West mountainous areas of Sistan, the plan implementation has been faced with high difficulties due to their geographical location and distance more than 90 kilometers from the city of Zabol the high cost of transport for the movement of materials. In these villages, due to lack of participation and cooperation of villagers in implementing of the rural guide plan, not only the Labor force has been provided from the city, but even water using for the plan implementation will be carried by tankers by housing Foundation and residents of the village have not have any role and participation in projects. The reasons have caused the project unfinished after 22 years of implementation and the projects have not been completed by the Housing Foundation and an ugly face of the village has been remained. On the other hand, the villages of the northeastern region, being proximity to the wetlands dry bed of Hamoon pond has been effective in decreasing of the implementation quality of the rural guide plan. Annual erosion of sand from the dry bed of Hamoon pond has caused massive amounts of sand be stacked in and around these group of villages due to the lack of consideration of the rural physical body to moving sand that in addition to health problems, it has damaged the rural houses.

Other research findings indicate that villages with average quality implementation are mainly scattered in eastern parts of the region. In fact, the government's new policies and changing of the county of Miankanagi to city have caused that housing foundation not only monitor the implementation of the plan, but the governor of the city also has direct supervision over the implementation of projects in rural areas and these factors have had a great impact on the desirability of plans. In this connection, the result of Kendall's correlation test between classes' distance of villages from urban centers and classes of implementation quality of the rural guide plan confirms a significant positive correlation between the two variables. In other words, the proximity of villages to cities and political centers can a factor for villagers' easier access to urban services and the authorities' greater attention to these villages and as a result, the lass the distance of the villages and the city center the more the quality of the implementation of the rural guide plan (table 2).

The total results of technical research projects in the studied villages show that only16/66 percent of villages have observed the technical issues in the construction plan and 36/66 percent of villages have also observed the principles of improving and retrofitting of houses and 46/66 percent of villages have considered the issues of proper disposal garbage and 13/33 percent of villages have considered the disposal of surface water.

The rate of effectiveness of the rural guide plans on housing indices

Among the housing indices, the average of the housing retrofitting index equals to 3/90 due to loans from the government and monitoring the construction of rural housing and the lowest performance was the index of construction pattern with the average of 2/18 (table 3). The highest percentage of respondents' homogeneity was related to rural housing price index with dispersion coefficient of 0/301 and the lowest of respondents' homogeneity was related to the index of construction pattern with dispersion coefficient of 0/515.

The rate of effectiveness of the rural guide plan on indices of passage network

According to results of research, the most important impact of the rural guide plan in the studied villages is the ease traffic in rural areas with an average of 4/15 that has been one of the priorities of the plan due to the increase in new machinery and the necessity of their travel (table 4). The lowest performance was related to observing of plan technical rules of the passages with average of 2/09 that indicates the weakness of the rural guide plan in the rural houses and it is only limited to the reconstruction of the main passages. However, based on the research findings the highest percentage of homogeneity was related the ease traffic index with dispersion coefficient of 0/148 and the lowest homogeneity percentage was related to the index of observing of plan technical rules of the passages with dispersion coefficient of 0/665.

The rate of effectiveness of the rural guide plan on Land use indices

Research findings show that the highest average is related to access to services index that it indicates appropriate services locating of the rural guide plan. The index of attention to the valuable historical and cultural tissues with the average of 1/81 has the lowest rate of performance among the indices that it indicates the low attention from executive authorities to the valuable historical and cultural tissues in villages. Since in most countries will provide an important source for attracting tourists and increasing the income of rural residents by restoring, maintaining and investing in the preservation of valuable historical and cultural tissues, attention and action is needed to restore valuable tissues in the villages. The highest percentage of homogeneity was related the index of reasonable appropriateness between population and user with dispersion coefficient of 0/246 and the lowest homogeneity percentage was related to the index of distribution and maintenance of valuable historical and cultural tissues with dispersion coefficient of 1/064 (table 5).

The rate of effectiveness of the rural guide plan on indices of environmental health

Research findings show that the highest rate of effectiveness in environmental health of villages is related to reduction pollution from dust with average of 3/98 which according to the 120-day winds of Sistan in the region and its impact on the increase in air dust, the impact of this plan is significant on this sector. In fact, to a considerable extent from dust will be reduced from the rural passages by implementing of the rural guide plan and asphalting rural passageways. On the other hand, the indices of creating a system of sewage discharge and access to parks and green spaces with the averages of 1/60 and 2/31 have the lowest rate of performance among the indices of environmental health respectively. Lack of attention to sewage discharge systems and creating a beautiful landscape and recreation in the villages have caused that the indices of creating a system of sewage discharge and spaces have the lowest performance other indices (table 6). Among the indices of environmental health, the highest percentage of homogeneity was related the index of creating a system of sewage discharge in village with dispersion coefficient of 0/108 and the lowest percentage of homogeneity was related the index of accessing to the parks and green spaces with dispersion coefficient of 0/802.

On the other hand**,** Independent-Samples T Test has been used for comparing the effectiveness intensity of border villages with other villages of Sistan. The comparison of the average of the effectiveness intensity of border villages with other villages of Sistan confirms that the effectiveness intensity of the studied components in border villages is 3/817 and other villages is 2/317 (table 7).

Also according to results to the Levene test, the significant level equals to 0/000 (table 8). As a result of the assumption of equality of variances will be rejected. On the other hand, since the significant level for the comparison of the two groups is 00 0/0, with a confidence level of 99%, there is a significant difference in the effectiveness intensity of two groups of villages.

The results of analysis test of one way ANOVA on the effectiveness intensity of the studied components in the studied villages shows that the mean variance between groups is higher than the average inside the groups and since the amount of P. value is smaller than 001/0, with a confidence level of 99%, there is a significant difference among the effectiveness intensity of various factors in implementation quality of the rural guide plan (table 9).

In this regard, the other results of research confirm that housing with coefficient of 0/302 and the passageways with coefficient of 0/248 have the highest effectiveness from the implementation of the rural guide plan respectively (Figure 4).

CONCLUSION

By preparing and implementing of the rural guide plan in past decades, a basic step been taken in the spatial organization of rural activities in rural environments. The rural guide plan has been considered to create the conditions for development, growth and development of the village, during the ten-year planning horizon, as a means of organizing the physical tissue the villages. In this regard, the present research has studied the quality level of implementing of the rural guide plan and its impact on 30 villages in Sistan region.

However, in a summary of the findings can be concluded that significant changes have occurred in the studied villages by implementing of the rural guide plan in construction of new roads, easy access to roads, rural housing price increase and decrease pollution from dust and to determine the general location of waste but however the weakness of the rural guide plan is undeniable in creating of discharge waste systems, collecting and directing surface water from the road, observing of plan technical rules of the passages, appropriate services locating, identification and maintenance of valuable historical and cultural tissues. Accordingly, considering the weaknesses the following recommendations will be suggested to improve the situation:

Due to the impact of participation on the implementation quality of the rural guide plan, it will be suggested that the situation of the villagers' participation will be studied by the housing foundation before implementing of the rural guide plan and appropriate measures shall be taken.

Due to 120 days winds and the possibility of erosion and the movement of sand flowing in the villages of Sistan, it will be suggested that the situation of the villages will be considered toward the sand path and the spatial physical tissue situation of villages with the prevailing winds in the region.

Because of the type of clay and impenetrable soil of Sistan and more than 90 percent of villages were located in desert areas without the necessary slope, inattention to above cases in implementation of the plan will cause some problems. Therefore, the adoption of appropriate measures to avoid further problems in this regard is required.

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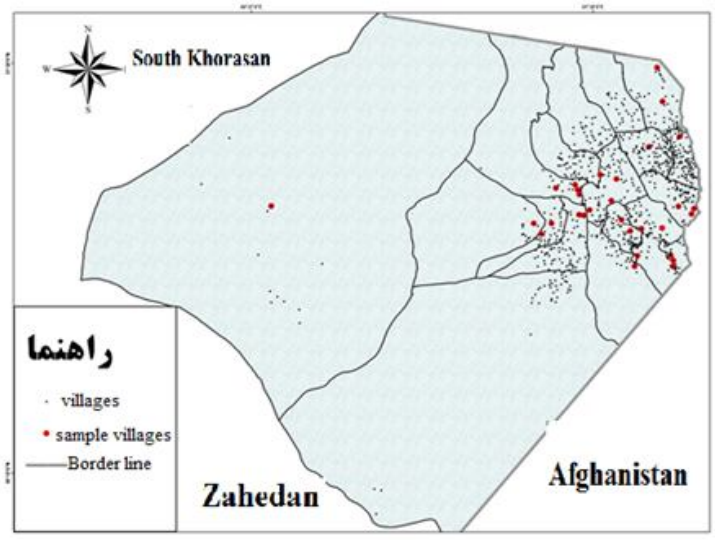

Figure 1: Distribution villages in Sistan and position the sample villages

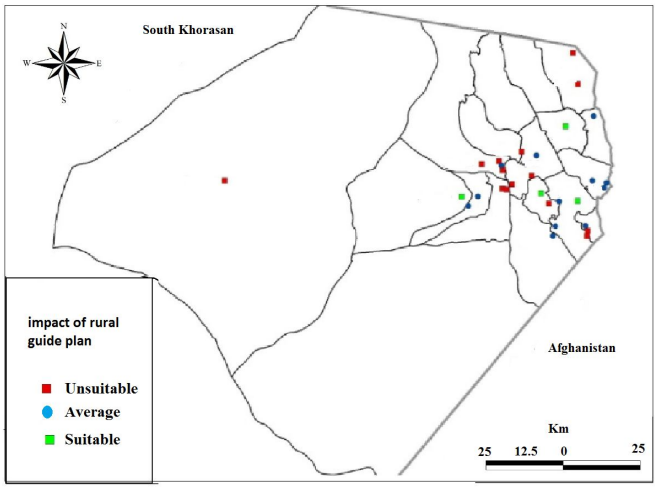

Figure 2: Distribution of studied villages according to the implementation quality level of the rural guide plan

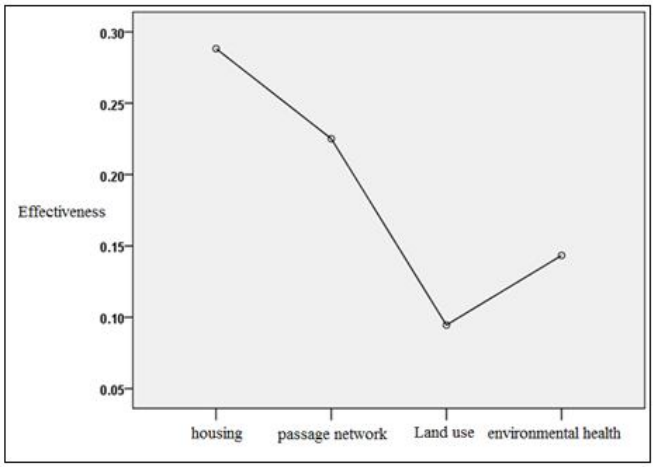

Figure 3: The effectiveness intensity of different components from the implementation of the rural guide plan in the studied villages

Table 1: Components and indicators to assess the quality and effectiveness of rural guide plan

Indices	Component
❖ Construction pattern ❖ Houses pattern ❖ Housing improvement and retrofitting ❖ Observing of plan technical rules on construction ❖ Preparing the groundwork for issuing property deed ❖ Rural housing prices	housing

❖ Obtaining a license to build ❖ Equipment and housing facilities (such as sanitary Bathroom and toilet)	
❖ Construction of new Passages ❖ Ease traffic ❖ Equipping and Improvement of the existing passages ❖ Passages network quality ❖ Changes in the hierarchy of Passages ❖ Easy access to Passages ❖ Observing of plan technical rules of the passages ❖ Beautification of the passages	passage network
❖ reasonable appropriateness between population and user ❖ Quality of access to services ❖ The right choice for the development of village ❖ Absorption of infrastructure features and utilities ❖ Access to services ❖ Appropriate services locating ❖ Maintenance of valuable tissues ❖ Protect and preserve the land for farming and gardening	Land use
❖ Collecting and channeling surface water from passage ways of village ❖ Creating a sewage discharge systems ❖ Collecting and disposal of waste ❖ determining of the overall location limits of waste disposal ❖ Accessing to parks and green spaces ❖ Cleanliness of the village ❖ Reduction of pollution from dust	environmental health

Table 2: The result of Kendall's correlation test between classes' distance of villages from urban centers and classes of implementation quality of the rural guide plan

The villages distance from urban centers	**Implementation Quality of the plan**			
.438**	1.000	Correlation Coefficient	Implementation Quality of the rural guide plan	Kendall's tau_b
.000	.	Sig. (2-tailed)		
30	30	N		
1.000	.438**	Correlation Coefficient	The villages distance from urban centers	
.	.000	Sig. (2-tailed)		
30	30	N		

**. Correlation is significant at the 0.01 level

Table 3: The rate of effectiveness of the rural guide plan on housing indices in the studied villages

Dispersion coefficient	Standard deviation	Average	Effectiveness					Indices
			very high	High	Average	low	Very low	
0/515	01/124	2/18	2/6	9/1	29/9	18/2	37/7	Construction pattern
0/324	0/750	2/31	3/0	8/5	31/9	29/4	27/2	Houses pattern
0/235	0/917	3/90	29/9	36/4	27/3	0	3/9	Housing improvement and retrofitting
0/430	1/314	3/05	15/4	24/9	26/1	16/2	17/4	Observing of plan technical rules on construction
0/328	1/247	3/80	24/7	37/7	28/6	3/9	2/6	Preparing the groundwork for issuing property deed
0/301	1/016	3/37	9/6	41/8	31/0	11/3	6/3	Rural housing prices
0/405	1/681	3/72	22/1	41/6	23/4	5/2	5/2	Obtaining a license to build
0/240	0/879	3/66	7/8	53/2	32/5	3/9	0	Equipment and housing facilities (such as sanitary Bathroom and toilet)

Table 4: The rate of effectiveness of the rural guide plan on indices of passage network in the studied villages

Dispersion coefficient	Standard deviation	Average	Effectiveness					Indices
			very high	High	Average	low	Very low	
0/259	0/981	3/78	7/8	59/7	22/1	2/6	0	Construction of new Passages
0/148	0/615	4/15	48/1	32/5	9/9	5/3	4/1	Ease traffic
0/222	0/890	4	40/7	33/3	9/3	16/7	0	Equipping and Improvement of the existing passages
0/397	1/357	3/41	3/9	40/3	45/5	7/8	0	Passages network quality
0/531	1/680	3/16	3/9	20/8	59/7	10/4	1/3	Changes in the hierarchy of Passages
0/495	1/334	2/69	3/3	15/3	41/3	27/7	12/4	Easy access to Passages
0/665	1/391	2/09	1/3	8/5	26/5	25/2	38/5	Observing of plan technical rules of the

								passages
0/195	0/742	3/79	7/8	59/7	24/7	1/3	0	Beautification of the passages

Table 5: The rate of effectiveness of the rural guide plan on Land use indices in the studied villages

Dispersion coefficient	Standard deviation	Average	Effectiveness					Indices
			very high	High	Average	low	Very low	
0/246	0/974	3/95	19/5	51/9	20/8	1/3	0	reasonable appropriateness between population and user
0/341	1/231	3/60	147/3	27/3	36/4	18/2	1/3	Quality of access to services
0/364	1/385	3/80	9/1	61/0	22/1	2/6	0	The right choice for the development of village
0/255	0/942	3/68	4/7	52/3	24/4	3/5	0	Absorption of infrastructure features and utilities
0/294	1/178	4/00	22/1	51/9	22/1	0	0	Access to services
0/725	1/951	2/69	3/3	15/3	41/3	27/7	12/4	Appropriate services locating
1/064	1/927	1/81	1/3	3/4	15/0	26/9	53/0	Maintenance of valuable tissues
0/259	0/803	3/10	1	29/1	33/7	22/1	0	Protect and preserve the land for farming and gardening

Table 6: The rate of effectiveness of the rural guide plan on indices of environmental health in the studied villages

Dispersion coefficient	Standard deviation	Average	Effectiveness					Indices
			very high	High	Average	low	Very low	
0/380	0/781	2/05	0	1/2	29/5	42/6	26/6	Collecting and channeling surface water from passage ways of village
0/108	0/173	1/60	0	0	11/9	22/1	65/5	Creating a sewage discharge systems
0/313	1/127	3/60	27/0	24/6	35/7	7/0	5/7	Collecting and disposal of waste

0/261	1/023	3/91	33/7	34/6	24/7	3/3	3/7	determining of the overall location limits of waste disposal
0/802	1/854	2/31	3/0	8/5	31/9	29/4	27/2	Accessing to parks and green spaces
0/282	1/071	3/79	36/5	30/7	16/8	7/0	9/0	Cleanliness of the village
0/239	0/953	3/98	33/7	38/7	22/6	2/1	2/9	Reduction of pollution from dust

Table 7: The output of descriptive statistics of t-test for two groups of studied villages

standard average error	Standard deviation	Average	The number of villages	Studied groups
0/0876651	0/5528541	3/817	15	Border villages
0/2343285	0/5644321	2/317	15	Other villages

Table 8: The output of inferential statistics of t-test for independent groups

T-test for the equality of averages							the Levene equality variance test		
95% confidence interval for the difference		The standard error of difference	difference of average	Significant level	Degrees of freedom (df)	t	Significant level	F	
Upper bound	Lower bound								
0/5876366	0/0516412	0/1851793	0/4206700	0/000	28	2/325	0/000	5/754	The assumption of the equality of variances
0/5881042	0/0511836	0/1851793	0/4206700	0/000	26/305	2/325			The assumption of the inequality of variances

Table 9: The results of analysis test of one way ANOVA on the effectiveness intensity of the studied components

Significant level (Sig).	F	The average of squares	Degrees of freedom (df)	The sum of squares	The effectiveness intensity of the rural guide plan
0/000	21/849	2/287	3	6/862	Among groups
		0/105	1614	168/893	Inside the groups
			1614	175/825	Total

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RESEARCH ARTICLE

Chemical Composition and In Vitro Antimicrobial Activity of Essential Oil of *Melissa officinalis* L. From Jordan

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ABSTRACT

The essential oil of *Melissa officinalis* L was isolated using hydrodistillation from the aerial parts of the plant. Analysis on its chemical composition was conducted using gas chromatography/mass spectrometry (GC-MS) and the antibacterial activity was evaluated using disc diffusion method. Forty five components accounting for 99.01% of the oil were identified. The major compounds identified (more than 1%) were Ethyl nerolate 24.56%, Geranyl formate 15.78%, Methyl geranate 8.18%, Limonene 7.92%, δ-Cadinene 7.66%, α-Cadinene 4.75%, 1,8-Cineole 4.69%, Selina-3,11-dien-6-alpha-ol 3.93%, 9-epi-E-Caryophyllene 3.10%, E-beta-Ocimene 2.48%, 1-para-Menthene 1.96%, Geranial 1.54%, Thymoquinone 1.38%, Sequilavandulol 1.37%, and Sabinene 1.25%. The essential oil of *Melissa officinalis* showed good antibacterial activity against all tested bacterial isolates.

Key words: *Melissa officinalis*, antibacterial, disc diffusion, essential oil.

INTRODUCTION

Essential oils are natural, volatile hydrophobic substances [1]. They are not essential for plant growth and development and thus they are described as secondary metabolites [2]. Chemically essential oils are complex mixtures of terpenoid hydrocarbons, oxygenated terpenes and sesquiterpenes. They are characterized by their strong fragrance and low solubility in water. They are extracted from different parts of the plants including leaves, flowers, seeds and fruits [3].

Different methods are used to extract essential oils. The most popular ones are hydro-distillation, steam and steam/water distillation [4]. Other methods include solvent extraction, aqueous infusion, cold or hot pressing, and supercritical fluid extraction [5, 6]. Essential oils have been used in traditional medicine, and as flavoring agents and spices for centuries. They have been shown to possess antibacterial, antiviral, anti-inflammatory, antifungal, anticarcinogenic, and antioxidant activities [7].

Melissa officinalis (also known as lemon balm, bee balm, melissa and sweet balm) is a perennial herbaceous plant with a lemon scent that belongs to the Lamiaceae family (mint family). It is used in traditional medicine for the treatment of headaches, enforcing memory, indigestion, colic, nervousness, improving in joint ache, dyspnea, cardiac failure, depression, and curing dry skin and anticancer property [8, 9, 10]. In addition, it has been reported that Melissa officinalis has antibacterial, antiinflammatory, antivirus, and antioxidant properties [11].

The aim of this paper is to analyze the chemical composition of hydrodistilled essential oil of Melissa officinalis from Jordan by GC/MS methods, and to investigate its antimicrobial activity against selected human pathogenic using disk diffusion method.

MATERIALS AND METHODS

Collection and authentication of plants

Fresh amount of Melissa officinalis before flowering was collected from Mutah town, Alkarak district south Jordan. The plant materials were taxonomically identified and authenticated by the Botanical Survey of Yarmouk University.

Isolation of essential oil

Fresh aerial parts of Melissa officinalis was finely chopped and subjected to hydrodistillation for 4 h using a Clevenger-type apparatus, yielding 0.19% (v/wt), yellowish oil. Subsequently, oil was dried over anhydrous sodium sulfate and immediately stored in GC-grade hexane at 4ºC until the analysis by gas chromatography/mass spectrometry (GC/MS) was done.

Essential oil composition

GC–FID analysis

The oils were analyzed in an Agilent (Palo Alto, USA) 6890N gas chromatograph fitted with a 5% phenyl–95% methylsilicone (HP5, 30 m × 0.25 mm × 0.25 μm) fused silica capillary column. The oven temperature was programmed to run from 60°C to 240°C at 3°C/min with hydrogen being used as the carrier gas (1.4 mL/min). 1.0 μL of a 1% solution of the oils in hexane was injected in split mode (1:50). The injector was kept at 250°C and the flame ionization detector (FID) was kept at 280°C. Concentrations (% contents) of oil ingredient for Melissa officinalis were

determined using their relative area percentages obtained from GC chromatogram, assuming a unity response from all components.

GC–MS analysis

Chemical analysis of the essential oils was carried out using gas chromatography–mass spectrometry (Agilent (Palo Alto, USA) 6890N gas chromatograph). The chromatographic conditions were as follows: column oven program, 60ºC (1 min, isothermal) to 246ºC (3 min, isothermal) at 3ºC/min, the injector and detector temperatures were 250ºC and 300ºC, respectively. Helium was the carrier gas (flow rate 0.90 ml/min) and the ionization voltage was maintained at 70 eV. A HP-5 MS capillary column (30 m × 0.25 mm i.d., 0.25 μm film thicknesses) was used. A hydrocarbon mixture of n-alkanes (C_8-C_{20}) was analyzed separately by GC-MS under same chromatographic conditions using the same HP-5 column. Kovats Retention Indexes (KRIs) were calculated by injection of a series of n-alkanes (C_8–C_{20}) in the same column and conditions as above for gas chromatography analyses.

Identification of the oil components were based on computer search using library of mass spectral data and comparison of calculated Kovats retention index (KRI) with those of available authentic standards and literature data.

Maintenance and preparation of cultures

Six clinical isolates antibiotics resistant bacteria were used in this study. Three strains of Gram positive bacteria: Methicillin-resistant Staphylococcus aureus (MRSA), Staphylococcus epidermidis, and Bacillus subtilis, and three strains of Gram negative bacteria: Escherichia coli, Enterobacter aerogenes, and Pseudomonas aeruginosa, were studied. Isolates were purified on specific nutrient agar plates and characterized by standard microbiological and biochemical methods namely Gram stain, catalase test, coagulase test and an API system (bioMerieux, France).

The bacteria were incubated at 37°C for 24 h by inoculation into broth. Inoculums (1 mL) per plate containing 10^6 cfu/mL were spread on Mueller Hinton agar (Oxoid, Hampshire, England).

Disc diffusion assay

The antibacterial activity of the Melissa officinalis essential oil was determined by the disc diffusion method according to the National Committee for Clinical Laboratory Standards. Sterile paper discs of 6 mm in diameter were impregnated with 10 μL essential oil and deposited on the agar surface. Petri dishes were placed at 4°C for 2 h to facilitate the dissemination of extract on the culture medium followed by incubation at 37°C for 24 h. For each sample, negative water control and positive antibiotic disc (Oxoid, Hampshire, England) control were used. At the end of the period, inhibition zones formed on the medium were evaluated in mm. Studies were performed in triplicate in three independent experiments.

RESULTS

Chemical composition of the essential oil

Hydrodistillation of the aerial parts of the Melissa officinalis sample gave an yellowish oil with a yield of 0.19%. The chemical composition of the oil was investigated using GC-MS techniques. The main constituent groups of the essential oil of Melissa officinalis are given in Table 1 with oxygenated monoterpenes 58.55% as the major constituent.

The identified components of the essential oils, their percentages and retention indices are given in Table 2. Forty five components accounting for 99.01% of the oil were identified. The major identified compounds (more than 1%) were Ethyl nerolate 24.56%, Geranyl formate 15.78%, Methyl geranate 8.18%, Limonene 7.92%, δ-Cadinene 7.66%, α-Cadinene 4.75%, 1,8-Cineole 4.69%, Selina-3,11-dien-6-alpha-ol 3.93%, 9-epi-E-Caryophyllene 3.10%, E-beta-Ocimene 2.48%, 1-para-Menthene 1.96%, Geranial 1.54%, Thymoquinone 1.38%, Sequilavandulol 1.37%, and Sabinene 1.25%.

Antimicrobial activity

The disc diffusion results given in Table 3 show the activity of Melissa officinalis essential oil against selected clinical isolates antibiotic resistant bacteria. The results show that the essential oil has significant activity against all tested species. The Melissa officinalis essential oil was found to be more active than the tested antimicrobial agents on P. aeruginosa, E. aerogenes, and S. epidermidis.

The essential oil was more active than Vancomycin, but less active than Rifampicin, against MRSA. It was less active than Neomycin and Nitrofurantoin against E. coli. Against B. subtilis it showed a greater activity than Vancomycin but lower than Chloramphenicol. The essential oil of Melissa officinalis did not show clearly specified activity against Gram-positive or Gram-negative bacteria, however it was found to be more active against Gram-negative bacteria than Gram-positive ones.

DISCUSSION

Melissa officinalis is a medicinal plant that has been used for centuries in traditional medicine against various illnesses. The major components of Algerian Melissa officinalis essential oil were geranial (44.20 %), neral (30.20 %) and citronellal (6.30 %) [8]. Zarei et al [11] reported on the essential oil of Melissa officinalis from Iran were nerol (30.44%), citral (27.03%), isopolcule (22.02%), cariophiline (2.29%), oxide carolyn (1.24%) and citronella (1.06%). The major components of Melissa officinalis essential oil from Turkey were 39% citronellal, 33% citral (citronellol, linalool) and 2% geranial [12] while the major components of the same from Morocco were Nerol (30.44%), Citral (27.03%), Isopulegol (22.02%), Caryophyllene (2.29%), Caryophyllene oxide (1.24%), and Citronella (1.06%) [13]. In this context it is appropriate to note that the content and quality of essential oil of a given species can vary depending on a number of factors including environmental conditions, harvest time, storage conditions and stage of growth at time of picking [14].

The essential oil of Melissa officinalis did not show clearly specified activity against Gram-positive or Gram-negative bacteria. The main target of the compounds found in essential oil is the cell membrane. They cause damage to cell membrane that leads to increased membrane permeability, ions leakage, and inhibition of different enzymes and proteins [1, 15, 16]. Generally, Gram-negative bacteria are more resistant to essential oil than Gram-positive bacteria due to difference in the structures of the cell walls [17]. Gram-negative bacteria have a hydrophilic outer membrane which is relatively impermeable to hydrophobic substances present in essential oil [18]. However, the activity of essential oils may vary depending on the presence or absence of some targets regardless of its Gram status [19].

Finally, the presence of multiple components in essential oil indicates that an important determinant of its overall activity is likely to be interactions (synergistic and/or antagonistic) between the components as applied to their involvement in various cellular pathways so that a subtle change in its composition may have a more pronounced effect on its activity. This is a likely reason why essential oils vary widely in their activity.

CONCLUSION

The essential oil of *Melissa officinalis* showed a promising antibacterial activity against all tested pathogens. It was able to overcome the resistance mechanism of these pathogens.

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Table 1. Constituents groups of the essential oil of *Melissa officinalis*

Compounds	Peak area %
Monoterpene hydrocarbons	14.13
Oxygenated monoterpenes	58.55
Sesquiterpene hydrocarbons	17.98
Oxygenated sesquiterpenes	7.79
Others	0.56

Table 2. Constituents (%) of the essential oil of *Melissa officinalis* grown in Jordan

KI	Compound	%A
943	Pinene	0.42
977	Sabinene	1.25
991	Myrcene	0.10
992	1-Octen-3-ol	0.13
1026	1-para-Menthene	1.96
1030	Limonene	7.92
1035	1,8-Cineole	4.69
1050	E-beta-Ocimene	2.48
1110	Cis-Rose oxide	0.27
1138	Iso-3-Thujanol	0.30
1159	Beta-Pinene oxide	0.12
1199	Trans-dihydro Carvone	0.24
1210	2E,4E-Nonadienal	0.43
1216	Trans-Carveol	0.10
1226	Nerol	0.16
1231	Cis-para-Mentha-1(7),8-dien-2-ol	0.10
1236	Pulegone	0.50
1253	Thymoquinone	1.38
1270	Geranial	1.54
1300	Geranyl formate	15.78
1320	Methyl geranate	8.18
1336	Piperitenone	0.10
1351	Ethyl nerolate	24.56
1398	b-Cubebene	0.30
1412	Z-Caryophyllene	0.16
1432	Neryl acetone	0.33

1459	9-epi-E-Caryophyllene	3.10
1463	Cis-Muurola-4(14),5-diene	0.10
1492	Neryl isobutanoate	0.10
1498	Valencene	0.20
1513	Z-gamma-Bisabolene	0.13
1520	Geranyl isobutanoate	0.10
1525	δ-Cadinene	7.66
1532	Trans-Cadina-1(2),4-diene	0.60
1540	α-Cadinene	4.75
1546	Selina-3,7(11)-diene	0.74
1559	Germacrene B	0.24
1578	Himachalene oxide	0.28
1606	Sequilavandulol	1.37
1638	Epi-alpha-Cadinol	0.51
1649	Selina-3,11-dien-6-alpha-ol	3.93
1652	Cedr-8(15)-en-9-alpha-ol	0.91
1655	α-Cadinol	0.14
1706	10-nor-Calamenen-10-one	0.31
1710	Mayurone	0.34
	Total	99.01

Table 3. Antibacterial activity of *Melissa officinalis* essential oil grown in Jordan

Name of Bacteria used	**Zone of inhibition of *Melissa officinalis* essential oil in mm**	**Antibiotic used**	**Zone of inhibition by antibiotic in mm**
MRSA	20±0.21	Vancomycin Rifampicin	10±0.12 28±0.16
P. aeruginosa	16±0.15	Ceftazidime Cefotaxime	16±0.13 6±0.11
E. aerogenes	38 ±0.24	Neomycin Nitrofurantoin	20±0.21 21±0.18
E. coli	10±0.11	Neomycin Nitrofurantoin	14±0.12 16±0.14
B. subtilis	20±0.21	Vancomycin Chloramphenicol	18±0.18 24±0.24
S. epidermidis	26±0.18	Cefuroxime Cefotaxime	20±0.12 10±0.14

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RESEARCH ARTICLE

Perception of Patients with Type-2 Diabetes of Supportive Resources in Self-Care: A Qualitative Study

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ABSTRACT

The type-2 diabetes patients use different Supportive resources in self-care process. There are few relevant studies in Iran in this area. This study investigated the perception of diabetic patients of Supportive resources in self-care.This was a qualitative study, in which content analysis method was used. Participants included 16 diabetic patients with records in a health center affiliated to the Isfahan University of Medical Sciences. The data collection process was continued until data saturation, using purposive sampling method. The semi-structured interview was conducted as the main technique for data sampling. Data was analyzed using qualitative content analysis and constant comparative approach.

After investigation and classification of primary concepts, 692 initial codes were elicited from the interviews. Classes were formed based on the generated codes and similarities after several reviews and summarizations. Further reviews and comparisons of classes revealed their underlying meanings as primary themes. These conceptual and abstract themes were named according to their nature. Accordingly, these named themes exposed the nature and dimensions of patient's perception of

Supportive resources. These concepts included: 1) involvement of family; 2) informed interaction with medical staff; and 3) friends' empathy.

Results and discussion of this study showed that diabetic patients' perception of self-care has three dimensions. These findings can help health managers and planners in diagnosing the fields and objectives that require intervention and planning to facilitate the self-care behaviors as the most vital factor in diabetes control.

Key words: Diabetes Mellitus, Self-Care, Supportive Resources, Qualitative Study

INTRODUCTION

The self-care dimensions include a wide range of self-care behaviors as follows: blood glucose monitoring and controlling, insulin therapy and oral diabetic medications, exercise and physical activities, nutrition and diet, prevention from acute diabetes complications including nephropathy and retinopathy, foot care, smoking cessation, and other health-related behaviors. Accordingly, several programs have been operated globally for training and promoting self-care behaviors, especially amongst diabetic patients [1, 2].

Depending on the health systems and cultural differences of countries, patients differ in adhering to self-care behaviors. This has made the identification of factors affecting self-care activities as one of the most important challenges of diabetes [3]. The identification of factors that are linked to self-care in diabetic patients can lay the ground for training programs and ensure the success of interventional programs [4]. Due to the importance of self-care activities in disease management, a complete understanding of self-care related factors in diabetic patients is required [5]. Previous studies have mentioned different self-care predicting factors [6]. The nature of factors affecting the self-care behaviors are complicated and still unclearly known; however, several relevant factors have been proposed individually or as different models. Different and even contradictory evidence has been reported in different communities [7].

Despite identification and expression of different variables in the self-care process, researchers and experts in recent decades have emphasized the need for recognition and provision of influential variables based on the perception and experiences of the involved people. In addition, people's perception and experiences vary based on time, location, and other factors, and require review and re-explanation in different times and places. Diabetes literature supports above findings [8-10].

Since diabetes, as a chronic disease, requires extensive behavioral changes and observation of complicated diet, social support, as an effective and important factor in self-care activities, and adherence to disease control and treatment can facilitate self-care activities and adjustment to the disease [11]. On the other hand, a major part of the care for this disease is done at home and inside the family. Therefore, social support can be a vital part of successful diabetes control [12].

The perceived support in self-care process is affected by cultural, economic, and social factors. In addition, regarding the emphasis on self-care studies, the patient's perception of social support should be investigated in a process with a holistic and qualitative approach in real environment. Regarding the research question, "what is the perception of diabetic patients of Supportive resources in self-care?," this study looked for the best method capable of investigating the nature of a phenomenon along with the structure, process, and factors affecting its formation.

MATERIALS AND METHODS

This is a qualitative study, in which content analysis method was used. The qualitative content analysis is a methodology used for mental interpretation of textual data. This method uses systematic classification process to identify the codes and themes. The content analysis is something beyond objective content elicited from textual data; rather, it extracts the themes and hidden patterns from the contextual data of research participants [13].

Research sites included health centers affiliated to the Isfahan University of Medical Sciences, Iran. In this study, the purposive sampling began and continued until data saturation. Inclusion criteria were patients with definitive diagnosis of disease by a physician, record in respective health center, no chronic and severe complications, age range of 25-60 years, willingness to participate in the study, and no dementia. The first interviewed participant had 15 years history of diabetes, whose data was used in selecting the next participant. After determination of initial classes, the next participant was selected based on his/her capability in further clarification of the emerging classes. This sampling process was continued until data saturation. Although data saturation was practically achieved and the initial classes were formed after interviewing 14 participants, two additional interviews were held in case, which did not produce new information that leads to coding and formation of new classes. Finally, 16 participants were interviewed in total.

The researcher attended the research site after obtaining the required permission and introduction letter, and began the selection of subjects based on research objectives and inclusion criteria (purposive sampling). Then, by introducing himself and explaining research objectives, the researcher began to obtain the informed consents of the subjects and select an appropriate place for conduction of interviews. After taking these initial measures and before conducting the interviews, the subjects were ensured about the confidentiality of their information. They were also told that they can discontinue their cooperation with the study. In addition, their consent for the recording their statements was obtained. Interviews were conducted individually once or twice, each lasted 45-60 minutes, by considering environmental and time factors, patients' conditions (degree of patience), and their willingness to participate. The interview site was a quiet room in health center for the comfort of the participants. The interviews were recorded, after obtaining the interviewees' consent. Then, they were transcribed and transferred to the analysis application word by word. As researcher should be immersed in information in a qualitative study, interviews were reviewed for several times [14]. The subjects were selected among those with the highest diversity in terms of duration of diabetes, age, gender, marital status, education, and career.

The main data sampling method was in-depth and semi-structured interview with open questions. This is one of the most common data collection techniques in qualitative studies [15]. After obtaining demographic information, the researcher began the interviews by asking general questions. Some key questions included: How much do you know about diabetes? What is self-care? What are self-care behaviors that control the disease? Why should a diabetic patient consider diabetes care and control? The follow-up and in-depth questions were also asked during the interviews based on the participant's answer for better clarification of the studied concept, including: Would you please explain more? What do you mean? Would you please give me an example?

Data collection and analysis were done in six stages in line with the research objective, i.e. the perception of diabetic patients of Supportive resource: 1) researcher's familiarity with data, 2) generation of initial codes from data, 3) looking for themes by reviewing codes elicited in previous stages, 4) reviewing the themes and re-comparing them with data to ensure their accuracy, 5) defining and naming the themes, and 6) preparing the final report. The researcher wrote down all mental-sparks related to the data to be used in next interviews.

Data analysis was done using constant comparative approach, which is used to increase the reliability and validity of data. All participants' statements were transcribed word by word, and analyzed and coded using content analysis

method. In this way, the researcher was fully immersed in data to obtain a novel perception and insight. Data analysis was initiated with frequent reading to get immersed in data and to find a general vision. The texts were then read word by word to elicit the codes. This was a continuous process from eliciting to naming the codes. After the extraction of concepts and codes from key sentences and paragraphs, they were categorized based on the similarities and differences. Finally, these classes were combined into fewer categories based on their relationship. To facilitate the main stages of the study (including open coding, axial coding, selective coding, and data analysis and interpretation), qualitative data analysis application was utilized.

During the research, some methods were used to determine the validity and reliability of the study. In addition, four reliability criteria (acceptability, transferability, consistency and verifiability) were employed [16]. Long-term involvement with the subject is one of the best methods for accreditation. In this study, the researcher was involved with research subject, data, and diabetic patients for one year. Data was reviewed by the participants to confirm the accuracy of data and elicited codes, and/or modifying them. In that, each coded interview was returned to the respective interviewee to ensure about the accuracy of the codes and interpretations, and to modify misinterpreted ones.

A review was also done by supervisors. For this end, some parts of the interview's transcriptions along with the respective codes and emerged classes were sent to some supervisors to investigate and validate the analysis process. The congruence of findings was confirmed by sharing them with some external diabetic patients. The application of sampling technique with maximum diversity, which contributes to the congruence of findings or transferability of them to others, was also considered in this study. Additionally, for verifiability of the study, the researcher precisely recorded and reported the research procedure for future studies. This study was approved by the Ethical Committee of ShahidBeheshti University of Medical Sciences. Moreover, the approval of the respective authorities was obtained before initiating the study.

RESULTS

After investigation and classification of primary concepts, 692 initial codes were elicited from the interviews. Classes were formed based on the generated codes and similarities after several reviews and summarizations. Further reviews and comparisons of classes revealed their underlying meanings as primary themes. These conceptual and abstract themes were named according to their nature. Accordingly, these named themes exposed the nature and dimensions of patient's perception of Supportive resources. These concepts included: 1) involvement of family; 2) informed interaction with medical staff; and 3) friends' empathy.

Involvement of Family

Among the perceived Supportive resources, the subjects clearly emphasized the importance of involvement of family. In that, the underlying meaning of the codes of the first sub-category was "Involvement of Family in Self-Care". Patients put that family support greatly mitigated disease problems and facilitated follow-ups required for treatment. This factor was more intense, especially during the early days of illness. According to a patient: "During the first month, everybody are careful about what they say or do, or how they behave; but this becomes normal after a while, something perpetual; attentions are no longer as before." The firm family support encourages the patients to perform more self-care activities. Another participant says: "Family is very helpful, and it is important to them that I care for my disease; I see all of these and try harder."

A sense of friendship and intimacy, and connection with children have a large role in promoting the sense of support perceived by the patient. One of the patients says: "we are father and child, we are friends, this is peace of mind."

The married patients mentioned their partners as the most important family member in providing support and encouragement to perform self-care behaviors. They put that their expectation is higher from their partners as compared to other family members like children. According to a participant: "eventually, one is more closer to his/her partner than children, the partner is the only helpful person in difficulties."

Informed Interaction with Medical Staff

The patients put that a good and sincere interaction along with professional behavior of medical staff, especially physician, have a significant role in creation of an informed interaction and generation of motivation to perform self-care activities. A participant says: "... I regard [my] doctor as an older brother, I comfortably unburden myself to him; I talk about what happened to me over this time and deliver a lengthy report about my condition; I actually inform him, and he listens to me attentively."

In addition, information and emotional support from medical staff in health centers grew a conscious trust and hope in them. In that, this trust was to the extent that the patient preserved the orders of other physicians and specialists only after coordination with the diabetic specialist. Many participants mentioned that they had less fear of the disease and its complications after being consoled by doctor. A participant says: "psychologically, they behave me well, encourage me; at least they say the disease can be controlled, [by this] the fear is alleviated."

Friends' Empathy

Participants said that the presence of friends or lack of their involvement have important role in performing self-care activities. According to a participant: "now that my friends are no longer here, I gradually reduced my activities, and I have no activities now." They also mentioned the friends' unsparing attentions show that they are not alone in facing with difficulties. Friends' behaviors such as consoling the patient, and talking about their problems and diseases, accompany the patients in self-care activities and support them psychologically and mentally. Having connection and talking with friends decrease psychological pressures of the patients. Another participant says: "I come to my friends and [we] say hello to each other, this friendly mood is literally comforting, they enjoy it as we gather in the same park and have close relationship; if one of us does not show up, they will ask why the guy hasn't come for two days." Whereas, some patients attributed non-adherence to diet, as a [negative] self-care behavior, to encouragement by friends.

DISCUSSION

Diabetes impairs daily operations and social activities, changes one's capability in performing common roles and responsibilities, and develops new roles. Diabetics depend on others more or less and are less capable of supporting others. Thus, their interactions with others are limited, which may isolate them from the society. Because of this, they are most in need of social support [17].

Different studies consider a significant role for perceived support in diabetes self-care; thus, this study explained the perception of diabetic patient of Supportive resources in self-care process. Findings of this study showed that patients receive different type of support during self-care process from various Supportive resources. Moreover, the perception of diabetic patients of Supportive resources has three dimensions with certain characteristics.

The participants mentioned that they received the biggest support from their families. Since such patients spend a major part of their life with their family, support from them has an important role in helping them to do self-care activities. Family support means that the attention and advocacy from family provide the patients with hope and

encouragement [18]. Family is the first and most significant source of advocacy, in that a family member scarifies himself/herself in taking care of other members. Even if the supported person is incapable of offering compensation, for his/her disability, family members attempt to provide him/her with an ongoing support [17]. According to the research findings, partners are usually the first source of support during any crisis. A strong relationship with children and/or parents does not compensate for poor relationships with partner [19]. Indeed, partner support is the most significant Supportive resource, followed by children support. The presence of partner as a person who promotes the sense of attachment and belonging can affect one's health and performance [20].

According to the participants' experiences, supportive behavior of doctors created an informed trust and hope in them. This support was mainly in form of information and hope provision. Interaction with medical staff and bringing hope of effectiveness [of treatment] to the patients decreased their fear. In addition, supporting the patients with information made them aware of self-care behaviors. Such types of support causes patient's satisfaction with doctor. It is a very important matter as higher satisfaction of the patient with his/her doctors is associated with more self-care and acceptance behaviors [21].

The participants also mentioned the kind, friendly, and respectful manners of nurses, along with information provision as another important supportive behaviors from medical staff. Patients in some other studies described supportive behaviors of medical staff as follows: providing an open environment where feelings can be expressed, spending time on listening, timely provision of physical care , talking respectfully, and behaving friendly [22].

Friend's empathy and appropriate interaction with others can be a suitable resource for relieving tension and relaxing the patient. In consistence with this study, some other studies attributed inappropriate conditions for performing self-care activities to companionship with friends [23]. Wrong supportive behaviors (e.g. blaming for negligence in timely use of treatment programs) in treating diabetic patient has an adverse impact on self-care programs. In contrast, when people display positive empowering behaviors to make the patient remain committed to treatment programs, better result is achieved and the diabetic is better capable of adhering to the programs. Driving the patients to despair and disappointment by the friends can impair self-care performance [24, 25].

CONCLUSION

Results and discussion of this study showed that diabetics' perception of self-care has three dimensions. The nature of their understanding of these supports included involvement of family, informed interaction with medical staff, and friends' empathy. These findings can help health managers and planners in diagnosing the fields and objectives that require intervention and planning to facilitate the self-care behaviors as the most vital factor in diabetes control. Results can be used to evaluate the effectiveness of employed interventions.

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RESEARCH ARTICLE

Relationship between Advertising and the Number of Public Library Patrons: A Case Study of Mazandaran City Libraries in Iran

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ABSTRACT

The aim of the present study is to examine the relationship between using advertisement and the number of public library patrons. This case study conducted in Mazandaran Province of Iran. It is an analytical survey and the data were collected by a field study, and a questionnaire was used as the instrument. The population consisted of 155 of the public librarians in Mazandaran. Survey data showed that the advertisement had the highest effect on increasing the number of public library patrons. Acquaintance with ads, using different advertising techniques, implementing promotional activities in identifying user needs, and increasing their access to information were in next orders, respectively.

Key words: advertisement, marketing, public libraries, patrons, Mazandaran

INTRODUCTION

Information needs are the basic needs of everyone in the present era. So, every human being has the right to have access to information and use it. Currently, Public libraries as service and non-profiting institution with public accessibility, has the task of collecting, organizing and using information as well as having access to information sources. In recent decades, social and cultural changes and especially technological changes, have created a new look at the role and status of this institution and consequently its performance. Today, social institutes in line with technological and emerging developments need modern techniques and more efficient strategies for survival. Libraries also should provide the services needed for the society in the most efficient and sufficient way. Otherwise,

the opinions of the librarians about the value of the library services would be invaluable [1]. In this regard, public libraries have found that they should compete with the changes resulting from financial sources and reduction of the number of patrons due to the economic and social changes as well as developing technologies. [2]

Everyone lives by selling something but active marketing is not the art of selling products; but is the awareness of what needs to be produced. Future society is global and competitive and its key to success relies on understanding the needs and demands of the customers and responding to them. Marketing library services is not bad; in fact, it has existed since the library was created; however, it was discussed and introduced by Samuel Sweet Green in the conference of American Library Association in 1876 and when in 1896 a person called Stearns raised the issue of advertising in the library, this word was added to the other words related to the library. Public libraries are giving services in completely advanced societies where most of the public time and attention is given to them. So, it is necessary that the libraries inform people about the presence and their activity scope. Advertisement can vary from the simple methods such as writing on the wall of the library building to express their roles or using newsletter for informing open hours of the library to the more complicated methods such as marketing programs, using websites for improving the librarian services and activities. [3]

Public libraries have the function based on three aspects of producer, distributor and consumer in order to fulfill their mission which is promoting science in the society. People in the society are the science producer and they provide basic materials for the libraries to create a social process. Libraries play the role of the distributor in this three-stage process. At this stage, libraries receive the produced knowledge and distribute it after organizing. Knowledge distribution needs marketing and knowing its customers as any other product. Marketing means searching to find the most appropriate market and the sections where the organization can provide better and more efficient services and answer the needs of the users and customers in the best way. Library is a market-based organization, all the activities of which are formed by the needs of the users. Marketing enables libraries in order to identify the needs of users and meet these requirements. [4]

Researches have shown that a huge part of the society does not use library services. One reason of this fact is that libraries have not been able to introduce their services efficiently. Many of the library managers lack marketing knowledge; are not aware of its importance, and even have negative views about it. Therefore, libraries and information centers are responsible for encouraging and motivating the patrons and customers to use the services. In fact, efficient and principle-based marketing in the libraries provides the instruments and facilities to inform the customers or users about the library services and their value. Libraries can use the marketing principles and strategies to know their objectives better, become familiar more effectively with users and their needs, and develop their services and products based on this recognition. Public libraries have more significant and important role in developing science in the society due to direct communication with different social classes. The communicative role of the public libraries in developing science causes knowledge to be cycled in different social classes, and each class can help the interpretation and analysis of it based on its own understanding. Scientific concepts reach the common people from different scientific classes through a more complicated cycle and this cycle causes more complicated scientific concepts to be simply understandable. The task and objectives of the public libraries are formed in a way that we can say they have a more significant and important role in developing and promoting science and knowledge than any other social institutions. In fact, creating a favorable environment for publicizing science and promoting scientific thoughts are the important goals and aims of these libraries.

The world where libraries live is changing fast. The pace of change has increased; relying on technologies has increased, and competition level is increased in order to attract more customers. Since such fast changes can jeopardize the existence of libraries, librarians should view marketing as an instrument for helping better management of the libraries. Discussion on promoting and advertising has been more considered by the libraries compared to other aspects of marketing. The importance of the advertisement is such that some believe it is necessary

to establish a separate section as a "Department of Marketing and Public Relations" so that this department can monitor this complicated process all the time and professionally to discover the weaknesses and solve them.

Public library is one of the cultural bases of the societies, and has an efficient role in improving the science, culture and filling the leisure time of the people in the society. Moreover, since libraries cover a wide range of people in the society regardless of the age, gender, religion and etc, quality of the provided services find more importance [5]. The main question is that how public libraries can successfully maintain their position and adapt themselves with the new condition, and how they can perform one of their most important tasks which is attracting more people to promote the public's level of study. According to Wingand, answering these questions depends on efficient use of marketing in public libraries. [6]

According to what was said about the importance of the advertising and marketing activities, and the needs of the libraries, particularly public libraries for these activities, and that libraries and their facilities to be used, research in this area will be required to provide better strategies for future by knowing and evaluating the present situation. Since the role of public libraries in social development and improving the education and culture is undeniable, and public libraries should meet wide range of needs in the society; but unfortunately in Iran they are still following traditional views, so it is necessary for the libraries to do a revolutionary act and introduce a new image of them. For this purpose, the present study investigates the relationship between advertising and the number of public library patrons in Mazandaran province of Iran to provide a guide for the managers and planners of public libraries.

MATERIALS AND METHODS

Advertisement

Advertising is any form of non-personal presentation or promotion of ideas, products and services done by paying money, through social media like newspapers, magazines, television or radio with sponsor set. Many organizations use advertising to send and convey messages about themselves, their services and products or any type of behavior to their predefined audiences to evoke a specific response in them. This response can be perceptional in nature, e.g. consumers find a certain view about a product or brand, or their attitudes changes by advertising. Response can be behavioral. For example, consumer does not buy the product or increases his purchase. The advertisers who sponsor Ads not only include business organizations but also social institutions and non-profit organizations such as the charities, museums and religious organizations which promote ideas and motivations in target population. Advertising is a proper method to inform the audience and motivate them to make them prefer a specific product at national or international level such as purchasing a type of cellphone, consuming drinking water, drinking milk, or quitting a specific action such as smoking. Advertisers have serious concerns on using the advertising budget to achieve their communicative targets and are always looking for logical strategies with maximum efficiency. [7]

Public libraries like other social and civil institutions offering services are responsible toward their patrons. Hence, efficiency of public libraries is measured by the index of efficiency of services to patrons and members. Moreover, public libraries are also responsible toward their staff. Staffs who are constantly learning act creatively toward the issue they encountered with, and improve the quality of services efficiently along with satisfying consumers. Creating innovation by public libraries is resulted in line with libraries' responsibility toward public. Libraries try to create innovational spirit among their staff through introducing, advertising and promoting the use of books and databases.

Advertising includes the process through which the target groups are informed of the accessible resources, services and products delivered by the information center and library. Competition level has risen in the present time and so libraries and information centers need to improve their advertising activities. Libraries and information centers

generally use the traditional systems such as displaying book covers, showcases, book exhibition, posters and advertising their products and services. Traditional approach is not justifiable in the present era. Dynamic marketing of library services is demanded when the importance of library cooperation in the world of logical development in special and economic world in general, is confirmed, respected and interacted. In the modern world, Internet, E-mail and others are important sources of advertising. [8]

Advertising means informing, communicating messages, dissemination of ideas and information, and insight in the form of a proper value system. In other words, advertising is the technique of impressing the human act by manipulating his imaginations and beliefs [9]. Advertising is not a type of entertainment or art, but is a type of informing [10]. Advertising is the systematic process of providing proper information about products and services to the customers, and motivating and persuading the consumers efficiently to buy services and products. Advertising is non-personal communication and introduction of products or services through different conveyors in return for a payment for profit or non-profit institutes, or any other related parties. Business advertising is a dynamic science that takes a new form every day with social, economic and political changes, and takes certain contents in various environments considering the rituals, beliefs, culture and religion. Advertising means sending a message, introducing something to others, or pretending something good or bad. It includes verbal and visual messages transferred from a source by advertising channels to a specified groups or all the society to promote an idea or product which are purchased [11]. Advertising is the magic of the twenty-first century, and without advertising, marketing is meaningless. Products in general, can be advantageous when they cover a wide range of consumers. Moreover, there are some common points in various definitions given to advertisement, including:

Advertising means an non-personal communication
It should be paid
It is done through different media
It is done to persuade or impress minds of the people

Various ways of advertising in libraries:

Advertisement without cost or with minimum cost (promotion) is the best option in Iranian libraries. It is done in different ways, some of which are mentioned below:

Brochures: In order to prepare brochures in libraries, the benefits of going to libraries should be emphasized. It is better to publish a series of brochures in predefined time intervals and specific topics to be addressed in each of them. The brochure can include the introduction of new services or sources. They should be short and figures and charts can be used in them. The writing and typing mistakes should be avoided as much as possible, and not that the name, address, telephone number, fax, email, and website address of the library (if available) should be written completely.

Statements should be simple and clear, and should be in question and answer form as much as possible. Note that brochures should not be used only inside the library as a noticeboard but they can also be used outside of the library, or be given to persons in any public place.

Business cards : It is recommended that the library staff should prepare some business cards to maintain their professional image, and use them when necessary.

Newsletters: Each library should have its own newsletter. They can be simply prepared in low cost, and make it possible to flexibly describe the values and nature of libraries. In addition, new services, new references, librarians activities, abstract of the published professional articles and people's quotes about satisfaction with services are mentioned in newsletters. One section can be devoted to the Frequently Asked Questions (FAQs) while all the

materials mentioned in the brochures should be taken into account. If the content is too much, they should be separated by columns. Newsletter should be published in certain time intervals, e.g., monthly or quarterly.

Journals : journals can be powerful tools for performing advertising activities in libraries.

Following points should be considered in preparing the paper for journals as much as possible:

Title should be attractive enough to attract the audiences' attention to read journals;

The information about library and the city in which journal is published should be included in the paper.

First paragraph should have materials in answering questions who, what, when, why, where and how. This section can have 40 to 100 words.

Rest of the text can include illustrations. Previous sections should not be repeated in this part but it should be more attractive and legible. It is better to use the name of the library rather than using personal pronouns. Content should be written in simple and easy language, and it should not be more than 250 words. Contact information should be incorporated. Make sure to mention the name of the library or the organization. Furthermore, telephone number, Postal address, fax, email and website address of the library should also be included.

Email email addresses can be used as a tool for sending questions or information in libraries. Furthermore, posters, advertisements or library programs can be sent to the related institutes via emails. Email address of the library can be sent to the users so that they become familiar with library and its services. It is better to highlight the important materials in the email. Emails are cheaper compared to journals.

Noticeboards using noticeboards is another proper method to introduce the library services and facilities. 3D noticeboards are better to be used if possible. These boards should be installed in crowded places. This is not necessary inside the library. Simplicity and clarity should be considered, and the letters should be bold and impressive.

Posters and Educational Guides these can be prepared and distributed in different places for free based on aforementioned points. Most of educational guides should be available to be taken for the patrons and users and a brief explanation of library activities and sources should be included in them in an attractive and clear way. Personal innovations and facilities of the library can be used to publish posters and guides in order to reduce the costs. Posters should be installed in crowded places and educational guides with visible letters in needed places, for example beside List of attachments or library catalog. [6]

Marketing in libraries

Patent of libraries has been broken up in the present era, and each library needs to compete with others in order to survive; as a result, library directors and information centers can not only emphasize on internal activities of libraries, but also they should make information available as marketable goods for the users and inform them about library services. Information market and needs of its users have significantly been changed today, but libraries have not adapted to these fast paced changes as they should. Libraries can use marketing and advertisement strategies of successful organizations to improve their status. Information marketing does not only include informational dissemination but proper use of sources in libraries. Libraries can be introduced as the information market, and patrons as the information customers. Information is one of the vital sources for national development. Increased

knowledge about the important role of information has led to establishment of informational systems which provide a variety of services and products. Knowing the importance of information role is a required step toward planning, designing and using these services and products to implement information properly. Providing, organizing and disseminating the information should be based on new marketing concept to satisfy the reader. Libraries should try to increase culture of service to the patrons to promote their status in the eyes of patrons. Adopting marketing approach toward libraries not only help them in funding but also in cost-recovery and self-sufficiency of products and digital Information Services [8]. Libraries and information centers can make use of following service to introduce their informational products: [12]

Building websites for the libraries or informational centers. Product introduction, various services, using condition, users comments and linking to other famous websites are the elements to be considered in website design;

- Using emails for a wide number of users;
- Using weblogs for marketing service or information product ;
- Using mass media;
- Using guides , brochures and posters for marketing;
- Holding exhibition and direct supply of goods;
- Holding workshops to use services and products
- Writing articles for journals and newsletters.

Information explosion, technological revolution and increased costs of libraries promote the librarians to define the marketing approach for their products and services. Our society is moving toward a knowledge-based society where information is key priority. For this purpose, increase users satisfaction and the level of using services, marketing services and information products are obvious needs for libraries and information centers [8]. Idea of marketing in libraries has been formed a long time ago in America and North Europe. Basically, marketing has a higher level of usage in countries with lower rate of illiteracy, high budget with enough number of libraries and library schools. However, they are not the only determining factors and there are some countries such as India in other regions of world with more activities in this field. Increased competition in trading market, increased customer expectations, expansion and variety of ways to access information are the main reasons for marketing in libraries. To survive in such an environment, customers' needs should be identified, and this identification and resulting information should be conveyed to all employees in a comprehensive form. [13]

Marketing in libraries and informational centers is a way to encourage patrons to use the valuable library services. When the information of a product is asked, a new approach is created in the market called information marketing. However, the important point is that in the world of business marketing deals with organization offering public services. The use of marketing principles in non-business organizations has been emphasized since 1970s. For example, marketing approach in libraries results in better services for the patrons.

Although marketing information services is a new concept, but now it is discussed as an important field for libraries and information centers because information as the library product, is considered as a business element, and individuals and professions monitoring information including developing, accessing, analyzing, and disseminating information would be more successful. Marketing covers the activities which relate the organization to the outer world to trade and use information. [14]

Libraries need to rethink the traditional methods of offering services and new products to the potential and active users for successful participation in a competitive information market. With Multiplicity of the information sources, libraries are not only source of information anymore which has weakened the role of this institution traditionally has leadership responsibilities in the field of information and communication. In past, libraries were the only information

centers and librarians and directors did no pay enough attention to introducing the library services and products, but today the libraries are intensely under pressure to justify their existence by providing quality services for the users, and marketing for more services . Public libraries as non-profit institutions can also use marketing as a strategy to meet their goals.

Most of library goals especially public libraries have both social and individual dimensions. For example, public libraries promote the culture of book reading and habit of reading in society. Therefore, the culture of reading is considered as a "social good". The programs and activities applied by libraries to institutionalize these habits are marketing technologies. Accordingly, librarians should take some actions to attract people toward information sources. They can even create their own information needs. On the other hand, libraries have users with information needs who want to use libraries. If libraries responded to their information needs and satisfied them, its most important outcome had been recommending others to use the library.

Previously, libraries might believe that patrons should automatically be attracted to them and their services are being used. It is outdated thinking today. Libraries, as any other social institutes, have recently understood the importance of marketing their product and services. Libraries have admitted the fact that by using marketing techniques they can have a better understanding of their users' needs, more accurate budgeting, more efficient communication with their audiences, and achieve more returns and better results in offering expected products of users. Potential audiences of libraries often have no sufficient information about services and facilities provided by libraries, and marketing can increase the use of library services and facilities. In this regard, libraries can show users that library is a desirable phenomenon through some marketing sections that promote and encourage patrons and include departments of public affairs, advertisement, and a section introducing services and facilities. [6]

Methodology

In this research survey method has been used considering the nature of the study, research objectives, research questions and extent of executive features. Population includes 155 of the librarians in public libraries of Mazandaran Province of Iran. By random sampling method 110 subjects were selected. Data were collected through a filed study. Since this is a survey study, questionnaire was data collection tool. The questionnaires were distributed among the participants some in person and others by sending them to Iran Public Libraries Foundation in Mazandaran Province. Here we used built questionnaires of Mirgozar Langeroudi [15] and Ghorbannejad [16] whose validity had been approved by the experts. However, since the questionnaire was a combination of two questionnaires, its validity was reevaluated by professors in the field of Library Science. Reliability coefficient of the questionnaire was obtained 0.89 using Cronbach's Alpha which indicates acceptability of the questionnaire. The 5-choice questionnaire had 28 questions about library services and the importance of advertising activities, based on Likert scale. The questionnaire was distributed among the participants after correcting. Finally obtained data were analyzed using SPSS software. All the variables were evaluated using linear regression model in order to analyze the effective factors on the number of public library patrons. The research hypotheses are as follows:

There is a significant relationship between familiarity with advertisement and the number of patrons

There is a significant relationship between implementing promotional activities in public libraries and the number of patrons.

There is a significant relationship between identifying the needs of users and increasing their access to information with the number of patrons.

There is a significant relationship between using different advertising techniques (ads, pictures, websites, emails, brochures, newsletters, noticeboards and etc) and the number of patrons.

RESULTS AND DISCUSSION

Descriptive statistics-Demographic characteristics

In table 1, demographic characteristics of the participants in the study are presented.

Inferential statistics- testing research hypotheses

In this section first we examine the normality of data. This is done by Kolmogorov-Smirnov test. The null distribution of this statistic is calculated under the null hypothesis, and it is rejected at a significance level of less than 0.05. ANOVA, t-test and regression analysis will be used when it was approved that data was normally distribute.

H0: data is normally distributed
H1: data is not normally distributed

Kolmogorov-Smirnov test determines if the quantitative data are in normal distribution. If significance level be meaningful, data will not be in normal distribution. Results of Kolmogorov-Smirnov tests in table 2 indicate that all of the research questions are at the significance level of higher than 0.05 that is, it is not meaningful. so the data are in normal distribution.

Hypothesis 1 There is a significant relationship between familiarity with advertisement and the number of patrons
H0: $M \leq 3$ they are not familiar with Sig <0.05
H1**:** $M \leq 3$ they are familiar with Sig < 0.05

Based on table 3, significant level of mean difference has been sig=0.000 which is less than predetermined significance value of 0.05. Therefore, there is a statistically significant difference between the means. So, the null hypothesis is rejected and alternative hypothesis is accepted. The observed mean is M=3.42 and predetermined mean is M=3. Hence, librarians are highly familiar with advertisement.

Hypothesis 2 There is a significant relationship between implementing promotional activities in public libraries and the number of patrons.
H0: $M \leq 3$ they do not have positive view Sig <0.05
H1: $M \leq 3$ they have positive view Sig <0.05

According to table 4, significant level of mean difference is sig=0.000 which is less than 0.05. So there is a significant difference between observed mean and predetermined mean. So, the null hypothesis is rejected and alternative hypothesis is accepted. The observed mean is M=3.69 and predetermined mean is M=3. In other words, librarians of public libraries had positive view about implementing promotional activities in public libraries.

Hypothesis 3 There is a significant relationship between identifying the needs of users and increasing their access to information with the number of patrons.

H0: $M \leq 3$ information can not be increased Sig <0.05
H1: $M \leq 3$ information can be increased Sig <0.05

As seen in table 5, sig=0.000 which is less than 0.05, so the null hypothesis is rejected and alternative hypothesis is accepted. The observed mean is M=3.19 and predetermined mean is M=3. We can say that identifying user needs and increasing their access to information is possible by performing the advertising activities in public libraries.

Hypothesis 4 There is a significant relationship between using different advertising techniques and the number of patrons.

H0: $M \leq 3$ No Sig <0.05

H1: $M \leq 3$ Yes Sig <0.05

Based on the table 6, significant level of mean difference was 0.000 which is less than 0.05. So we can say that there is a statistically significant difference between the two means. So, the null hypothesis is rejected and alternative hypothesis is accepted. The observed mean is M=3.20 and predetermined mean is M=3. Then we can find out that the studied libraries use different advertising methods such as advertisements, pictures, library website, email, brochure, newsletters, noticeboards and etc to promote and introduce their services and activities at a relatively good level.

In total, To test the relationship between advertisement and the number of patrons we use Pearson correlation test whose results are shown in table 7.

Results of Pearson Correlation test shows that there is a positive (r=0.234) and significant (sig=0.014) relationship between the number of patrons in public libraries and using advertisement.

The results of simple linear regression analysis between independent variable of “using advertisement” and the dependent variable of “number of patrons” in public libraries are presented in table 8. Significance level of the t-test indicates that using advertisement had a positively significant effect on the number of patrons in public libraries (sig=0.014) and using advertisement explains 75.5 percent of the variation of the patrons number in public libraries. So, there is a significant relationship between the two variables.. Therefore our hypothesis is accepted. That is, the more advertisement, the more number of patrons will come to public libraries and the less advertisement, fewer patrons will come to public libraries. Using advertisement predicts 75.5 percent of number of patrons to public libraries. That is using advertisement has a 75.5 percent effect on the number of patrons to public libraries.

CONCLUSION

Libraries and information centers as the information sources have significant effect on promoting knowledge. Meanwhile, public libraries play an important role in promoting knowledge due to communicating with more people from different social classes. Creating proper condition for making knowledge available for public and promoting the culture of scientific thinking are the main goals and functions of these libraries. Different social classes can share their knowledge in public libraries and in turn have access to a wide range of information and knowledge. Libraries can use the marketing and advertising strategies of successful organization to improve their condition. Since the public libraries have an important role in increasing the literacy and study level of people, we should benefit from strategies that increase the satisfaction of active patrons and attraction of potential patrons. Moreover, potential audience for Libraries often lack sufficient information on services and facilities which can be provided for them by libraries, and marketing can increase the level of using services and facilities.

The issue of promotion and advertisement has been considered more than any other aspects of marketing in libraries. In this regard, library by some methods of marketing that encourage patrons which include public libraries as a public organization, plays an important role in society and are known as a vital system in social and cultural development of the society. It is obvious that this type of institution has multiple goals and achieving these goals need taking advantage of specific aspects of management, one of which, due to the competitive environment, is

marketing and systematic use of marketing elements. Iran Public Libraries Foundation is responsible for monitoring all the public libraries of Iran including Mazandaran public libraries and includes 60 public libraries in Mazandaran province.

According to our findings, it can be concluded that the librarians have positive view about using advertisement in public libraries of Mazandaran province. They are fairly familiar with advertisement and public libraries of Mazandaran use different advertising techniques to promote and introduce the activities of their libraries in a proper way. Also results indicated that implementing promotional activities in public libraries can help recognizing the patrons' needs and increase their access to information. So far, the importance of advertising and marketing has been known for the librarians, and they have had positive attitudes toward using it. Unfortunately, despite of the librarians' readiness to use advertisement, there are some barriers to implementation in public libraries most important of which is the lack of librarian, specially the expert ones. If efficiency be coupled with the expertise and creativity, we can see more success in the Libraries

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Table 1. Demographic characteristics

Measure	n	%
Age group		
20-25	12	10.9
26-30	17	15.5
31-35	23	20.9
36-40	36	32.7
40 and higher	22	20
Total	110	100
Academic degree		
Associate Degree	7	6.36
Bachelor degree	83	75.45
Master degree	20	18.18
PhD	0	0
Total	110	100
gender		
Male	64	58.2
Female	46	41.8
Total	110	100
Work Experience(year)		
1-5	25	22.72
6-10	28	25.45
11-15	44	40
16-20	12	10.90
21-25	1	0.90
Total	110	100

Table 2. Kolmogorov-Smirnov Test results of Research Questions

		Familiar with advertisement	Implementing promotional activities	Identifying user needs and increasing their access to information	Using different advertising techniques
N		110	110	110	110
Normal parameters	Mean	3.4205	3.6903	3.1931	3.2043
	Standard Deviation	0.83130	0.44864	0.36329	0.41490
Maximum Deviation	Absolute	0.097	0.086	0.092	0.075
	positive	0.089	0.081	0.058	0.059
	negative	-0.097	-0.086	-0.092	-0.075
Kolmogorov-Smirnov		1.022	0.907	0.960	0.785
Sig.		0.247	0.384	0.315	0.568

Table 3. One sample t-test results of H1

	N	Mean	SD	SEM
Familiarity with advertisement	110	3.4205	0.83130	0.07926

	t-test Test Value= 3					
	t	df	sig	Mean Difference	95% confidence Interval of Mean Difference	
					Lower Bound	Upper Bound
Familiarity with advertisement	5.305	109	0.000	0.42045	0.2634	0.5775

Table 4. One sample t-test results of H2

	N	Mean	SD	SEM
Implementing promotional activities	110	3.6903	0.44864	0.4278

	t-test Test Value= 3					
	t	df	sig	Mean Difference	95% confidence Interval of Mean Difference	
					Lower Bound	Upper Bound
Implementing promotional activities	16.137	109	0.000	0.69028	0.6055	0.7751

Table 5. One sample t-test results of H3

	N	Mean	SD	SEM
Identifying user needs and increasing their access to information	110	3.1931	0.36329	0.3464

	t-test Test Value= 3					
	t	df	sig	Mean Difference	95% confidence Interval of Mean Difference	
					Lower Bound	Upper Bound
Identifying user needs and increasing their access to information	5.574	109	0.000	0.19307	0.1244	0.2617

Table 6. One sample t-test of H4

	Number	**Mean**	**SD**	**SEM**
Using different advertising techniques in libraries	110	3.2043	0.41490	0.03956

	t-test Test Value= 3					
	t	df	sig	Mean Difference	95% confidence Interval of Mean Difference	
					Lower Bound	Upper Bound
Using different advertising techniques in libraries	5.163	109	0.000	0.20426	0.1259	0.2827

Table 7. Pearson Correlation Test results of research hypothesis

		Using advertisement
Number of patrons in public libraries	Pearson Correlation Coefficient (R)	0.234
	Sig.	0.014
	N	110

Table 8. Simple Linear Regression between two variables

Dependent variable	**Independent variable**	**Non-standard coefficient**		**R^2**	**Standardized coefficients (β)**	**t**	**sig**
		Regression coefficient (b)	**Standard Error**				
Number of patrons	Using advertisements	0.205	0.082	0.755	0.234	2.50	0.014

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RESEARCH ARTICLE

Evaluation of Microbial Quality of Sludge Outlet from the Refinery of Naein City and a Feasibility Study on using it as Manure

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ABSTRACT

Lack of adequate monitoring the quality of effluent and sludge outlet from refineries in the country led to entering a great deal of pollution into the environment. This study aimed to investigate the microbial quality, fertilizing value, heavy metals and physical parameters of sludge outlet from the refinery of Naein City and compare it with existing standards. This descriptive cross - sectional survey was conducted during 9 months and in three seasons- winter 2013, spring and summer 2014 and with three replications per season on the sludge of the refinery of Naein City. America's Environmental Standards were applied for monitoring the microbial quality, fertilizing value, heavy metals and minerals of sludge outlet,

The sludge outlet from this refinery is commonly used for agricultural purposes. In terms of physical parameters, only minerals have been exceeded the allowed limit and the remaining parameters are in the allowed range and in terms of the fertilizing value of the sludge and heavy metals, all parameters are in the allowed range and in terms of the microbial quality, they belong to the class B of America's Environment Standards. At present, the use of sludge outlet from the refinery of Naein City is done without any regard to sanitation. This is a serious threat to public health and hence, the administrative and supervisory agencies should take corrective actions and necessary controls in this regard as soon as possible.

Key words: America's Environment Standards, manure, microbiological quality, Naein City, refinery sludge

INTRODUCTION

Lack of adequate monitoring the quality of effluent and sludge outlet from refineries in the country caused that in most cases, these materials in a raw and non-stabilized form, find their way into the environment and impose a lot of damage to natural resources. Microbial and chemical contamination of water, soil and crops and parasitic diseases and chemical poisoning are of the effects of reusing this materials [1]. The wastewater comprehensive management plan includes collection, treatment, hygienic disposal and reuse of wastewater and sludge outlet from refineries. Implementation of these plans in addition to health benefits, is followed by many economic benefits such as the provision of water and manure requirements or modification of poor quality soils [2].

Wastewater treatment is always associated with the production of two parts of effluent and sludge. Each of these two part must obtain the necessary environmental criteria before returning to nature or reuse [3].The general attitude of the wastewater treatment process in our country is in a way that the main interests are focused on effluent quality and the quality of sludge outlet is rarely considered [2]. Among the main reasons for the lack of quality monitoring of sludge outlet from the country's refineries, some reasons can be mentioned such as the technical complexity of sludge treatment processes, high costs of sludge installation and lack of regulatory rules and regulations for the authorities in this field [4,5].

The study on the performance of the Serkan Refinery by Mehrdad et al. in 1998 showed that the effluent from this refinery don't treat the Standards of Environment Protection Agency [6]. However, based on the results of studies by Farzad Kia Et Al., sludge outlet from these refineries is compatible with none of the standards of the United States Environmental Protection Agency (USEPA) [4]. Studies Farzad Kia et al. in 1997 on four wastewater refineries in Tehran which was conducted through the method of extended aeration of activated sludge, showed that in most cases, the effluent from these refineries are not compatible with the Environment Protection Agency's standards, while the sludge outlet of these refineries was raw and non-stabilized[2].

Research by Takdastan and colleagues in 2000 on the sludge outlet from Isfahan's refineries showed that the anaerobic digesters in Shahin Shahr's refinery only was able to treat the regulations to reduce pathogens in Class B of USEPA, while, the anaerobic digesters of south refinery, met no criteria of the USEPA standards for reuse [7]. This study aimed to investigate the microbial quality, fertilizing value, heavy metals and physical parameters of sludge outlet from the refinery of Naein City and compare it with existing standards.

MATERIALS AND METHODS

In this descriptive cross - sectional survey, the quality of the physical parameters, fertilizing value and heavy metals and microbial quality of sludge outlet from the refinery of Naein City were evaluated during the 9 months. Sampling of the sludge outlet was conducted after the initial survey and ensuring the normal condition of operating the wastewater treatment plant. The samples were prepared momentarily with 3 replications per season and along with ice and in less than 2 hours, were transported to the laboratory to perform the necessary tests. For microbial testing, the sampling was performed in sterile glass containers. All tests were performed to determine the criteria intended in this study and according to standard methods available in the book of standard methods for the examination of water and wastewater [8].

To compare the results of the quantitative indicators with the allowed values, the software SPPS and T-TEST statistical tests were used. The software EXCELL also was applied to draw diagrams.

Assessing the quality of the physical parameters, fertilizing values and heavy metals of the sludge outlet from the refinery

Currently, the required rules and criteria in terms of the characteristics of the sludge outlet from wastewater plants, are not provided by the responsible organizations and agencies such as the Environmental Protection Agency. Therefore, administrators and supervisors of wastewater treatment don't have the needed tools to control and monitor the quality of their sludge outlet. Accordingly, to control the sludge outlet quality from the wastewater treatment, it is possible to use the rules and valid regulations of other countries such as USEPA standards [4,9].

A summary of the regulation relating to the biological quality of sludge (Part D of section 503, CFR Regulations) is presented in Table 1 [10,11].The applicability of sludge for different purposes according to these regulations, are listed in Table 2 [12,13,14].

In this study, first, the microbial quality of the sludge outlet was determined by counting the number of fecal coli forms. Then, if the index was in Class A of USEPA standards, were investigated other microbial indicators listed in this class such as salmonella, enteric viruses and parasites. In Tables 2 and 3 the functional capabilities of the sludge and features of the studied treatment plant were investigated.

Table 4 shows the values of the physical parameters of the sludge in Naein City's refinery and comparing them with standards. In this table also the mean of parameters such as pH and moisture content and organic and mineral materials' percentage of parameters are shown in three seasons of winter, spring and summer.

Table 5 shows the amounts of sludge's fertilizing values in Naein City's refinery and comparing them with standards. In this table, the mean parameters of carbon and nitrogen and phosphorus, sodium, potassium and the parameters' c / n are shown three seasons of winter, spring and summer.

Table 6 shows the amounts of parameters of sludge's heavy metals in Naein City's refinery and comparing them with standards. In this table, the mean parameters such as arsenic and cadmium, copper, lead and iron are shown three seasons of winter, spring and summer.

As can be seen in Table 6, the treated sludge of Naein City is in Class B of the EPA Standard. That's why their values are more than 1000 and less than 2000000 (MPN per gram of dry solids).

RESULTS AND DISCUSSION

Increase in the population covered by the refinery of Naein City, strongly threatens the optimal performance of the refinery. Unfavorable results obtained from the microbial quality of the sludge outlet from these refineries, also confirm this issue. Refineries' sludge outlets are usually applied as manure in farms and agricultural lands of Naein City. The lack of compliance between the sludge microbial quality and existing standards, certainly, threatens the general health of farmers and consumers of these products.

This is consistent with the results of the study by Farzad KIA Et Al. in 2013 which is conducted in some refineries in Tehran [2] and confirms that from that year so far, no specific action has been taken in this regard. The results of studies on sludge outlet from wastewater treatment of Serkan City in Hamedan Province [4] and Chanibeh in Ahvaz [1] and south of Isfahan [7] showed that the sludge outlets in all cases were according to the USEPA's raw standards. This indicates lack of general attention to the issue of the quality of the sludge outlet from refineries and the lack of motivation and determination to improve the situation.

It should be noted about the high mineral content of the physical parameters that the value of this parameter in summer is higher than other seasons and the main reason of this issue can be attributed to the usable water resources in Naein City, which more consisted of deep and semi-deep wells. Naein County is known as a collection of minerals and soil in the Province and the most likely, the great amounts of minerals in water and soil led to this issue.

CONCLUSION

Reuse of effluent and sludge outlet from wastewater treatment, in compliance of their quality with the standards, can largely relieve the water and fertilizer s' needs of farming in the country. The study showed that the reuse of sludge outlets from the local refineries of Naein City is underway without any regard to sanitation. Due to the low microbial quality of the materials, reusing them in this condition is a serious threat to public health.

Therefore, it is strongly recommended to the executive authorities (Water and Wastewater Company) and regulator1y agencies (Ministry of Health and the Environment Agency) to modify this issue and take appropriate actions. Revision of the treatment system, controlling and the need for careful monitoring in the refinery, are necessary. No use of the sludge of the refinery of Naein City in farming land close to residential areas and prohibition of grazing animals in the land for a month, are considered as preventive measures.

It is recommended to scholars and researchers who are interested in research in this field, for achieving more practical results, by conducting hierarchical studies, in several years, to continuingly analyze the research and predict the status of next years, according to the generalizability of the results of this study. In order to ensure success and a closer look at the issue, it is recommended to analysis the farms geology for the use of manure and also to investigate the effect of each parameter on fields' plants and then the analysis and classification of manures be conducted in proportion with the desired plant

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Table 1: A summary of regulations of the United States Environmental Protection Agency (USEPA), [10,11].

Class A regulations	Class B regulations
Fecal coliform less than 1000 N/g .DS Salmonella less than 3 MPN / g .DS enteric virus less than 4g .DS / 1PFU parasites fertile eggs less than 4g .DS / 1OVA * - 1000 MPN per gram of dry sludge solids	Fecal coliform less than 2*10**6** N/g .DS

Table 2: The applicability of sludge for diverse applications, according to regulations of sub-section D from section 503 [12,13,14].

Applications	farmer	Forming lands rehabilitation	Grass lands	Forestation	Recreational place and park	Packaging for selling	Houe crofts	Flowerboxes	Pastures	SurfaceDisposal
Class A	*	*	*	*	*	*	*	*	*	*
ClassB and constraints	*	*		*	*				*	

Table 3:. Characteristics of the studied wastewater treatment

Wastewater treatment	Population coverage	wastewater Treatment method	Sludge Treatment installation
Naein City	38800	Stabilization pond	waste prevention unit, primary sedimentation ponds , optional ponds , additional ponds

Table 4: the values of sludge's physical parameters

Parameter	pH	Moisture percentage	Organic material percentage	Mineral materials Percentage (ash)
Winter	6.66	47.3	29	70.3

Spring	6.5	43	28	71.6
Summer	6	41	27	74.6
Allowed values	6-9	30-50	25-50	2-65

Table 5: The amounts of sludge's fertilizing values

Parameter	C (Percent)	N (Percent)	c/n	Na (Percent)	K (Percent)	P (Percent)
Winter	17.3	1	16	0.44	0.07	0.3
Spring	15.3	0.96	14	0.4	0.05	0.3
Summer	13	0.86	13	0.39	0.05	0.3
Allowed values	8-50	0.1-3.5	20	0.2-0.5	0.1-2.8	0.3-3.5

Table 6: The amounts of heavy metals in sludge

Parameter	As	Cd	Cu	Pb	Fe
Winter	36	1.16	72.6	0.3	16
Spring	32.6	0.96	65.3	0.13	15.3
Summer	31	0.56	62.3	0.07	13
Allowed values	41	39	1500	300	11000

Table 7:. The values of biological parameters

Parameter	fecal coliform	Total coliform	Parasite egg
Winter	180000	1900000	116
Spring	1496667	1630000	107
Summer	1420000	1553333	98
Allowed values	Class A, less than 1000 mpn / gr of dry solids	Class A, less than 1000 mpn / gr of dry solids	Class A, less than 1000 mpn / gr of dry solids
	Class B between 1000 and 2000000 mpn / gr of dry solids	Class B between 1000 and 2000000 mpn / gr of dry solids	Class B between 1000 and 2000000 mpn / gr of dry solids

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RESEARCH ARTICLE

Scientific Productivity of Faculty Members and its Inhibiting Factors in Islamic Azad University of Tehran, Iran

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ABSTRACT

Information is one of the strategic national resources and the basis of social, economic and technical development. One of the approaches of developing the science and technology system is increasing the scientific, research, and technological activities or enhancing the outputs and products of science and technology system whose results are usually published as papers, discoveries and research projects. In fact scientific, ideological, cultural, political and economic self-reliance and developing the country is not possible except through developing the research projects and activating the universities, especially the experts and faculty members in the field of research. In this paper we investigate scientific production status of the faculty members of Islamic Azad university of Tehran (district 8) in Iran, and its inhibiting factors. Science production in the present research was defined as developing different academic resources including books, publishing papers in scientific journals, conducting research projects, presenting conference papers, supervising dissertation and registering patents over the past three years. The method used in this study was analytical survey. Findings showed that the economical-financial, socio-personal, facilities/equipment, and organizational-administrative factors had the highest inhibiting effect on research activities, respectively.

Key words: Scientific productivity, inhibiting factors, faculty members, Islamic Azad University, Tehran

INTRODUCTION

Undoubtedly, scientific production is one of the most important indicators of scientific growth in each country, since scientific production growth and valuing the research affairs paves the way for real independence, development and growth of the countries. In other words, increasing scientific and research activities and extending the science and knowledge frontiers of countries improves their reputation which in turn results in scientific balance of the countries. Obviously, a country which has no role in the process of scientific and technological production of the world and does not try to gain knowledge and scientific principles and does not have predefined and predetermined objectives with administrative programs, will be less able to use the findings of others and even get a chance to have a continual presence on international scene, development and modernity. In this regard, each country has to try to create a local procedure of science production and mobilize a significant amount of its financial and intellectual resources for this purpose.

Evidences indicated that there is a large and growing gap between the life standards in developing and developed countries which is due to the technical and scientific distance. In fact, what distinguishes the poor nations from the rich nations is not financial asset production but it is the ratio of scientific production, and having access to the knowledge of proper utilization of available resources. One of the approaches of developing the science and technology system is to increase the scientific, research and technological activities or the outputs and products of science and technology system whose results are usually published as papers, discoveries and research projects. In this way, the scientific system management aims to increase these outputs and scientific and research products. In this regard, universities and science and technology centers, administrators and faculty members should be evaluated based on their efficiency in developing papers, books and research projects. In this process, it is believed that increasing the capability of scientific system of the countries and efficiency of the researchers and scholars will inevitably increase the efficiency of the scientific principles.

Information is one of the strategic national resources and the basis of social, economic and technical development. Therefore, improving the quality and quantity of information is one of the most important purposes of the scientific policy makers of all countries. The history of last two decades shows that generally the countries which have considered the issue of research and development seriously, could have significant economic and industrial growth. A brief look at the developing countries shows that knowledge and technology are not acquired through learning but “research” has been the only cause of modern civilization.

In this regard, the higher education system as a dynamic, intelligent and targeted system has an important role in providing the condition for development of the countries through training required skillful human force, promoting and improving knowledge and developing research. Correct planning, targeting the scientific movements, determining the research priorities, the relationship between industry and university, preventing reworks are the issues considered by the countries all over the world to act in a coordinated system to solve problems and difficulties for development and this is not possible unless in the light of better and superior teaching which itself needs the scientific support of universities and scientific centers. Evidences indicate that, in spite of the basic and important role of the universities in research system of Iran, unfortunately one of the key and most important weakness of research system in this country is the fact that universities have only sufficed to their educational role and have been emaciated while universities are not considered as pure education institutes in the world of today.

Therefore, solving the common problems in this field, recognizing the needs, economic, social and cultural difficulties and issues have priority. Universities, and to a great extent, the faculty members can play a significant role here. In fact scientific, ideological, cultural, political and economic self-reliance and developing the country is not possible except through developing the research projects and activating the universities, especially the experts and faculty members in the field of research. Meanwhile, recognizing the factors which can be effective in this regard

is more required than ever. To do so, the present research investigates scientific productivity status as well as determining the most important barriers to scientific products of faculty members of Islamic Azad University branches of Tehran, district 8 (including Islamshahr, Tehran Medical, South Tehran, North Tehran, Central Tehran, Dental, Shahr-e Rey, Science and Research, and Ghiamdasht branches) located in Iran.

MATERIALS AND METHODS

Scientific Communication

Since the first half of the 20th century, scientific communication has been considered as one of the most effective strategies of producing knowledge at the heart of studies related to sociology and philosophy of science and its importance has been discussed in interaction of various scientific paradigms, combination of views and creating new paradigms, increasing interactions in scientific society and creating coherence and cohesion, interdisciplinary scientific communication and creating new proficiencies, increasing the international social interactions, interagency communications in science and applying the scientific findings in technology and industry, structural reflection and revolution of science and others.

Considering the evolutions of industrial community, the importance of information and information community, developing electric communications, eliminating the spatial and temporal limits in social and scientific communication and creating virtual learning have become more significant. Evolution of sociological approaches and presenting Structuration and Reflective theories due to the recursive and super recursive nature of human communication (Giddens, 1984; Woolgar and Ashmore, 1988) and considering the self-organization feature of social systems (Leydesdorff, 2000; Luhmann, 1995) showed the importance of communication in evolution of scientific structures and methods more than before.

Scientific communication both inside the scientific organizations and through institutional boundaries have always been one of the factors of scientific development and production and provided the condition of continuous reconstructing the basic knowledge systems during the history of science. Accordingly, most of the philosophers of science considered scientific communication as one of the methods of producing knowledge and defined its recursive effect as one of the most important factors in science development and they emphasize on the fact that intense scientific development needs new methods of scientific communication to make evolution from linear information chain to interactional communication systems possible.

Arrow (1974) also considered scientific communication and its channels as the proper tool for scientific communication and discussing the axioms, main assumptions and fundamental issues of science. Vygotsky (1927) defined scientific communication and cognitive interactions as the factors of communicating information and understandings and creating a shared mentality and he emphasized on the role of interaction in cognitive development. Etzkowitz and Leydesdorff (1997) considered the relationship between science institution and other institutions as the factor of scientific development and emphasized on the relationship between the science institution with government agencies and industries and studied them as observable units or nodes in a social network. Interdisciplinary scientific communication provides the condition for creating new proficiencies. Scholars integrate different scientific branches by taking the viewpoints from different branches of science and create separate new proficiencies, such as the neurological science which has combined the viewpoints of medical science, biology, pharmacology and psychology. Today, knowledge development has increased these types of interdisciplinary combinations and creation of new branches of science (Mohammadi, 2005). The effects of scientific communication can be summarized as shown in figure 1.

LITERATURE REVIEW

So far, many investigations have been conducted about scientific activities of faculty members of universities and its barriers. First we review researches conducted in Iran. Based on survey method and using a questionnaire, Abili (1996) studied the opinions of 62 faculty members of Tehran University and Shahid Beheshti University about their Lack of interest in research activities. The findings indicated that there were different factors in research system of Iran which could affect the faculty members' willingness and increase it or in contrast create some obstacles leading to difficulties in this field. These factors are divided into five categories of bureaucracy-administrative, regarding the research finding and research applicability, cultural factors, budgeting and research revenues and the factors related to promoting the faculty members. According to the respondents, the factor of reducing research approval time had the highest effect from among the organizational factors. While from among the second factors, the increased willingness of industrial and service units to use the research projects and from among the third factors, the factor of getting used to do the activities with early returns were the factors with highest effect, respectively. The financial control method of the research budgets had the highest effect from among the budgeting factor. Based on the viewpoints of this group, at the present the time, the budgeting system of researches are not regular and fair and lead to unwillingness of some of faculty members to do research projects, finally, from among the faculty members promotion factors, the Faculty Member Promotion Regulation and Guideline had the most significant effect on the willingness to do research. According to the respondents, the Promotion Regulation and its conditions had to be clear and straight so that the faculty members' promotion would be based on researches and other indexes.

The viewpoints of the faculty members of universities in Kerman about difficulties of doing researches were studied by Sabzevari and colleagues (2000). 329 permanently employed faculty members in Shahid Bahonar Medical Science University and Islamic Azad University of Kerman who were selected through multistage sampling method participated in this research. A questionnaire including 26 questions organized in two sections of personal and organizational obstacles. Central tendency, distribution measures and One-way ANOVA, Chi-square and Kruskal–Wallis tests were used to analyze the data. The results of the present research indicated that there was a difference in mean score of organizational obstacles in different groups based on personal traits, non-educational and non-research academic experience, academic rank, the university where they work, last academic degree, educational group, number of published papers as author or corresponding author. Obviously, recognizing the research obstacles can facilitate the process of solving problem by improving the relationship between the researcher and users of the research findings and practically make the use of research findings possible.

Baratpour (2002) used the survey method to study the viewpoints of 57 faculty members of librarianship departments of all the state universities of Iran about the personal, welfare, social, motivational, economic and administrative organizational factors affecting their research activities. Research findings indicated that willingness and interest from among the personal factors had the highest effect and time factor had lowest effect on doing research projects, respectively. From among the welfare-supporting factors, the factor of having access to books and journals had the highest effect and two factors of holding educational workgroups on o research and statistical methods and using the welfare facilities had the lowest effect.

According to the respondents, from among the social factors, human relations among the faculty members had more effect on their scientific activities compared to the research scientific relations. The results also indicated that from among the motivational factors, the factor of encouraging the professors to participate in national and international conferences had the highest effect and the factor of encouraging professors to do joint activities with other universities had the lowest effect. In economic dimension, financial rewards, increased wages and benefits and differences between the amount of payment to research project by university and their incomes out of university had the highest efficiency. Finally from among bureaucratic factors, long process of research topic approval and the bureaucratic process due to the regulation of devoting lower research payment had the highest and lowest effect on

research and scientific activities, respectively. Comparing the studied factors, the results indicated that based on the respondents viewpoints, the combination of bureaucratic and the Economical- financial factors had the highest and least effect on scientific activities, respectively.

Talebi (2002) studied the viewpoint of 37 faculty members of technical and engineering departments of Amirkabir University of Technology, Sharif University of Technology, Iran University of Science and Technology about the factors involved in developing and publishing the scientific papers in a survey and using a questionnaire. Results of the study indicated that the majority of the respondents had pointed to the high effect of PhD theses and average effect of M.S. theses. Considering the administrative research facilities, the statistical tests showed that the facilities had higher effect on developing paper than the co-researcher. Although the degree of need for facilities in scientific researches was different and this difference could be due to the type of the research field and type of the research whether it was theoretical or practical.

Moreover, findings indicated that the vertical promotion motivation was the most important motivational factor in developing scientific papers. This factor was more effective than the payment to research and interest of acquiring fame in scientific productions. Based on the research findings, the majority of the respondents pointed to the very high effect of the factors related to the welfare and financing. However, from among the scientific cooperation and relations factors, scientific cooperation and relation with the colleagues and foreign researchers had more effect on scientific productions compared to two other factors that are cooperation and relation with the faculty members of other national universities and the researchers in non-academic centers.

Ghazipour (2002) did a comparative study of internal factors of science institution including the normative and institutional factors on the status of scientific production of the faculty members in research and academic population. The population of the study included 194 faculty members of Tehran University as the academic population and 76 of faculty members of some research institutes in Tehran as the research population which were studied through survey method and a questionnaire. Results of the study indicated that a part of predicted normative and institutional factors played a role in explaining the status of scientific production of faculty members. From among these factors, first of all, the status of communications had the effective role on scientific production of the respondents in both studied groups of populations and the status of scientific production was more for the members with stronger communications. Furthermore, the role of normative commitment on the status of scientific productions of the respondents was only confirmed in academic population and the members of academic population who were committed to scientific norms had more scientific productions. But the effect of institutional normativity on scientific productions of faculty members was not confirmed for both populations and the amount of institutional normatively had no effect on the status of scientific production of the members. Moreover, the findings indicated that the normative factors had been less effective on the scientific productions of the research population and it seemed that their scientific and research activities was more related to their personal interests and motivations. However, it seemed that the special principles and criteria of the academic and educational environment had made the researchers normative in a way that the more normative ones had more scientific production.

Zohor and Fekri (2003) investigated the viewpoints of 60 faculty members of school of Health Management and Information Sciences of Iran University of Medical Science about the barriers of doing research projects in Iran universities in a survey and using a questionnaire. As the respondents stated, only about half of them had the necessary skill in developing proposals, doing research, analyzing and interpreting the data and writing papers. The limitations of typing, printing, Xeroxing, research consultation, internet and library were the important factors of their dissatisfaction from the research services in the library, respectively. No paper was accepted from among 38 percent of the faculty members during the past three years while from among other respondents, 224 papers were accepted as conference, posters or publishing in national and international journals. Based on the results of the study, it is suggested that the faculty authorities hold the workshops of research method, data analysis, developing paper, writing and using informative networks. Establishing the office of research consultation in faculties and hospitals,

providing the easy access to information networks and internet at the faculty, equipping the professors' room with computers and printers, reducing the teaching hours and … were the other suggestions in removing the research barriers.

A descriptive analytical method and questionnaire were used in the study of Alamdari and Afshoon (2003) to investigate the viewpoints of 118 faculty members of universities in Yasouj about the personal and institutional barriers influencing their research activities. The findings showed that lack of time, being busy and unwillingness to research from among the personal factors were recognized as the highest and lowest research barriers, respectively, while lack of facilities and necessary equipment and moral limitation from among the institutional factors, had the highest and lowest influence, respectively.

The viewpoints of 168 faculty members of Ferdowsi University about the reason of running less research projects in or out of university by faculty members of Humanities departments compared to non-humanities departments were studied in the explanatory survey of Behravan and Noghani (2004). Research findings indicated that professors' perceptions about research barriers, expecting the loss and returns of running a research project, defining research in their field of study and finally the opportunities for scientific activities influenced the professors' tendency to present and run the research projects.

Farmanbar and Asgari (2005) implemented descriptive method and a questionnaire as research instrument to study the viewpoints of 187 faculty members working in faculties of Nursing and Midwifery, Medicine, Dentistry and Health about research inhibiting factors including financial, organizational-administrative, Socio-personal , Specialized / professional and facilities / equipment. According to the research respondents, organizational-administrative factors were the most important research barriers. From among the faculty members, majority of the associate professors (76.9 %) believed that the managers and authorities pay no attention to the findings of applied research while 87.6 percent of Lecturers stated that there was no strong motivation for doing research projects. It was suggested that efficient management of academic research and providing research facilities such as establishing research consultations centers, shortening the process of research plan review and approval, reducing teaching hours and educational responsibilities and enabling the professors in field of research could eliminate the research bottlenecks at universities.

Foroughi and Kharrazi (2005) investigated the scientific information production status of faculty members at Kermanshah University of Medical Sciences during 1993 to 2003. In this descriptive study, a valid and reliable questionnaire and related documents were used for collecting the data. All full time faculty members (210) were studied through census sampling method. The data was analyzed by descriptive statistics and SPSS software. The total number of scientific products, in all forms, produced by faculty members was 2956. The most produced scientific information was in the form of thesis (42.82%) and the highest percentage of scientific information production was done in 2001 (16.05%). Faculty of Medicine had the highest percentage in scientific information production (82.8%). Papers published in international journals (73) as the most creditable products were developed by 31 of faculty members (15.2%) and a total of 370 national papers produced by 131 of them (64.5%). Only 20% of research projects were presented as scientific papers. Book translation and compiling were performed in a very low level and informing about the results of research projects was very limited also. It was recommended to provide more facilities for publishing scientific papers.

METHODOLOGY

The method used in this study was analytical survey. Population of the present study includes all the full-time faculty members with M.S. and higher degree or the academic rank of Lecturer, assistant professor; associate professor and professor in Islamic Azad University district 8 branches. Science production in the present research

was defined as developing different academic resources including books, publishing papers in scientific journals, conducting research projects, presenting conference papers, supervising dissertation and registering patents over the past three years. Since, based on the data collected from the Islamic Azad University secretariat of region 8, a significant percentage of the faculty members in Islamic Azad University were young and had less work experience (the findings related to the question seven indicated that about 40 percent of the faculty members had less than 5 years of work experience) so, in order to study the scientific productions of all the faculty members within the same time limit, only the scientific productions of the respondents during last three years were taken into account. Finally, based on the Iranian Faculty Promotion Regulation issued by Central Organization of Islamic Azad University (table 1), total research score of each respondent was calculated.

Based on table 2, the population of the study includes 2593 members (1303 Lecturers, 1164 assistant professors, 80 associate professors and 46 professors). Due to plurality of faculty members working in these branches, stratified random sampling method was used to select the research sample.

Cochran's formula was used in order to determine the sample size and the obtained value was 417. Further, in-person data collection happened using analytical survey method and a questionnaire and lasted for nearly two months during which 500 questionnaires were distributed between the faculty members through in-person connection with the related branches and coordination with the heads of departments and faculty members' room staff. 420 completed questionnaires were gathered after two weeks. to test the reliability of the questionnaire, Cronbach's alpha coefficients was applied whose result was 0.87 which was higher than 0.5. so it was accepted, and respondents were answered carefully and with awareness.

RESULTS AND DISCUSSION

Results of data analysis are presented as descriptive and inferential statistics in three sections. first we provide demographic features of the respondents including age, gender, department, academic rank, and work experience in order to provide an overall picture of them. then the analysis of the status scientific productions of the respondents during three years as dependent variable. finally the analysis of factors inhibiting research activities are presented based on five categories of Economical-financial , organizational-administrative, Socio-personal , Specialized/professional and facilities/equipment.

Descriptive statistics

Demographic characteristics of research sample are presented in table 3.

Scientific production status

Scientific production status of the faculty members during the Past Three Years is presented in table 4.

Publishing Research papers in national journals developed individually from among a total of 420 respondents, 148 (35.2 %) had no authorship. 213 of them (50.7 %) had 1 to 3 published research papers developed individually. 48 of them (11.5 %) had 4 to 6 and 11 respondents (2.6 %) had more than 6 published research papers developed individually.

Publishing Research papers in national journals developed cooperatively 218 of the faculty members participating in this study (66.9 %) had no published research papers developed cooperatively. 106 respondents (25.2 %) published 1 to 3 papers, 20 of them (4.8 %) had 4 to 6 papers and 13 respondents (3.1 %) had more than 6 r papers.

Publishing Review papers in national journals developed individually 60.8 percent of the respondents (n=255) had no published Review papers developed individually while 34.5 percent (n=145) had 1 to 3, 4 percent (n=17) 4 to 6 and 0.7 percent (n=3) had more than 6 published Review papers.

Publishing Review papers in national journals developed cooperatively 346 of the faculty members (66.9 %) had no published review papers developed cooperatively. 73 respondents (17.4 %) published 1 to 3 papers, 1 of them (0.2 %) had 4 to 6 papers developed cooperatively.

Publishing papers in international journals developed individually from among a total of 420 respondents, 321 (76.4 %) had no internationally published papers developed individually due to lack of English writing ability. 94 of them (22.4 %) had 1 to 3 internationally published papers developed individually, 5 of them (1.2 %) had 4 to 6 papers during the past three years.

Publishing papers in international journals developed cooperatively 80.5 percent of the respondents (n=338) had no internationally published papers developed cooperatively, while 17.6 percent of them (n=74) had 1 to 3, 1.2 percent (n=5) 4 to 6, and 0.7 % of them (n=3) had more than 6 internationally published papers which had developed cooperatively.

Presenting conference papers developed individually 235 of the faculty members (74.2 %) had no conference papers developed individually. 165 respondents (40.2 %) published 1 to 3 papers, 13 of them (3.1 %) had 4 to 6, and 3 respondents (0.7 percent) developed more than 6 conference papers individually.

Presenting Conference papers developed cooperatively from among a total of 420 respondents, 321 (74.2 %) had no conference papers developed cooperatively. 99 of them (23.6 %) had 1 to 3, 7 of them (1.7 %) had 4 to 6, and 2 members (0.5 %) had more than conference papers developed cooperatively.

Conducting research projects 220 of the faculty members participating in the present study (52.4 %) had not conducted any research during the past three years. However, 196 (46. 7 %) had 1 to 3, and 4 of them (0.9 %) had conducted 4 to 6 research project as the researcher.

Collaborating research projects 287 (68.3 %) of the faculty members had not participated in any research project as the co-researcher while 218 0f them (29.8 %) had been the co-researcher of 1 to 3 research projects and 8 of them (1.9) participated in 4 to 6 research project.

Registering Patents during the past three years, no patent was registered by 98.6 of the respondents (n=414). This level of patent registration seems natural because patents are usually registered in a specific field of study. Also, only 1.4 percent of the faculty members (n=6) had 1 to 3 patents registered.

Writing books No book was written individually during the past three years by 323 of the respondents (76.9 percent). However, 97 of the faculty members had 1 to 3 books written individually.

Co-writing books 351 of the respondents had not cooperated in writing books. 1 to 3 books were written cooperatively by 68 of the faculty members (16.2 %), and one of the respondents had cooperated in writing 4 to 6 books during the past three years.

Translating books During the past three years, 85 percent of the faculty members (n=357) had no books translated individually, but 15 percent of them (n=63) had translated 1 to 3 books individually during the same period of time.

Co-translating books from among 420 of the respondents, 345 of them (82.2%) had no book translated cooperatively while 74 (17.6 %) and 1 (0.2 %) of them had cooperated in translation of 1 to 3 and more than 6 books, respectively.

PhD Thesis supervision 351 of the faculty members (83.6) had not supervised any PhD theses during the past three years, while 31of them (7.4 %) had been the supervisor of 4 to 6 PhD theses. also 9 respondents (2.1 %) had supervised more than 6 PhD theses.

PhD Thesis Consultation 0.7 percent (n=3) of the faculty members had been responsible for the consultation of more than 6 PhD theses, 11.9 percent of them had consultation of 1 to 3 PhD theses. Nevertheless, 84.5 percent (n=355) of the respondents had no PhD thesis consultation during the past three years.

M.S. Thesis supervision 318 faculty members (74.3 %) were not involved in any M.S. theses consultation during the past three years. also, 49 (11.7 %), 34 (8%) and 9 (4.6%) of the respondents conducted the supervision of 1 to 3, 4 to 6 and more than 6 M.S. theses, respectively.

M.S. Thesis Consultation 74.3 percent of the faculty members (n=312) had not consulted any M.S. theses during the past three years, while 12.4 percent (n=52),9 percent (n=38) and 4.3 percent (n=18) of them had been the advisor for 1 to 3, 4 to 6 and more than 6 M.S. theses, respectively. Undoubtedly, this was because high percentage of faculty members who were lecturer were not allowed consulting theses.

Inhibiting factors

Socio-personal factors Table 5 shows respondents' opinions about socio-personal inhibiting factors of conducting scientific research activities

According to table 5, socio-personal inhibiting factors were:
Problems of living
Lack of interest in research activities
Lack of cooperative spirit among faculty members
Lack of incentives, motivation, and moral support
Uncertainty of research and researcher place in value system of the society
Failure to apply research findings in various sectors of society

Economical- financial factors Table 6 shows the opinions of the respondents about economical- financial inhibiting factors.

According to table 6, economical- financial inhibiting factors for scientific production are:
Low amount of fees for research
Lack of research funds
Improper distribution of research funds

Organizational-Administrative Factors Table 7 shows the opinions of the respondents about organizational-administrative inhibiting factors.

Based on table 7, organizational-administrative inhibiting factors for scientific production can be mentioned as follow:
Lengthy approval process

Involvement of unrelated people in approval process
Lack of clear rules regulations for research activities

Facilities/equipment factors According to faculty members, facilities/equipment inhibiting factors are as shown in table 8.

As seen in table 8, facilities/equipment inhibiting factors are:
Lack of information sources
Lack of adequate physical space for work and research
Research services personnel shortage
Various obstacles in the enjoyment of study opportunities
Various barriers to participation in local and international conferences

Specialized/professional factors The opinions of faculty members about Specialized/professional inhibiting factors are presented in table 9.

Based on table 9 we conclude that Specialized/professional inhibiting factors are:
Too much involvement in administrative and managerial activities both inside and outside the university
Not familiar enough with internet and databases searching techniques
Not familiar enough with research methods, statistics and essay writing
Lack of sufficient proficiency in foreign languages
Various barriers to publishing research findings

Ranking inhibiting factors

Table 10 presents five groups of inhibiting factors for conducting research activities based on their mean (higher average). As it can be seen, the economical-financial, socio-personal , facilities/equipment and organizational-administrative factors had the highest inhibiting effect on research activities, respectively.

CONCLUSION

Emphasizing science and research leads to development, growth, self-sufficiency and independence in each country. Research activities of developing countries are not at a proper level compared to the developed countries and research funds and facilities are pretty negligible. Universities and academic centers have three main functions of producing knowledge, transporting knowledge (training expert human force) and providing services for the society. On the other hand, human force working in research sections is one of the main resources for growth and development of a country. Studying the research activities is impossible without detailed evaluation of this factor. Now, most faculty members of universities and academic centers of Iran are more willing to teach and prefer teaching over research. Undoubtedly, first step toward reintegrating research in society is to have a correct perception about capabilities, available facilities and also recognize the strengths and weakness of research plans. In order to achieve the goals, improve the methods and increase the efficiency, it is necessary for policy makers and research planner to recognize the insufficiencies, condition and extent ofrealizing research objectives (Alamdari and Afshoon, 2003).

Now, studying the issues related to scientific and research activities and knowledge production is one of the most important priorities in Iran. It is due to the fact that in spite of scientific development of the country during the recent years, Iran's share in the world production of science is negligible. Accordingly, the main goal of the present study is to study the status of scientific productions of the faculty members of Islamic Azad University at district 8 of Tehran

during the past three years and the most important inhibiting factors of doing scientific research activities were recognized based on their viewpoints.

Respondents believed that from among five groups of most important inhibiting factors, Problems of living and failure to use research findings in different sectors of societies as the personal and social factors had the least inhibiting effect on research activities. The most and the least effective economical- financial factors were low payments for research and lack of research funds, respectively. Long process of research project topics and findings approval and lack of clear regulations and guidelines had the highest and lowest mean among organizational administrative factors, respectively. Regarding the Facilities/equipment inhibiting factors, various barriers in using sabbaticals had been the most effective factors while Research services personnel Shortage had the lowest effect on research activities of the respondents. Finally, respondents believed that Not familiar enough with research methods and essay writing was the mostly effective Specialized/professional factor while Not familiar enough with internet and databases searching techniques had the lowest inhibiting effect on them. Investigating five groups of factors inhibiting doing research showed that Economical- financial, Socio-personal, Specialized/professional, facilities/equipment and administrative-organizational factors had the highest mean, respectively.

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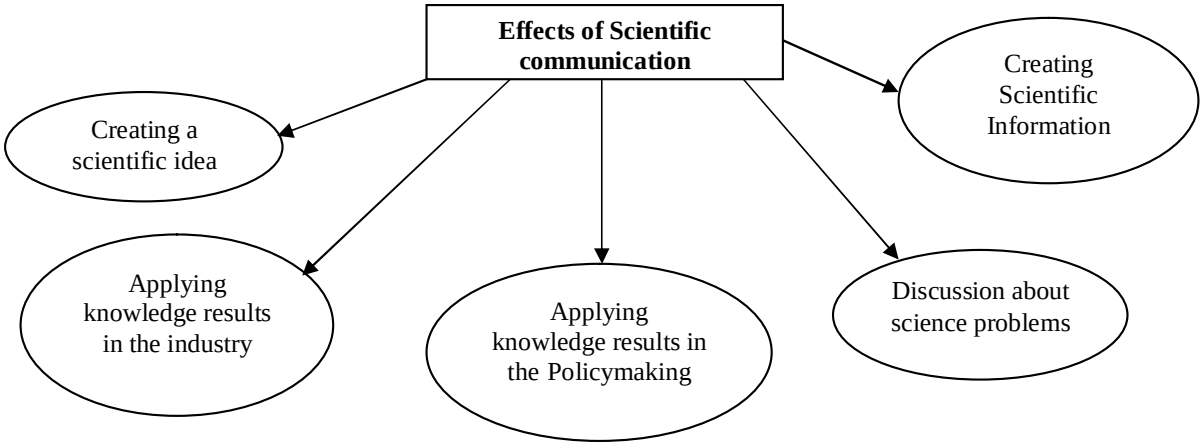

Figure 1. Effects of scientific communication

Table 1. Scientific productivity measure according to Iranian Faculty Promotion Regulation

Scientific activity	Score	Scientific activity	Score
Publishing Research papers in national journals developed individually	5	Registering Patents	10
Publishing Research papers in national journals developed cooperatively	4	Writing books	20
Publishing Review papers in national journals developed individually	3	Co- Writing books	17
Publishing Review papers in national journals developed cooperatively	2	Translating books	12
Publishing papers in international journals developed individually	7	Co-translating books	10
Publishing papers in international journals developed cooperatively	5	PhD thesis supervision	8
Presenting conference papers developed individually	2	PhD thesis consultation	8

Presenting Conference papers developed cooperatively	1.5	M.S thesis supervision	3
Conducting research projects	5	M.S. Thesis consultation	3
Collaborating research projects	3		

Table 2. Sample distribution based on branches and academic ranks

Row	Branches	Professor	Associate professor	Assistant professor	Lecturer	Total
1	Science and Research	26	28	175	61	290
2	Tehran North	5	12	200	212	429
3	Central Tehran	4	22	368	334	728
4	Tehran South	1	2	144	276	423
5	Islamshahr	-	-	27	63	90
6	Shahr-e Rey	4	4	71	136	215
7	Ghiamdasht	-	-	13	47	60
8	Tehran Medical	4	4	84	120	212
9	Pharmaceutical	2	3	13	24	42
10	Tehran Dental	-	5	69	30	104
Total		46	80	1164	1303	2593

Table 3. Descriptive statistics of demographic variables

Measure	N	%
Age		
Less than 30	59	14
31-40	191	45.4
41-50	105	25
51-60	33	7.9
Higher than 60	32	7.6
Total	420	100
Academic rank		
Professor	12	2.9
Associate professor	25	6
Assistant professor	217	51.7
Lecturer	160	38.1
No answer	3	0.7
Total	420	100
gender		
Male	313	74.5
Female	107	25.5

Total	420	100
Work Experience (year)		
Less than 5	160	38.1
6-10	118	28.2
11-15	66	15.7
16-20	27	6.4
21-25	10	2.3
26-30	6	1.4
More than 30	33	7.9
No answer	3	0.7
Total	420	100
Department		
Humanities	120	28.6
Science	90	21.4
Engineering	63	15
Medical Science	54	12.9
Agriculture	59	14
Art	34	8.1
Total	420	100

Table 4. Scientific production status of the respondents

Type of scientific production	No activity		1-3		4-6		More than 6		Total	
	N	%	N	%	N	%	N	%	N	%
Publishing Research papers in national journals developed individually	148	35.2	213	50.7	48	11.5	11	2.6	420	100
Publishing Research papers in national journals developed cooperatively	281	66.9	106	25.5	20	4.8	13	3.1	420	100
Publishing Review papers in national journals developed individually	255	60.8	145	34.5	17	4	3	0.7	420	100
Publishing Review papers in national journals developed cooperatively	346	82.4	73	17.4	1	0.2	0	0	420	100
Publishing papers in international journals developed individually	321	76.4	94	22.4	5	1.2	0	0	420	100
Publishing papers in international journals developed cooperatively	338	80.5	74	17.6	5	1.2	3	0.7	420	100
Presenting conference papers developed individually	235	56	169	40.2	13	3.1	3	0.7	420	100
Presenting Conference papers developed cooperatively	312	74.2	99	23.6	7	1.7	2	0.5	420	100

Conducting research projects	220	52.4	196	46.7	4	0.9	0	0	420	100
Collaborating research projects	287	68.3	128	29.8	8	1.9	0	0	420	100
Registering Patents	414	98.6	6	1.4	0	0	0	0	420	100
Writing books	323	76.9	97	23.1	0	0	0	0	420	100
Co-writing books	351	83.6	68	16.2	1	0.2	0	0	420	100
Translating books	357	85	63	15	0	0	0	0	420	100
Co-translating books	345	82.2	74	17.6	0	0	1	0.2	420	100
PhD thesis supervision	351	83.6	31	7.4	29	6.9	9	2.1	420	100
PhD thesis consultation	355	84.5	50	11.9	12	2.9	3	0.7	420	100
M.S thesis supervision	318	75.7	49	11.7	34	8	19	4.6	420	100
M.S. Thesis consultation	312	74.3	52	12.4	38	9	18	4.3	420	100

Table 5. Socio-personal inhibiting factors according to participants

Socio-personal Inhibiting Factors	Very high		High		Average		Low		Very Low		No answer		Median	Mean	SD
	N	%	N	%	N	%	N	%	N	%	N	%			
Economic problems	155	36.9	164	39	67	16	19	4.5	13	3.1	2	0.5	4	4.01	1.033
Lack of interest in research activities	77	18.3	123	29.3	130	31	53	12.6	34	8.1	3	0.7	3	3.35	1.192
Lack of cooperative spirit among faculty members	72	17.1	154	36.7	126	30	54	12.9	11	2.6	3	0.7	4	3.51	1.047
Lack of incentives, motivation, and moral support	118	28.1	162	38.6	85	20.2	47	11.2	6	1.4	2	0.5	4	3.79	1.047
Uncertainty of research and researcher place in value system of the society	70	16.7	108	35.7	119	28.3	103	24.5	18	4.3	2	0.5	3	3.25	1.152
Failure to apply research	56	13.3	124	29.5	111	26.4	98	23.3	28	6.7	3	0.7	3	3.17	1.169

findings in various sectors of society															
Total	Mean and Standard Deviation of Respondents opinion about Socio-personal inhibiting factors													3.51	1.106

Table 6. Economical- financial inhibiting factors according to participants

Economical - financial Inhibiting Factors	Very high		High		Average		Low		Very Low		No answer		Median	Mean	SD
	N	%	N	%	N	%	N	%	N	%	N	%			
Low amount of fees for research	103	24.5	166	39.5	100	23.8	44	10.5	5	1.2	2	0.5	4	2.74	1.011
Lack of research funds	72	17.1	116	27.6	126	30	83	19.76	21	5	2	0.5	3	3.31	1.145
Improper distribution of research funds	113	26.9	158	37.6	98	23.3	29	6.9	18	4.3	4	1	4	3.73	1.117
Total	Mean and Standard Deviation of Respondents View about Economical-financial inhibiting factors													3.59	1.091

Table 7. Organizational-administrative inhibiting factors according to participants

Economical-financial Inhibiting Factors	Very high		High		Average		Low		Very Low		No answer		Median	Mean	SD
	N	%	N	%	N	%	N	%	N	%	N	%			
Lengthy approval process	105	25	154	36.7	120	28.6	30	7.1	6	1.4	5	1.2	4	3.73	1.035
Involvement of unrelated people in approval process	72	17.1	157	37.4	147	35	40	9.5	2	0.5	2	0.5	4	3.6	0.928
Lack of clear	33	7.9	179	18.8	157	37.4	107	25.5	38	9	6	1.4	3	2.87	1.11

rules regulations for research activities															
Total	Mean and Standard Deviation of Respondents View about organizational-administrative inhibiting factors													3.59	1.024

Table 8. Facilities/equipment inhibiting factors according to participants

Facilities/equipment inhibiting factors	Very high		High		Average		Low		Very Low		No answer		Median	Mean	SD
	N	%	N	%	N	%	N	%	N	%	N	%			
Lack of information sources	88	21	166	39.5	73	17.4	58	13.8	33	7.9	2	0.5	4	3.5	1.215
Lack of adequate physical space for work and research	63	15	140	33.3	148	35.2	57	13.6	9	2.1	3	0.7	3	3.43	1.017
Research services personnel shortage	44	10.5	138	32.9	141	33.6	73	17.4	22	5.2	2	0.5	3	3.25	1.057
Various obstacles in the enjoyment of study opportunities	89	21.2	121	28.8	144	34.4	51	12.1	12	2.9	3	0.7	4	3.51	1.058
Various barriers to participation in local and international conferences	44	10.5	163	38.8	132	31.4	61	14.5	18	4.3	2	0.5	3	3.35	1.022
Total	Mean and Standard Deviation of Respondents View about Facilities/equipment inhibiting factors													3.41	1.079

Table 9. Specialized/professional inhibiting Factors according to participants

Specialized/professional Inhibiting Factors	Very high		High		Average		Low		Very Low		No answer		Median	Mean	SD
	N	%	N	%	N	%	N	%	N	%	N	%			
Too much involvement in administrative and	201	47.9	100	23.8	63	15	18	4.3	36	8.6	2	0.5	4	3.98	1.285

managerial activities both inside and outside the university															
Not familiar enough with internet and databases searching techniques	95	22.6	153	36.4	94	22.1	39	9.3	38	9	2	0.7	4	3.53	1.221
Not familiar enough with research methods, statistics and essay writing	205	48.8	94	22.4	59	14	33	7.9	27	6.4	2	0.5	4	3.98	1.265
Lack of sufficient proficiency in foreign languages	157	37.4	130	31	68	16.2	33	7.9	29	6.9	3	0.7	4	3.82	1.248
Various barriers to publishing research findings	92	21.9	142	33.8	123	29.3	42	10	19	4.5	2	0.5	4	3.57	1.102
Total	Mean and Standard Deviation of Respondents View about Specialized/professional Inhibiting Factors													3.77	1.224

Table 10. Prioritization of inhibiting factors

Rank	Groups	Mean	SD
1	Economical- financial	3.59	1.091
2	Socio-personal	3.51	1.106
3	Specialized/professional	3.41	1.224
4	Facilities/equipment	3.41	1.079
5	Organizational-administrative	3.4	1.023

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RESEARCH ARTICLE

Concept Mapping of Social Capital in Entrepreneurial Marketing of SMEs

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ABSTRACT

Enjoying strong social capital in small-sized enterprises (SMEs) leads to rapid access, and a variety of competitive information with an appropriate scheduling. This study intends to define a conceptual map of social capital in entrepreneurial marketing of small enterprises. This case study conducted in Iran. Based on Purposive sampling methods, 10 participants with high academic degree and work experience were selected, and a semi-structured interview was employed as the method to collect data. The results from the study indicated outstanding place of social capital and its dimensions throughout the entrepreneurial marketing activities, so that social capital is mapped in seven elements of entrepreneurial marketing including customization, informality, innovation, experience, opportunism, flexibility and networking. Overall, the role of entrepreneurial marketing manifests at elements of innovation and informality.

Key words: Social capital; entrepreneurial marketing; small enterprises; concept mapping

INTRODUCTION

With the advent of small enterprises within economy, more activities have been conducted in the context of marketing throughout these enterprises [1], and this has been led to development of knowledge across entrepreneurial enterprises and their marketing strategies and planning [2]. These enterprises due to the limitations on their human and financial resources use a variety of conventional marketing strategies. Indeed, such a marketing mechanism is used by them that do not impose large costs [3]. In such enterprises, individuals to enjoy a strong social capital enable to have a rapid access to a variety of information. Communication together with trust can improve the rate for attracting information and improving people's understanding towards their knowledge in a specified range. Social capital causes facilitated access to information that is one of the key components for entrepreneurship opportunities. In this regards, Martine [3] addresses the role of networks and communications as a Facilitator of marketing, believed that networks and communications can provide a large information from informal channels for entrepreneurs. Despite the fact that small and medium size enterprises have a high potential to build continuous economic growth, yet developing them is just a difficulty. The most prevailing problems at small and medium size enterprises include lack of access to information on market, technology, low quality of Human Resources, and shortage of access to capital. Most of small and medium size enterprises do not know market requires which of the goods, and at what time goods are required, and how the goods have to be delivered? Furthermore, Small and medium size enterprises have weaknesses in the bargaining power especially with the purchasers. Even if they knew the market; they might face problems on supply of raw materials, even in terms of access and price. Given the problems and barriers existing in small enterprises that mostly associate to loss of financial and human resources, the necessity of applying and using social capitals and networking emerges for entrepreneurs. Social capital social capital through different ways including facilitation and acceleration of information and knowledge circulation inside organization, facilitation of forming human capital, reducing costs including costs for supervision and control, and also facilitating access to the individuals inside and outside the organization, play a major role in better realization of aims throughout the organization and fading the barriers. Critical Evaluation of the previous studies indicates major role by social capital in success of marketing across small enterprises, yet the extent to which each dimension of social capital contributes to this process is not given, so that this study aims to find out to what extent each dimension of social capital contributes to entrepreneurial marketing and how each sub-dimension can be mapped within the main components of entrepreneurial marketing. Hence, this paper mainly aims to investigate role of social capital within entrepreneurial marketing and how to map its components. Furthermore, the novelty of research can be regarded as follows: first, networks and communications are considered as the factors affecting marketing that also other facets affecting marketing of small enterprises including trust, cooperation, commitments, and understanding objectives, values and common points in addition to networks and communications are addressed; second, employees in addition to social capital entrepreneurs have been taken into account, and the third is that the communication for Competitors and suppliers in addition to networking and communication with customers has been considered. Hence, this study tries to provide a concept mapping of social capital in entrepreneurial marketing of small enterprises.

MATERIALS AND METHODS

Concept mapping

Concept mapping is a graphical tool for presenting an image of a group's thought that indicates all the group's ideas in association with the topic under study, further indicating how the ideas associate with each other. Concept mapping is a proper mix of inductive and deductive approaches. In other words, this method includes Delphi method and statistical survey method, so that enjoys high validity [4]. According to Riesman, the process of concept mapping includes combining knowledge inside each of the academic fields and among these fields so as to build new opportunities to extend more knowledge. This approach lets us to combine different components of knowledge

required without losing their expertise [5]. Concept mapping defines conceptual framework appropriate for participants rather than theorists or programmers. [4]

Research method

This study intends to define ideas and attitudes of market activists on how to use their social capitals to do their marketing activities. For this, Concept mapping has been used to access tangible and real results because Concept mapping deals with presenting people's thoughts in which all the ideas of people on a topic under study and how the ideas associate to each other are shown.

One of the most important tasks is choosing individual or individuals that like to engage in concept mapping. The sample group engaged in process of concept mapping was selected by purposive sampling. In this regard, 10 individuals were selected and asked to participate in guided brainstorming session. Table 1 shows characteristics of 10 participants.

RESULTS AND DISCUSSION

Implementation

Step1 Preparation
Choosing participants
concentrating on the subject

Step 2 Term building

concentrate on mindstorm

Step 3 Term structuring

Ordering terms
Clustering terms

Step 4 Representation of terms

illustrate the mapping

Step 5 Mapping interpretation

listing terms
listing clusters
Naming clusters

Table 2 shows clusters, terms, and elements in entrepreneurial marketing. In this basis, and in accordance with the main dimensions and clusters of social capital, the terms were written and the elements in entrepreneurial marketing were defined through the qualitative content analysis.

With respect to the steps for concept mapping (social capital in elements of entrepreneurial marketing), the hierarchical structure of the study concept map was obtained as shown in figure 1.

Mapping communication dimension and its subclusters in entrepreneurial marketing

According to figure 2, the mapping for communication dimension and its clusters including trust, identity, cooperation and attachment, commitments and expectations in entrepreneurial marketing have been shown. This map indicates that the sub-cluster "trust" plays a major role in activities including opportunism, innovation, flexibility and informal methods. The sub-cluster "cooperation and attachment" plays a major role in activities including innovation, informality, customization and opportunism. The sub-cluster "commitments and expectations" plays a major role in activities including innovation, informality, and customization. The results indicate little role by sub-cluster "identity" at activities of entrepreneurial marketing, that only plays a major role in innovation activities. Indeed, group cooperation and attachment, high level of trust, commitment to company and customers all lead to the fact that the employees at different departments of organization share their information and knowledge without any doubt, that this increases employees' creativity, whereby new opportunities would be recognized, resulting in higher levels of performance, innovation and meeting the customers' needs.

Figure 3 shows the mapping for communication dimension at entrepreneurial marketing. According to this figure, communication cluster found with an outstanding role in doing innovative activities so that four sub-clusters of communication dimension play a major role in innovation which shown with four lines from communication dimension towards innovation. Several studies indicate this. For example, Chen et al [6] in his study on the international electronic enterprises showed that social interactions and trust through interaction among departments would have a significant effect on creation of values and innovation. Kohtamaki [7] found out that trust among individuals and mutual respect can encourage and empower ideas, sharing knowledge and problem resolving.

Followed by innovation, the role by communication cluster in informal methods has been indicated that three lines from communication dimension depicted towards informality, associated to sub-clusters including trust, cooperation and attachment, commitment and expectations. This finding is in accordance with the study done by Kaasa [8] show that dimensions of social capital especially communication dimension are instruments that can be used as alternatives for formal mechanisms of control at organization, and persuade members of organization to cooperation, partnership and information sharing, that this facilitates better innovation of objectives within organization. Furthermore, Reynolds argued that creation of the culture for internal sympathy is one of the success factors at entrepreneurial marketing. Moreover, findings indicate that communication cluster through increasing sub-clusters of cooperation, attachment and trust can recognize more opportunities, and in the end activities can be done with more flexibility as trust increased.

Mapping structural dimension and its sub-clusters in entrepreneurial marketing

Figure 4 illustrates a conceptual map for structural dimension and its sub-clusters at entrepreneurial marketing. According to this figure, the sub-cluster "networks and communications" of the structural dimension affects facets including innovation, informality, networking, opportunism and customization.

The findings from this sub-cluster indicate that ability and applying communication skills with customers, competing enterprises, educational institutions and friends has a leading role in collecting data through informal channels and recognizing new opportunities within market. This finding is relevant with the study by Shane and Venkataranman [9] based on the fact that great entrepreneurial and innovative opportunities through informal networks and involvement in friendly assemblies like coffee shops and restaurants are recognized. The sub-cluster "Large contacts" plays a major role in facets innovation, networking, experience and informality. Findings from this sub-cluster indicate that large contacts and communication with customers, friends and different industries would lead to gaining more experiences.

Figure 5 shows the mapping for structural dimension in elements of entrepreneurial marketing. in this basis, structural dimension plays a major role in six elements of entrepreneurial marketing so that two lines connected from structural dimension to innovation indicate that both sub-clusters at structural dimension, that is, communication abilities and networks as well as large contact, all have essential role. In addition to innovation, both sub-cluster of structural dimension play a major role in recognizing new opportunities, informal methods and networking. This is in a way that having informal communication networks with customers, rivals, close friends, educational centers and different industries lead to access to large information and experience from market, industry, technologies and products as well as recognizing new opportunities. In this regards, Tushman and Anderson [10] concludes that network ties through collecting and transmitting information among members of group lead to innovation. Furthermore, Kaasa et al [11] in a study showed that social capital especially formal and informal networks and civil partnership would have positive effect on innovative activities. In addition to innovation, both sub-clusters of structural dimension would have essential role on recognizing new opportunities, informal methods and networking. This is in a way that having informal communication networks with customers, rivals, close friends, educational centers and different industries lead to access to large information and experiences from market, technology, industry and products as well as recognizing new opportunities. A wide range of studies approve these findings. Hill and Wright [12] declared that personal contact networks play a major role in defining marketing in a small firm. Lindman [13] believed that entrepreneurs who know customers would benefit from advantages such as customer loyalty and higher levels of customer satisfaction, mentioned that long-term relationship between customer and entrepreneurs increases ability of small enterprises to react faster to customer's needs and more flexibility to meet customer' needs. Zontanos and Anderson [14] explicitly declared the role by entrepreneur in communication in entrepreneurial marketing, not required to technical knowledge or a formal structure. Martine [3] discusses that entrepreneurs tend to spend their time in communication skills helping them in making better communications. Miles and Darroch [15] considered improving communication with customers and customer-orientation as the leading factors to explore identification and utilization of new opportunities to meet hidden needs.

Mapping cognitive dimension and its sub-clusters in entrepreneurial marketing

Figure 6 depicts the concept map for cognitive dimension in elements of entrepreneurial marketing. This mapping indicates that sub-cluster of common values and objectives play a major role in facets including gaining experience, informality and innovation. Indeed, cognitive dimension can be used as an alternative for formal mechanisms of control within organization, and persuade members of organization to cooperation, partnership and sharing information, that this facilitates innovation and realization of objectives within organization more better.

Figure 7 presents the Conceptual map for cognitive dimension in entrepreneurial marketing. According to the figure, both sub-clusters of cognitive dimension "Commonality and sharing stories, anecdotes, and examples" have a major role in facets including experience and informal mechanisms at entrepreneurial marketing, and just the sub-cluster "common values and objectives" plays a major role in entrepreneurial activities. Pearce and Ensley [16] in a longitudinal study found out that shared vision and innovation effectiveness have a reciprocal and longitudinal relationship with each other. In other words, shared vision emerges from the early innovative successes and helps for effectiveness at entrepreneurial marketing.

Mapping social capital

As shown in figure 8, social capital has been mapped into seven elements of activities in entrepreneurial marketing.

Social capital among the elements of entrepreneurial marketing plays a major role in activities including innovation and informal mechanisms. Mapping for social capital in entrepreneurial marketing indicates that all three dimensions of social capital affect innovation and informality.

CONCLUSION

In this study we aimed at providing a conceptual map of social capital in entrepreneurial marketing of small enterprises. This case study conducted in Iran. The results from the mapping of social capital in entrepreneurial marketing indicated that social capital and its dimensions have an effective role in activities of entrepreneurial marketing, so that social capital plays a major role in 7 elements including: "Informality", "Networking", "customization", "experience", "flexibility", "opportunism", and "innovation". This role is more obvious in elements of innovation and informality. Furthermore, the communication dimension of social capital is mapped into five elements of innovation, Informality, opportunism, customization and flexibility. Such role is more obvious in elements of innovation and informality. Structural dimension plays a major role in 6 elements of "innovation", "Informality", "opportunism", "customization", "networking", "customization", "experience". This is more obvious in elements of opportunism and networking. Eventually, cognitive dimension plays a major role in 3 elements including "experience", "informality" and "innovation". The results indicate that three dimensions of social capital generally play a major role in innovation and informality, so that people's adherence to values and aims of company results in cohesive communications among them, where by feeling of trust finally can be realized facilitating access to accurate, reliable and associated information from informal channels and more success in developing innovative activities.

Generally, given that this study was conducted for the first time at international and national level, suggestions are proposed as follows:

- Conducting a study in large enterprises, and comparing them with small enterprises;
- Using the results obtained from this study in other industries, and comparing them with each other;
- Analysis of mapping for social capital dimensions;
- Analysis of mapping for entrepreneurial marketing dimensions
- Using other analytic methods to analyze results obtained from this study

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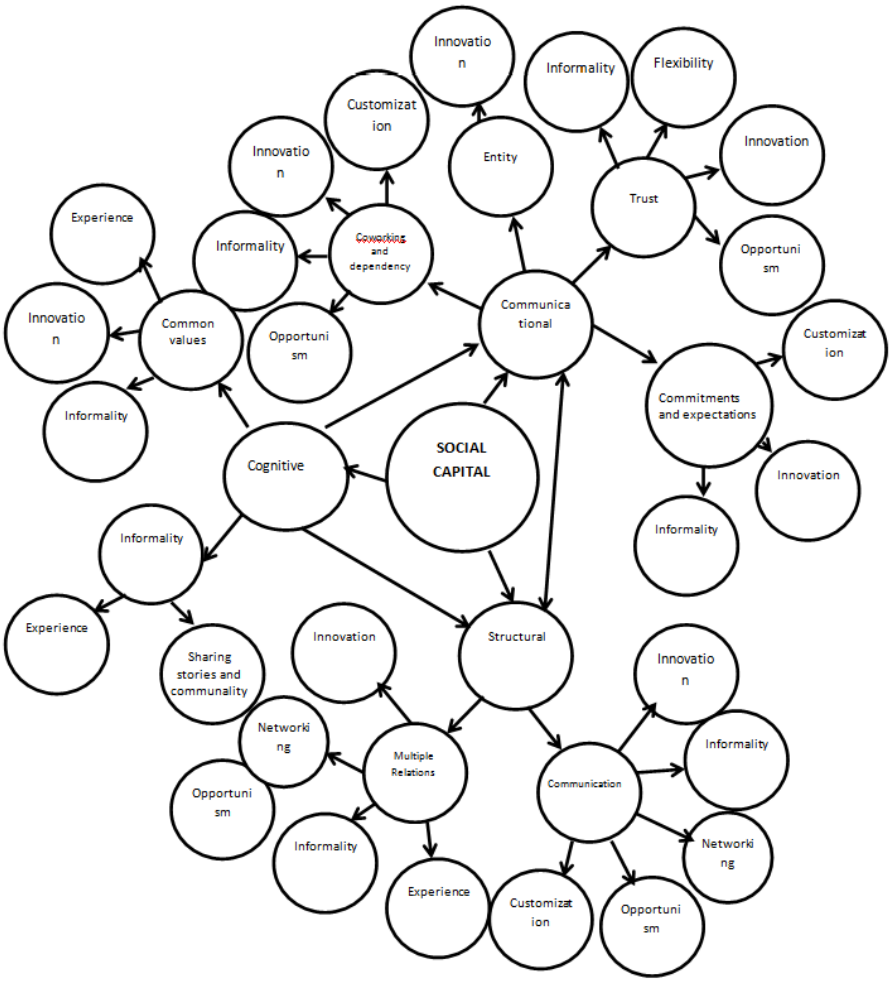

Figure 1. Hierarchical structure of concept map for social capital

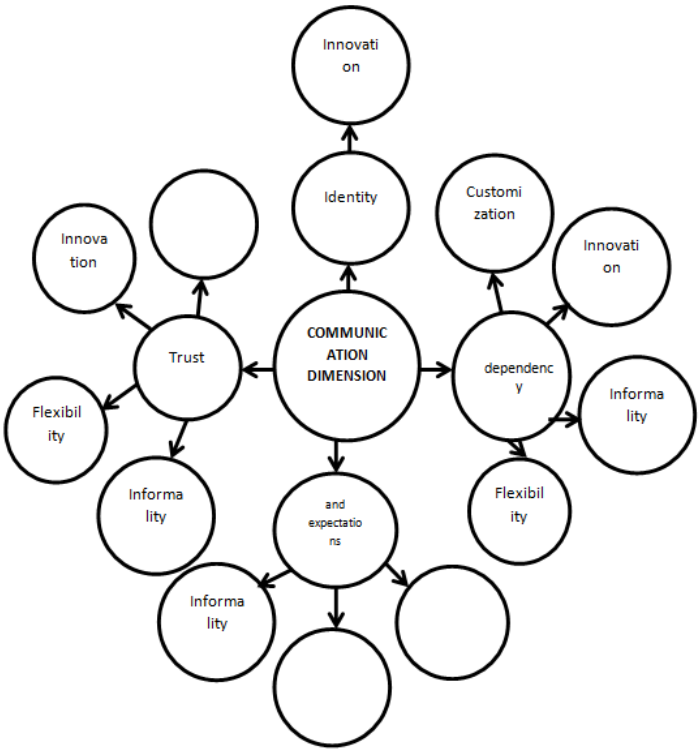

Figure 2. Conceptual map for communication dimension and its sub-clusters

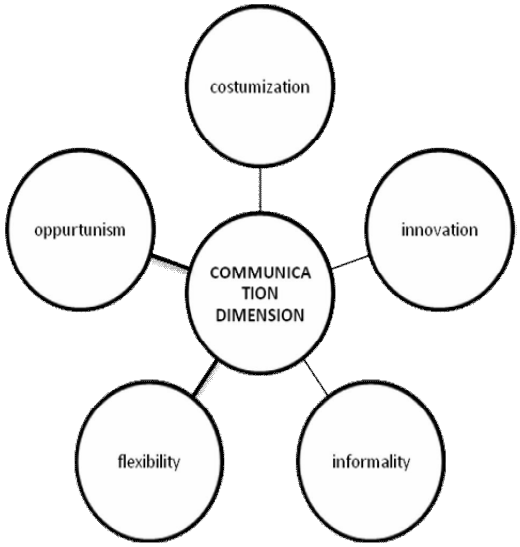

Figure 3. Conceptual map for communication dimension

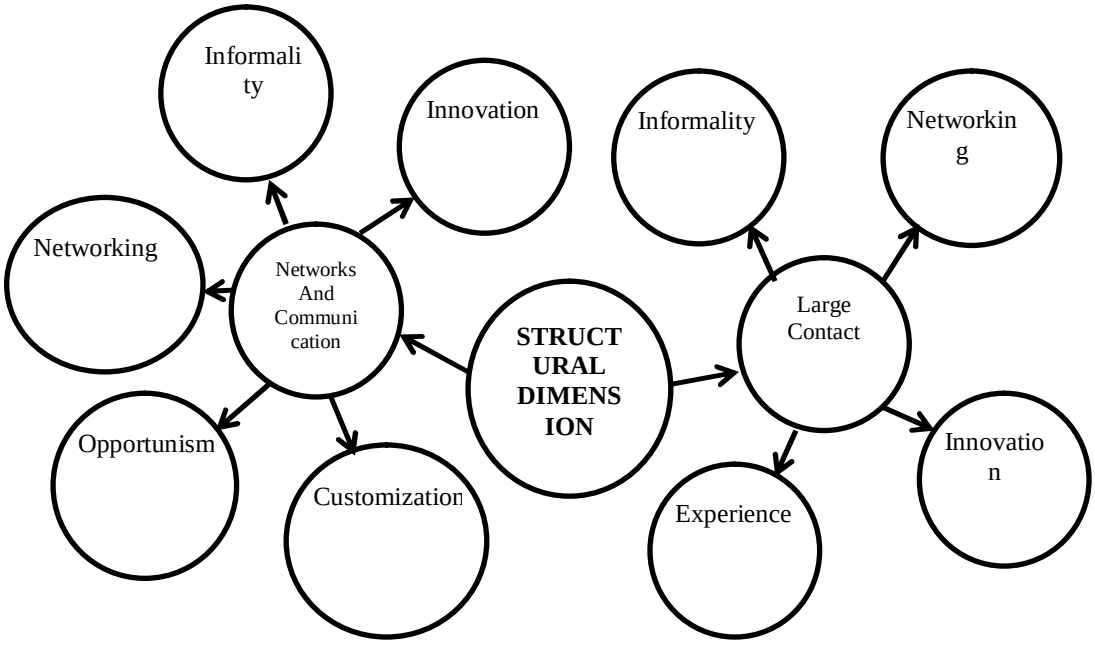

Figure 4. Conceptual map for structural dimension and its sub-clusters

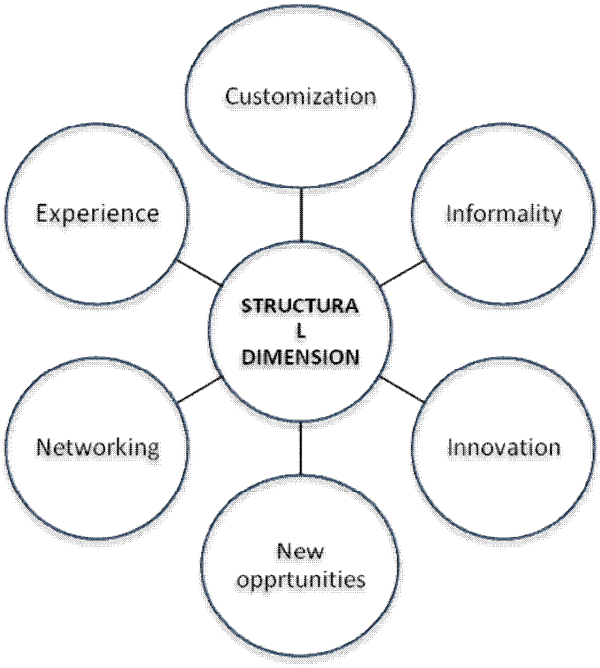

Figure 5. Conceptual map for structural dimension

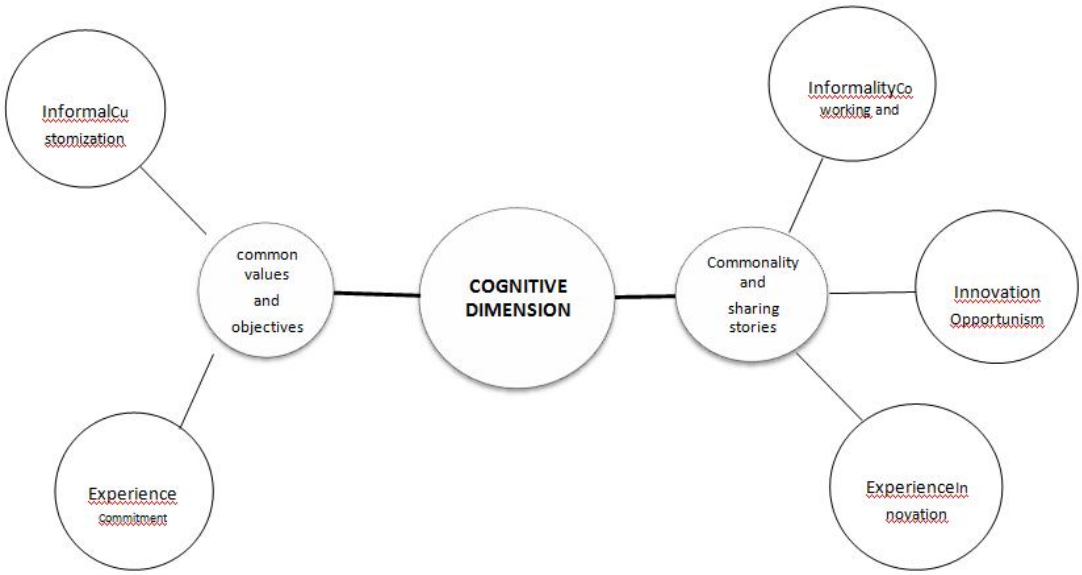

Figure 6. Conceptual map for cognitive dimension and its sunclusters

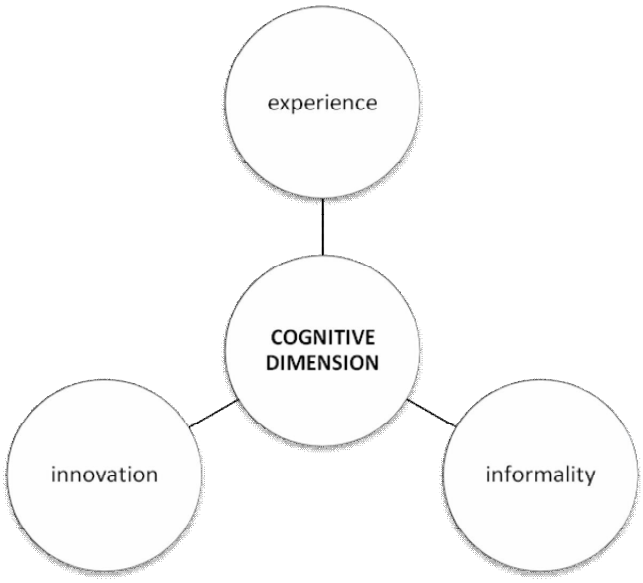

Figure 7. Conceptual map for cognitive dimension

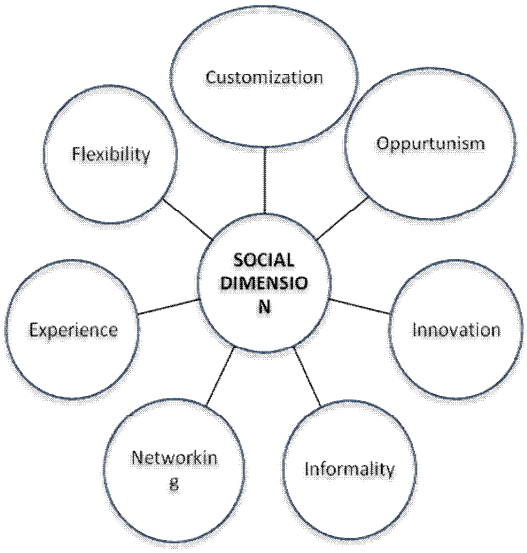

Figure 8. Conceptual map for social capital

Table 1. Characteristics of 10 participants

	Position	Academic field	Work experience in food industry
1	Project manager	Management	5 years
2	Marketing manager	Management	10 years
3	Owner	Engineering	4 years
4	Sale and marketing manager	Management	8 years
5	Owner and CEO	Food industry	7 years
6	Marketing manager	Marketing management	15 years
7	Internal Audit Manager	Food industry	10 years
8	Sales Expert	Marketing management	6 years
9	CEO	Industrial engineering	9 years
10	Owner and CEO	Engineering	12 years

Table 2. Clusters and terms from the process of concept mapping

Clusters	Subclusters	Terms	Elements
Communication Structural	**Trust**	Access to large amount of information through informal channels with increasing trust among employees	Informality
		More flexibility in doing activities with increasing trust among employees	Flexibility

		Access to large amount of information through in the context of production of new products with increasing trust among employees	Innovation
		Access to large amount of information to industry and product with increasing trust among employees	Informality
		Persuade to supply new product with increasing trust among employees	Innovation
		Trust to friends and relatives as facilitators to access more information from informal channels and identify new opportunities	Recognize opportunity
	Cooperation and attachment	Team Spirit among employees would be along with innovation and new approaches	Innovation
		Employees at different sectors in decision making on a special topic share their information, ideas and expertise	Informality
		Cooperation among employees leads to success in meeting customers' needs	Customization
		Cooperation between employees and customers leads to better recognition of their hidden needs and more success in presenting innovative ideas	Innovation
		Cooperation with Competing enterprises leads to access to more information to market and exploring new ideas and opportunities	Informality
		Team spirit and cooperation among members of company leads to decreasing the time for supply of product to market as well as rapid responsiveness to customers' needs	Customization
		Members at company share their skills which this leads to better performance in recognizing new markets and acceleration in meeting the customers' needs	Customization
	Commitments and expectations	Honesty and Integrity in employees lead to more trust by customer to company and more cooperation with company	Informality
		Employees' commitment to meet customers' needs leads to success in	Innovation

		activities of product development	
		Employees' commitment lead to larger effort to meet customers' needs	Customization
		Customers' more expectation to company persuade the individuals to develop new products	Innovation
	Identity		Innovation
	Communications and networks	Managers' involvement in different ceremonies increase popularity of beneficiaries	Informality
		Communication with educational institutions increase success in supply of new products	Innovation
		Company in friendly Assemblies could have a wider access to information in the context of supplying new product	Networking
		Intimate relationships with customer lead to better understanding of customers' needs and meeting their needs	Customization
		Communicate with competing enterprises leads to access to new information on market and recognizing new opportunities	Recognize opportunity
	Large contacts	Active contacts with active enterprises in different industries cause access to different communication channels and data gathering.	Networking
		Large contact between customers and firm has caused new ideas and suggestions on products and services to be found	Innovation
		Effective contact with active enterprises in other industries caused more flexibility in data gathering	Flexibility
		Continuous contact with active enterprises in different industries provided access to information through informal channels and recognizing new needs of customers	Recognize opportunity
	Values and objectives	Commitment to common values and objectives among employees would be	Informality

		followed by empowering team works	
		Commitment to common values and objectives among employees would be followed by their better understanding from methods to do activities and increasing fees	Experience
Cognitive	**Commonality**	Tendency to common values and objective among employees leads to empowering team work, increasing knowledge to build innovation and new approaches	Innovation
		Conduct the mission at company by employees would be followed by more innovation within organization	Innovation
		Accurate understanding of members of company in knowing each other leads to acceleration in doing activities and lack of any need to formal approaches	Informality
		More consistency between personal values of employees with values and objectives leads to their high tendency to presenting new ideas	Innovation
	sharing stories, anecdotes, and examples	Use the common terms by members of company would be followed by empowering informal relationships	Informality
		Having the common job memories among members of company leads to improving informal and empirical relationships in new work topics	Experience

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RESEARCH ARTICLE

Designing a Fuzzy Expert System for Environmental Risk Assessment of Petrochemical Industry

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ABSTRACT

This study is an attempt to design a fuzzy expert system for environmental risk assessment in order to develope petrochemical industries. The designed expert system was developed based on fuzzy logic. First, the rule-based approach was used to represent expert knowledge and the Mockler Chart was drawn to determine the exact number of required rules to form a knowledge base expert system. Several scenarios that each condition may assign were arbitrarily determined by experts. After thedevelopment ofMockler Chart, the decision tables were drawn. According to the main risk factors, the expert system requires 5 decision tables. Finally, the inputs were used by the system rules for the purpose of risk assessment and environmental risk was identified. The MATLAB software was used to define the rules of system.Lorestan province was selected as the case study for the execution of expert system, main risk factors for the development of the petrochemical industries include: climate change, hazards and natural disasters, ecological damage and incompatible land use. Overall assessment of environmental risk was conducted in critical, semi-critical and normal levels. Environmental risk was measured with considerations of the severity, probability and extent of damage. The results show that in construction level, almost all risk factors are in semi- critical level and in operational stage, hazards and natural disasters are the only risk factors at critical level.

Key words: Environmental risk assessment, Expert system, Fuzzy, Petrochemical Industry, Lorestan

INTRODUCTION

In today's society, wheremostly complex systems are used, accidents can cause disorder at various levels and even be considered a threat to society and environment (Smith, 2013).That's why everyone seeks safe and low-riskconditions(Meng,et al.,2014;Tian, 2015). This is where the term 'risk' emerges in uncertainty sense andindicator of probability and severity of damages (Suter II, 2006). The risk results determines extent of damage inflicted on the system with occurrence of each damage, and environmental impacts these damages will have (El-Sayegh, 2008). By definition, risk is a measure of probability and severity of risk and its consequences (Stoessel, 2008; Nieto-Morote, et al.,2011). The International standards organizations defines as probability of accidents and their consequences (Saripalli& Walters, 2010). In another definition provided by Zio(2006) risk is a combination of probability of each risk (Pi) and its consequences (Ci). Willis (2007) defines risk as the equivalent of the inflicted loss or damage. In the same year Aven defines risk as a two-dimensional concept, which includes events and consequences as well as possibilities associated with it. All of these definitions can be summarized in the definition provided byAven (2009). According to this definition, risk is a measure of probability of an accident and its consequences, and different parameters are considered to determine probability and severity of accidents (Tian, 2015).

On the other hand, with the industrial and technological development, risks in industry and dangers diversityhave significantly increased(Bjerga&Aven, 2015). Since the refineries, pipelines, oil and gas networks and petrochemical plants are considered major infrastructures and also due to the great extent, the large volume of capital, comprehensive risk and a lot of people who are working in these industries, Oil, gas and petrochemical industries have drawn the attention of expertsand those involved in safety of them and great efforts are being made to provide greater security for this industry in the world(Li, 2014). Therefore, in this study attempts are made to identify the driving forces and factors which have the potential of risking the development of petrochemical industry, and to design a fuzzy expert system to carry out an environmental risk assessment for developing petrochemical industry within the study area.

The concept of expert system

Expert system is a branch of artificial intelligence, which using a large extent of specialized knowledge solves problems like an expert(Patel, 2012). The Knowledge embedded in the expert systems may include experiences and knowledge which is accessible through books, magazines and scientists(Lee& Wang, 2011). The terms expert system, knowledge-based system, or knowledge-based expert system, are used interchangeably. Most people use term expert system due to its conciseness(Tasso&Guida, 2014). While that expert system may contain no experience or skill and only include general knowledge. Professor Feigen Bam of Stanford University, who is one of the pioneers of expert systems technology, defined expert systems as: "an intelligent computer program that uses knowledge and inference procedures to solve problems that due to their difficult nature, require the human experience and skills "(Kou,et al.,2014). The following figure 1 shows the basic concept of a knowledge-based expert system:

Case Study

Lorestan Province is about 28157 km2. It is in the west part of Iran between 46^0 50' to 50^0 01' east longitude and $32^0$40' to $34^0$23' northern latitude (Fig.2). The average height of Lorestanis 2200 m from sea level. The lowest part of Lorestanis located in plains, 239 m and the highest part of this Province is about 4080 m OshtoranKooh Mountains in Zagros Mountains. This province covers about 1.72% of total area of Iran by ranking 16^{th} among provinces.Lorestan Province is limited from north by Hamedan Province, from northeast by Markazi Province; from east by Esfahan Province, from southeast by ChaharMahalvaBakhtiari, from south by Khuzestan Province, from west by Ilam Province and from northwest side by Kermanshah Province.

METHODOLOGY

There are many different ways to carry out an environmental risk assessment. In this study, the researcher seeks a new method for risk assessment, therefore the fuzzy- logic based expert system for environmental risk is used for developmentof petrochemical industry. By doing this study, the researcher aims to provide an opportunity for managers and planners so that they can carry out environmental risk assessment more quickly and thereby identify, prevent and control risks that petrochemical industries may face.

The abilities of expert systems include addressing quantitative issues, and addressing qualitative issues (which the computer programs typically fail to address). These capabilities have led toincreasing application of this system as a decision-making instrument in differentfields(Kou,et al., 2014). The Expert system designed in this study which is named Risk-EX is codified by the MATLAB software. The Risk-EX system is shown in the following diagram(Fig.3).

MOCKLER Chart

The rule-based approach was used to represent expert knowledge and the Mockler Chart was drawn to determineRisk-EX system the exact number of required rules to form a knowledge base expert system. The 5 triangles drawn on the chart represents five set of decision-making rules.The possible scenarios that can be assigned to variable are provided beside each of risk factors and risk sub-factors. Different scenariosthat may be assigned to each condition are arbitrarily determined by experts. After the survey of expert's opinions, "Climate Change", "hazards and natural disasters", "ecological damage" and "incompatible land use" were selected as four main risk factors for the developmentof industries and each of factors was divided into some sub-factors at the discretion of experts(Fig.4).

Decision-making Tables

After drawing the Mockler Chart, the decision-making tables should be established. Each risk factor in the chart, requires a decision-making table. The decision-making table shows the internal relations between variable values and output of each phase. According to the main risk factors shown in the Mockler Chart, the Risk-EX system requires five decision-making tables. Each decision-making table generates a set of rules, and each set of codified rules are written down in specific triangles within the chart.

In the following part, an example of measuring the number of rows for the first set of rules is provided:

Rule Set 1:The possible number of values for each condition are:
-Climate change (Critical, Semi-critical and Normal)=3
-Hazards and natural disasters(Critical, Semi-critical and Normal)=3
-Ecological damage(Critical, Semi-critical and Normal)=3
-Incompatible land use(Critical, Semi-critical and Normal)=3
Then the total number of rows are calculated bymultiplying the numbers given above:
Rule Set 1= 3*3*3*3 = 81
So we have:
Rule Set 2= 3*3*3= 27
Rule Set 3= 3*3*3= 27
Rule Set 4=3*3*3*3 = 81
Rule Set 5=3*3*3*3 = 81

The total number of expert system rules are determined by total number of rows obtained for each set of rules. As a result, the total number decision-making rules in the designed system is 297.

System Architecture

The system consists of three major components, which include: database, user interface and inference engine.

The database which contains the rules extracted by experts. This knowledge is saved in form of "if-then" rules. The needed codes were written in MATLAB software. For example, if for climate change:

-Temperature changes "critical"
-Precipitation "critical"
-Severe wind "critical"
Then environmental risk for the petrochemical site would be "critical".

User Interface is the means for communication between user and expert system and attempts are made to make this communication as user friendly as possible. User interface is prepared software, which during decision-making and choosing, shows different options to user. By choosing one of options of table, user states severity, probability and his diagnosis of the status of environmental risk factors on each of sub-factors. Finally, system represents site status in terms of environmental risks, according to information that is stored in knowledge base.

Inference engine "intelligence" of system, which is the mechanism of combination of knowledge and information for decision-making, is referred to as inference engine. In this case, inference engine is responsible of deciding how and when facts and rules should be used to assess environmental risk.

In the present designed expert system, inference is carried out leading chain, such that user reaches final answer, step by step, by selecting a series of options.

Consultation process

A typical Expert System, uses different scenarios of some criteria for broader assessment of the driving forces affecting environmental risks in order to develope petrochemical industries. These factors include: climate change, natural hazards and disasters, ecological damage and incompatible land use. Afterwards, these driving forces are integrated with each other and provide a general evaluation of risks in one of (critical, semi-critical and ineffective) levels. The user answers a series of questions so that input of expert system for different risks may be obtained. After that, inputs are used by system rules for assessment of four factors. Finally the status of environmental risks becomes clear. The consultation process is user friendly and provides possible responses (severity, occurrence, extent of damage) for each question, such that user can select the desired response from among them.

Finally, after the data of all factors are inserted, the final status of environmental risks, as well as guidance about preventive measures or changes in the procedures of some activities will be displayed. The designed system displays bar graphs of factors and their sub-systems, as final report.

This type of reporting from the perspective of project management, is very favorable among planners and managers.

It should be noted here that therelevant expert team is responsible for making final decision on the proposed solutions and validity of system inputs, and risk assessment in this way is only considered an aid to decision-makers and planners, and a preliminary assessment.

An example of the designed system is as below(Fig.5).

The results of environmental risk assessment for development of petrochemical industries

The results of environmental risk assessment for development of petrochemical industry in Lorestan are provided in the form of customer rating tables and graphs of assessment results.

In the method used in this study, risk criterion number is used to obtain an acceptable level of risk. Risk benchmark index is used to distinguish risks at critical and semi-critical levels. Therefore the risk levels are:

-Critical: 80 <
-Semi-critical: 40-80
-Normal: < 40

The results obtained from execution of fuzzy expert system is provided in the following chart(Fig.6).

As shown in figure 6, the status of environmental risk assessment fordevelopment of petrochemical industries in Lorestan is such that most of environmental risks posed by climate change are attributed to sudden changes in temperature and rainfall, which will bring about higher risks for industry development during construction phase. And a critical part of the potential damages are fundamental for the development of industry, and considering their semi-critical condition, they will have the potential for inflicting critical damages on the development of industries. And the severity of environmental risk resulting from wind blow in both construction and operation stages will be lower(at the normal level).

According to the experts the best way to deal with the semi-critical condition of climate change is to do the necessary proposed activities for recognition, prevention and control of these sudden incidents.

As shown in the above figure 7, the highest environmental risk results from earthquake at both construction and operation stages, and this consequence would be associated to the critical level. Flood and landslide-driftare both at the semi-critical level both at construction and operation levels. According to the experts, the best course of action in the face of critical conditions resulting from earthquake is to develope industries in areas away from active faults. As for the recommended actions in the face of semi-critical conditions resulting from flood, it is suggested that the industries be developed at appropriate distances from surface waters, and rivers with high levels of water and dams in particular. And as for the semi-critical condition resulting from landslide the industries should be developed on suitable and strong bedrocks.

As shown in the figure 8, the highest environmental risk at the construction stage, results from changes in land use, which is in a semi-critical condition. And the highest environmental risk in the operation stage is attributed to disturbing sounds and vibrations. According to the experts, the best way to deal with the semi-critical condition resulting from changes in land use, is continued assessment and monitoring of nearby land use. As for risks arising from noise and vibration during operation stages, it seems necessary to use sound and vibration proof workhouses and to develope the industries away from centers of noise pollution and vibration such as free roads and highways.

As shown in thefigure 9, the highest environmental risks caused by incompatible land use occur during operation stages and the high-risk centers such as petrol and gas stations, and high voltage electricity posts and power lines are the main contributors to these risks. According to experts, the best way to deal with the issue, is to develope the industries in proper posture and away from important sites, development of appropriate safeguards to reduce the risk of these centers, and the use of warning signs.

The status of environmental risk assessment for development of petrochemical industries in Lorestan, in terms of all factors indicate that all factors altogether except for natural disasters and hazards and risks lead to semi-critical risks, and natural disasters and hazards are the only sources of critical risk during the operation stage. According to experts, in order to reduce and mitigate the environmental risks and hazards arising from natural disasters and hazards, the industries should be developed as far away from the center of risk of natural disasters such as active faults and rivers, etc. as possible. And for the recognition, prevention and control of other risk factors that are critical in semi-critical conditions, the compilation of comprehensive instructions for environmental planning and management and appropriate development of industries would be necessary and inevitable.

CONCLUSION

Since petrochemical plants are major infrastructures and given the great extent, the large volume of capital, comprehensive risk and large number of people who are working in these industries, industries should be developed at safe and low risk locations.

The present study is an attempt to design a fuzzy expert system for environmental risk assessment in order to develope petrochemical industries. The designed expert system was developed based on fuzzy logic. First, the rule-based approach was used to represent expert knowledge and the Mockler Chart was drawn to determine the exact number of required rules to form a knowledge base expert system. Several scenarios that each condition may assign were arbitrarily determined by experts. After the development of Mockler Chart, the decision tables were drawn. According to the main risk factors, the expert system requires 5 decision tables. Finally, the inputs were used by the system rules for the purpose of risk assessment and the environmental risk was identified. The MATLAB software was used to define the rules of the system. Lorestan province was selected as the study area for the execution of the expert system, the main risk factors for the development of the petrochemical industries include: climate change, hazards and natural disasters, ecological damage and incompatible land use. Overall assessment of environmental risk was conducted in the critical, semi-critical and normal levels. Environmental risk was measured with considerations of the severity, probability and extent of damage. The results show that in the construction level, almost all risk factors are in the semi- critical level and in the operational stage, hazards and natural disasters are the only risk factors at the critical level.

It is suggested that in future studies, the system be developed through the use of simulation in inference engine for assessment of different environmental scenarios, and web-based programming languages, as well as object-oriented or framework-oriented data bases rather than rule-oriented ones be tested

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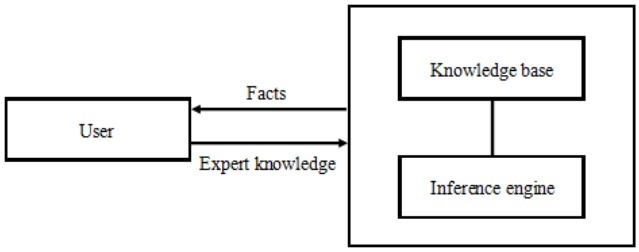

Fig.1: The main concept of an expert system performance(Akhouayri,2015)

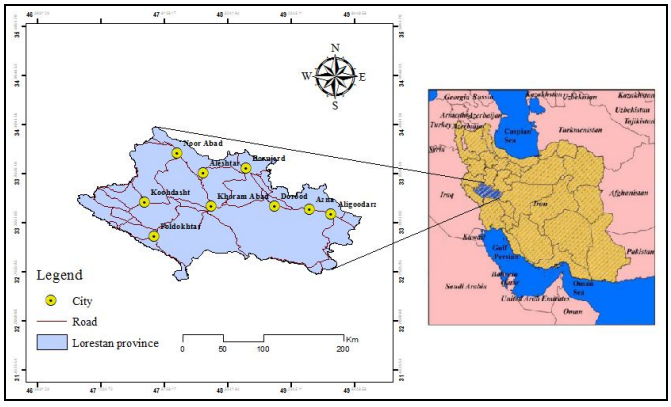

Fig.2: Case study, Lorestan Province

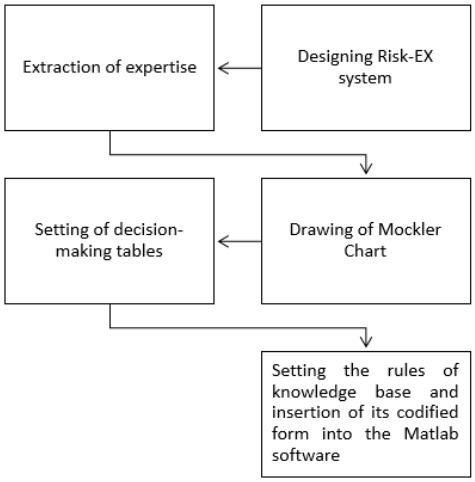

Fig.3: The diagram of Risk-EX system designing procedure

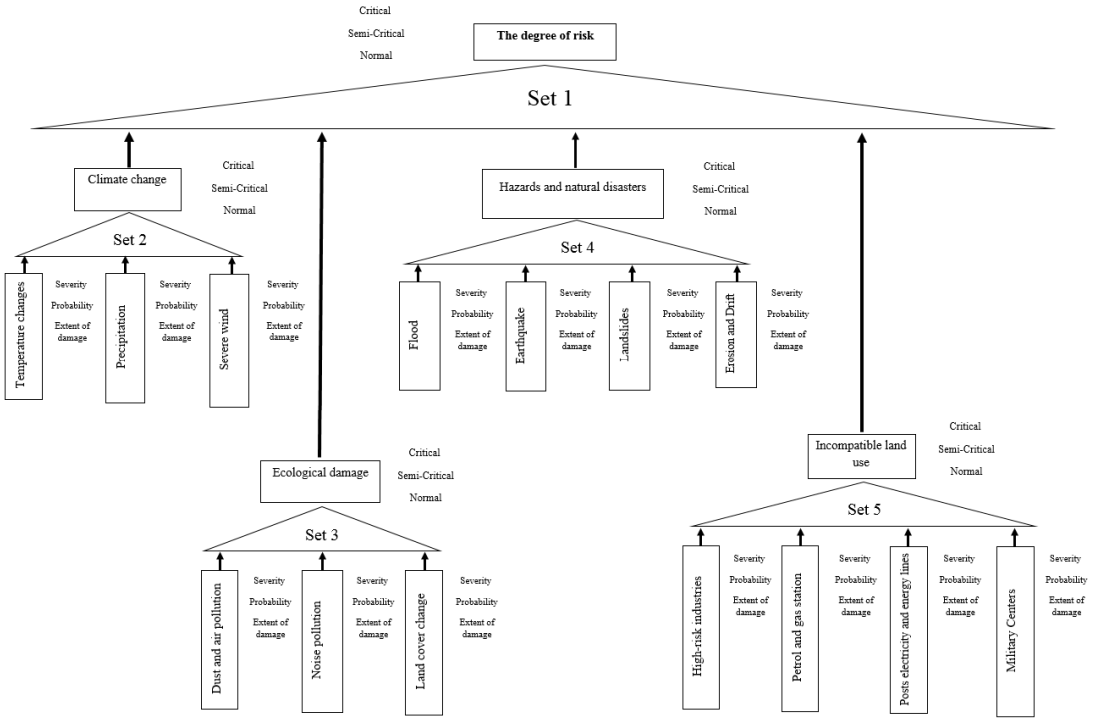

Fig.4: Mockler Chart

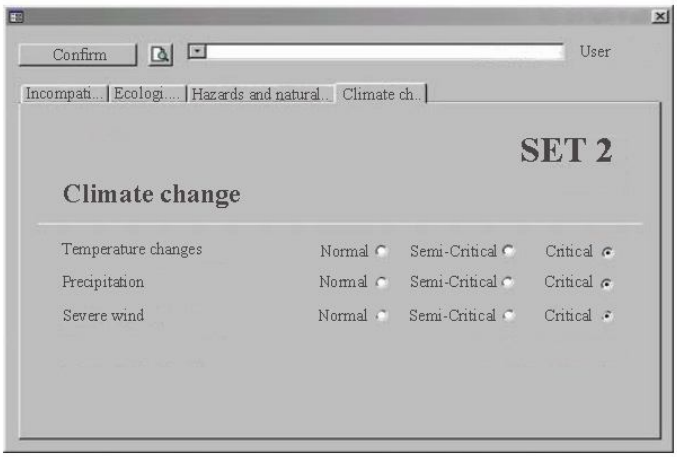

Fig. 5: an overview of Graphical User Interface in the fuzzy Inference System

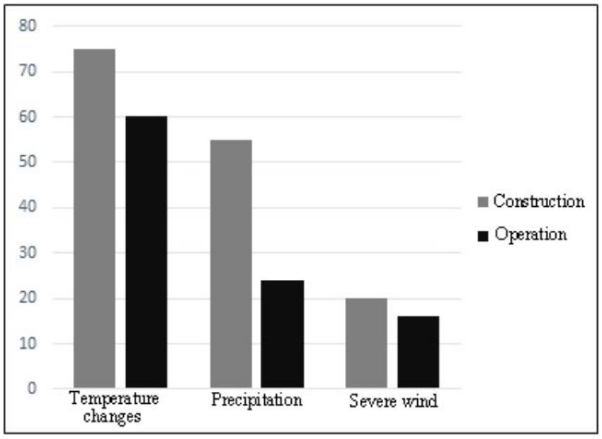

Fig.6: The status of environmental risk assessment resulting from climate change

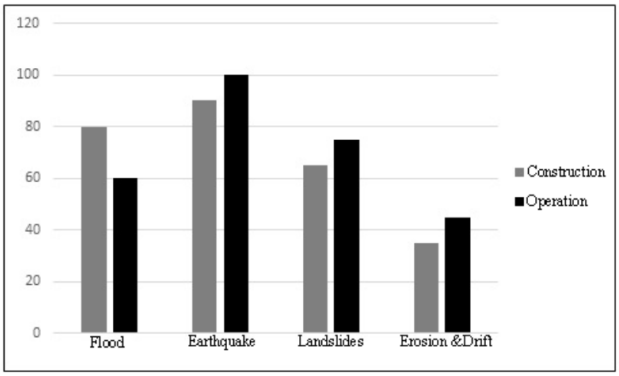

Fig.7: The status of environmental risk assessment resulting from hazards and natural disasters

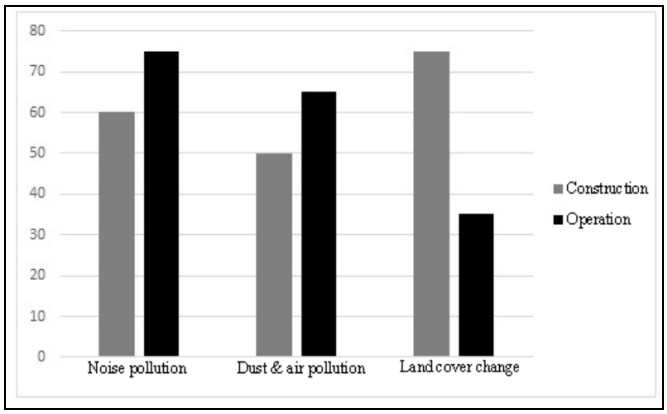

Fig.8: The status of environmental risk assessment resulting from ecological damage

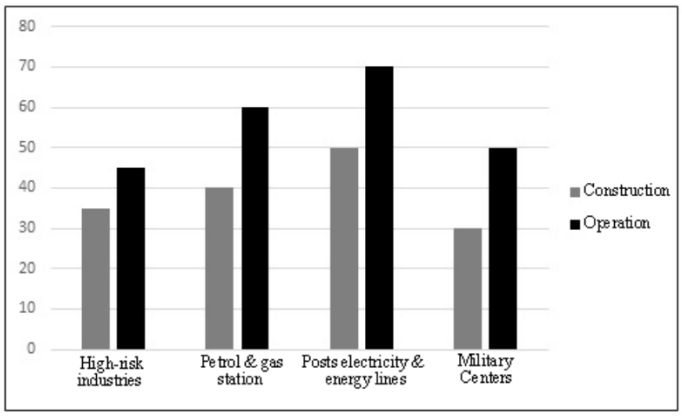

Fig. 9: The status of environmental risk assessment resulting from incompatible land use

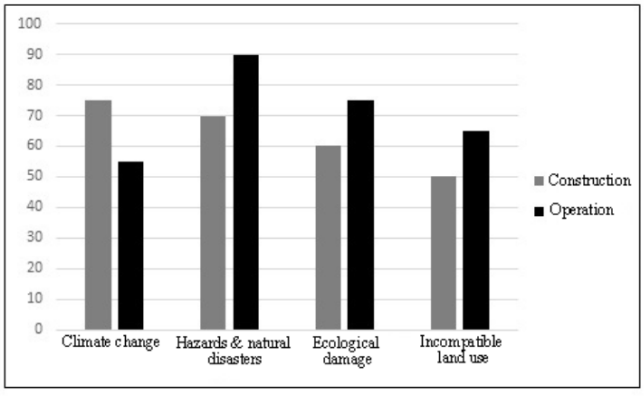

Fig.10: The status of environmental risk assessment resulting from all risk factors

Table 1: Equivalent expressions for customer rating of probability, extent of damage and severity

Severity		Probability		extent of damage	
Critical	5	Very High	5	Very High	5
Severe	4	High	4	High	4
Medium	3	Medium	3	Medium	3
Weak	2	Low	2	Low	2
Venial	1	Very Low	1	Very Low	1

Table 2: Fuzzy linguistic expressions for rating the probability, extent of damage and severity

Experts's Expressions	Reverse fuzzy linguistic expressions	Fuzzy linguistic expressions
1	[1 1 1]	[1 1 1]
2	[1 4/3 2]	[1/2 3/4 1]
3	[2/3 1 3/2]	[2/3 1 3/2]
4	[1/2 2/3 1]	[1 3/2 2]
5	[2/5 1/2 2/3]	[3/2 2 5/2]

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RESEARCH ARTICLE

Comparison of Anxiety, Stress and Depression in High School Students with and without Asthma in Kerman

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ABSTRACT

The present study was performed with the purpose of comparing the level of anxiety, stress and depression of people with and without asthma. The research method was causal comparative and statistical population of the present study consisted of all high school female students (2370 students) in the academic year 2013-2014 with and without asthma. The statistical sample consisted of 60 students (in two groups of 30 students with and without asthma) was considered that was selected by simple random method. For collecting information, 3 questionnaires including Beck Anxiety and Depression (1961) and Morris Stress (1990) were used. The questionnaires information was analyzed using independent t-test. The results showed the mean score of depression, anxiety and stress is different in both groups and the mean of these scores is higher in students with asthma.

Key words: depression, anxiety, stress, asthma

INTRODUCTION

Asthma is the most common chronic disease of the respiratory tract and the most common cause of absence from school among students. There are more than 150 million people with asthma in the world and it has been increased 2.5 times since 1980s and the mortality rate has been enhanced 6% annually. To date, about 5% of people in the world

have asthma and this ratio in childhood reaches to 7% to 10% and 80% to 90% of these cases happens before the age 4-5 years. Until the age of puberty, the proportion of these cases in boys with asthma is more than girls and after puberty the proportion is vice versa. The factor of inheritance plays an important role in the incidence of this disease so that if one of the patients has asthma, the risk of developing reaches to 50%. Asthma symptoms including cough, sputum, shortness of breath, wheezing, rapid breathing, restlessness, anxiety, excessive sweating and secondary abdominal pain due to the assistance of abdominal muscles, humping and relying on hands during an attack and premature fatigue (Klausi, 2010). In the fourth revised edition of Diagnostic and Statistical Manual, asthma is classified as one of the psychosomatic mental disorders affected by psychological factors (Kaplan and Sadock, 2002). In fact, the connection between asthma and psychological factors has been considered for several centuries (Klausi, 2010). A very common view about asthma has been proposed in a way that it is a disease composed of three physical, psychological and social dimensions (Yelvelz, 2010). There are no accurate statistics on the rate of asthma incidence in Iran, there are many objective findings that show the psychological factors interfere with the preparation of developing asthma and aggravating or improving the process of asthma (Harrison, 2011).

Patients with asthma in comparison with others show more preparation for developing mental disorders (Anek, 2001). In this research that was conducted in order to investigate public health of patients with asthma, the results showed that these patients have obvious problems in public health subscales (Cheta, 2009).

Psychological problems in many patients are one of the incentive factors of asthma symptoms (Marshall, 2000). Among these factors, the most important ones are stress (Hampl, 2002), depression (Deshmokh, 2009), anxiety, social isolation, emotional problems, physical and family problems (Shaloitz, 2010). On the other hand, depression is a continuously and unstable mood state that covered various aspects of a person's life and interfere in them. The mood variation means severe to mild sorrow, sadness and irritability which affect people. Depression is common disorder with large consequences so that more than 15% of the total population experiences its symptoms. In etiology of depression different views have been proposed. These people in contrast with normal people have more negative cognitive content (Kaplan and Sadock, 2006). Depression is one of the most important causes of disability in all the countries and one of the most common mental disorders that is obvious as a global health problem in all the cultures. There are a few numbers of people who do not experience depression during their lifetime. Depression does not belong to a particular group but some people are more vulnerable to this disorder because of the special situation (Gharache Daghi 2014).

The prevalence of major depressive disorder in adolescent girls and adult women is twice of adolescent boys and adult men. It seems girls and boys before puberty develop this disorder at the same proportion. The prevalence of dysthymia is equal in both sexes and more common among first-degree relatives of patients. It is also predicted that the number of people with depression due to the pressures caused by social-environmental variations and increase of the number of physical diseases is increasing. The anxiety includes the feelings of unpleasant and uncertain fear and concern with unknown origin and including uncertainty, helplessness and physiological arousal. The recurrence of situations that were stressful earlier and during them the person has been injured caused anxiety among the people. All human beings have anxiety in their lives but chronic and severe anxiety is abnormal and problematic (Rahm, 1997).

Anxiety disorders are a group of disorders that are described by persistent and severe anxiety. Also, their other common characteristics include bleak, unwanted and lasting symptoms. These symptoms are not actively violating social norms. But anxiety is underlying numerous disorders such as fear, obsession, suicide, substance abuse, personality disorders and a variety of deviations. Symptoms such as anxiety, abdominal pain, resignation, nausea, coercions, insomnia, isolation, depression and weeping all specify a person with inner suffering. The anxiety, stress and depression have been known as three major disorders that endanger a person's mental health (Villa, 2008).

Nowadays also each person experience stress in everyday life and inevitably tries to be responsive to the factors by adopting a unique approach. Stress or tension is a special force that has pressured the object and makes temporary and permanent changes in its structure. The researchers of cognitive evaluation believe that the pattern of cognitive evaluation of people in comparison with tension situation of life show different exciting and logical responses such as anger, guilt, pride, plan designing, specific action or attempt to reduce unpleasant emotions based on creating different personality characteristics (Harrison, 2011).

The findings of Shaloitz et al. (Shaloitz, 2010) show that stress and depression are the most important predicting factors of asthma attacks. Also Lehrer et al. (Lehrer, 2008) stated that symptoms of anxiety and stress can be as incentives that produce cytokines which causes inflammation of the trachea. 20% to 35% of patients with asthma go through more critical courses during the periods of stress (Fourist, 2004).

Physical and mental health in patients with asthma have significant relationship with self-esteem, psychological well-being, anxiety, depression, stress, health status, defective function and their excitements (Villa, 2008). Psychological variables such as confidence and social support are important as much as variables related to the diseases such as shortness of breath and disorder in function in determining the overall health of these patients (Anderson, 2009). Also Mahmoudi and Nasiri (2013) in a research with a purpose of comparing the mental health of patients with MS and those without MS in Mazandaran, stated that having a chronic disease can reduce mental health and also significantly increase anxiety and depression in people. With emphasis on this point that psychological and exciting factors such as anxiety, depression and stress considered as incentive factors of asthma (Jansons, 2009), the present study sought to answer this question that is there a difference between the level of anxiety, stress and depression in high school female students with and without asthma in Kerman?

METHODOLOGY

The causal comparative research method is with the control group which on this basis the comparison of stress, anxiety and depression are accomplished as the dependent variables and having asthma as independent variable. The statistical population of the present study consisted of all high school female students (2370 students) in the academic year 2013-2014 with and without asthma. In descriptive-continuous and cross-sectional and also field and case studies, a sample with minimum 100 subjects in each main group and at least 20 to 50 subjects in each secondary group is required to analyze the answers (Khaki, 2008). Volume or size of the sample group is different in terms of research method type and other characteristics related to the research method. According to studies and investigations, in comparative studies some groups with at least 30 to 50 subjects (in each group) are required. Simple random sampling method was from the list of students with and without the disease and the sample size was considered 60 subjects. (In two groups of 30 students with and without asthma).

Research Tools

Beck Anxiety Inventory (BAI):

This questionnaire is a 21-item scale that item 1 receives zero, item 2 receives one, item 3 receives two and item 4 receives three points. If the score is between 0-7 there is no anxiety. If it is 8-15 there is a mild anxiety, if is 16-25 the anxiety is average and 26-63 shows severe anxiety. In order to investigate the reliability and validity of Beck Anxiety Inventory, 1513 men and women in different age and sex categories in Tehran has filled out BAI test by cluster sampling. Also, 261 patients with anxiety referred to the clinics and medical centers were participated in the study. In order to achieve the test-retest reliability coefficient, 112 subjects who have already been tested from normal population in a time interval of one month from the first stage once again completed the tests. Also in order to achieve the validity coefficient, 150 patients with clinical anxiety had clinical interview and two assessors evaluated

the anxiety level of a person based on a quantitative grading 0-10 in a parallel way. Two assessors were unaware of the scores from BAI. The results show that the desired test has appropriate validity (r=0.72, 0.001>p), reliability (r=0.83, 0.001>p) and internal consistency (Alpha=0.92). (Kaviani and Mousavi, 2008).

Beck Anxiety Inventory

This inventory is designed based on clinical depression criteria by Beck in 1961 and include 21 groups of sentence and each group have four items. Among 21 items, eleven refer to cognitive problems, two refer to obvious behaviors, five refer to physical signs and one item refers to interpersonal relationships. The subject is asked to choose the item with the highest compatibility with his/her mood state. The score of each group of sentence is 0 to 3 and total scores of inventory is 0 to 63. Studies of the validity of the test have been satisfactory. For example, the validity of the inventory has been 0.93. (Taraghi Jah, 2006). The validity coefficient of Bambrio et al. and Mehryar el al. in the Iranian population studies have been reported as 0.90 and 0.78, respectively. (Moutabi, 1994). The validity of this inventory in (Nissi et al. 2005) have been reported by split-halves method and Cronbach's alpha as 0.80 and 0.90, respectively. Klaus and Lisman (2002), have reported the validity of this test in the student population by test-retest and split-halves method 0.74 and 0.84, respectively.

Stress Inventory (SSI)

A tool has been designed to study sources of student stress and their responses to the sources of stress. This questionnaire is a self-assessment questionnaire and include 51 items in 9 categories. The questionnaire is based on Morris theoretical model (1990). In this model, the sources of stress are located in 5 categories including failures, pressures, conflicts, changes and internal constraints (self-impose), the response to stress is also located in 4 categories including physiological, exciting, behavioral and cognitive evaluation responses. Many studies have been conducted using SSI. These studies implies SSI appropriate reliability and validity. For example, this questionnaire separates the students with different levels of stress (Godzilla, 1994). The correlation between SSI and its subscales is significant with three other tools including learning process questionnaire (Smack, Robich and Ramanaya, 1977), Anxiety Inventory (Spielberger, 1980) and locus of control (Iversen, 1981) that indicates its validity (Godzilla, Musten, Stocks, 1998). In a study, the criterion for the total test has been reported 0.92 for male students and 0.72 for female students (Godzilla and Guthrie, 1993). Confirmatory factor analysis indicates three models of sources of stress, response to stress and overall model of appropriate fitness of Morris theoretical model. In general, studies indicate concurrent validity and appropriate structure of test and the test reliability also has been reported through retest and appropriate internal consistency.

In order to analyze the data, the mean and standard deviation descriptive statistics criteria and to compare the groups, the inferential statistics t of independent sample was used.

FINDINGS

First hypothesis: there is a difference between mean anxiety of students with and without asthma.

There is a significant difference between mean anxiety in students with and without asthma with degrees of freedom and lower significance level than 0.01. Accordingly, the null hypothesis is rejected and this shows that two groups are different in terms of mean anxiety.

In explanation of present hypothesis, it can be said, since anxiety is an excitement that causes internal pain with deep and often unknown and sometimes forgotten root, some of the patients feel anxiety, dizziness, and confusion because

of asthma symptoms and some other feel failure and angry when they pay attention to the symptoms. In any case, the diagnosis of this disease may change the preparation of patients (Hiland, 1998). Also by according to the study results, it can be said that there is a difference between mean anxiety of students with and without asthma. The results of present study is consistent with results of Alvin (2009), Coffie (18), Cooper (2008), Almando et al. (2009), Lehrer et al. (2008), Hiland (1998) studies.

The second hypothesis: there is a difference between mean stress of students with and without asthma

There is a significant difference between mean stress of students with asthma and students without asthma with degrees of freedom and significance level lower than 0.01. Accordingly, the null hypothesis is rejected and this shows that the two groups are different in terms of mean stress.

In explanation of present hypothesis, it can be said, since the symptoms of anxiety and stress can be as incentives that produce cytokines which causes inflammation of the trachea. 20% to 35% of patients with asthma go through more critical courses during the periods of stress (Fourist, 2004). Also, the psychological factors can change the symptoms of the disease through various ways. Some patients pay more attention to their symptoms and some other become anxious by seeing their symptoms (Hiland, 1998). Therefore, according to the results of present study it can be said there is a difference between mean stress of students with and without asthma. The results of present study is consistent with the results of Alvin (2009), Coffie (18), Cooper (2008), Almando et al. (2009), Lehrer et al. (2008) studies.

Third hypothesis: There is a difference between mean depression of students with and without asthma.

There is a significant difference between students with and without depression with degrees of freedom and significant mean lower than 0.01. Accordingly, the null hypothesis is rejected and this shows that the two groups are different in terms of mean depression.

In explanation of present hypothesis, it can be said, since depression is defined as the changes in mood as the lack of interest in activities that are usually pleasant and decrease of interest in activities and daily life and the patients with asthma especially the adolescent students cannot have many activities such as sports, loud talking and laughing and also specific dietary prohibition and participation in their same age groups are developing depression more than normal students. Therefore, according to the results of study, it can be said that there is a difference between mean depression of students with and without asthma.

The results of present study is consistent with the results of Alvin et al. (2008), Arke et al. (2001), Coffie (2001), Cooper (2008), Almando et al. (2009) studies.

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Table 1: The difference of mean anxiety of students with and without asthma

md	%95		df	sig	T	test
	H	L				
6/83	10/00	3/65	58	0/000	4/30	independed T

Table 2: The difference of mean stress of students with and without asthma

md	%95		df	sig	T	test
	H	L				
5/100	8/36	1/83	58	0/003	3/12	Independed T

Table 3: Difference of mean depression of students with and without asthma.

md	%95		df	sig	T	test
	H	L				
13/30	15/12	11/49	98	0/000	14/56	independedT

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RESEARCH ARTICLE

Sociological Study about Social Deviances, Considering Structures of Iranian Society

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ABSTRACT

Growth of social deviances is of the main problems which nowadays have caused problems for current societies. Social deviances which refer to behaviors which are against norms and values of the society, on the one hand result in functional disorder in the field of culture and the society, and on the other hand prevent from realization of cultural security objectives. Hence, the issue of social deviances can be studied both as a social and as a security issue, and in both cases it is subject to its specific characteristics and assumptions. The objective of this paper on the one hand is to determine effective factors in social deviances, and on the other hand to qualitatively examine and analyze deviances and social issues in Iranian society. This research, by qualitatively analyzing the content of research about social deviances in Iranian society during 2001 to 2014, tried to identify reasons and factors of offences and deviances in the society.

Key words: Social deviances, social structure, anomie, social norm

INTRODUCTION

Studying social deviances and abnormalities, or in other words social pathology refers to studying and identifying origin of social disorders. In fact, social pathology refers to studying disorders, abnormalities, and damages such as

unemployment, addiction, poverty, suicide, divorce, and etc., along with their preventive methods and reasons, and curing them, and also studying inappropriate social conditions (Sotudeh, 2000).

From view of sociology of deviances, social deviance can be divided into two classifications of delinquency and offence. It should be noted that this classification is not based on the type and intensity of deviant behavior, but also it is based on the age of people when committing such actions. Hence, if deviant behavior is conducted by adults, then it is called offence, and if it is conducted by adolescents and youths, it is considered as delinquency (Ahmadi, 2004).

Everyday increase of deviant behaviors such as abuse of drugs and alcoholic drinks, destroying public and private properties, and rioting after soccer matches, having illegitimate sexual relationships, running from home and school, and aggressive actions of young people caused sociologists of deviances to focus on describing delinquency of these people and discover effective reasons and factors in their delinquent behavior (Ahmadi, 2005).

Social deviance means disobedience of the individual from rules of the group. From view of Cohen, any kind of behavior which does not comply with expectancies of the society or one of the certain groups in the society is called deviance. Deviance is avoiding and escaping from norms and occurs when the individual or the group do not observe criteria of the society. Deviant behavior and the deviant action are defined by considering norms existing in the culture, for instance a behavior or action might be acceptable in a specific situation, while the same behavior or action might not be acceptable in another situation (Cohen, 1936).

If deviance becomes like a pattern in the society and becomes common among people, gradually the anomaly changes into norm and would be considered as a social value and even the common conscience won't criticize it. Inevitably, its consequence would be anarchy and fall of the society. "By appearance and growth of feminism, more focus was dedicated to studying sex, social deviances, and offences of women by sociological studies. Until 1970s, because of low and ignorable rate of offences of women compared to men, the issues of sex and social deviances have less been considered by sociologists. By release of women from traditional family, reduction of social limits, development of social movements of women, and entrance of women to work markets, behavior of women became close to men and following this phenomenon, offences of women increased" (Ahmadi, 2005).

Among reasons and factors of appearance of delinquency and commission of social deviances, the factor of poverty and living and economic problems have a special importance. Some of the sociologists believe that poverty is one of the main factors causing offence and note that in a poor person an inferiority complex would be established and make him commit offence. There is no doubt that there is a relationship between different types of deviances and poverty, prostitution, begging, and some of the robberies, and spiritual diseases. Fornasari De Vorse who is one of the pioneers of criminology has indicated through a research that in Italy, poor families constitute 60% of the population, while they commit 85% to 90% of total crimes. In a research conducted by Anderson in 2002 about delinquency of adolescents, he founded that those adolescents who live in a single-parent family or live in inappropriate families have a higher probability of becoming delinquent (Anderson, 2002, P.585). Research of Dr. Cyril Burt in the book of "The Young Delinquent" indicated that 19% of crimes were related to poor people of London while they used to include only 8% of the population.

In a research conducted about delinquency of adolescents, Hagan and Foster found that boys compared to girls are more delinquent and adolescents with single-parent family are also more delinquent than those having both parents (Hagan & Foster, 2003; P.67-68).

The research conducted on delinquency of adolescent girls in Tehran indicates that arbitrarily parenting style and ignorance of parents are effective in tendency of adolescents to delinquency. Factors such as being away from family,

low education level of parents, type of job of parents, inappropriate economic status, small spaces, living in crowded zones, possession type of the domicile, separation of parents, death of parents, deviance of parents, and aggressive behavior of parents towards each other are considered as effective factors in tendency of adolescents to delinquency (Raheb, 2001).

Theoretical Framework

Sociologists and theorists within the recent one or two centuries, have proposed different and helpful theories in the field of social deviances. Each of these theories have been developed based on economic, political, cultural, and social status and also structure of the society, and while being developed more, they can define deviances and provide solutions in this field. In this research, in a selective manner, some important theories about deviances and delinquency will be examined.

Merton's Theory of Deviance

One of the theories which is under the effect of the view of social inorganization and view of functionalism about social damages and issues, is the anomy theory of deviant behavior and individual adaptation pattern proposed by Robert Merton.

Merton's theory is based on concepts such as "institutionalized objectives", "institutionalized devices", and functional relationships between them, overt and covert function, and adopted patterns (deviant behavior). The purpose of this view is to describe the appearance of individual adaptation methods (appearance of deviant behaviors or damages and social issues) based on heterogeneity between main constructs of the society which are "institutionalized objectives" and "institutionalized devices". According to Merton, institutionalized objectives are standard methods of action for achieving the objectives and values (Skidmore, 1996).

According to Merton, four types of "Ritualism", "Retreatism", "Innovation", and "Rebellion", besides "Conformity", are causes of situation of the society and contact of these two constructs, so that each of them is a specific method of individual adaptation with these two constructs (Tavassoli, 2001). Anyway, this theory can describe addiction to drugs in most societies such as Iran. Since value of being wealthy has grown in the recent years and ways of becoming wealthy have become intensely limited, drug trafficking has increased and resulted in many retreated persons who come to use drugs disappointedly (Karampour, 2000).

Theory of Normative Disorder

Normative disorder theory (Anomie) is mostly proposed based on Dorkim and Parsonz and generally based on functionalists. Normative dimension of the social structure in the society is of a high importance so that if disorder occurs in it, it can impair the sense of being united and integrated in the society and cause problems for the person with respect to behavioral pattern and strengthen anomie in the person, so that from this aspect, tendency to deviances such as addiction is inevitable. This disorder would appear in the society in different forms that will be mentioned in the following: 1.Polarization of norms: when two separate or opposite poles define norms for the person and population distribution is not normally based on normative pressure level, population distribution has two exponentials and instead of the majority, the minority of the society understand the normative average, normative polarization would be established. 2. Normative opposition: In some societies, members of the society are divided into two groups and each group is in a different normative environment and this issue results in appearance of two different sets of norms, in which average state norms might oppose the governing stage, today generation might oppose the previous one, or different groups might oppose each other, and besides this issue, there might be some groups which tend to deviances and promote immoral norms. 3. Normative instability: logical contradiction

between two or multiple norms in a normative system cause that each of the norms emphasize on a specific issue based on different sub-cultures and make the person encounter normative instability. 4. Normative weakness: when the sense of attachment and commitment towards norms is lower than the required average extent, and the necessary normative pressure does not exist, normative weakness would be established and in this situation, the person does not have the behavioral pattern required for action in the society and faces with serious problems in this field and even it is probable that the person does not accept some of the deviances like addiction to drugs. 5. Anomaly: Anomaly or anomie which refers to lack of norm in the society, is mostly specific for transient societies in which the person because of quick social and cultural changes accepts in no norm and this issue is the factor and intensifier of phenomena such as addiction (Rafeepour, 1999).

Konig (1976), in completing the theory of Dorkim, has focused on the relationship between poverty and deviant behavior and believes that poverty (without interfere of other factors) is mostly effective in the society as an stabilizing factor. But, if against poverty, ambitious wishes and images are provided, poverty cannot be tolerable anymore and the human tries to use every possible tool to get rid of poverty, whether it is legitimate and allowed or illegitimate and unallowed. Hence, deviant behaviors grow. Therefore, according to theories of Konig and Dorkim it can be noted that when in a society a quick economic growth occurs and following this event a group of people become wealthy and this wealth is demonstrated from different ways to poor levels of the society, the situation of social anomie establishes and threatens personal and social security and its development and continuity results in public dissatisfaction and so it endangers political security (Mahboobimanesh, 2010). On the whole, Iranian society is known to have disorder and weakness in the four primary dimensions. Such procedure makes every single Iranian person involved with anomie and it can be noted that in an anomic environment with normative disorder, existence and development of deviances such as addiction is inevitable.

Social Control Theory

Nai (1985), as the first theorist of social control, focused on relationship between family and delinquency (Ahmadi, 2005; P.110). Nai believes that the family which is filled with tense and disputes, can play an important role in deviant behavior of adolescents. In such families, adolescents do not conform to the society and the family (Momtaz, 2002;124). He believes that family has the following effects:

1. Interior supervision, 2. Indirect supervision, 3. Direct supervision, 4. Supplying the needs.

Differential Association Theory

This approach was first proposed by Edwin Sutherland in 1939. Differential association theory emphasizes on this point that those relatives and intimate friends who are delinquent, have a great effect on constitution and strengthen the attitude towards delinquency and tend the person towards delinquency. Differential association theory considers social content of the delinquency and also considers the delinquent in his social position with respect to his relationship with his family, zone of living, friends, and companions.

Sutherland, about the way of cultural transmission of deviance notes that deviance would be resulted through a social communication group that in fact reminds the term of "bad companion" (Abodollahi, 2004). Theory of Sutherland includes 9 characteristics which are as follows:

1. Offensive action is learnable, not inheritable. Meaning that until the person doesn't learn it, won't even think about doing it.

2. Learning occurs through communication of a person with other persons and often occurs verbally, and only in some cases might occur through facial movements.

3. Major part of learning delinquent behavior occurs in relationship with close groups which have intimate relationships with the person.

4. Learning delinquent actions has multiple stages:

A. Techniques of offence committing which are sometimes simple and sometimes complicated.

B. Directing the motivations, tendencies, interior desires, and justifying the offensive action.

5. Achieving motivations and tendency to show interior desires is a learnable issue. Not all people of the society have positive opinion about observing legal norms.

6. The person commits offensive action when he has more relationship with people who are more agree with breaking the law than having relationship with those who are not agree. This provision is in fact the basis of theory of Sutherland and regards the relationship between the delinquent and non-delinquent person (Sekhavat, 2006).

7. Frequency of association can be different in terms of times of association, duration, priority, and intensity. Meaning that the criterion is the extent the person associates with people with deviant behavior compared to the extent he associates with norm-respecting people.

8. Learning flow of deviant behavior through association includes all learning mechanisms which are necessary for any other behavior. Meaning that learning the deviance does not only include imitation.

9. While deviant behavior indicates general needs and values, it cannot be justified through the same needs and values, because normative behavior is also an indicative of needs and values. Attempt of some of the researchers to explain deviant behavior through needs and values such as the principle of happiness, looking for ambition, financial motivation, or being under pressure, cannot explain the deviant behavior, because the same needs and values also exist in normative behavior (Momtaz, 2002).

Sutherland's theory is one of the strongest theories in the field of appearance of deviances which so far has a great power of being explained. Sutherland, in the framework of his theory, believed that deviances are generally learnt in the primary groups such as the family or friends. These groups are much more effective than official authorities and agents such as teachers, priests, police agents, or mass media instruments such as movie or newspaper. According to Sutherland, learning procedure of delinquent behavior includes criminal techniques, and motivations, tendencies, and excusing which are necessary for it. Hence, a young person learns how to successfully commit robbing, and also how to reason to justify himself and make excuses for it (Rafeepour, 1999).

Various research have been conducted in Iran based on this approach, and associating with relatives and companions, colleagues, and specially deviant and addicted friends, imitating friends, associating in various and unhealthy environments such as school and inappropriate educational environments are considered as the main factors of addiction to drugs (Karampour,2000).

METHODOLOGY

Since this research is of a qualitative-descriptive type, it is necessary to determine the documents, evidence, ways, and methods used in this research and create a database from them.

One of the qualitative methods which have application in some of the branches of humanities is the "commenting method". Based on this method, content analysis is applied on sources and at the end, the researcher, by using various interpretations and commentaries, documents the obtained information. In this research, books and papers related to social deviances in Iran have been considered and analyzed. First we have considered and analyzed the papers. Since analysis of all papers is impossible, so in the present paper some papers have been selected to be considered and analyzed.

There are 15 examples of the elite research, 11 number of them used Survey method, 3 number of them used Comparing method (Causal-comparative), and the last one used descriptive method. Data collecting method in 12 questionnaires was self-reporting and the rest of the questionnaires were along with interview. Therefore, it is determined that the type of research method and specific method of collecting the information has a holistic aspect and in line with collecting the quantitative information, is appropriate for statistical analyses. Generally, in this research, in the framework of dependent variables, items such as the extent of offences of social deviances (delinquency), rioting or tending to it, breaking norms, extent of conformity of adolescents to general values and norms of the society, inconsistent behaviors, aggressive behaviors, robbery, destroying public property, public inconformity, and etc., and also in the framework of independent variables, factors such as alienation, individual anomaly, relationship of the person with deviant groups, being drifted apart, cultural, economic, and social base of the family, belonging to poor urban zones, family type (patriarchal or equalitarian), family structure (appropriate or inappropriate), and etc., have been discussed and analyzed. Among the 15 elite research, 6 number of them were conducted by women and 9 number of them were conducted by men. These research were all conducted between 2001 to 2014.

RESEARCH FINDINGS

Poverty and Social Deviances

In sociology, poverty is usually defined as not responding to fundamental needs of the human sufficiently (Rach, 1976;15). Dorkim and after him Merton believe that in case of rise of sudden economic crises or quick economic growth, the society undergoes social chaos and anomaly or anomie situation occurs. This situation tends individuals towards conducting deviant behaviors such as committing suicide. According to existing statistics about people who have committed suicide, the relationship between poverty and suicide is of the relatively high correlation. The research conducted in some deprived regions of the country such as Ilam by some experts in this field, indicate that, promotion of this phenomenon in poor regions is more than other regions (Mohseni Tabrizi, 1993). Of course, studies conducted by some scientists about this relationship indicate that suicide is common among all stages of including poor or rich ones. Much evidence indicates that the poverty alone does not have any problem for the society and does not cause any special damage to it. For instance, during the war of Iran and Iraq, there were many deprivations for people, but in spite of that, not only noticeable contributions were made to fronts even by poor levels of the society, but also poverty and deprivations didn't have such manifestation and our social system was very solid (Rafeepour, 1997).

Family and Social Deviances

A child after the birth, learns norms and values from family and by the family moves in the path of accepting the culture and becoming social. In fact, family plays an important role in training the child and his personality and moral characteristics. Unfortunately, in our today society, the extent of offences, social anomalies and deviances, especially among young people, is intensely increasing. This is while countries such as Singapore, by applying a calculated and exact plan, find negative origin of offences. The more important issue is that in this field, the role of family is being less regarded. Interior pressures, dissolution of families and frustration in the most sensitive age which is adolescence and puberty, causes deviation of the person. In fact they have become victims of desires and decisions of their parents. Emotional problems and inappropriate life situations are of the results of inattention of parents to situation of their children and their tendency to delinquency. For instance, Kowsari (2001), in his research under the title of "Sociology of addiction" in determining its social origin, names living in deprived regions, intense poverty, ruined domiciles, families torn apart, and other problems as the set of factors which cause deviant behaviors, and also believes that addiction has many negative effects on living level of people. For instance, divorce can be considered as one of the results accompanying addiction.

Delinquency of the youths

Cohen (1955) believes that paying attention to sub-cultures in defining delinquency of the youths is of a high importance, since modern societies have been constituted with different sub-cultures, and a behavior that in a specific position of sub-culture is known as a normative behavior, in another position of sub-culture might be considered as a deviant behavior (Ahmadi, 1998). Sub-culture of the delinquent youths is not the only set of rules, but it is a type of living that its norms are different with norms of the society, and even are in an opposite position (Baniasadi, 2004). Cohen emphasizes on this point that offences of adolescents is different from those of adults and offences of adolescents shall be studied separately. Cohen in studying the youths in the natural environment of life notices that their offences are different with adults from three aspects, though these differences do not include all offences or crimes of the youths. Such differences are such as being non-materialistic, having a sense of holding grudge and anger, and denying social norms (Haman, 27).

Investigating reasons of delinquency of adolescents of Mashhad in 1997 indicated that inappropriate situation of the family and its dissolution, bad behavior of parents, and inattention to needs of the adolescents, result in escape of the child from the family and his fall into trap of nefarious friends and being in an inappropriate environment, and finally result in anomaly and deviant behavior in the society (Sarabandi, 1997).

Another research conducted in the field of social deviances of adolescents and the youths, indicate that there is a significant relationship between method of arbitrarily parenting, religious extent of parents, type of associating parties of responders, and the dependent variable (tendency to addictive substances). However, the relationship between the other four variables (democratic parenting method, extent of inappropriateness of family situation, extent of using leisure time, and migration) and tendency of adolescents and the youth to addictive substances is not significant (Mousanejad, 1999).

Variable of Age

Extent of contact of individuals with deviant friends; membership in delinquent groups; inconformity degree existing in the environment or reference group of the adolescents; the time adolescents spend with their friends walking in the street; status of friend groups with respect to their age; criminal record; criminal conviction; being a fan of smoking; number of imprisoned friends; number of addicted friends; encouraging friends of the individual to

commit offence; and friendship with individuals with the opposite sex, are of the variables considered in this research.

In some of the conducted research, a significant relationship is observed between age and abnormal behaviors. Meaning that low-aged groups or adolescents and the youths, more than other age groups, have abnormal behaviors or violate from social norms and values. In fact, the more age of people increases, their law-breaking tendency decreases, or in other words, by increase of the age, individuals become more law-oriented. This relationship has been confirmed in most conducted research.

According to one of these research in the field of increase of marriage age and inattention of parents to issues of the youth, from the view of frequency distribution and percentage of clients (Department of interfering in crisis and office of reception and quarantine of north for Well-being organization of Tehran), age of majority of clients of this department is between 16 and 21. In a research which was conducted with the purpose of investigating "factors causing women tend to prostitution", on 147 prostitutes including girls and women, it has been indicated that 62% of them started doing this when were between 13 to 20 years old which is the adolescent age and primary ages of being a youth, and 69.3% of these girls noted that their reason was not having appropriate conditions for marriage and inattention or opposition of parents with their marriage. In other words, these girls because of lack of appropriate conditions for marriage, had to satisfy their needs from illegitimate ways. Close relationship between increase of age of marriage, or in other words inattention of officials and families to marriage of the youths, and sexual deviation, not only in this research, but are reported in other research.

CONCLUSION

Mary scientific research and efforts have been made to solve this problem of the world (social deviances). But, what everyone unanimously believes in is that most of these deviances are due to ignorance and unawareness and its only solution is to make public awareness in two socialization and acculturation methods. But, the second method is more helpful and functional, though in western societies acculturation method is not possible or performing it is very difficult, because its only factor is family that has lost its authority today.

This research, by descriptive-content analyzing the research related to social deviances in the society of Iran in years 2001 to 2014, has tried to identify the reasons of delinquency and deviant behavior.

Results of the present research indicated that existence of children, age, and social situation of children would have positive effect on occurrence of deviances and social damages. Also based on the research studied in this research, associating with relatives, colleagues, and especially addicted and deviated friends, imitating friends, living in different and unhealthy environments such as school and inappropriate educational places, are named to be the main factors of addiction to drug abuse.

In majority of this research, family is introduced as the rescue factor of social deviances that to a large extent can solve the problem. If the family, in its parenting style applies two strict and simple methods of parenting, the society will observe numerous anomalies that official control agencies in the society don't have the power to cope with them. However, if the family considers strict method, will provide the society with acculturating children that reduction of offence statistics and anomalies is one of its outcomes.

Also these researches have indicated that there is a significant relationship between age and abnormal behaviors, meaning that low-aged groups or adolescents and the youth have abnormal behaviors more than other age groups or violate from social values and norms more than others.

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RESEARCH ARTICLE

Sexual Violence against Women

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ABSTRACT

Sexual violence against women is the most common type of human rights violation, is considered as a public crisis, and is also known as an obstacle for equality, growth, security, and peace. This term refers to all harms and abuses against women, violations due to sexual discrimination, traditional beliefs with respect to sexual role of people, and that women shall obey men in the society. This research is a qualitative study with approach of content analyzing. The process of data collecting includes 9 semi-structured interviews with women who had been victims of violence. Analysis of the data resulted in extraction of 7 subjects which indicate experience of women about economic, social, and cultural factors which are effective in sexual violence against women. and it was also concluded that these factors are effective in ruining family life and rise of sexual violence. It seems that in order to prevent from this problem and control it, we should make public awareness and improve the public approach towards the real position of woman in the Islamic society and improve financial issues of needy families.

Key words: Violence against women; sexual violence; mental violence; economic, social, and cultural factors

INTRODUCTION

Sexual violence against women is an event in which women are forced by men because of their sex (Ghalibaf, 2009). A great portion of the research indicate that there are differences in occurrence of violence against women which are due to unique cultural factors. Hence, differences in culture, whether they are based on geographical district,

international territories, religion or nationality, have caused differences in the attitude towards violence against women (Nayak et al., 2003).

In a general definition of violence it can be said that: "Violence refers to illegal and incorrect abuse of power which is a type of illegal forcing against freedoms and general rights and in relation with aggressive offences it refers to offences with intense physical or sexual aspects and this characteristic is known as an offensive feature and construct of the action in cases such as murder, rape, or beating" (Mohammdi Asl, 2008).

Primary examinations about domestic violence used to consider physical violence, but by elapse of time other types of domestic violence such as psychological, economic, social, etc., were taken into consideration by sociologists and psychologists (Abot P,Wales K.2002). Lisley (1988) has proposed the following definition for sexual violence: "Any kind of physical, visual, verbal, or sexual action that the girl or woman in time of its occurrence or after that, feel it as a threat or intimidating attack which result in her sadness or humiliation or disable her from having close and intimate relationship" (Abut & Wallace, 2001).

Domestic violence in its most complicated form is considered as an strong tool of oppression. Violence against women in a family, to the extent it causes intense physical damages, it endangers psychological health of the woman. Unfortunately, because of privacy of domestic places in various societies, there is not an exact and valid statistics regarding frequency and percentage of the violence including wounds (from cutting to breaking and damages to internal organs of body), unwanted pregnancy, and sexual transmitted diseases (Cocer, Crown, and King, 2000). Therefore, it should be considered that when right of the woman in the role of spouse, in the safest social institution which is the family, is being trespassed and safety and peace are replaced with fear and unsafety, identity of the woman will be impaired and her confidence will be changed into sense of humiliation and worthlessness, and this is obvious that such woman would never be able to play her managerial and educational role and cannot change the family environment into an energetic and warm place (Johnson & Sidney, 2000).

According to the report of the World Bank, 19% of total of diseases of women between 19 to 44 years old in industrial countries is related to domestic violence and rape (Nojomi et al,2007). Sadeghi Fasaei and Rajab Larijani (2011), in their paper with the title of "Empowerment strategies of women against sexual harassments in work place", have deeply interviewed with 82 working women in Tehran by applying a qualitative method. According to this research, most of the women, in order to cope with sexual harassments, prefer to remain silent, tolerate the situation, or leave the place, that in most cases it won't result in putting an end to the disturbances. Strengthening the self-confidence, holding training programs for working women, attendance of supporting managers, and strengthening the unity among women are suggestions of authors for empowerment of women against disturbances.

Theoretical Framework

Feministic Approaches:

All feministic approaches consider violence against women in a wide context which refers to inferior position of women against men. Feminists believe that whatever that results in fear and terror of women, shall be considered through a control basis that men own on behavior of women. Feministic theories shall be considered based on social conditions. Today radical feminists have a greater emphasis on ability of women in finding ways of conforming and becoming united with each other. The value of this theory bases on how women rely on their intrinsic features, wisdom, and common experiences against oppression. Being able to have a unanimous understanding of having practical power, provides them with sense of power and hope to change some things (Brigman, 2011).

They believe that in a general concept, sexual violence is not limited only to physical harassment of the victim and it also includes spiritual damages due to commitment of actions against nature of humanity. The fact that the person is not deeply and naturally satisfied with giving sexual services and commits it only as a result of economic obligation, or force of man, or abuse of drug, is considered as an evident example of violence (Harridan, 2003).

Therefore, feminists should consider that prostitution and trafficking of women and girls for sex and sex tourism are evident examples of violence against women, and governments shall take practical actions to supply economic, social, and cultural needs of the victims and people in danger of being harassed, and punish traffickers, agents, and brokers. The fact is that focusing on political law has made theorists to ignore the most important issue of the current age which is change of women into a product for satisfying the men.

Genetic Descriptions

Some of the recent research indicate that young men have a higher tendency to have different sexual partners and lower tendency to have a continuous relationship with a certain person and not having rival. However, opposite of this feature is claimed for young women (Shackelford, et al, 2005). Sometimes this approach has also been proposed that men who have problems in finding sex partner whether legitimate or illegitimate, tend to sexual offences more than others (Ellis, 2000). Some theorists have mentioned to genetically courage of men, so that it might appear in the form of violence and be effective in commitment of offences such as spouse killing (Daly & Wilson, 1982).

Although the aforementioned claims have not been practically and completely proved, a relationship can be made between a number of social and biological facts: Man is more strong and courage and woman while being physically weaker, has some psychological and physical features such as ability to show off (based on sex) and disturbing the sexual partner, which can be effective in creation of some violence.

Personality of Victim of Violence

Specifically, in domestic sex violence, the female mostly tends to sexual satisfaction, but for reasons such as a grudge, saying taboo, or insulting from past time, might be sexually harassed or herself might commit sexual violence. In cases that the relationship is not legitimate in terms of conscience, the victim of violence becomes intensely sad or fears from its consequences, and this would intensely affect her subsequent actions or reactions. Showing off or provoking the partner which has direct relationship with personality of the victim and culture of the society or deviated groups, is considered as another factor of creation of violence. In terms of personality, those victims who themselves provide the grounds for sexual violence, are mostly single girls, divorced women, and wives who have had less moral commitment in their lives (Barnett & Hamberger 1992). Regardless of passive state of the offence victim, offensive personality of those who are in danger of committing sexual offences is mostly under the effect of illegal media advertisement of models, dances, and prostitutes who apparently enjoy having illegitimate and limitless affairs. Readiness of the victim of offence for accepting violence might be because of great economical need (Fajnzylber et al, 2000).

RESEARCH METHOD

This research is a qualitative content analysis and is the type of heuristic studies. In using the documents and texts, content analysis method, and in completing it, interview methods were used. Sampling method of this research was conducted by considering features such as marital status, education level, employment, being housewife, and economical status. In this line, a degree of flexibility was also considered, because by starting the project, the researcher may consider other variables as important.

In this research, 9 women who had been victims of violence were considered. 7 women among these people were residing in cities and 2 others were residing in villages. Average age of these women was 27 years old and their oldest and youngest ones were respectively 35 and 19 years old. These people were selected using objective-based sampling method. Subject were selected while considering maximum variety of the data until data saturation was resulted, meaning that in fact no new concept was established and all conceptual levels were completed. To collect the data of this research, semi-structured, interactive, and deep interview were conducted individually. Some guiding questions were used in the interview which constituted only a primary framework for initiating the interview and were developed during the interview. Guiding questions of the interview were as follows:

How many times sexual violence has been occurred to you? 2. What was your reaction to violence? 3. Are your relatives aware of physical violence of the man at home? 4. In case of affirmative answer, what was their reaction? 5. Explain a situation when you felt that you had been victim of violence more than ever before. 6. What was the effect of such physical violence in your life? By progress of the study, interviews were guided based on the questions and the researcher continued asking questions by considering cultural and social conditions.

Date analysis was conducted in a qualitative content analysis form and using a contractual approach. It was attempted to have the highest homogeneity inside the stages and the most non-homogeneity between the stages. Classification was conducted by considering separate codes and repeatedly reviewing and merging similar codes to produce the main codes. Finally, researchers and participants reached a joint agreement about meaning of the data and what was indicated in the form of main and secondary stages, content, and their name. Extracted codes and stages were investigated and discussed in order to correct the codes and add new codes.

In order to make sure about validity and reliability of the data during the study, methods such as reviewing participants were used in order to confirm the authenticity of the data and codes extracted. The analysis unit in this research is the implication. Of the implications extracted it seems that the personality of the offence victim and mass media, are the nature and meaning of findings in this research. Also, by analyzing the handwriting texts about views of women undergone violence towards economic, social, and cultural factors which are effective in violence, the following implications were extracted which are as follows:

Financial poverty and lack of a safe domicile

One of the other main reasons deducted from interviewing with people in the study, is their lack of financial ability in affording their living. This issue is mostly true about divorced women who have participated in this interview and also two other single ones. These people mentioned financial poverty and lack of a safe domicile as their most important reason. For instance, one of these divorced women stated that after separating from her husband in order to supply the needs of her child, she had to do this, and in order to justify her work she said she knows prosperity of her child more important than her own life (participant No.8).

Personality of Victim of Violence

Since sexual relationship in the first instance is considered in the classification of human desires and not in the classification of offences, in most cases, victim of offence, at least before rise of violence, creates sufficient motivation for the offender (Barnett & Hamberger, 1992). One of the interviewed subjects who was a divorced woman, explained her experience of sexual violence as following: "I didn't have a good experience of sexual relationship in my married time and always my husband used to force me to have sex with him, while in that time I had no desire of doing so. So having a good sexual relationship had become a big complex for me" (Participant No.1).

Satisfaction of sexual and emotional excitements and desires

Satisfaction of sexual needs occurs in multiple levels: Fist level is having a verbal relationship. Some people attempt to respond this need by having a verbal relationship even from an unpleasant and incorrect way. The higher level of satisfying sexual needs is having physical contacts, which its deviated form manifests as physical disturbances. The person who tries to have a relationship but is faced with negative response of the other party, can easily become a disturber.

Currently, because of change of living patterns in the society, a gap is created between sexual maturity and marital maturity. By increasing marriage age, because of necessity of completing educations, completing compulsory military service, not finding an appropriate job, lacking a domicile, and etc., a part of natural needs are remained with no response and since they cannot be answered reasonably and legitimately, they would be manifested in an abnormal manner and in the form of sexual harassments. Also a part of street disturbances are made by those who are not able to satisfy their emotional and sexual needs in their family. Accordingly, some researchers believe that besides the term of street women we shall also consider the concept of street men.

Fear of extreme reaction of relatives

Most women participated in this interview, because of fear of extreme and aggressive reaction of their relatives towards them, prefer not to explain the story of their sexual harassments for their father, brother, or spouse, and of course this mistake in most cases result in their pessimism. Women and girls should learn to explain their sexual disturbances and harassments for their families. Of course, on the other hand, the family members should also be taught the necessary trainings to take a reasonable and appropriate reaction in responding to the phenomenon of disturbance. "Now how can I look at my family? I cannot live in that house anymore!" (Participant No.2).

Modesty and preserving the respect

The main reason that women remain silent is to preserve their respect. "I even don't dare to tell this issue to my family (Participant No.4). Above all other reasons, that the sexual issues are considered as a taboo in our society, causes such issues to remain silent. Modesty of women prevents them from explaining such events which mostly have sexual nature including taboos and unpleasant sexual behaviors that the offender has done. In most cases, the victims prefer to keep the event covered and remain silent. "If my neighbors know this fact, then no respect would be preserved neither for me nor for my family (Participant No.5 and 9). Then, most interviewed individuals are afraid of this issue to be disclosed.

Mass media

Most researchers believe that free advertisement of prostitutes and prostitute viewing in Internet and satellite channels as the main factor of trespassing on sexual rights of women who don't have any desire to execute their content under pressure of their sexual partner (Brownmiller, 1975). Participant No.7 explains the reason of her experience of sexual violence as following: "First I became familiar with a man through the Internet and after having a short-term friendship it resulted in an illegitimate relationship".

New communication devices such as satellite have entered cultural and social areas and have their certain messages including sexual and violence messages. In this regard, one of the participants said that she often watches aggressive movies and after a while she imitates their savagery (Participant No.6).

DISCUSSION AND CONCLUSION

Sexual violence has been ignored in most societies, since the social reaction which exists towards violence and sexual issues, make the woman to remain silent. In this research also one of the negative effects in people undergone sexual violence, is to fear of the social reaction towards themselves. Sexual violence as one of the impairing factors of sexual health which is of the rights of women, must be highly considered by most authorities of health cares. According to fertility laws, women have the right to experience a safe and pleasant sexual relationship, not a relationship accompanied by force and threat (Tavara et al, 2006). Suzan Brown Miller, in her theory with the title of "Sexual assault and anxiety of women" states that: All western women are victims of assault, since women who have never been assaulted so far, suffer from anxiety like those who have been assaulted. She considers "Sexual assault" as a component of manly threat system which makes all women fear. Brown Miller, in her theory, proposes a list of things to do and things not to do for women who try to reduce the risk of being assaulted (Gidenz, 2000).

The study conducted by Coker et al. (2000) in South Carolina indicated that addiction to alcohol and drugs has strongest relationship with rise of violence. In our research also addiction was mentioned among the reasons for domestic violence against women.

Lacking appropriate social supports was of the other findings of this research. Dinan (2004) has mentioned the effect of social support in reducing social damages. Several evidence indicate that availability of supporting sources is one of the main components of compatibility with stress, especially in cases of behavioral abuse. One of the other results of this research is that some of the interviewed individuals know themselves as the main factor in creation of sexual violence, which is consistent with approach of Dr. Delacosta in the group work report of victims of offence, so that sometimes such women had roles in making themselves as victim.

Ahmadi et al (2008) believe watching aggressive scenes in the media can result in learning and promoting domestic violence against women in the society and have effects on psychological and spiritual health of families. Though in this research only a number of participants mentioned this issue, it seems that because of gradual and calm effects of the media on beliefs, behavior, and performance of people, this issue can be justifiable (Ahmadi B, Nasseri S. 2008).

One of the negative legacies of sexual violence is creation of individual damages. The most important individual damages that the interviewed subjects had experienced are as follows:

1. Reduction of occupational or educational performance of the victim of offence due to stress of fear of reoccurrence of disturbance,
2. Distributing rumors about the victim of offence and labeling her,
3. Hurting the personality and identity of the victim of offence,
4. Distrust and feeling disgust at offenders,
5. Physical problems such as blood pressure, headache, digestive disorders, disorder in sleeping or eating,
6. Feeling weakness and humiliation and losing confidence and motivation and even feeling disgust from being a woman,
7. Depression, anxiety, and apprehension,

As findings have indicated cultural, social, and economic conditions and factors play a noticeable role in establishing the ground and intensity of sexual violence against women. Although great changes have been occurred on mass media devices, economic bottlenecks have also been effective in increasing sexual violence.

In order to reduce sexual violence against women, supporting systems have a remarkable role for families and especially for men and considering regional differences, and cultures in the families. Supporting systems, whether

their official type such as consulting centers or unofficial type such as large scale of family and relatives, must not be lost in complicated layers that the economic conditions and modernity disaster has created. Therefore, strengthening support systems and controlling cultural conditions seem to be necessary for reducing violence and stabilizing the family.

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RESEARCH ARTICLE

A Micro Controller Based Soft Switched Single Phase Grid-Tied Inverter

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ABSTRACT

This paper represents a soft switched PWM inverter topology based on (Jiang, et al. 2011) and a novel control strategy using microcontrollers. Main switches operate at zero-voltage-switching (ZVS) turn-on and turn-off while the auxiliary switches operate at zero-current switching (ZCS) turn-on and turn-off as a result, commutations of main and auxiliary power switches have lower losses furthermore higher efficiency is achieved. The proposed microcontroller based grid-tied inverter is analyzed theoretically and demonstrated experimentally.

Key word: dc-ac power converters, soft switching, zero current switching, zero voltage switching, and grid-tied inverter

INTRODUCTION

Grid-tied inverters for renewable energy generating systems are exponentially increasing and developing rapidly. Due to the limited availability of fossil fuels moreover the increasing global electrical energy demands the renewable energy resources such as solar energy or wind energy etc. are the most preferable solutions in these cases. Most renewable energy resource systems have a significant disadvantage since their produced power is unregulated and discontinuous. In order to convert discontinuous and unregulated output power from renewable energy resources to useful electrical network voltages, grid-tied inverters are used. Various converter topologies and inverter schemes have been proposed for a single phase grid-tied inverters (Jiang, et al. 2011; Prasanna, Adams, 2013; Batzel, Rathore, 2013) Soft switching techniques are used significantly to decline switching losses of power switches (Li, 2007; Jain, 2008; Todorovic, 2008; Rathore, 2008)

A lot of soft-switched inverters have been proposed in the references (Divan,1989; Katsis, 1997). The purpose of soft-switched inverters is to decline switching power losses and electromagnetic interference (EMI) more than that of traditional hard-switched inverters. Soft-switched inverters are mostly divided into two categories: resonant link inverters (Divan, 1989; Xiangning 2006) and resonant pole inverters (MeMurray,1989; Katsis, 1997) The resonant link inverters have a significant disadvantage since they have a high voltage or current stress on power switches. However, the resonant pole inverters do not suffer from those drawbacks. The auxiliary resonant commutated pole inverter (ARCP) (MeMurray, 1993; Donker, 1990; Lai, 1996), is a family of mentioned soft-switched inverter types (Jiang, et al. 2011).

In this paper a soft-switched grid tied inverter which is identical to inverter topology proposed in literature (Jiang, et al. 2011) however the novel control strategy which is using microcontrollers moreover different from control method mentioned in reference (Jiang, et al. 2011) In the proposed grid-tied inverter the main switches operate at zero-voltage-switching (ZVS) turn-on and turn-off while the auxiliary switches operate at zero-current switching (ZCS) turn-on and turn-off as a result, commutations of main and auxiliary power switches have lower losses furthermore higher efficiency is achieved. The power converter presented in this paper implements a type of grid-tied topology and a novel control strategy using microcontrollers. The topology reaches high efficiencies with its continuous constant power operation, zero-voltage switching (ZVS) capability for main power switches and zero-current switching (ZCS) capability for auxiliary power switches.

Proposed topology for control strategy

The block diagram and circuit schematic in Fig. 1 depict the power circuit topology and control block diagram which consists of two AVR-ATMEGA 16 microcontrollers and associated driver circuits to drive the gate of power devices. By using zero voltage switching of main power switches moreover zero current switching of auxiliary power switches the power losses associated with this impact can be greatly declined. This study shows that this approach has high efficiency furthermore in contrast with traditional converters the algorithms for maximum power point tracking (MPPT) in photovoltaic converts, grid synchronization and islanding detection methods can extensively be used within this proposed grid-tied inverter. As shown in Fig. 1, the right hand microcontroller and that's associated driver is used to drive the left half bridge leg of inverter. First, the grid voltage is sampled using a zero cross detecting circuit which is an opt-coupler with associated circuit elements. The sampled grid voltage is entered to the analog to digital pin of the microcontroller. Then, the microcontroller generates two pulses which are synchronous to the main power grid voltage furthermore these two pulses have enough delays to maintain zero voltage switching (ZVS) conditions for main power switches in left half bridge leg of inverter. On the other hand, the left hand microcontroller and that's associated driver is used to drive the right half bridge leg of inverter furthermore the auxiliary resonant pole power switches. Generated pulses of the microcontroller are such that they maintain zero voltage switching conditions in the right half bridge leg of inverter moreover zero current switching conditions within auxiliary resonant pole power switches. To make it clear with more details the theoretically waveforms of generated waveforms from microcontrollers also description of operation modes of proposed grid-tied inverter is more discussed at the following sections. Fig. 2 illustrates gate pulses applied to power switches M_1 and M_2 respectively. It should be mentioned that these gate pulses generated using microcontrollers are inverted then applied to driver circuits moreover appropriate delays are set up to ensure zero voltage switching conditions.

The frequency of the generated pulses is equal to the grid voltage frequency i.e. 50 Hz and that is synchronous to the main network. Fig. 3 depicts gate pulses applied to power switches M_3, M_4, M_5 and M_6 respectively. Similarly, the gate pulses generated using microcontrollers are inverted then applied to driver circuits. The frequency of the generated pulses is 10 kHz.

Fig. 4 illustrates operation modes of the proposed grid-tied inverter. In mode I, the switches M_2 and M_6 are on and other switches i.e. M_1, M_3, M_4 and M_5 are off. In this mode the following differential equation is satisfied:

$$\frac{1}{C_5}\int_0^{t_1} i\,dt + L_1\frac{di}{dt} + L_2\frac{di}{dt} + \frac{1}{C_{20}}\int_0^{t_1} i\,dt = V_{dc} \qquad (1)$$

In mode II, the switches M_2, M_3 and M_6 are on and other switches i.e. M_1, M_4 and M_5 are off. In this mode the output current is calculated as follows:

$$L_2\frac{di'}{dt} + \frac{1}{C_{20}}\int_{t_1}^{t_2} i'\,dt = V_{dc} \qquad (2)$$

$$i_{total} = i + i' \qquad (3)$$

In mode III, all switches are off and we have the following equation:

$$L_2\frac{di}{dt} + \frac{1}{C_{20}}\int_{t_2}^{t_3} i\,dt = V_{dc} \qquad (4)$$

In mode IV, the switches M_1 and M_5 are on and other switches i.e. M_1, M_3, M_4 and M_5 are off. In this mode the following differential equation is maintained:

$$-\frac{1}{C_6}\int_{t_3}^{t_4} i\,dt - L_1\frac{di}{dt} - L_2\frac{di}{dt} - \frac{1}{C_{20}}\int_{t_3}^{t_4} i\,dt = V_{dc} \qquad (5)$$

In mode V, the switches M_2, M_3 and M_6 are on and other switches i.e. M_1, M_4 and M_5 are off. In this mode the output current is calculated as follows:

$$-L_2\frac{di'}{dt} - \frac{1}{C_{20}}\int_{t_4}^{t_5} i'\,dt = V_{dc} \qquad (6)$$

$$i_{total} = i + i' \qquad (7)$$

In mode VI, all switches are off and we have the following equation:

$$-L_2\frac{di}{dt} - \frac{1}{C_{20}}\int_{t_5}^{t_6} i\,dt = V_{dc} \qquad (8)$$

Output transformer primary and secondary voltage waveforms are shown in Fig. 5 furthermore to depict soft switching conditions, drain current, drain to source voltage and gate pulse waveforms of power switches M_1, M_3 and M_6 are illustrated in Fig. 6, Fig. 7 and Fig. 8 respectively. Zero voltage switching is maintained for M_1 and M_2 power switches however zero current switching is provided for power devices M_3, M_4, M_5 and M_6. As shown in the simulation study, the proposed topology and control strategy is very successful to maintain soft switching conditions

for power switches therefore commutations of main and auxiliary power switches have lower losses furthermore higher efficiency is achieved.

RESULTS

To illustrate the performance and functionality of the proposed grid-tied inverter as described in this paper, a prototype platform has been designed furthermore a photograph of the proposed converter can be seen in Fig. 9 furthermore, the transformer primary voltage waveform which has been extracted using a digital oscilloscope is depicted in Fig. 10.

The driver IC (IR2101) is used for driving gates of power MOSFETs (IRF840). Microcontrollers' C codes are provided in Appendix.

CONCLUSION

The grid-tied inverter design and implementation presented in this paper has demonstrated a novel topology and control strategy using microcontrollers. In addition, the proposed inverter maintains soft-switching ZVS turn on and turn off for half bridge leg of power devices however they include soft-switching ZCS turn on and turn off for other power switches. Simulation results using ORCAD software have been presented to validate the proposed analysis and design. The presented prototype verifies of the functionality and performance of the design and analysis. Experimental results show the accuracy of the analysis and high performance of the proposed topology and control strategy.

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APPENDIX

Right Microcontroller:

```
#define MX_AVR
//Defines for microcontroller
#define MX_AVR
#define MX_EE
#define MX_EE_SIZE 512
#define MX_SPI
#define MX_SPI_B
#define MX_SPI_SDI 6
#define MX_SPI_SDO 5
#define MX_SPI_SCK 7
#define MX_UART
#define MX_UART_D
#define MX_UART_TX 1
#define MX_UART_RX 0
#define MX_MI2C
#define MX_I2C_C
```

```
#define MX_I2C_SDA 1
#define MX_I2C_SCL 0
#define MX_PWM
#define MX_PWM_PORT PORTD
#define MX_PWM_CNT 2
#define MX_PWM_TRIS1 DDRD
#define MX_PWM_1 5
#define MX_PWM_TRIS2 DDRD
#define MX_PWM_2 4
#define MX_PWMTYPE 1

//Functions
#define F_CPU 4000000UL
#include <stdlib.h>
#include <stdio.h>
#include <math.h>
#include <avr\io.h>
#include <avr\interrupt.h>
#include <avr\eeprom.h>
#include <avr\wdt.h>
#include <MX_util\delay.h>
#include <MX_util\bit_cmds.h>
//Configuration data
#pragma DATA 0x0, 0xdf
#pragma DATA 0x1, 0xff
//Internal functions
#include "C:\Program Files\Matrix Multimedia\Flowcode AVR V4\FCD\internals.h"

//Macro function declarations
//Variable declarations
volatile double FCV_INPUT;
volatile char FCV_IN1;

//Defines:
/**** Macro Substitutions ****
0 = Which ADC Channel
40 = Acquisition time
3 = Conversion Speed
0 = VRef+ Option
500 = VRef Voltage x 0.01V
*****************************/

//ADC(0): //Macro function declarations
```

```
static void FCD_ADC0_SampleADC();
static char FCD_ADC0_ReadAsByte();
static short FCD_ADC0_ReadAsInt();
static float FCD_ADC0_ReadAsVoltage();
static void FCD_ADC0_ReadAsString(char* FCR_RETVAL, char FCR_RETVAL_SIZE);

//ADC(0): //Macro implementations

static void FCD_ADC0_SampleADC()
{
                #define MX_ADC_CHANNEL          0
                #define MX_ADC_SAMP_TIME    40
                #define MX_ADC_CONV_SP          3
                #define MX_ADC_VREF_OPT         (1 - 0)

                char dda;
                volatile char cnt;

                dda = DDRA;

                //turn selected ADC on
                DDRA &= ~(1 << MX_ADC_CHANNEL);
                ADCSRA = (1 << ADEN) | MX_ADC_CONV_SP;
                ADMUX = (MX_ADC_VREF_OPT << REFS0) | (1 << ADLAR) | MX_ADC_CHANNEL;

                //wait the acquisition time
                cnt = 0;
                while (cnt < MX_ADC_SAMP_TIME) cnt++;

                //begin conversion and wait until it has finished
                ADCSRA |= (1 << ADSC);
                while(ADCSRA & (1 << ADSC));
                DDRA = dda;
                #undef MX_ADC_CHANNEL
                #undef MX_ADC_SAMP_TIME
                #undef MX_ADC_CONV_SP
                #undef MX_ADC_VREF_OPT

}

static char FCD_ADC0_ReadAsByte()
```

```
{

		FCD_ADC0_SampleADC();

		return ADCH;

}

static short FCD_ADC0_ReadAsInt()
{

		int iRetVal;

		FCD_ADC0_SampleADC();

		iRetVal = (ADCL >> 6);
		iRetVal |= (ADCH << 2);
		return (iRetVal);

}

static float FCD_ADC0_ReadAsVoltage()
{


		int iSample;
		float fSample, fVoltage, fVperDiv;

		#define MX_ADC_VREF_V			500

		iSample = FCD_ADC0_ReadAsInt();
			//Read as 10-bit Integer

		fVoltage = iSample * (float)MX_ADC_VREF_V / 102300.0;			//Find voltage by
multiplying sample by resolution

		#undef MX_ADC_VREF_V
		return (fVoltage);

}

static void FCD_ADC0_ReadAsString(char* FCR_RETVAL, char FCR_RETVAL_SIZE)
{
```

```
		float fVoltage;

		fVoltage = FCD_ADC0_ReadAsVoltage();
		FCI_FLOAT_TO_STRING(fVoltage, 2, FCR_RETVAL, FCR_RETVAL_SIZE);	//Convert to
String

}

//Macro implementations

int main()
{

	//Initialisation
	MCUCSR=0x00;
	wdt_disable();

	//Interrupt initialisation code

	//Loop
	//Loop: While 1
	while (1)
	{
		//Call Component Macro
		//Call Component Macro: input=ADC(0)::ReadAsVoltage
		FCV_INPUT = FCD_ADC0_ReadAsVoltage();

		//Decision
		//Decision: input > 1.0?
		if (FCV_INPUT > 1.0)
		{
			//Output
			//Output: 1 -> D7
			DDRD = DDRD | 0x80;
			if (1)
				PORTD = (PORTD & 0x7f) | 0x80;
			else
				PORTD = PORTD & 0x7f;

			//Output
			//Output: 0 -> D6
			DDRD = DDRD | 0x40;
```

```
if (0)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;

//Delay
//Delay: 7 ms
delay_ms(7);
//Delay
//Delay: 500 us
delay_us(255);
delay_us(245);
//Output
//Output: 1 -> D6
DDRD = DDRD | 0x40;
if (1)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;

//Output
//Output: 1 -> D7
DDRD = DDRD | 0x80;
if (1)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;

//Delay
//Delay: 2 ms
delay_ms(2);
//Delay
//Delay: 500 us
delay_us(255);
delay_us(245);

//Output
//Output: 1 -> D6
DDRD = DDRD | 0x40;
if (1)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;
```

```
//Output
//Output: 0 -> D7
DDRD = DDRD | 0x80;
if (0)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;

//Delay
//Delay: 7 ms
delay_ms(7);
//Delay
//Delay: 500 us
delay_us(255);
delay_us(245);
//Output
//Output: 1 -> D7
DDRD = DDRD | 0x80;
if (1)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;


//Output
//Output: 1 -> D6
DDRD = DDRD | 0x40;
if (1)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;

//Delay
//Delay: 2 ms
delay_ms(2);

//Delay
//Delay: 500 us
delay_us(255);
delay_us(245);

//Output
```

```
                        //Output: 1 -> D7
                        DDRD = DDRD | 0x80;
                        if (1)
                                PORTD = (PORTD & 0x7f) | 0x80;
                        else
                                PORTD = PORTD & 0x7f;

                        //Output
                        //Output: 0 -> D6
                        DDRD = DDRD | 0x40;
                        if (0)
                                PORTD = (PORTD & 0xbf) | 0x40;
                        else
                                PORTD = PORTD & 0xbf;

                }


        }


        mainendloop: goto mainendloop;
}
```

Left Microcontroller:

```
#define MX_AVR
//Defines for microcontroller
#define MX_AVR
#define MX_EE
#define MX_EE_SIZE 512
#define MX_SPI
#define MX_SPI_B
#define MX_SPI_SDI 6
#define MX_SPI_SDO 5
#define MX_SPI_SCK 7
#define MX_UART
#define MX_UART_D
#define MX_UART_TX 1
#define MX_UART_RX 0
#define MX_MI2C
#define MX_I2C_C
#define MX_I2C_SDA 1
#define MX_I2C_SCL 0
#define MX_PWM
```

```
#define MX_PWM_PORT PORTD
#define MX_PWM_CNT 2
#define MX_PWM_TRIS1 DDRD
#define MX_PWM_1 5
#define MX_PWM_TRIS2 DDRD
#define MX_PWM_2 4
#define MX_PWMTYPE 1
//Functions
#define F_CPU 4000000UL
#include <stdlib.h>
#include <stdio.h>
#include <math.h>
#include <avr\io.h>
#include <avr\interrupt.h>
#include <avr\eeprom.h>
#include <avr\wdt.h>
#include <MX_util\delay.h>
#include <MX_util\bit_cmds.h>
//Configuration data
#pragma DATA 0x0, 0xdf
#pragma DATA 0x1, 0xff
//Internal functions
#include "D:\Program Files (x86)\Matrix Multimedia\Flowcode AVR V4\FCD\internals.h"
//Macro function declarations
//Variable declarations
//Macro implementations
int main()
{

	//Initialisation
	MCUCSR=0x00;
	wdt_disable();
	//Interrupt initialisation code

	//Loop
	//Loop: While 1
	while (1)
	{
		//Output
		//Output: 1 -> D6
		DDRD = DDRD | 0x40;
		if (1)
			PORTD = (PORTD & 0xbf) | 0x40;
```

```
else
        PORTD = PORTD & 0xbf;

//Output
//Output: 1 -> D7
DDRD = DDRD | 0x80;
if (1)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;

//Output
//Output: 1 -> C2
DDRC = DDRC | 0x04;
if (1)
        PORTC = (PORTC & 0xfb) | 0x04;
else
        PORTC = PORTC & 0xfb;

//Output
//Output: 0 -> D2
DDRD = DDRD | 0x04;
if (0)
        PORTD = (PORTD & 0xfb) | 0x04;
else
        PORTD = PORTD & 0xfb;

//Delay
//Delay: 10 us
delay_us(10);
//Output
//Output: 0 -> D6
DDRD = DDRD | 0x40;
if (0)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;
//Output
//Output: 1 -> D7
DDRD = DDRD | 0x80;
if (1)
        PORTD = (PORTD & 0x7f) | 0x80;
else
```


```
            PORTD = PORTD & 0x7f;
//Output
//Output: 1 -> C2
DDRC = DDRC | 0x04;
if (1)
            PORTC = (PORTC & 0xfb) | 0x04;
else
            PORTC = PORTC & 0xfb;
//Output
//Output: 0 -> D2
DDRD = DDRD | 0x04;
if (0)
            PORTD = (PORTD & 0xfb) | 0x04;
else
            PORTD = PORTD & 0xfb;
//Delay
//Delay: 20 us
delay_us(20);
//Output
//Output: 0 -> D6
DDRD = DDRD | 0x40;
if (0)
            PORTD = (PORTD & 0xbf) | 0x40;
else
            PORTD = PORTD & 0xbf;
//Output
//Output: 1 -> D7
DDRD = DDRD | 0x80;
if (1)
            PORTD = (PORTD & 0x7f) | 0x80;
else
            PORTD = PORTD & 0x7f;
//Output
//Output: 0 -> C2
DDRC = DDRC | 0x04;
if (0)
            PORTC = (PORTC & 0xfb) | 0x04;
else
            PORTC = PORTC & 0xfb;

//Output
//Output: 0 -> D2
DDRD = DDRD | 0x04;
```

```
if (0)
        PORTD = (PORTD & 0xfb) | 0x04;
else
        PORTD = PORTD & 0xfb;

//Delay
//Delay: 10 us
delay_us(10);
//Output
//Output: 1 -> D6
DDRD = DDRD | 0x40;
if (1)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;
//Output
//Output: 1 -> D7
DDRD = DDRD | 0x80;
if (1)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;
//Output
//Output: 0 -> C2
DDRC = DDRC | 0x04;
if (0)
        PORTC = (PORTC & 0xfb) | 0x04;
else
        PORTC = PORTC & 0xfb;
//Output
//Output: 1 -> D2
DDRD = DDRD | 0x04;
if (1)
        PORTD = (PORTD & 0xfb) | 0x04;
else
        PORTD = PORTD & 0xfb;
//Delay
//Delay: 20 us
delay_us(20);


//Output
//Output: 1 -> D6
```

```
DDRD = DDRD | 0x40;
if (1)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;

//Output
//Output: 0 -> D7
DDRD = DDRD | 0x80;
if (0)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;

//Output
//Output: 0 -> C2
DDRC = DDRC | 0x04;
if (0)
        PORTC = (PORTC & 0xfb) | 0x04;
else
        PORTC = PORTC & 0xfb;


//Output
//Output: 1 -> D2
DDRD = DDRD | 0x04;
if (1)
        PORTD = (PORTD & 0xfb) | 0x04;
else
        PORTD = PORTD & 0xfb;

//Delay
//Delay: 10 us
delay_us(10);
//Output
//Output: 1 -> D6
DDRD = DDRD | 0x40;
if (1)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;
//Output
//Output: 0 -> D7
```

```
DDRD = DDRD | 0x80;
if (0)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;
//Output
//Output: 1 -> C2
DDRC = DDRC | 0x04;
if (1)
        PORTC = (PORTC & 0xfb) | 0x04;
else
        PORTC = PORTC & 0xfb;
//Output
//Output: 1 -> D2
DDRD = DDRD | 0x04;
if (1)
        PORTD = (PORTD & 0xfb) | 0x04;
else
        PORTD = PORTD & 0xfb;
//Delay
//Delay: 20 us
delay_us(20);
//Output
//Output: 1 -> D6
DDRD = DDRD | 0x40;
if (1)
        PORTD = (PORTD & 0xbf) | 0x40;
else
        PORTD = PORTD & 0xbf;
//Output
//Output: 1 -> D7
DDRD = DDRD | 0x80;
if (1)
        PORTD = (PORTD & 0x7f) | 0x80;
else
        PORTD = PORTD & 0x7f;
//Output
//Output: 1 -> C2
DDRC = DDRC | 0x04;
if (1)
        PORTC = (PORTC & 0xfb) | 0x04;
else
        PORTC = PORTC & 0xfb;
```

```
		//Output
		//Output: 1 -> D2
		DDRD = DDRD | 0x04;
		if (1)
			PORTD = (PORTD & 0xfb) | 0x04;
		else
			PORTD = PORTD & 0xfb;
		//Delay
		//Delay: 10 us
		delay_us(10);
		//Output
		//Output: 1 -> D6
		DDRD = DDRD | 0x40;
		if (1)
			PORTD = (PORTD & 0xbf) | 0x40;
		else
			PORTD = PORTD & 0xbf;

		//Output
		//Output: 1 -> D7
		DDRD = DDRD | 0x80;
		if (1)
			PORTD = (PORTD & 0x7f) | 0x80;
		else
			PORTD = PORTD & 0x7f;
		//Output
		//Output: 1 -> C2
		DDRC = DDRC | 0x04;
		if (1)
			PORTC = (PORTC & 0xfb) | 0x04;
		else
			PORTC = PORTC & 0xfb;
		//Output
		//Output: 0 -> D2
		DDRD = DDRD | 0x04;
		if (0)
			PORTD = (PORTD & 0xfb) | 0x04;
		else
			PORTD = PORTD & 0xfb;
}
mainendloop: goto mainendloop;}
```

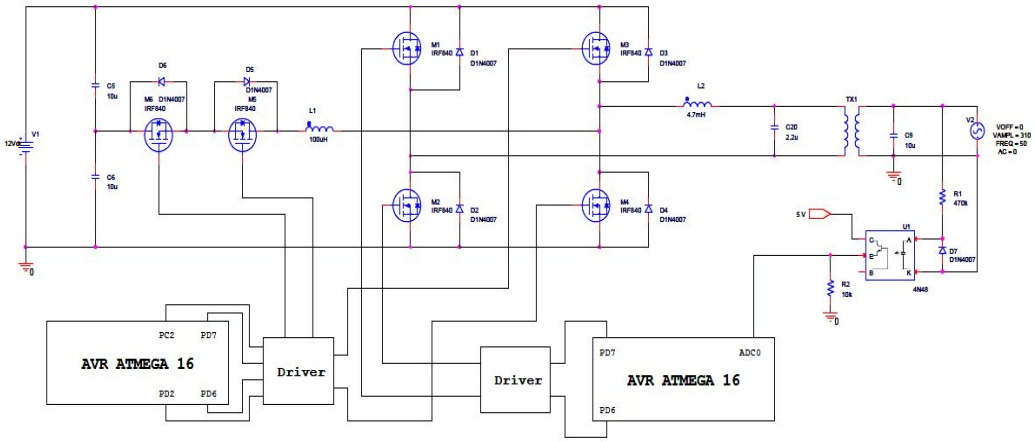


Fig.1. Block diagram and circuit schematic of the proposed grid-tied inverter

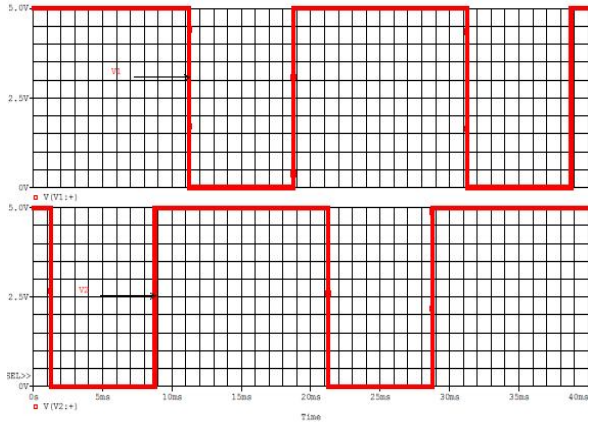


Fig.2. Gate pulses of power switches M_1 and M_2 respectively

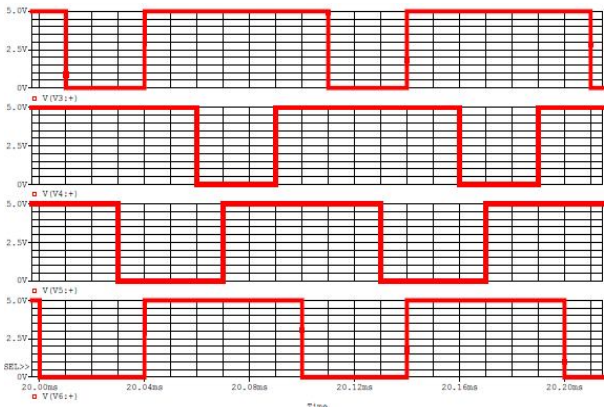
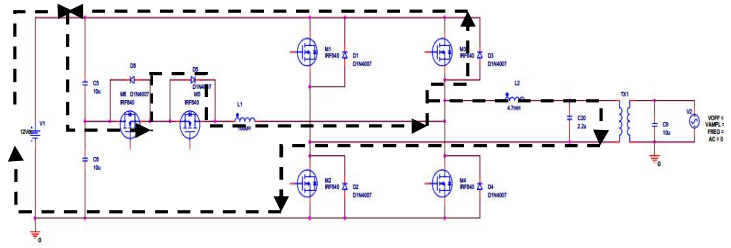
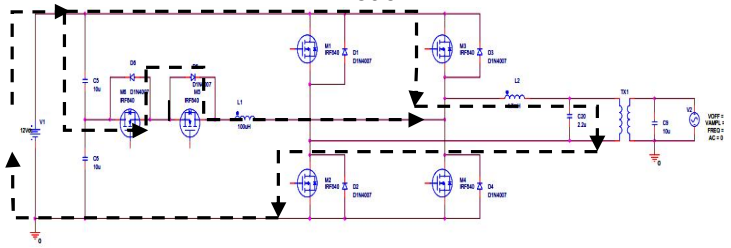


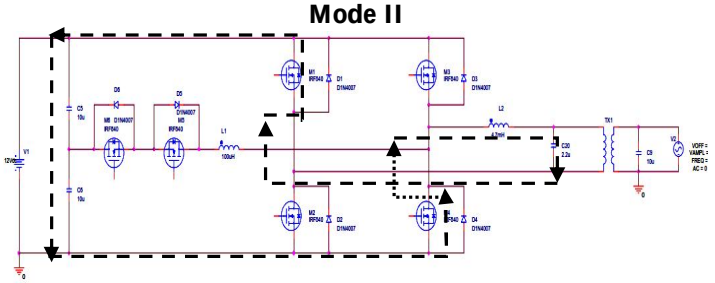
Fig.3. Gate pulses of power switches M_3, M_4, M_5 and M_6 respectively



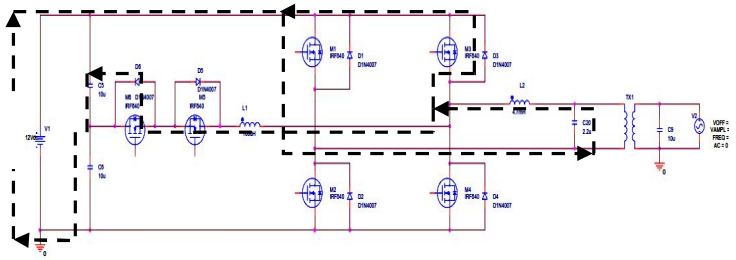
Mode I



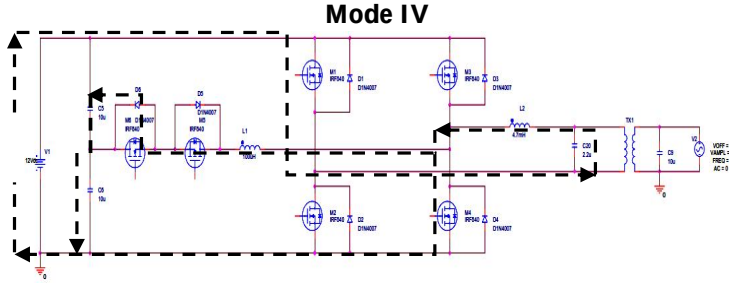
Mode II



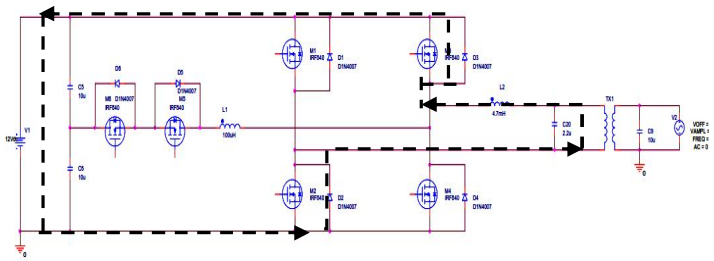
Mode III



Mode IV



Mode V



Mode VI

Fig.4. Operation modes of proposed grid-tied inverter

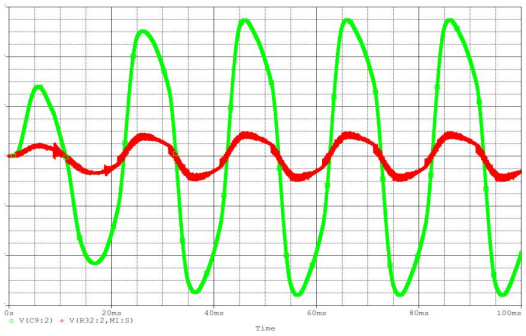


Fig.5. Transformer primary and secondary voltage waveforms

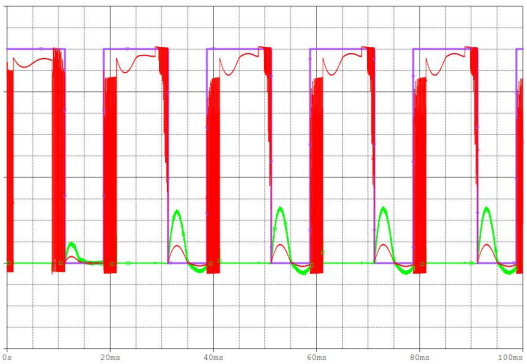


Fig.6. Drain current, drain to source voltage and gate pulse waveforms of switch M_1

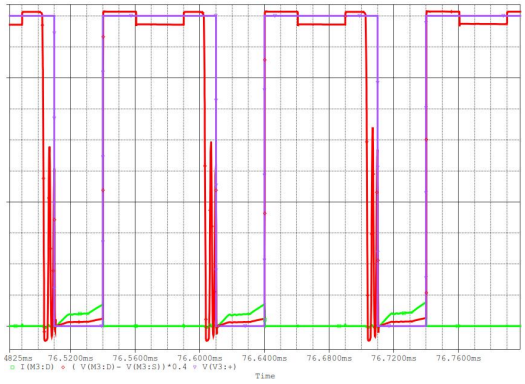


Fig.7. Drain current, drain to source voltage and gate pulse waveforms of switch M_3

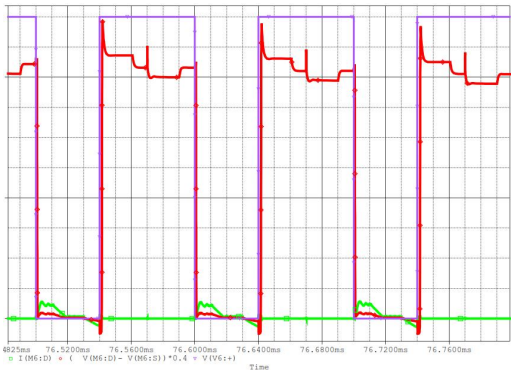


Fig.8. Drain current, drain to source voltage and gate pulse waveforms of switch M_6

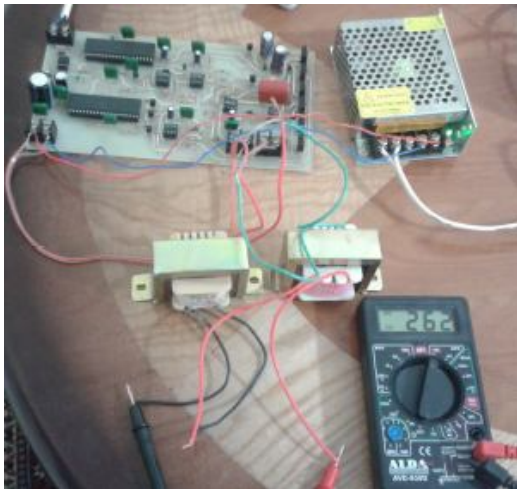


Fig.9. A photograph of the proposed grid-tied inverter

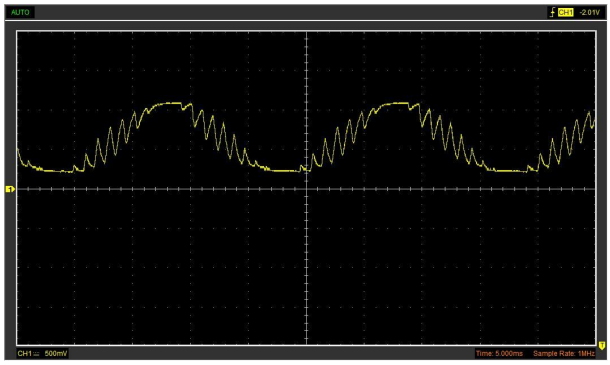


Fig.10. Transformer primary voltage waveform

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RESEARCH ARTICLE

Periodicity of *Orius bifilarus* and *Orius niger* Encountered on Different Flora in Himachal Pradesh, India

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ABSTRACT

The species of the genus Orius Wolff of family Anthocoridae are well-known as generalist predator able to control thrips outbreaks worldwide. Two species *Orius bifilarus* Ghauri and *Orius niger* Wolff belonging to this genus were collected from the different flora including 3 species of vegetable crops, 1 species of field crop, 2 species of fruit crops, 7 species of ornamentals and 3 species of forest-wild flora. Activity of O. bifilarus on Prunus persica, Rosa sp. and Cucumis sativus were noticed during all the three years of study. Its capture was maximum on C. sativus being 8.8, 40.1 and 40.4 percent during 2009, 2010 and 2011, respectively. Whereas, O. niger remained active during all the three years of study on P. persica and C. sativus with average capture on C. sativus being 18.7, 33.3 and 83.3 per cent during 2009, 2010 and 2011, respectively. Among these two species O. bifilarus was predominant with 86.96 per cent capture of the total and collected from almost all the sampled plant species.

Key words: Orius bifilarus, Orius niger, Prunus persica, Cucumis sativus, Rosa sp., thrips

INTRODUCTION

The Orius bugs, commonly known as minute pirate bugs or flower bugs, belong to the insect order Hemiptera and family Anthocoridae (1, 13, 17). They are common and abundant predator in field cropping systems, possess many of the characteristics of an ideal biocontrol agent, such as high searching efficiency and feeding rate, short duration of

development, density dependent response to the pest population and synchronization of predator and prey population. Genus Orius appear to be efficient polyphagous predator, fed on a wide range of soft bodied arthropod pests. They are associated largely with annual and perennial crops, forests, greenhouse crops, ornamental plants, and stored products. Several species of Orius have been found in orchards including O. insidiosus (Say), O. vicinus (Ribaut), O. majuscules (Reuter), O. niger and O. minutus (L.) (14, 16, 24), where they feed on small insects. Although, flower bugs are polyphagous predator they show a preference over thrips. Thrips are one of the most serious pests worldwide. They are difficult to control by conventional insecticides, because they live concealed in flower and in meristematic parts of the plants. Thus Orius species prove to be efficient biocontrol agents, as they also live concealed in the same habitat as thrips. Several studies show that O. albidipennis (Reuter), O. majusculus (Reuter) and O. laevigatus (Fieber) can maintain populations of Frankliniella occidentalis (Pergande), Thrips tabaci Lindeman, T. palmi Karny and Scirtothrips dorsalis Hood below economic thresholds (6, 7, 9, 11, 20). In India O. indicus (Reuter), O. insidiosus (Say), O. tristicolor (White), O. laevigatus (Fieber) and O. albidipennis, has been reported to be an effective predator of F. occidentalis, Therioaphis maculate (Buckton), Gynaikothrips ficorum (Marchal), Megalourothrips nigricornis, Sericothrips variabilis (Beach), eggs and newly hatched larvae of cotton bollworm, Helicoverpa armigera (Hübner) and H. zea (Boddie), whiteflies, aphids, leaf hopper nymphs, mites and nymphs of cotton flea hopper, Psallus seriatus (Reut.) (2, 3, 18, 19). Thus the present research was focused on the distribution and periodicity of indigenous Orius spp. on different cropping systems infested by soft bodied insects and mites mainly thrips, and on neighboring wild flora.

MATERIALS AND METHODS

Periodic observations at weekly interval during the period from March to December for two years (2009-2010) and from March to July in 2011 were carried out for recording the population of Orius spp. in Himachal Pradesh (31.1033° N, 77.1722° E), India. For collection of these bugs different vegetable crops (Cucumis sativus (L.), Phaseolus vulgaris (L.) and Solanum tuberosum (L.)), field crop (Zea mays L.), fruit crops (Malus domestica Borkh. and Prunus persica (L.) Batsch), ornamentals (Callistemon lanceolatus (Sm.), Cosmos sulphureus Cav., Dahlia X hybrida Cav., Clarkia amoena (Lehm.) A.Nels. & J.F.Macbr, Hibiscus rosa-sinensis L., Polianthes tubrosa L., Rosa spp.) and wild flora (Albizia lebbeck (L.) Benth, Bauhinia vahlii Wight & Arnott and Eucalyptus hybrid) infested with soft bodied insects (aphids, psyllids, thrips, etc.) and mites were surveyed. In order to follow a standard methodology for each crop, mainly the flowers and apical growing buds were monitored and anthocorids (adults and nymphs) were collected by shaking the flowers and apical buds onto a plastic bag. Sampling continued for 30 minutes, but when no specimen could be obtained it was prolonged to 1 hour. The collected specimens were brought to the laboratory and counted as males and females. Adults were identified by using the key given by various authors (10, 12, 25, 26, 27). Adult flower bugs were first identified to genus level on the morphological features of the body, wings, antenna, pronotum, pseudarolia, collar, etc. by using key of Muraleedharan and Ananthakrishanan (1978) (17), and then to species level by observing male and female genitalia. Slides for identification of male and females genitalia were prepared according to the methodology given by Silveira et al., (2003) (21) and Ke and Bu (2007) (15). Identification was done by using the details given by Ghauri (1972) (10).

RESULTS AND DISCUSSION

During field survey, mainly two Orius species: O. bifilarus and O. niger were collected on crops and wild flora. Orius nymphs and adults were collected by beating flowers or terminal buds by Bosco and Tevella (2008) (5). Same technique was used to capture the Orius species and these bugs were mostly collected from annual crops. Study of Tommasini et al., (2004) (23) revealed the association of Orius species mainly with annual crops. They collected Orius from 19 vegetable crops, 10 ornamental crops and from 5 wild plants in Italy. In the present study, Orius spp. were collected from 16 plant species (herbs, shrubs and trees). Amongst two species, O. bifilarus was the predominant and was noticed on all the 16 host plants, whereas O. niger was found associated with 7 host plants. Ghauri (1972) (10)

collected O. bifilarus from 11 plant species in Pakistan infested mainly with thrips and mites and from cotton in India infested with Aphis gossypii (Glover). Clements and Yeargan (1997) (8) collected O. insidiosus individuals more commonly from flowers. They also collected specimens of Orius from trees. O. niger feeding on grass aphids infesting grains and bird cherry were collected by Bokina (2008) (4) in the forest-steppe zone of Western Siberia.

Amongst the two species collected from the study area, O. bifilarus was the predominant throughout the year. Overall, 86.96% of adults totally collected belong to O. bifilarus and 13.04% to O. niger. Peak activity period of O. bifilarus was noticed during October, September-October and June in 2009, 2010 and 2011, respectively. Whereas, O. niger was sparingly collected during the study period and a maximum catch was obtained in September, 2009. Relative per cent proportion of O. bifilarus and that of O. niger during three years of survey is presented in Fig. 1-3. On the surveyed crops on which both the species were collected, O. bifilarus prevailed (Fig. 4) with per cent capture ranging from 83% to 95%. Similar study was carried out by Bosco and Tavella (2008) (5). They collected three Orius species from various field crops and wild flora in Italy with maximum capture of 67% of O. majuscules (Reuter) followed by O. niger and O. minutus (L.). Tommasini (2004) [(22)] collected O. laevigatus, O. niger and O. majuscules with 57.58 %, 37.51% and 4.05% of the total number. He also collected other three species, O. harvathi (Reuter), O. vicinus (Ribaut) and O. pollidicornis (Reuter) in very low number (0.82%, 0.02% and 0.02%, respectively of the total capture).

Periodic study revealed that O. bifilarus remained active during all the three years of study on P. persica, Rosa sp. and C. sativus. Its capture was maximum on C. sativus being 18.8, 40.1 and 40.4 per cent of the total yearly catch during 2009, 2010 and 2011, respectively (Table 1). This species was also active on peach trees (10.7, 1.7 and 50.9 per cent of the bugs collected during the respective years). However, on rose the catch was low (0.4, 0.3 and 1.7 per cent in 2009, 2010 and 2011, respectively) and was collected only once in May, September and June in the respective year. Period of activity on peach was March to May, while on cucumber it was active during June to October. This species was also quite active on Z. mays (13.7 and 11.2%), Dahlia, Dahlia X hybrida (9 and 17.1%) and godetia, C. amoena (14.1 and 4.2%) in September-October/November during 2009 and 2010, respectively. The activity was also noticed on H. rosa-sinensis during September–October but to a low extent (1.3 and 2.4%). Activity of O. bifilarus on A. lebbeck (14.3 and 2.6% in April to June 2010 and 2011, respectively), B. vahlii (2.1 and 4.4% in May–June 2010 and 2011), P. vulgaris (8.1% in May–July 2009 and 6.6% in August–September 2010) was noticed in two out of three years of the study. C. lanceolatus (bottle brush), E. hybrid (eucalyptus), S. tuberosum (potato), C. sulphureus, P. tubrosa were the other flora where activity was noticed during 2009 only. Among these plant species, the maximum capture was on Cosmos (11.1%), while on others capture ranged from 2.6 to 4.3 per cent.

O. niger remained active during all the three years of study on P. persica and C. sativus with average capture on C. sativus being 18.7, 33.3 and 83.3 per cent of bugs captured during 2009, 2010 and 2011, respectively (Table 1). Peach was the another habitat where this species was also active and 9.4, 26.7 and 16.7per cent of the bugs were collected during the respective year. Period of activity on peach was March to May, while on cucumber, it was collected in May, June and August. This species was also quite active on maize (9.4 and 33.3%) and Dahlia (18.7 and 6.7%) in August– September/September during 2009 and 2010, respectively. P. vulgaris, C. amoena and H. rosa-sinensis were the other flora on which activity was noticed during 2009. Among these plant species, the maximum per cent capture was on C. amoena (28.1%), while on others capture was in the range of 6.4 to 9.4 per cent.Adults of O. bifilarus were noticed for the first time among the flowers of P. persica feeding on thrips, mainly in second week of March in 2009 and 2011 and in third week of March in 2010, whereas adults of O. niger were noticed for the first time in the second week of March during three years of study among the flowers of P. persica. Neighboring wild flora may positively affect the occurrence of Orius spp. by providing alternate host when there are no field crops. Preference shown by Orius spp. for cultivated plants over wild flora, is a positive parameter for biocontrol agent. However further research is needed to plant/predator association, presence of prey on plants and influence of local microclimate on the abundance of Orius species.

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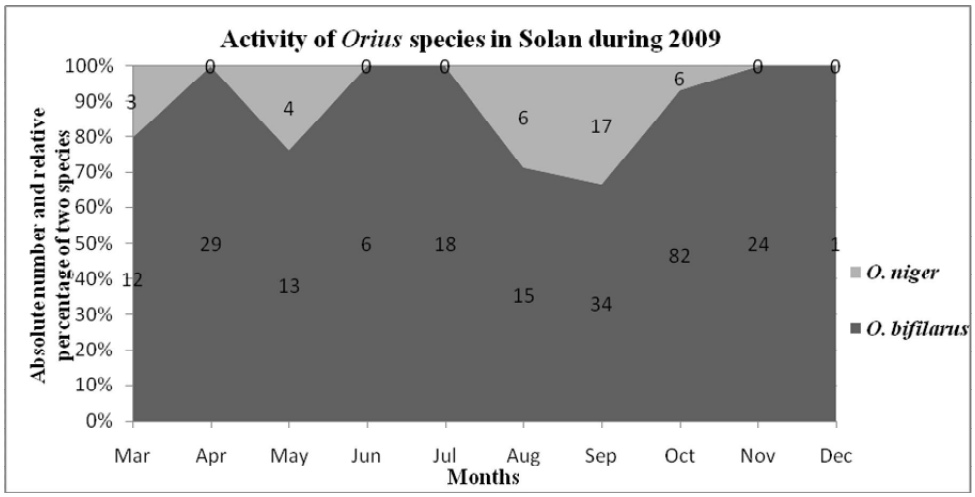

Fig 1: Comparison of activity of two *Orius* species during 2009

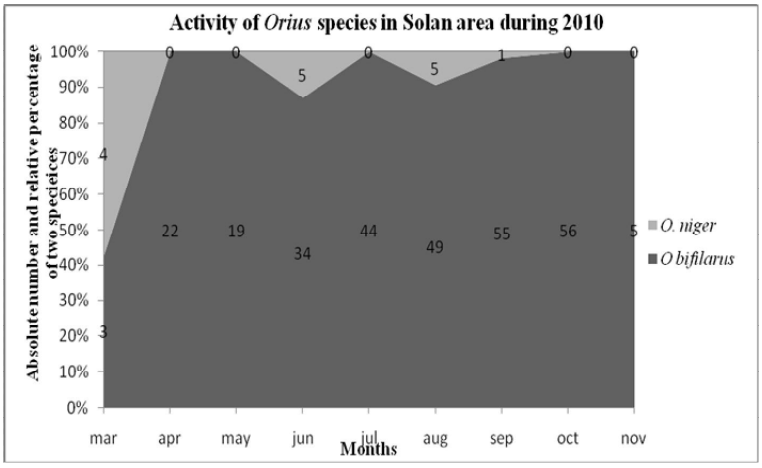

Fig 2: Comparison of activity of two *Orius* species during 2010

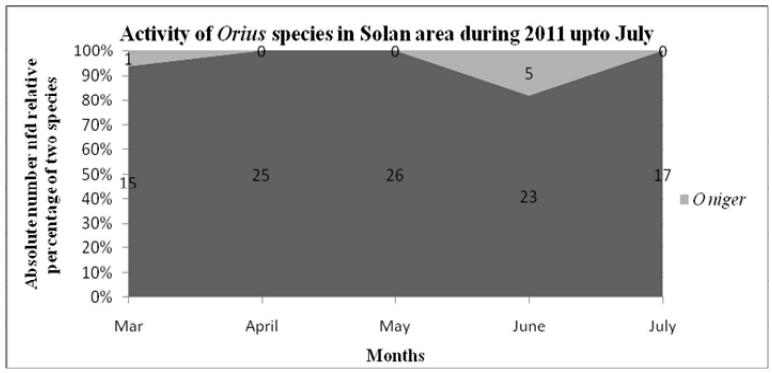

Fig 3: Comparison of activity of two *Orius* species during 2011upto July

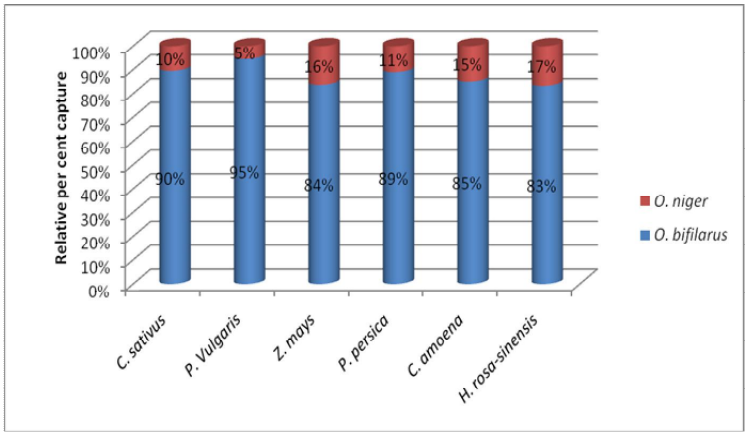

Fig 4: Relative per cent capture of *O. niger* and *O. bifilarus* on common host plant.

Table1. Activity of Orius spp. noticed on different host plants during study period (January 2009-August 2011) in Solan, Himachal Pradesh.

Periodi-city and host plant	*Orius bifilarus*						*Orius niger*					
	2009		2010		2011		2009		2010		2011	
	Activity period	% captu-re	Activity period	% capture	Activity period	% captu-re	Activity period	% capture	Activity period	% captu-re	Activity period	% capture
Prunus persica	Mar II-May II	10.7	Mar III-Apr II	1.7	Mar II-May IV	50.9	Mar II-May III	9.4	Mar II-III	26.7	Mar II	16.7
Cucumis sativus	Jul III-Oct I	18.8	Jun I-Oct IV	40.1	Jun I-Aug III	40.4	Aug I-III	18.7	Jun I,IV	33.3	May III-IV	83.3
Rosa sp.	May II	0.4	Sep II	0.3	Jun II	1.7	-	-	-	-	-	-
Albizia lebbeck	-	-	Apr II-Jun I	14.3	Apr III	2.6	-	-	-	-	-	-
Bauhinia vahlii	-	-	Jun I,II	2.1	May II-May IV	4.4	-	-	-	-	-	-
Phaseolus vulgaris	May IV-Jul I	8.1	Aug I-Sep I	6.6	-	-	Mar IV	6.4	-	-	-	-
Zea mays	Sep II-Oct III	13.7	Aug I-Oct I	11.2	-	-	Sep II	9.4	Aug II-III	33.3	-	-
Clarkia amoena	Sep II-Nov II	14.1	Sep II-Oct II	4.2	-	-	Sep IV-Nov II	28.1	-	-	-	-
Dahlia x hybrida	Sep II-Nov II	9.0	Sep II-Nov II	17.1	-	-	Sep III-IV	18.7	Sep II	6.7	-	-
Hibiscus rosa-sinensis	Oct II-Oct IV	1.3	Sep II-Sep IV	2.4	-	-	Sep IV	9.4	-	-	-	-
Callistemon lanceolatus	Mar III-Apr III	2.6	-	-	-	-	-	-	-	-	-	-
Eucalyptus hybrid	Mar IV-Apr II	4.3	-	-	-	-	-	-	-	-	-	-
Solanum tuberosum	Apr III-May I	3.0	-	-	-	-	-	-	-	-	-	-
Cosmos sulphureus	Oct I-Dec I	11.1	-	-	-	-	-	-	-	-	-	-
Polianthes tubrosa	Oct II-Nov I	3.0	-	-	-	-	-	-	-	-	-	-

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RESEARCH ARTICLE

Effect of Chaotic Behavior on Sales Outsourcing: Case Study of Zamzam Company in Iran

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ABSTRACT

This paper aims to investigate the effect of components of chaos theory on sales outsourcing in Zamzam Company located in Tehran. Participants in this study consisted of all staffs in Zamzam Company who was mainly involved in sales outsourcing. Data collection tool was a 5-point likert type questionnaire. Structural equation modeling technique was used to test the relationship between variables. The results showed that components of nonlinearity, self-similarity, bifurcation, strange attractors, butterfly effect, dynamic adaption, and fractals influenced the sale outsourcing, but Homeostasis and bifurcation components had no effect on it.

Key words: chaos, order in disorder, outsourcing, chaotic behavior, fractals, butterfly effect, self-similarity, strange attractors, bifurcation, adaption

INTRODUCTION

Today, the management concepts are in a prospective stage. The present proposed management approaches as the post-modern under management concepts or modern organizational approaches are highly discussed. Postmodernism as a system of social sciences aims to get rid of the established thinking frames and criticizes any investigation and the accumulation of stored information. The issue represents a form of rebellion to the established order and suggests observing everything within a comparative perspective (Kilduff and Mehra, 1997). Further, interdisciplinary relations have been appeared in various fields causing a variety of theories. Management science is not an exception, either. Complexity Theory and Chaos Theory can be mentioned as one of these theories (Murphy, 2010). A branch of Complexity Theory is the theory of Complex Adaptive Systems (CAS) (Hayles, 1990).

There is no doubt that chaos theory can be defined as a new paradigm with many applications for each action. Chaos Theory same as any new discovery has provided many evidences which seems sufficient to reject old beliefs. The word Chaos is defined as a type of general clutter. These terms indicates lack of any structure or order (an example of chaotic behavior can be found drop of water from a waterfall or in weather conditions (Priesmeyer, 1992). Chaos is a kind of "Orderly Disorder"; Disorder since the results cannot be predicted and orderly since it has a kind of certainty (Hayles, 1990). Chaotic behavior and movement of different physical or psychological phenomenon in human beings or in business, all indicate an ultimate chaos. Chaos is not random, but there is order in disorder and regularity in the irregularity. Chaos is present everywhere in a chaotic way and appears in all aspects of human life but the important point is that this chaos is structured (Alvani, 2006). Chaos theory was found by the mathematicians such as Edward Lorenz and James Yorke in 1960s and 1970s.

Many studies have tried to present chaos theory applicably, and for different subjects in research (Cohen et al, 1972; Shintani and Lintani, 2002; Yang et al, 2006; Hwarng and Xie ,2007). Since the modern business system is getting increasingly complex, defining a framework for outsourcing decision making has become a serious challenge in the companies. Although, the researchers have pointed to different outsourcing factors in determining the variables affecting the decision-making but no study has dealt with the issue regarding the chaos theory. The company in which the present study investigates the effect of chaos on sales outsourcing is a company producing beverages, and drinks called ZamZam. This study aims to investigate if sales outsourcing in Zamzam Company follows the features of chaos theory or not.

MATERIALS AND METHODS

Chaos Theory

The principles of Chaos Theory can be originally attributed to the Butterfly effect introduced in 1873 by Edward Lorenz discussing the calculation of differential equations. The dynamic adaption principle was introduced by Denis Morgan in studying the complex systems and their relations. The self-similarity principle was discussed in 1984 by Dennis Gabor and strange attractors was discovered by Edward Lorenz, and named by David Ruelle and Floris Takens . Also, the equations comprising the Chaos Theory or the finite order (Chaotic systems) have some other properties which are mentioned by Smith (1995) as following:

Nonlinearity: The chaotic equations are nonlinear and interactive (nonlinearity). This phenomenon indicates that the chaotic behavior has no similarity with a series of random behaviors. A chaotic series follows a definite proves but has some huge random fluctuations which happen in definite intervals. A random order process cannot be predicted but the behaviors of a chaotic process despite looking complex and random can be predicted (Baumol and Benhabib, 1989).

Self-similarity :The chaotic equations are self-similar. According to this property, there is a kind of similarity between elements and the entire system in which each element are similar to its total (Alvani, 2006).

Strange attractors: The chaotic equations have strange attractors. A complex attractor is a set of uncountable points in a way that all the adjacent time series are attracted to it and the time paths can be non-periodic when starting inside it or they can be voluntarily repeated in predefined numbers (Baumol and Benhabib, 1989). In other words, a complex system is composed of many complicated components which although seem chaotic in first sight but according to chaos theory these sets are the orderly patterns resulted from the slight chaos (Feyz and Elahirad, 2006).

Butterfly Effect: In this property, the final results of these types of equations are seriously affected by the slight changes in their primary condition (butterfly effect). A chaotic time series is highly sensitive to primary condition.

That is in two time series with chaotic process but with approximately similar primary condition, the time paths become completely distinguished after a while and they seem as two different time series. The more similar condition of time series, the longer their time path looks similar (Baumol and Benhabib, 1989). Generally, according to chaotic theory, a slight change can lead to huge effect on a system. Finding the sensitive points and in other words the favorable lever and fulcrum point makes it possible to get great results using little energy. Peter Senge in discussing the learning organization referred to butter fly effect as the Principle of Leverage.

Dynamic Adaption :In this regard, chaotic systems act like living being in relation with the human environment and there is a kind of adjustment and dynamic adaption between and around them. This is called the dynamic adaption or the Complex Adaptive System (Waldrop, 1992). This kind of adaption in chaotic systems such as intelligence of human brain is a type of momentary appearance.

Homeostasis: Systems theory claims that the chaotic systems naturally have the property of Homeostasis. That is, they have an equilibrium or dynamic self-maintenance and stability. This feature is known as equilibrium or dynamic self-maintenance and stability in complex systems. In other words, the main variables of a system are maintained in a definite area. The essential variables are the quantities which express the mode and identity of the system. Although the variables can be classified into two groups of coexistence or vital and correlational variables, the main issues here are the vital variables of the system. If these variables get out of their boundaries, the equilibrium disappears and system loses its identity (Farshad, 1983). Property of Homeostasis can be equal to self-organization. As some unorganized systems automatically are separated spontaneously, and then are linked together in a higher level and new order, Kauffman (1993) describes self-organization as a force of ''anti-chaos''.

Fractals :The chaos theory states the features of a complex system in form of self-repeating and naturally created patterns, structures and properties which are called fractals. Fractals were considered by evaluating or describing the complex systems. The fractals are similar in detail as the whole; that is they are self-similar. In other words, the fractals repeat in similar patterns in different scales. If the pattern of each size is closely examined, they are similar. The fractal patterns have been described in economic data, cloud patterns, traffic flow, indefinite stimuli, fluids and weather patterns (Feyz and Elahirad, 2006).

Bifurcation: Bifurcation is a practice in which a main unit is subdivided into two equal subunits and the levels double in behavioral complexity. The Chaos Continuum has some points on which chaos changes from a level to another level and is increased or decreased. These changing points are called Bifurcation which means dividing into two parts (Feyz and Elahirad, 2006).

Sales Outsourcing

The term Sales Outsourcing was first used in 1989 to describe the decision made by Kodak Company to transfer its IT activities to one of the IBM subsidiaries as a business strategy. However, many companies also did not do all their activities and assigned the activities with low competitive potentials to the third party contractors (Lonsdale and Cox, 2000). According to Andrew Kakabadse, transfer of tax collection activities to contractors by government in Roman time was first type of outsourcing (Amani, 2004).

Due to the complexities in the world of business, organizations have turned to outsourcing for different reasons and because of the various interests. In other words, in the world of today, it seems that the businesses do the limited activities and outsource the other activities to the service providers out of the business. Simply, outsourcing is a conscious business decision based on the idea of assigning an internal task to a third party service provider (Beebe and Meyers, 1999). In outsourcing, not only the activities are assigned but also the productive factors and related authorities are assigned, too (Greaver, 1999). In order to gain the competitive advantage in the modern world of

business, new strategies are needed. It is also necessary to consider the complexity and multiplicity of the factors affecting these strategies.

Many studies have been done on outsourcing which have emphasized on the importance and advantages of sales outsourcing (Dessert and James, 2002; Hood and Stein , 2003; Wang et al, 2005; Wu and Zhang, 2007). The PA Consulting Group (1996) studied the sales outsourcing in international strategic sourcing and reported at least 30 percent of increasing propensity of outsourcing business activities during the five years from 1991-1996. In addition, Forrester Institute in 2012 studied the amount of outsourcing in IT until 2015 and reported an increase of outsourcing as 3,400,000 job prediction until 2015. Generally, the researches done on the issue of outsourcing show that applying outsourcing resulted in reducing the costs and increasing the companies' focus on their main activities. The studies on outsourcing various service activities in different small and medium sized firms have concluded that they were active in outsourcing or preferred to do their activities traditionally inside the firm.

METHODOLOGY

The present research is a descriptive/correlational survey. It is an applied study in terms of purpose. Population of the study includes all the staffs working in Zamzam Company in Tehran, Iran who were mainly involved in sales outsourcing (n=180). Cochran formula was applied to determine the proper sample size. Using this formula, sample size was obtained as 122.79. For collecting data we used questionnaire and distributed it among 123 participants. This questionnaire has 57 questions based on a 5-point Likert scales in a rank and ordinal level. At this level, in addition to calibrating variables based on the absence or presence of traits, they are also determined based on the strength and weakness of that trait or their preferences. questions 1-9 measure the nonlinearity, questions 10-13 are about self-similarity, questions 14-21 are related to strange attractors, questions 22-30 are related to the fourth hypothesis and measures butterfly-effect, questions 31-36 are related dynamic adaption, questions 37-45 measure homeostasis, questions 46-50 measure fractal, questions 51-54 are related to bifurcation, and questions 55-57 measure sales outsourcing.

Validity of the research was tested using the academic experts' opinions and Lawshe formula regarding item utility which led to deletion of some questions or adding experts' opinions. The reliability of each question in the questionnaire was calculated using Cronbach alpha. The result was 0.7 which is an acceptable coefficient. Based on the literature review, following hypotheses were assumed for the present research:

- Nonlinearity affects the sales outsourcing
- Self-similarity affects the sales outsourcing
- Strange attractors affects the sales outsourcing
- Butterfly effect has an impact on sales outsourcing
- Dynamic adaption affects the sales outsourcing
- Homeostasis affects the sales outsourcing
- Fractal affects the sales outsourcing
- Bifurcation affects the sales outsourcing

Based on descriptive and inferential statistics, data obtained from questionnaires were analyzed in SPSS v.20 and LISREL v.8.80

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RESULTS AND DISCUSSION

Demographic characteristics: Based on the data collected from the questionnaire, 76 of the participants were male (61.50 %) and 47 of them were female (38.50%). Most of the participants (47.5%) were 30-39 years old. The minimum frequency was for participants over 50 years (10.7 %). The highest frequency based on the educational level was for those with bachelor degree (n=54, 43.8%) and the lowest frequency was for those with PhD degree including 7 participants (6.2%).

Testing Normality of distribution

Normal distribution of the variables was tested using Kolmogorov-Smirnov test. If the significance level (Sig.) of the study variables be higher than 0.05, the null hypothesis and normal distribution of the variables will be approved. Table 1 shows the results of Kolmogorov-Smirnov test.

According to the level of significance shown in table 1, all the variables except Fractals property are higher than 0.05 (sig. > 0.05). Therefore, study variables have been distributed normally.

Testing sampling adequacy Using Factor Analysis

In factor analysis, first it should be confirmed that if the sample size fit the analysis. KMO) statistic should be greater than 0.600 and the Bartlett's test should be significant (e.g. $p < .05$). KMO is used for assessing sampling adequacy and evaluates the correlations and partial correlations to determine if the data are likely to coalesce on factors (i.e. some items highly correlated, some not). The Bartlett's test evaluates whether or not our correlation matrix is an identity matrix (1 on the diagonal & 0 on the off-diagonal).

According to table 2, Since the KMO value is 0.688 , the sample size is adequate for factor analysis, and structural equation modeling (SEM) or path analysis. Also, in Bartlett test, significant level is less than 5 percent which indicates correlation matrix is appropriate for identifying the structure of factor model.

Structural Equation Modeling (SEM)

The relationship between the variables in the structural equation model (SEM) is generally divided into two general areas: the relationships between observable and latent variables (measuring or confirmatory factor analysis model) and the relationship between the latent variables with the structural equation or path analysis model.

Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis is used in order to prove that the questionnaire has measured the latent variables properly. The results of the Confirmatory Factor Analysis (CFA) of the studyvariables measured by LISREL software are provided in this section. If the t value of each observable with its construct is outside the range +1.96 and -1.96, then the observable variable is accurate enough to measure the latent variable.

The Measurement Model for Independent variables

Based on the significance values obtained by the measurement model for Independent variables, questions 2, 16, 19, 31 and 33 had significant value of less than 1.96; Therefore, these questions are removed from the measurement model. Other questions had the significance level of higher than 1.96, so it can be stated that all the remained

questions in the model have exactly measured the predicted variables in the questionnaire. Figures 1 and 2 present the measurement model for iindependent variables in both standard and significant conditions.

Based on the table 3, the fitness indices of the overall measurement model including χ^2/df, RMSEA and CFI have acceptable values. Therefore, the estimated parameters in the model and the questions fitness with research structures are statistically reliable.

Measurement Model of Dependent Variable

In the initial measurement model of the variable, "outsourcing", the questions correctly confirm their related structures in terms of the researchers' preferred construct. However, since the fitness index values did not reported the desired values, the construct had to be statistically modified in order to be used in the research structural model and testing the hypotheses. Figure 3 and 4 show the modified model in standard and significant condition, respectively.

Based on table 4, the fitness indices of the measurement model of independent variables including χ^2/df, RMSEA and CFI have acceptable values. Therefore, the estimated parameters in the model and the questions fitness with research structures were statistically reliable.

According to table 5, the correlation between items is less than 0.85 which indicates that none of variables have complete correlation with each other, and item are combined in a way that the constructs have been well separated from each other, so the instrument has divergent validity. Table 6 shows the correlation values among each variables.

Path Analysis

In this section, the relationships among the research constructs are tested. Accordingly, the research model with path analysis is implemented using LISREL software and the casual relationship between the variables is tested. Figures 5 and 6 shows path analysis model for both conditions.

Based on table 7, the model has a relatively good fitness. The square root of the estimation error variance RMSEA for the research structural model was less than 0.08, χ2/df less than 3 and, CFI value is 0.91. Other fitness indices are relatively good. Thus, the model has good fitness for testing the research hypotheses and it can be considered statistically reliable.

Significance coefficients (t statistics) are used for approving or rejecting the hypotheses. If t statistic be more than 1.96 or less than – 1.96 (at 5% error level), then the hypothesis is approved, and there is a significant relationship between two latent variables.

DISCUSSION

Based on the obtained coefficients, it can be concluded that there was a direct relationship between nonlinearity and sales outsourcing, and nonlinearity had a positive effect on sales outsourcing. Sales outsourcing was affected by a nonlinear behavior. However, it was predictable due to being chaotic not random. The result indicated that the outsourcing process in Zamzam Company had been diverse or repeated in specified times.

Considering the path coefficient of self-similarity on outsourcing, it can be concluded that there was a direct relationship between self-similarity and sales outsourcing and self-similarity has a positive effect on sale outsourcing.

It can be concluded that there was a similarity between the components and the whole sales outsourcing process of Zamzam Company.

Regarding the significant and positive path coefficient of the strange attractors on sales outsourcing, it can be concluded that there was a direct relationship between the strange attractors and sales outsourcing. As it was stated, there is disorder in chaotic systems but in fact there the system components follow a specific order. Therefore, it can be said that there is a strong strange attractor in chaotic system of Zamzam Company and related to sales outsourcing.

The path coefficient of butterfly effect on sales outsourcing indicated that there was a direct relationship between the butterfly effect and sales outsourcing. The butterfly effect indicated that the chaotic equations were affected by their primary condition. However, it can be said that there was a key and sensitive point in Zamzam Company's business which affected all the process of sales outsourcing. This sensitive point was probable the slight attempts of the minor customers, sub-processes, parts of process, slight changes in outsourcing and ….

Further, the path coefficient of the dynamic adaption on sales outsourcing indicated a direct and positive relationship between these two variables. That is, dynamic adaption had a positive effect on sales outsourcing. Therefore, the hypothesis was approved. The chaotic systems behave like a living being in relation to their environment and there is a type of adaption between them and their environment. Therefore, the outsourcing process in Zamzam Company happens adaptively without any controversies with other components. Further, it can be said that the outsourcing model of the company was very flexible.

The Homeostasis path coefficient on sales outsourcing was 0.08 to and had a t value of 0.22. t value for this parameter has been calculated less than 1.96. That is, there was no meaningful relationship between Homeostasis and sales outsourcing. Therefore, the sixth hypothesis was rejected. As it was mentioned before, equilibrium or dynamic self-retention are the definitions given for Homeostasis. Therefore, there was the possibility of discrimination from sales outsourcing in Zamzam Company.

Based on the path coefficient of fractals on sales outsourcing, there was a direct relationship between fractals and sales outsourcing. According to the results of the previous related literature, it can be stated that there was a process unity in sales outsourcing of the products, the possibility of creating and predicting orderly patterns for outsourcing decision making and the complexity of sales outsourcing differs at each stage.

The bifurcation path coefficient on sales outsourcing was negative which indicated that there was no significant relationship between the bifurcation and sales outsourcing. That is bifurcation had no effect on sales outsourcing. Therefore, the last hypothesis is rejected. Bifurcation is the process of dividing a main unit into two minor units. If the sales outsourcing process in Zamzam Company is divided into two units, then the process gets complex. In addition, considering the results, outsourcing improved the sales process and saving the costs of sales.

CONCLUSION

The rapid process of changes in today's business world and the need for businesses to keep up with the trends have caused basic changes in their structure and behavior for quick response take advantage of momentary opportunities. One of these changes is the basic change in the structure of the organizations and networking their activities. So that, the organizations do the activities in which they have the key potentials and can created competitive advantage for them and outsource other activities to the third party or the external business. Outsourcing, in addition to the financial considerations, needs considering the business behavior of the firms and the effect ratio of non-financial

factors. Therefore, the present study analyzed the sales outsourcing in Zamzam Company which has been very active in this regard to investigate the effect of Chaos theory components.

The findings indicated that sales outsourcing had been highly affected by chaos properties including nonlinearity, self-similarity, strange attractors, butterfly effect, dynamic adaption and fractals. In addition, Homeostasis and bifurcation had no effect on sales outsourcing in Zamzam Company and there was no meaningful relationship between them. A system is considered as chaotic if it has at least four main properties of chaos theory that is self-similarity, strange attractors, butterfly effect and dynamic adaption. Therefore, considering the number of approved hypotheses, Zamzam Company is defined as a chaotic company and it has a kind of chaos in business and related to the outsourcing issue.

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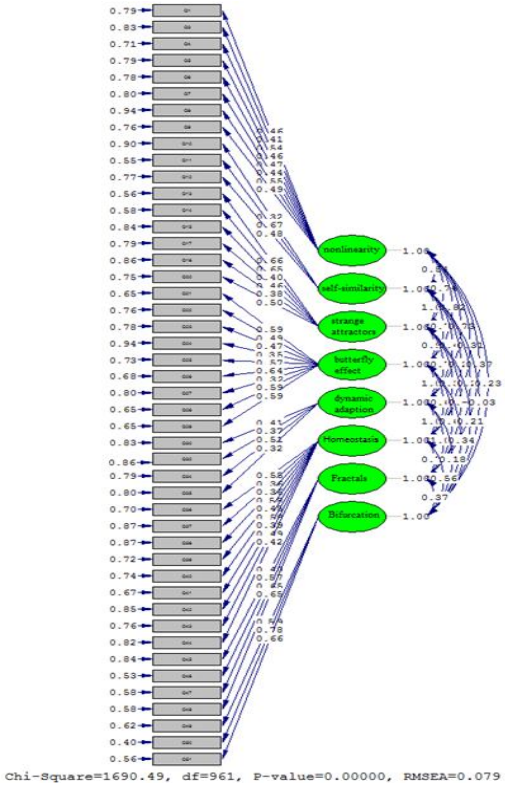

Figure 1. Measurement Model of Independent Variables in Standard Condition

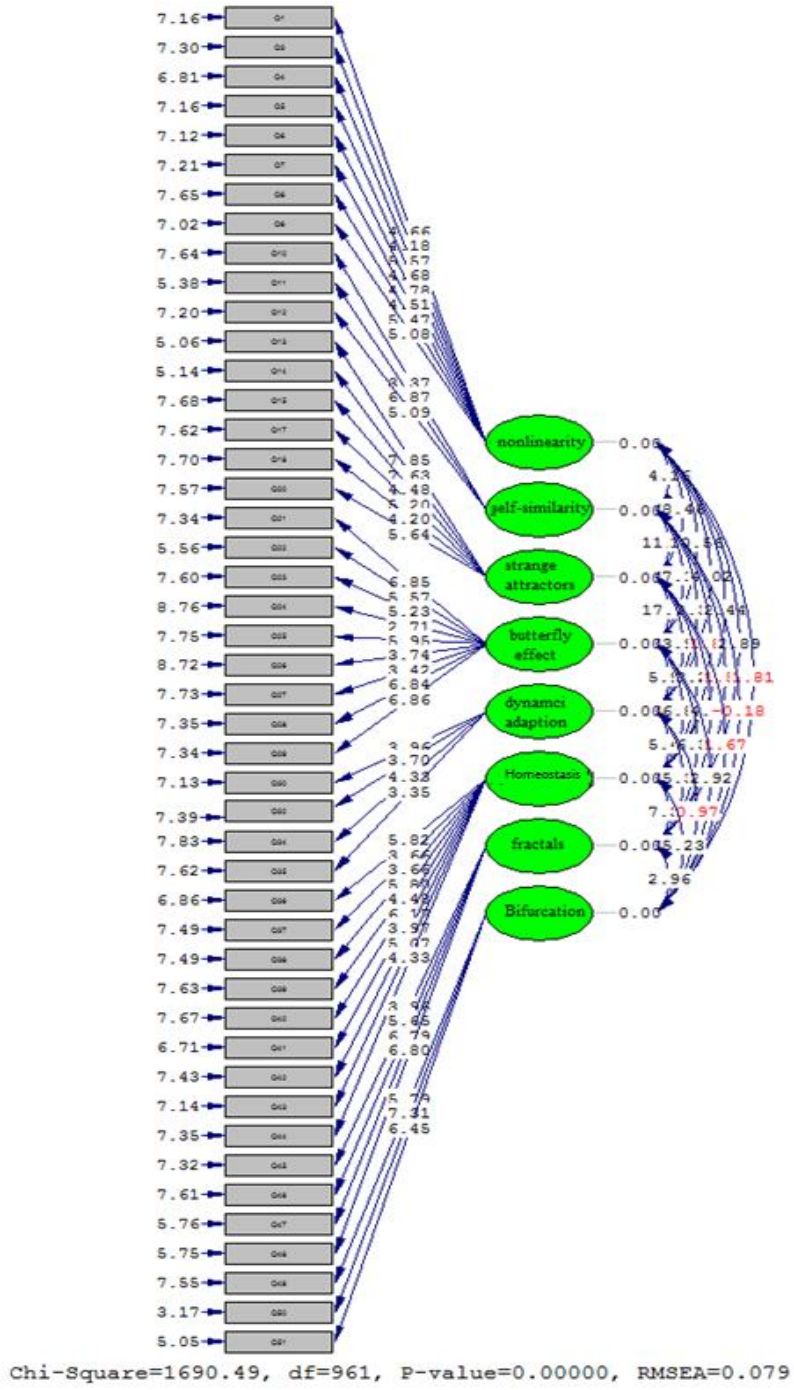

Figure 2. Measurement Model of Independent Variables in Significance condition

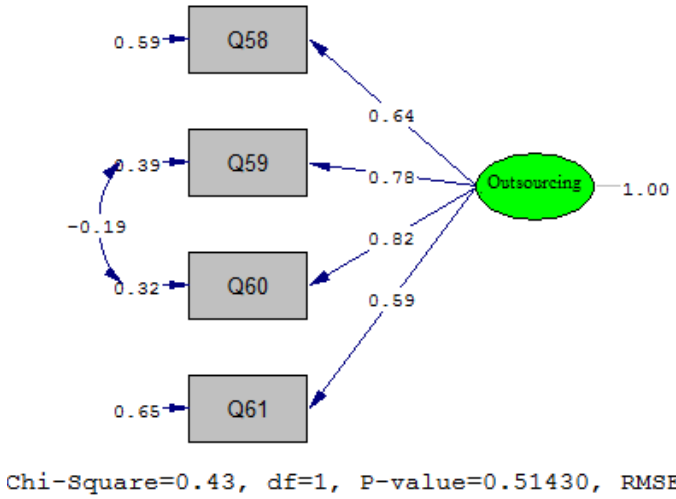

Figure 3. Measurement Model of Outsourcing in standard condition after modification

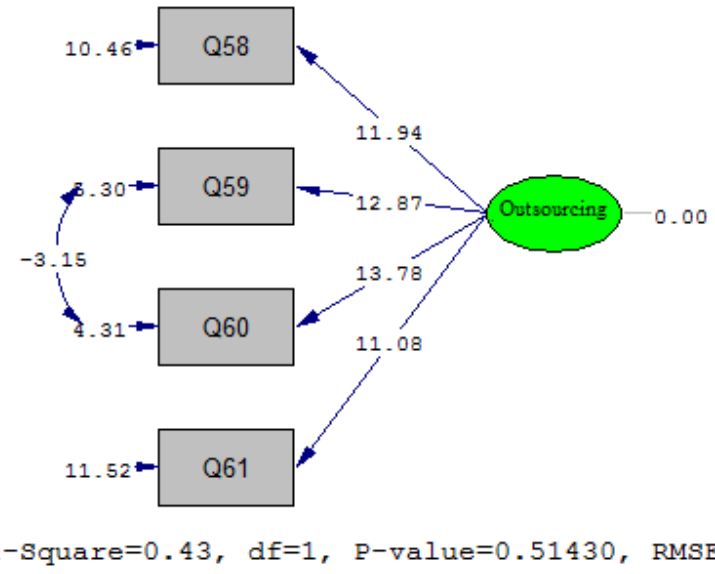

Figure 4. Measurement Model of Outsourcing in significant condition after modification

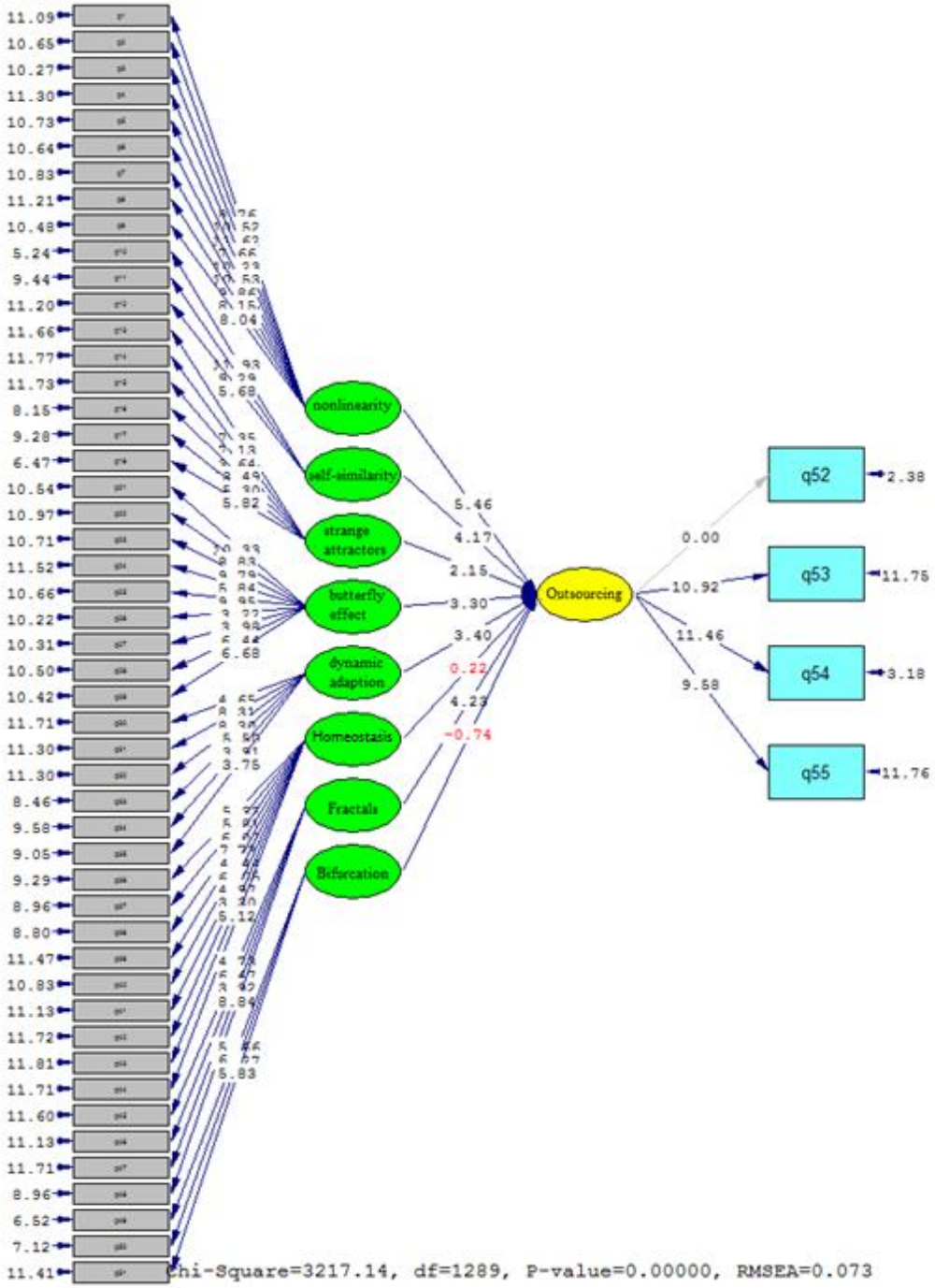

Figure 5. Path Analysis model in significance condition

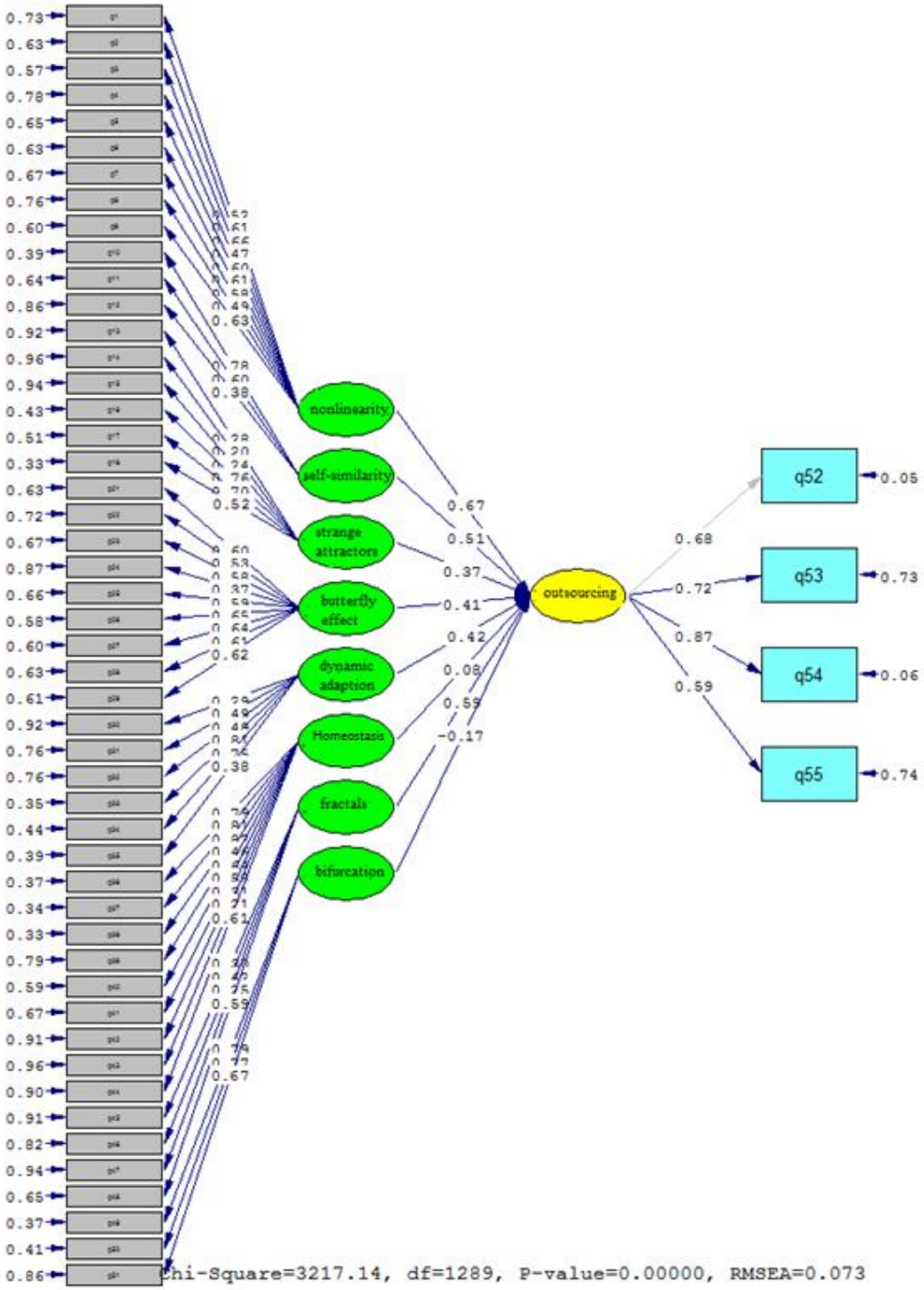

Figure 6.Path Analysis model in standard condition

Table 1. Significant levels of Kolmogorov-Smirnov test for variables

Variable	(Asymp. Sig)	Normality
Nonlinearity	0.059	normal
Self-similarity	0.054	normal
Strange attractors	0.053	normal
Butterfly effect	0.269	normal
Dynamic adaption	0.392	normal
Homeostasis	0.068	normal
Fractals	0.02	abnormal
Bifurcation	0.082	normal
Sales Outsourcing	0.064	normal

Table 2. KMO and Bartlett test results for Sample Adequacy

KMO	Bartlett test statistic	df	Sig.
0.688	2750.243	1431	0.000

Table 3. Fitness index of the Measurement Model of Independent Variables

Variable	Index	Reported value	Optimum Value
Measurement Model of Independent Variables	$\chi 2/df$	1.76	< 3
	RMSEA	0.079	<0.08
	NFI	0.85	>0.9
	NNFI	0.90	>0.9
	CFI	0.92	>0.9
	GFI	0.82	>0.9
	AGFI	0.78	>0.9
	RMR	0.06	Almost zero

Table 4. Fitness index of the Measurement Model of dependent Variables

Variable	Index	Reported value	Optimum Value
Measurement Model of dependent Variables	$\chi 2/df$	0.43	< 3
	RMSEA	0.00	<0.08
	NFI	1.00	>0.9
	NNFI	1.00	>0.9
	CFI	1.00	>0.9
	GFI	1.00	>0.9
	AGFI	0.99	>0.9
	RMR	0.006	Almost zero

Table 5. t-test values and load factor of the questions and combined reliability of each variable

No.	Variable	Load factor	Sig.
1	Nonlinearity	0.46	4.66
3		0.41	4.18
4		0.54	5.57
5		0.46	4.68
6		0.47	4.78
7		0.44	4.51
8		0.55	5.47
9		0.49	5.08
10	Self-similarity	0.32	3.37
11		0.67	6.87
12		0.48	5.09
13	Strange attractors	0.66	7.85
14		0.65	7.63
15		0.40	4.48
17		0.46	5.20
18		0.38	4.20
20		0.50	5.64
21	Butterfly effect	0.59	6.85
22		0.49	5.57
23		0.47	5.23
24		0.35	2.71
25		0.57	5.95
26		0.64	3.74

27		0.32	3.42
28		0.59	6.84
29		0.59	6.86
30	Dynamic adaption	0.41	3.96
32		0.37	3.70
34		0.51	4.33
35		0.32	3.35
36	Homeostasis	0.55	5.82
37		0.36	3.66
38		0.36	3.66
39		0.58	5.80
40		0.48	4.48
41		0.59	6.17
42		0.39	3.97
43		0.49	5.07
44		0.42	4.33
45	Fractals	0.41	3.95
46		0.57	5.65
47		0.65	6.79
48		0.65	6.80
49	Bifurcation	0.59	5.79
50		0.78	7.31
51		0.66	6.45
52	Sales outsourcing	0.64	11.94
53		0.78	12.87
54		0.82	13.78
55		0.59	11.08

Table 6. Correlation among variables

Constructs	Nonlinearity	Self-similarity	Strange attractors	Butterfly effect	Dynamic adaption	Homeostasis	Fractals	Bifurcation
Nonlinearity	1							
Self-similarity	0.70	1						
Strange attractors	0.68	0.74	1					
Butterfly effect	0.55	0.59	0.55	1				
Dynamic adaption	0.69	0.70	0.81	0.70	1			
Homeostasis	0.51	0.70	0.59	0.62	0.74	1		

Fractals	0.64	0.68	0.63	0.57	0.72	0.74	1	
Bifurcation	0.65	0.66	0.66	0.55	0.72	0.56	0.71	1

Table 7.Fitness index of Path Analysis Model

Variable	Index	Reported value	Optimum Value
Structural Equation Modeling (SEM) (Path Analysis) Model	$\chi 2/df$	2.49	< 3
	RMSEA	0.073	<0.08
	GFI	0.80	>0.9
	AGFI	0.77	>0.9
	CFI	0.91	>0.9
	NFI	0.85	>0.9
	NNFI	0.90	>0.9
	RMR	0.07	Almost zero

Table 8. Results of Path Analysis for Testing Research Hypotheses

Hypotheses	Sig.	Path Coefficient	Result
H1	5.46	0.67	Approved
H2	4.17	0.51	Approved
H3	2.15	0.37	Approved
H4	3.30	0.41	Approved
H5	3.40	0.42	Approved
H6	0.22	0.08	Rejected
H7	4.23	0.59	Approved
H8	-0.74	-0.17	rejected

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RESEARCH ARTICLE

Determination Blood Factors of Oscar Fry (*Astronotus ocellatus*) Fed up with Napoli Artemia Enriched with Manan Oligosaccharide

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ABSTRACT

This research has been done at biochemistry laboratory at Islamic Azad university of Lahijan and research center of Dr.Keiwan at Chamkhaleh for 8 weeks in June 2013 with the aim of determining the effect of different levels of Mannan Oligosaccharides (MOS) prebiotic and prebiotic of yeast cell wall(YCW)onblood parameters and immune system of Oscar fry(Asstronosocellatus). After a week of compatibility with culture condition 100 Oscar fries with average weight of 0.35gr were randomly fed up into 4 aquariums with density of 25 pieces in each aquarium for 8 weeks regarding water temperature of 10% of biomass. In this experiment by separating MOS from prebiotic of yeast cell wall and enriching Napoli Artemia with prebiotic MOS at 4 levels of 0 (control group) , 250, 500, 750 mg /l (with three replicate)equal to 21 days the Oscar fries were fed up and from the beginning of the fourth week till the end of eighth week by adding prebiotic of yeast cell wall four levels of 0 (control group) ,1 %, 2% and 3 % (with three replicate) to the first food of Oscar fry(Biomar) was designed. At the end of a period hematological parameters and immune parameters were measured.At considering hematological factors, the moderate concentration of hemoglobin in the red blood cell (MCH), the degree of moderate capsular volume of fries(MCV), moderate concentration of hemoglobin in red blood cells(MCHC) and Eosinophil that were being considered among treatments and the control group didn't show significant statistical difference($p>0.05$). White and red blood cells, hematocrit, hemoglobin, neutrophil, monocytes between treatments and the control group showed significant statistical difference and had significant increase at

treatment than the control group but lymphocytes at control group was more than all treatments. At considering immune parameters, serum lysozyme, IGM at control group was less than other treatments and statistically any significant difference has been observed($p<0.05$).The degree of total immunoglobulin between treatments showed significant statistical difference at 1 and 3% treatments.

Key words: Fish (*Astronotus ocellatus*), prebiotic of yeast cell wall, MOS, Artemia, blood parameters, immune indices

INTRODUCTION

Suitable and sufficient food is one important and effective factor at Agriculture. Natural food that is so-called as live food has high importance at culturing and saving ornamental fries(Shaterian, 2011).live foods are a suitable source of food and are often necessary for infants and some other culturing species, especially those who don't have fully grown gastrointestinal system. In this state, live foods provide enzymes for digesting food eaten by new-born fries. Two important actions for aquacultures are supplying creatures proper with the size of fry's mouth during primary steps of feeding and then supplying many of these creatures for culturing new-born fries. Artemia or Brine shrimp is a tiny creature from Branchiopoda species that is part of fresh water aquatics that for its survival and potential has gone to the brine water and finally very brine water, on the other hand because this aquatic doesn't have any defensive tool against other aquatics, it will rapidly be defeated by kinds of predators. Therefore it has high adaptability power against different brines (AzariTakami, 2009).One important cases of use of infant Artemia and adult Artemia are as carriers of materials that are directly used by different farmed fishes and crustaceans, through bio-encapsulationArtemia are fed up with some of vital materials like necessary nutrition, vitamins, vaccine, pigments and kinds of necessary drugs that are needed at aqua culturing and then these Artemias as carriers are eaten by farmed aquatics. This action that is called enrichment causesincrease of resistance against kinds of stress like salinity, temperature,transportation,density at farmed aquatics. Based on the kind of using, enrichment can be done by various kinds of required materials. For example enrichment with proteins, oils, vitamins, vaccines and antibiotics and..(Sorgeloos&lavens,1996).Aghreported in 2001 that Artemiadue to having 55% of protein,4-20% of oil, all main Amino acids and most fatty acids at favorable level are counted as the best food of aquatics. The basis of proper enrichment are the maximum enrichment(reaching the highest degree) at the shortest time, this time depends on the duration of reaching Napoli to the first nutritional step(Instar2) and is related to the characteristics of hatching rate and hatching coordination of cysts. As the duration of hatching coordination is shorter that is cysts could hatch with each other at a more limited time, better result is obtained at enrichment. As the duration of hatching coordination is longer, during the accessibility to enrichment ration a number of Napoli's haven't still started feeding and this factor reduces the total absorption of nutrient at napoleonsmass (Azaritakami, 2007).Food is one of the most expensive parts of aqua culturing and its optimization can have important function at reducing production expenses. Blood can act as a medical board because blood by passing through all organs, textures and body cells takes nutrients and oxygen to them and collect different waste material and is affected by different metabolic processes and reflect any changes in comparison to natural states and many of pathogens that affect other textures can show disease effect. Blood parameters or indices is varied regarding the size, age, health situation, environmental factors and locating at different steps of sexual maturity(Kazemi&et al, 2010). Prebiotics are in fact cell wall extracted from the yeast Saccharomyces Cerevisiae that are produced by the company named Bioncy Orange Natural Company in Austria is supplied from ParsiyanShafaghdarou company that is the formal delegacy of the company in Iran. For doing the research cell wall of the yeast is the origin of 2 important materials of Immunostimulant called β-Glucan(1-3) and MOS , MOS and β-Glucan are the main materials mostly affecting prebiotics(Huang, 2008).Cell wall of the yeast is composed of 30-60% of polysaccharide(MOS & β-Glucan),15-30% of protein, 5-20% of lipid and a little Ketin(Huang &et al, 2004,2005).Mos has also an active prebiotic and can be preserved as a nutrition for growth of beneficial bacteria in colon of intestine. Mos are indigestible Glaucoma and protein that provide places of establishment of Mannose at Velvet pile of intestine and prevent connecting of pathogenic bacteria to enterocytes cell(absorptive

epithelial cells) of intestine, also prevent formation of bacterial colony and infection of host cells that it leads to the increase of cohesion of intestine velvet pile in order to improve and increase the efficiency of intestine and leads to more and better beneficiary of nutrients(Pryor et al, 2003; Newman, 2007). Mos as a moderate source of energy is counted by lactic acid bacteria(Miles, 1993).Oscar fry was firstly named as labotesocellatus by Baron Kovieh in early 1800 but nowadays this fry with a scientific name of (Astronotusocellatus) belongs to Siklideh family. Regarding the positive effects of prebiotic of yeast cell wall it considers the mentioned fish with the aim of improving its immune and blood factors.

MATERIALS AND METHODS

Extracting MOS from prebiotics of yeast cell wall

The first step of this research has been done at chemistry lab of Islamic Azad University of Lahijan in field and experimental forms for a month. At separating and extracting prebiotics MOS from prebiotic of yeast cell wall in any step of separation that has been done at the first step 20gr of prebiotic of yeast cell wall was measured by digital scales. at the second step 2gr of 5% sodium hydroxide was dissolved at 200ml distilled water into a Beaker and 20gr of poweder of prebiotic of yeast cell wall was added to it. It is necessary to mention that inside a Beaker one or two magnets have been placed in order to keep the ingredients suspending then the ingredients of the Beaker was put on a heater at the temperature of 100 ^{0}c for two hours at the second step beaker was taken from heater to become cool and after making the ingredients cool 5%HCL was added slowly and with PH-meter it was measured until its PH reaches neutral ph that is PH=7. At the third step the ingredients of beaker was purified by filtration system. At the fourth step 80ml of pure ethanol was added to the ingredients of beaker at this step MOS sediment this sediment was separated from ethanol by centrifuge machine with 5000pm turns for two minutes and at the last step this sediment was washed by diethyl ether.(Huang and et al, 2010).

Preparation of incubator for hatching Artemia

Constructing incubation for hatching cyst Artemia

For this purpose incubators were made by mineral water bottles for hatching cyst Artemia with 3 treatments at 3 levels of 250, 500 and 750mg/l and a control group that was done by 3 repeats. Firstly 5cm of bottom of each bottle was cut then at the center of cap of bottles a hole was made for passing air tube in order to do the action of delivering oxygen and suspension of cysts constantly then the bottles were put in an inverted form as its cap was placed downward and the action of delivering oxygen was done in a bottom-up direction and placed in aquarium.

At the first step, 2gr of cyst Artemia and 28-35gr salt rock for each bottle were measured by digital scale and were transferred into each bottle, mild and constant aeration action and permanent light, fixing temperature at 30^{0}c during 4 hours has been done very well(for fixing temperature a 150w heater was placed in aquariums.

Enriching Artemia

After 36 hours, Napolies went out of cysts and 12 hours after hatching, while Napolies entered in instar step and have started active feeding from outside environment, enrichment has been started and prebiotic MOS at 3 levels of 250, 500 and 750mgr/l and control group (without enriching Napoli Artemias was enriched to Napoli Artemia and finally fed up to fishes.

One hundred Oscarfries (*Astronotus ocellatus*) were sent to each four 60liters aquariums after bioassay (assessing weight and length) and determining biomass with average weight of 35%gr and minimum length of 1.25cm and maximum 2.5cm and density of 25 ones. Then the act of making fishes compatible with basic ration(that the standard food was Biomar) based on 8-10% of their body weight has been done at three turns(at 10a.m,12 o clock and 3p.m) for a week(pourali&et al, Mohseniet al, 2006, 2003).After a week of compatibility of Oscar fries and bioassay of all studying population of thee research for 21 days(3 weeks) in 3 treatment groups and one control group that each has been done with 3 repeat consisting fishes fed up with Napoli Artemia without entering with MOS(control group) fishes fed up with Napoli Artemia enriched with 250mg/l of MOS(first treatment) and fishes that fed up with Napoli Artemia enriched with 500mg/l of MOS (second treatment) and fishes that fed up with Napoli Artemia enriched with 750mg/l of MOS(3^{rd} treatment). Treatments of fourth week till the end of eighth week were as below, fishes fed up with Biomar foodcontrol group), fishes fed up with mixture of Biomar and 1% prebiotic of yeast cell wall (first treatment), fishes fed up with mixture of Biomar and 2% prebiotic of yeast cell wall (second treatment) and fishes fed up with mixture of Biomar and 3% prebiotic of yeast cell wall (third treatment). Three minutes after the first period of daily feeding the act of siphoning remained food and removing waste was done. Washing filters and stones of aquarium has also been done once a week. Measuring physical and chemical factors including temperature with thermometer,water PH with digital Ph.meter of Eco model and the amount of soluble oxygen has been done by Eutech digital oxymeter daily and data were recorded. Average temperature was 28-30^{0}c, average oxygen 6.62ppm and average PH 8-8.7, during the culturing period that mentioned physical and chemical factors during culturing period didn't have significant difference($p>0.05$).At the end of a period were calculated based on available resources of mathematical equations at the end of eighth week taking blood has been done as 24 hours before taking blood feeding hasn't been done in order to empty digestive tubes completely. 48 fishes and 12 hours from each group(4 pieces for each repeat) were randomly chosen and the place of stalk or tail of considered fish dried with a clean towel, also while taking blood a wet towel was placed on a fish's gill. Taking blood from vessel of tail was done by 2cc syringe or insulin syringe. During the process of taking blood, anesthetic drugs haven't been used because of the probability of affecting blood factors(torrecillaset al, 2010). The volume of blood taken from 4 fishes poured into Eppendorf tube(violet tube) having anticoagulant heparin. Applied centrifuge was labfuge model made by Heraceus in Germany. The aim of providing smear was taking a proper layer from blood cells on microscopic slide as different cells after doing dying procedures, become identified and countable. For full and constant distribution of blood a drop of blood was poured at 1 cm of right angel of slide by micro hematocrit tube and then with another slide with 30-40 degree angel was stretched by a rapid,sudden,horizontal movement and at two diverse direction –then blood expansion was conformed. Then dying with 10% solution of Giemsa(made by Merck of Germany0 was done and slides were put into it for 30-35 minutes. Counting blood cells of fishes includes counting red cells or RBC,counting white cells or WBC, PVC, Hb and red factors or cells(MCH, MCHC, and MCV) has been considered.For counting blood cell from slide of hemocytometerNeobar has been used. For white cells diluting pipette of white cells or white Melanzhor has been used. For red cells diluting pipette of red cells has been used(Lewis et al, 2006). Measuring activity of Lysozyme that was obtained by using the dried Elisa Reader(Awareness USA) and the model Statfox-2100 and by Turbidometric method through gradual analysis of positive warm bacteria-Micrococus-lysodeikticu)sigma,USA). Measured specific immune indexes also includes total immunoglobulin (IG) immunoglobulin M(IGM) that for measuring Ig(Elisa) method was used. Applied Elisa Reader system was StarFax2010(Awareness). And for measuring immunoglobulin M, the method of Immunoturbidimetric was used and by the system the degree of created turbidity had direct relationship with the amount of IGM and by spectrophotometer system of Minineph made by (Binding site,UK) at wave length of 340nm was read by blank(distilled water).(Sagha&Soroushnia,2003;Khoshbavar&Rostamiet al, 2006).

Statistical analysis

For considering normal distribution of data in groups and repeats them in order to conform treatment the test Wilk-Shapiro and Histogram drawing was used. In case of normality of data for statistical comparison between groups in treatments, the one-way Anova test was used and for considering the reciprocal effect,2-way Anova and after doing

test of Homogeneity of variances for comparing groups, Duncan test was used. All statistical analysis was done by using Spss software version 17 and for drawing chart the software Excel 2003 was used.

RESULTS

The results showed that among considering blood factors except MCV, MCH,MCHC, Eosinophil and Lymphocytes in blood, at other blood and immune factors of Oscar fries a significant statistical difference has been observed between all treatments with control treatment. At all 1% treatments, significant statistical increase has been observed than control treatment and other treatments in this experiment. At CBC significant statistical difference has been observed between treatments with control group. The degree of CBC at 1% and 2% treatment was more than other treatments and control treatment and in all treatments significant statistical increase has been observed than control treatment. At RBC significant statistical difference has been observed between treatments with control group. The degree of RBC at 1% treatment was more than other treatments and control treatment and in all treatments significant statistical increase has been observed than control treatment. At hemoglobin of fishes significant statistical difference has been observed between treatments and control group and its degree at 1% treatment is more than other treatments and control treatment and in all treatments significant statistical increase has been observed than control treatment. At Hematocrit of fishesblod significant statistical difference has been observed between treatments with control group and its degree at control treatment was less than other treatments and in all treatments significant difference has been observed than control treatment. the degree of notrophils at fishes blood, significant statistical difference has been observed between treatments with control group. At lymphocit of fishes blood significant statistical reduction has been observed as blood linphocit at control treatment was more than all treatments and significant statistical difference of control group was observed than all treatments and at control treatment was less than other treatments and in all treatments significant increase was observed than control treatment. The degree of monocit of fishes blood had significant statistical difference between treatments with control group and at control group it was less than other treatments($p<0.05$). At MCV, MCH, MCHC and eosinophil at all tretmentssignificant statistical differencehasn't been observed than control group($p>0.05$).

The degree of fishes blood lyzozym has shown significant statistical difference between treatments with control group and at control treatment it was less than other treatments and at 3% treatment significant statistical increase has been observed than control group and other treatments. The degree of IMG of fishes blood showed significant statistical difference between treatments with control group and among all treatments especially 1% treatment significant statistical increase has been observed than control treatment and other treatments. The degree of total Immunoglobulin of fishesblood indicates significant statistical difference between treatments with control group. And at control group it was less than other treatments and at 1% and 3% treatments more than other treatments and control treatment and the highest degree at fishes' blood was observed at 1% treatment and statistically significant statistical difference has been observed with control treatment and 2% treatment($p<0.05$).

DISCUSSION

Applying different levels of prebiotic MOS and yeast cell wall has high effectiveness on improving blood parameters and immune indices at Oscar fries and totally positive correlation has been obtained between blood and immune and nutrition parameters with levels of prebiotic MOS and yeast cell wall at ration. In comparison between different levels of prebiotic MOS and yeast cell wall at ration, 1 and 3% levels have had higher performance at improving performance of blood and immune indices.

Welker &et al(2007) by adding MOS to the amount of 2g/kg food,didn'tobserve significantdifference at Ictaluruspunctatus fed up with MOS and control group regarding hematological parameters($p<0.05$).that didn't correspond to our results.

Suxsuhe&et al,(2009) by adding 2 levels of 0.2 and 0.4 percent of business matter DVAQQA resulted from fermentation of Saccharomyces Cerevisiae to ration of hybrid tilapia(Oreochromisnilotcusoaureus) at system of culturing in cage found that beside concentration of beneficial intestinal bacteria, improvement of performance at growth,FCR and survival, mechanism of nonspecific defense such as activities of complement direction of serum replacement(c_3& c_4) activity of lysozyme, phagocytosis activity of anterior kidney macrophage and respiratory burst activity of another kidney improvd($p<0.05$) that is compatible with the result of our research.

Tukmechi&et al in 2011 considered the effect of yeast cell wall on blood parameters of rainbow trout that hematocrit, neutrophil, lymphocyte, monocyte, the amount of lysozyme Ach 50 and Ig and the total number of CBC at treatments having cell wall of the brewer's elbow at ration, didn't have significant difference with control ration that these results except lack of significant difference at $Ach_{50}$and total number of Crsc corresponds with the result of the current research.

Taati(2010)mentioned that adding prebiotic Immunosteroimmunowall to ration of Beluga didn't make significant difference at hematocrit, hemoglobin,MCH,MCHC, neutrophil, total protein, IGM and lysozyme between treatments and control group that didn't correspond to the finding of this research.

The effect of nutrition of common carp(cyprinuscarpio) by adding β-(1,3) 1%Glucan and yeast saccharomyces Uvarum to ration for 60 days showed that β-(1,3) Glucan at the end of a period comparing to control group and the group fed up with Suvarum increased the degree of CBC significantly.($p<0.05$) whereas phagocytic activity of neutrophils at experimental treatments fed up with yeast has significantly increased(Gopalalallan& Arul, 2009).that doesn't correspond to our finding.Yusefi&et al, 2008 by adding nucleotide of ration at the level of 0.15,0.25, 0.35 and 50 ration found that the amount of Lymphocyte at young Beluga fed up with ration Nucleotide of ration at intermediate level especially treatment($p<0.05$) but significant difference hasn't been observed at the amount of WBC,CBC, percent of Neutrophil and Eosinophil between different treatments comparing to control treatment($p<0.05$) that it doesn't correspond to the findings of this research and its reason is the kind of ration.

Totally the present difference at the result reported by different researchers for applying kinds of prebiotics at various species of cultured aquatics should be probably related to the type of cultured species, environmental condition, nutritional behavior and physiological features of aquaculture.Also the effect of different prebiotic can be evaluated based on quantity and quality of ration, kind of consumable prebiotic, purity degree and its consumable degree at ration and probably especial microbial population being able to use different kinds of prebiotics.Factors such as environmental factors especially due to being cold-blooded (season, salinity, light period, temperature, density) physical factors (aquatic species, reproductive cycle and maturity situation, age, gender and nutritional condition) time of sampling, the way of supplying sample, accuracy and sensitivity of methods of measuring on activity of indices of blood and immune can affect it and causes difference at interpretation of the result of the research (Verdegemet al, 1997).

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Table 1.comparing average of blood parameters of Oscar fries fed up with MOS and yeast cell wall during 60 days of culturing

750mg/lofMOSand 3%prebiotic of yeast cell wall	500mg/l-ofMOSand 2%prebiotic of yeast cell wall	250mg/lofMOSand 1%prebiotic of yeast cell wall	Control	Treatment
11325 c ± 154/78	10750 b ±202/07	12550 ±359 /39 b	8750 ± 232 /73 a	White blood cell
1982750 a ± 43401/95	±19045/45 1972250 a	2088500 b ±30546/41	±22863/73 1899500 a	Red blood cell
8/1 ±0/14 a	7/87 ±0/05 a	8/22 ±0/15 b	7/6 ±a0/14	Hemoglobin
31/75 ± 0/5 b	32 ±0/b40	33/25 ±b0/85	29/5 ±0/a29	Hematocrite
158/75 ± 2/01	162 ± 1/47	159 ± 2/16	155/25 ± 1 /38	MCV
39/25 ± 0/75	39/75 ± 0/25	39/25 ± 0/25	40 ±0/70	MCH
24/5 ± 0/28	24/25 ±0/25	24/25 ±0/25	25/5 ± 0/29	MCHC
36/5 ± 0/65 b	35/25±0/63 b	37/75 ± 0 /85 b	30/5 ± 0 /a5	Notrophils
58/75 ± 1/03 a	60 ±0/70 a	55 ±3/69 a	65/75 ± 0 /75 b	Lymphocit
4 ± 0/40 b	3/25 ±0/ab25	±0/40 b	2/5 ± 0 /29 a	Monocit
1/5 ± 0/5	1/5 ±0/29	1/ 5±0/5	1/67 ± 0 /33	Eosinophil

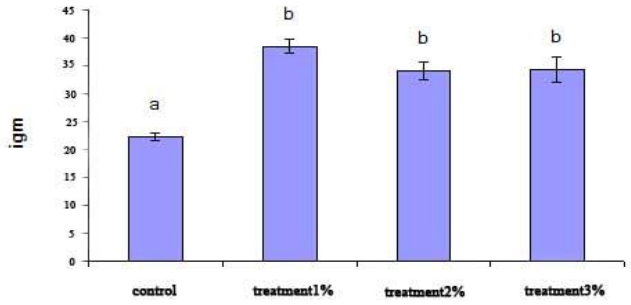

Fig.1: comparing average amount of IGM of control group with different treatments

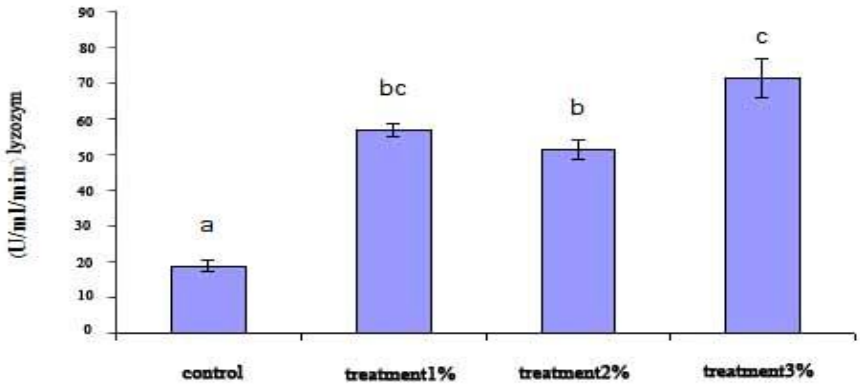

Fig.2:- Comparing average amount of lyzozym with different treatments

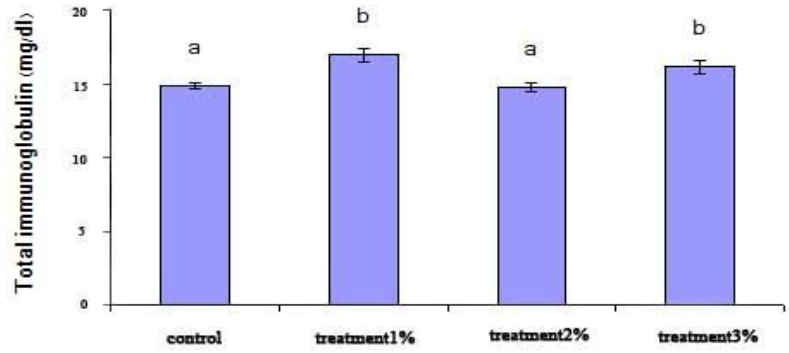

Fig.3-comparing average amount of total Immunoglobulin of control group with different treatments