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RESEARCH ARTICLE

Study on Morphological Characteristics of Maize (*Zea mays* L.) Cultivars under Different Plant Densities

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ABSTRACT

This experiment was lay out in order to evaluate the effect of plant density on morphological characteristics of maize (*Zea mays* L.) cultivars in faculty of agronomy and plant breeding, Islamic Azad University, Boroujerd Branch, Boroujerd (field location: Kohdasht), Iran during the growing seasons 2011-2012. The experiment was a split-plot design based of RCBD with three replications. Treatments were four plant spacing (10, 15, 20 and 25 cm) in main plots and three early growing corn cultivars (AS31, AS54 and BIARIS) in sub plots. Results showed that, the effect of plant density, cultivar and interaction between them on number of leaf per plant, cob weight, cob diameter and cob length were significant. The effect of plant density and interaction between them was significant on plant height. Effect of plant density and cultivar were significant on stem diameter and leaf length only. The comparison of the mean values of the plant height for interaction between plant density and cultivar showed that AS31cultivar in 25cm plant density treatment had the highest and AS54cultivar in 15cm plant density treatment had the lowest plant height. 25cm plant spacing treatment had the highest stem diameter and 10 cm plant had the lowest of them. In cultivar treatment AS54 cultivar had the highest and AS31 cultivar had the lowest stem diameter. AS54 cultivar in 25cm plant density treatment had the highest cob weight. Also, AS31 cultivar in 25cm plant density treatment had the highest cob length. However, BIARIS cultivar in 25cm plant density treatment had the highest plant height number of leaf per plant and cob characteristics. Then increasing in plant density improved plant morphological traits that this increased maize yield.

Also in cultivar treatment, BIARIS was better cultivar in different plant density that we can use of in for agronomic purpose.

Key words:, Cultivar, morphology and plant population

INTRODUCTION

Maize (*Zea mays* L.) is a crop of world repute and has a remarkable adaptability in a wide range of climates, and it is more extensively distributed over the cobth than any other local crops (Ibeawuchi et al, 2008). Maize is the world,s most widely grown cereal and it is ranked third among major cereal crops (Ayisi and Poswall, 1997). Maize has a big potential in that it has a large utilization as food sources for people and animals and for industry.Corn is a very versatile grain that benefits mankind in many ways. Each ycob, 6 billion bushels of corn are used as feed for cattle, hogs and poultry in the United State.

Plant density is one of the most significant agronomic practices contributing towards grain yield, as well as other important attributes of this crop (Charles and Charles, 2006) also, is an important agronomic attribute since it is believed to have effects on light interception during which photosynthesis takes place which is the energy manufacturing medium using green parts of the plant. One of the most important cultural practices to reduce impact of weed on crops is increasing crop competitiveness by increasing plant density. plant deficit per unit area prevents maximum usage of production parameters and on the other hand, excessive density can increase the competition and decrease the yield._Plant density is of particular importance in corn, because it does not have tillering capacity to adjust to variation in plant stand (Moosavi et all, 2012) .The response of corn into plant density is changes due to in yield components more effective than other weeding plants (Normohamadi et al, 1997). The results of previous studies showed that plant density and planting pattern differently affected yield and morphological traits (Colville et al., 1963; Edmeades and Lafitte, 1993; Fishbach and Mulliner, 1974;). Good plant spacing gives the right plant density, which is the number of plants, allowed on a given unit of land for optimum yield (Obi, 1999). Saberi et al (2001) investigated the effect of three planting methods (ridge planting, double rows by 15 and 20 cm distance) and four plant densities (70,000; 80,000; 90,000 and 100,000 plants ha-1) on yield of fodder maize. Prine (1964) reported that competing for light is the most limiting effect of plant density on plant yield. Roy and Singh (1986) found that in maaize, 80000 plant population per hectare produced higher yield than 60,000 plant population (Roy et al, 1996). The optimum plant population of 53,333 plants/ha for maximum yield of maize (Iken et al, 2004). Haidargholinezhad et al (2003) showed the best quality of SC704 hybrid forage gained by plant density of 78,000 and 104,000 plants ha-1. Mazaheri et al (2002) reported that enhancing plant density increased forage yield significantly. High plant densities resulted in better light absorbance by flag leaves which have high photosynthesis efficiency and enhanced forage yield (Tetio-Kagho and Gardner 1988).

Therefore this study was planned to examine effect of different plant densities on morphological traits of maize.

MATERIALS AND METHODS

This experiment was conducted in the faculty of agronomy and plant breeding, Islamic Azad University, Boroujerd Branch, Boroujerd (field location: Kohdasht), Iran during the growing seasons 2011-2012. The experiment was laid out in order to evaluate the effects of different plant densities on morphological characteristics of maize (zea mayz L.). The experiment was a split-plot design based of RCBD with three replications. Treatments were four plant spacing (10, 15, 20 and 25 cm) in main plots and three early growing corn cultivars (AS31, AS54 and BIARIS) in sub plots. The maize cultivars seeds were was planted in 5-rows in plot. Row to row distance was maintained at 75 cm. Plant samples were taken with 10 plants from each plot. The plant height, stem diameter, number of leaf per plant, leaf length, cob weight, cob length and cob diameter were determined as standard methodsfrom 8 plants per plot.

The statistical analyses to determine the individual and interactive effects of treatments were conducted using JMP 5.0.1.2 (SAS Institute Inc., 2002). Statistical significance was declared at $P \leq 0.05$ and $P \leq 0.01$. Treatment effects from the two runs of experiments followed a similar trend, and thus the data from the two independent runs were combined in the analysis.

RESULTS

Plant height: The effect of plant density and interaction between density and cultivar plant height was significant (table 1). The comparison of the mean values of the plant height for interaction between plant density and cultivar showed that AS31cultivar in 25cm plant density treatment had the highest (218cm) and AS54cultivar in 15cm plant density treatment had the lowest plant height (176cm) and the differences were significant (table 3).

Stem diameter: The effect of plant density and cultivar on stem diameter was significant only (table 1). The comparison of the mean values showed that in density treatments, 25cm plant spacing treatment had the highest (2cm) stem diameter and 10 cm plant had the lowest stem diameter (1.6cm) and the differences were significant (table 2). In cultivar treatment AS54 cultivar had the highest (2.1cm) and AS31 cultivar had the lowest (1.8cm) stem diameter.

Number of leaf per plant: The analysis of variance showed that, the effect of plant density, cultivar and interaction between them on number of leaf per plant was significant (table 1). The comparison of the mean values of the number of leaf per plant for interaction between plant density and cultivar showed that BIARIS cultivar in 25cm plant density treatment had the highest (13.6) number of leaf per plant and AS31 cultivar in 15cm plant density treatment had the lowest number of leaf per plant (11.9) and the differences were significant (table 4).

Leaf length: The effect of plant density and cultivar on Leaf length was significant (table 1). The comparison of the mean values of the Leaf length for plant density showed that 25cm plant density treatment had the highest (82cm) Leaf length and 10cm plant density treatment had the lowest (75cm) Leaf length. However, The comparison of the mean values of the Leaf length for cultivar treatment showed that BIARIS cultivar had the highest (79cm) Leaf length and AS54 cultivar had the lowest (73cm) Leaf length (table 3).

Cob length: The analysis of variance showed that, the effect of all treatments on cob length was significant (table 1). The comparison of the mean values of the cob length for interaction between plant density and cultivar showed that AS31 cultivar in 25cm plant density treatment had the highest (16.7cm) cob length and all cultivars in 10cm plant density treatment had the lowest cob length (12.4g) and the differences were significant (table 4).

Cob diameter: The analysis of variance showed that, the effect of all treatments on cob diameter was significant (table 1). The comparison of the mean values of the cob diameter for interaction between plant density and cultivar showed that AS54 cultivar in 25cm plant density treatment had the highest (4.7cm) cob diameter and AS31 cultivar in 10cm plant density treatment had the lowest cob diameter (3.6cm) and the differences were significant (table 4).

Cob weight: The analysis of variance showed that, the effect of plant density, cultivar and interaction between them on cob weight was significant (table 1). The comparison of the mean values of the cob weight for interaction between plant density and cultivar showed that AS54 cultivar in 25cm plant density treatment had the highest (208g) cob weight and AS31 cultivar in 10cm plant density treatment had the lowest cob weight (94g) and the differences were significant (table 4).

DISCUSSION

The results of this study showed that, plant density and cultivar had significant effect of morphological traits of maize (table1). Many researchers told that the many of factors and processes such as light intercepted by the canopy, metabolic efficiency of plants, translocation efficiency of photosynthates from leaves to economic parts and sink capacity or sink strength affected growth and yield of crops (Doku, 1997). In this study maximum plant height was obtained at 75*25 cm plant population.These results indicated that with increasing of space between plants absorption of light increased and competition between plants decreased then plant height incrased. Moosavi et al (2012) told that in maize plant height and stem diameter of forage corn were significantly affected by plant density but leaf number per plant no significantly affected by it. They told that It appears that the increase in plant height following the increase in plant density was related to the increase in the inter-plant competition over light and the disruption of the balance of growth regulators.Also, plant density interaction was not significant on morphology traits (moosavi et al, 2012). Different plant spacing with different plant densities generally influenced maize morphological traits. Moosavi (2007) and Mohammadi Nikpoor (1995) told the plant height increased with increasing in plant density. Mean comparisons showed with increasing plant density these stem diameter and leaf length decreased, so the maximum rate of those was obtained from lowest density (Table 2 and 3). In high densities cause increasing competition between plants share assimilate for per ear reduced and ear length decreased (Sadeghi and Bohrani, 2002; Zamanian and najafi, 2002; feyzbakhsh et al. 2007).

According to the data of table 4, with increase in plant space in all cultivars plant height, cob weight, cob length, cob diameter and number of leaf per plant were increased significantly (table 3). In another research Faravani (1995) also founded that with increasing plant density Cob weight in per plant decreased. Ibeawuchi et al (2008) told that the plant spacing, for maize plant, which had the least plant, height, could be explained by the competition for scarce growth resources available, the genetic makeup and environmental factors of the plant. It means that these identified factor could be harnessed especially close spacing which cause competition and removal of nutrients for growth and genetic makeup either for tallest or shortness for the particular plant.

Interaction effect between cultivar and plant density was not significant on stem diameter and leaf length (Table 1).

All traits were affected by cultivar treatment too (Table 1). For stem diameter AS54 cultivar had the highest and AS31 cultivar had the lowest of it (table2). However, for leaf length BIARIS cultivar had the highest and AS54 cultivar had the lowest Leaf length (table 3). Yarnia (2010) reported that interaction between delay sowing and increasing plant density decreased leaf area of amaranth at least 19.63 up to 97.15%. Safari et al (2008) found that leaf area index increased with increasing plant density but decreased with delay in sowing date.

AS54 cultivar in 25*75 cm plant population treatment had the highest cob weight. The data showed that the cob length decreased as the plant population increased.

In the present study highest cob diameter obtained at AS54 cultivar in 25cm plant density treatment and lowest of it obtained at AS31 cultivar in 10cm plant density treatment and the differences were significant (table 4). Karim et al. (1983) and Akcin et al. (1993) who concluded that the cob length and diameter decreased linearly with increase in plant population. Our results indicate that there is a positive relationship between plant spacing and cob diameter and cob length of maize. For cultivar treatments, AS31 cultivar in 25*75 cm plant density treatment had the highest cob length. These findings are in agreement with those obtained byAslam et al. (2011) and Moaveni et al. (2011) in maize. In final our results showed that increasing in plant density improved plant morphological traits that this increased maize yield. Also in cultivar treatment, BIARIS was better cultivar in different plant density that we can use of in for agronomic purpose in Lorestan province.

REFERENCES

1. Akcin A, Sade B, Tamkoc A, Topal A. 1993. Effect of different plant densities and nitrogen fertilization rates on the grain yield, yield components and some morphological traits of hybrid TTM- 813 grown at Kenya. Doga, Turk Turmve orrmanculik Dergisi. 17(1): 181-294.
2. Aslam M, Iqbal A, Ibni Zamir MS, Mubeen M, Amin M. 2011. Effect of different nitrogen levels and seed rates on yield and quality of maize fodder. Crop and Environment. 2(2): 47-51.
3. Ayisi KK, Poswall MAL. 1997. Effect of plant population on leaf area index, cob characteristics and grain yield of early maturing maize cultivars. Europ. J. Agron.16: 151-159.
4. Charles AS, Charle, SW. 2006. Corn response to nitrogen rate, row spacing, and plant density in Eastern Nebraska. Agron. J. 98, 529-535.
5. Colville WL, A. Dreier DP, Megill, P. Grabouski, and P. Ehlers. 1963. Influence of plant population, hybrid, and productivity level on irrigated corn production. Agron. J. 64: 332-335.
6. Doku, E.V. (1977). Some concepts of Crop yield. Ghana Journal of Agric Sc. 10 (1), 53 – 60.
7. Edmeades, G.O., and H.R. Lafitte. 1993. Defoliation and plant density effects on maize selected for reduced plant height. Agron. J.85;850-857.
8. Faravani, M., 1995. Effects of planting date and plant density on yield and yield components of corn (Zea Mays L.) in Karaj, Iran's.M.Sc. Thesis, Department of Agronomy, Tehran University, Iran.
9. Feyzbakhsh, M.T., Mokhtarpour, H., Mosavat, S.A., Mohager, M., Shahee, G.H.A., 2007. Effects of sowing date and plant density on forage yield and some morphological characteristics of corn (SC. 704). Electronical Crop Production Journal. 3(1), 217 224.
10. Fishbach, P.E., and H.R. Mulliner. 1974. Every other furrow irrigation of corn. Plant Density. Agron. J. 24: 1141-1147.
11. Haidargholinezhad, M.; Ghadimzadeh, M.; Faiazmoghaddam, A., 2003: The effect of planting density of corn hybrid on the basis of agronomy traits. Iranian Journal of Agricultural Sciences 34(2): 417-425.
12. Ibeawuchi, I. I, Matthews-Njoku, Edna; Ofor, Miriam O; Anyanwu, Chinyere P and Onyia; V. N. 2008. Variation in the harvest index of tropical maize: evaluation of recent evidence from Mexico to Malawi. Annals of Applied Biology 138: 103–109.
13. Iken, J.E. & Anusa, A. (2004). Maize Rescobch and Production in Nigeria. African Journal of Biotechnology, 3(6): 302-307.
14. Karim, M.A., Bakhash, P. & Shah, P. (1983). Effect of plant population on yield and yield components of synthetic 66(maize). J. Agron. Res. Rab, 21(2): Maize Absts., 1(5).
15. Mazaheri, D. askarirad, M. Bankesaz, A. 2002. Effect of planting method and plant density on yield and yield components of two fodder maize hybrids. 7th agronomy symposium.
16. Moaveni P, Farid Afshar M, Aliabadi Frahani H, Maroufi K. 2011. Effect of planting density on quantity and quality features in maize (Zea mays L.). Advances in Environmental Biology. 5(7): 1680-1682.
17. Mohammadi-Nikpoor A, Keshavarzi A. 1995. Study of effect of sowing date and plant density on yield and yield components of safflower in Mashad, Iran. M.Sc. Thesis on Agriculture, Ferdowsi University of Mashad, Mashad, Iran.
18. Moosavi SGR. 2007. Effect of plant density and planting pattern on agronomic traits and yield of forage sorghum. Final report of agricultural design in Islamic Azad University, Birjand Branch, Iran.
19. Moosavi, Seyyed Gholamreza, Mohamad Javad Seghatoleslami, Ali Moazeni. 2012. Effect of planting date and plant density on morphological traits, LAI and forage corn (Sc. 370) yield in second cultivation International Research Journal of Applied and Basic Sciences. Vol., 3 (1), 57-63.
20. Normohamadi, G.H., Sadat, S., Kasbani, A., 1997. Agronomy (cereal). Ahvaz University, (1): 428.

21. Obi I.U. (1991). Maize, its agronomy, diseases, pests and food values. Optional Computer Solutions Ltd., Enugu Pp 207.
22. Roy, R.K. & Singh, K.S.P. (1986). response of popcorn (Zea mays) to plant population and nitrogen. Indian Journal of Agronomy, 31(1): 88-92.
23. Saberi, A.R, Mazaheri, D, Heydary Sharifabad, H. 2001. Determining the best planting pattern and plant density in Mazie var three way cross 647. Proceeding of 8th congress of agronomy and plant breeding.
24. Sadgei H, Bohrani MJ. 2002. Effects of plant density and nitrogen rates on yield and yield components of corn (Zea mays L.). Ir. J. Crop Sci. 3, 403-412.
25. SAS Institute. Inc. 1997. SAS/STAT Users Guide. Version 6.12. SAS Institute Inc. Cary. NC.
26. Yarnia M. 2010. Sowing dates and density evaluation of amaranth (cv. Koniz) as a new crop. Advances in Environmental Biology. 4(1): 41-46.
27. Zamanian M, Najafi E. 2002. Assessment of row spacing and plant density effects on silage yield and morphological characteristics of corn cv. KSC 704. Seed Plant. 18, 200-214.

Table1. Analysis of variance (mean squares) for effects of different plant densities on morphological traits of maize cultivars

Treatments	df	Plant height	Stem diameter	number of leaf per plant	Leaf length	Cob length	Cob diameter	Cob weight
R	2	50.4	0.02	0.06	0.38	0.01	0.0002	0.22
Density (A)	3	1980**	0.23**	0.51*	5.45**	20**	0.54**	9193**
Error (a)	6	15.25	0.02	0.06	0.129	0.18	0.007	11.12
Cultivar (B)	2	39.9	0.58**	1.03**	34.7**	4.1**	0.44**	30.2**
D*C	6	651**	0.03	0.382**	14.83	1.1**	0.03**	537**
Error (b)	16	25.2	0.07	0.197	12.16	2.2	0.08	1058
CV(%)		2.56	7.29	1.38	0.41	0.9	1.42	1.63

* and **: Significant at 5% and 1% probability levels, respectively

Table2. Mean comparisons for stem diameter of different maize cultivars under different plant densities

Density	Stem diameter (cm)	cultivar	Stem diameter (cm)
10cm	1.6b	AS31	1.6c
15cm	1.8b	AS54	2.1a
20cm	1.7b	BIARIS	1.8b
25cm	2a		

Means by the uncommon letter in each column are significantly different (p<0.05)

Table3. Mean comparisons for leaf length of different maize cultivars under different plant densities

Density	Leaf length (cm)	cultivar	Leaf length (cm)
10cm	75d	AS31	77b
15cm	78c	AS54	73c
20cm	79b	BIARIS	79a
25cm	82a		

Means by the uncommon letter in each column are significantly different (p<0.05)

Table 4. Interaction effect of treats for effects of different plant densities on morphological traits of maize cultivars

Treatments		Plant height (cm)	Number of leaf per plant	Cob length (cm)	Cob diameter (cm)	Cob weigth (g)
density	cultivar					
10cm	AS31	186d	12cd	12g	3.6h	95g
	AS54	179de	12.4cd	12g	4.1de	150e
	BIARIS	214ab	12.5cd	12.2g	3.7h	130f
15cm	AS31	184de	11.9e	14.5de	4ef	150e
	AS54	176e	12.5cd	14.1e	4.3c	160d
	BIARIS	178de	13.2b	15c	3.9g	161d
20cm	AS31	202c	12.6cd	14.2e	3.8h	123f
	AS54	208bc	12.3d	13f	4.2d	175c
	BIARIS	175e	12.7c	15.5b	3.9g	173c
25cn	AS31	218a	12.7c	16.2a	4.4b	195b
	AS54	213ab	12.7c	14.8d	4.7a	208a
	BIARIS	215ab	13.6a	16.4a	4.1d	210a

Means by the uncommon letter in each column are significantly different (p<0.05)

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RESEARCH ARTICLE

Effect of Delay Cropping on Qualitative and Quantitative Traits of Winter Rapeseed Cultivars in Qazvin Area

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ABSTRACT

In order to investigate the effect of delay cropping on qualitative and quantitative characteristics of winter rapeseed cultivars in Qazvin, Iran,two experiments was performed separately in dates 1 October and 31 Octoberas randomized complete block design with 3 replications and variance analysis based on combined analysis in 2013-2014. The cultivars in 5 levels included V1: Zarfam, V2: Opera, V3: RGS003, V4: Okapi and V5: Licord. Results of the variance analysis of grain yield indicated that effect of sowing date (*P<0.01*), cultivar (*P<0.01*) and their interaction (*P<0.01*) were significant. The interaction of treatments demonstrated that Opera and Okapi had the highest grain yield in first sowing date (1 October) and Zarfam had the highest grain yield in delay cropping (31 October).

Keywords: rapeseedcultivars, yield, sowing date, glocosinolate content

INTRODUCTION

Rapeseed (*Brassicanapus* L.) is considered as one of the most important oil seeds in the world such that after soybean and oily palm, it is the third source of the vegetable oil (FAO, 2007). In average, this plant contains 40 to 45% oil in its seeds (Naseri, 1996) and generally, seed oil percentage is of great significance in the profitability of rapeseed production (Robertson and Holland, 2004). Planting dates obviously affect canola yield and yield components. Planting date is critical since if canola is planted too early or late and the acceptable planting dates are based upon location and elevation. In this regard, Martin (2006) and Fink, et al. (2006) stated that planting date is one of the most important production decisions. Timely sowing of canola has proven a key to maximize yield potential and by default reduce risk. With the delay in sowing date, all the investigated traits declined. Different researches indicate that through the delay in the sowing date, there occurs a decline in the pod number per plant (Asgari, et al., 2008), pod number per plant (Angadi, et al., 2003), plant height, pod number (Nanda, et al., 1999), stem number per plant

(Ozer, 2003) and finally seed yield and oil quality (Hocking, 2001). Taylor and Smith (1992) reported that seed yield declined when sowing date is delayed.Glucosinolates, commonly referred to as goitrogens, are uniform class of naturally occurring compounds found exclusively in the plant kingdom, and only in limited number of dicotyledonous families (Underhill, 1980). All members of the cruciferae family, including rapeseed, contain glucosinolates (Fenwick and Curtis, 1980). Rapeseed meal is unsuitable for livestock feed due to its high glucosinolate content and is a hindrance to domestic rapeseed production. Because low glucosinolate meal can be used for livestock feed, and high glucosinolate meal for potential pest control (Bhardwaj et al., 1996), either a reduction or an enhancement in glucosinolate content might be helpful in developing rapeseed as a renewable-domestic source of erucic acid. Therefore, the present study was undertaken to determine effect of delay cropping on qualitative traits and grain yield of canola (*Brassicanapus* L.) cultivars in Qazvin region, Iran.

MATERIALS AND METHODS

This experiment was carried out in order to investigate effect of two sowing dates (1 October and 31 October) and several cultivars on yield of canola plants during 2013-2014 in Qazvin, Iran. In this research, two experiments was performed separately in dates 1 October and 31 October as randomized complete block design with 3 replications and variance analysis based on combined analysis. The cultivars in 5 levels included V1: Zarfam, V2: Opera, V3: RGS003, V4: Okapi and V5: Licord.

Each replication of this design consisted of 5 treatmentsand a total of 15 plots for each experiments were analyzed. There was a 2 m distance between two adjacent experiments.Total amount of recommended of N (200 kg ha^{-1}) and P (150 kg ha^{-1}) fertilizers based on soil physic-chemical test. Fertilizers was broadcasted and incorporated to the experimental soil prior to canola cultivation. Nitrogen fertilizer but was added in three splits: Nitrogen fertilizer but was added in three splits: 1.2rd at stem initiation stage and the remaining1.3rd was applied at flowering stage. Determinate traits includes:Glocosinolate content, grain yield, oil content and grain oil percent.

Glucosinolate content in rapseed meal was determined by using High Performance Liquid Chromatography (HPLC). The glucosinolates were separated using a type C18 column (CAPCELL PAK C18 Type: C18 AG 120 A Size 4.6 mm × 150 mm, 5 μm) with a flow rate of 0.5 ml/min at 30° C. Elution of glucosinolates from HPLC was performed by a gradient system of water (A) and acetonitrile/water (25:75, v/v, B). The total running time was 45 min with a gradient as follows: 100% A and 0% B for 5 min, then in 35 min to 0% A and 100% B and in 5 min back to 100%A and 0%B. An UV detector was used at a wavelength of 229 nm. Total glucosinolate amount was accomplished using the response factors as published in the ISO protocol (ISO Method, 1992). Total glucosinolate was expressed as mg. g^{-1} DM of meal.Statically analysis was conducted using SAS software. Mean comparison was also conducted with Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The obtained results showed that effect of cultivar (*P<0.01*) were significanton glocosinolate content(Table 1). Results indicated that Zarfam and Opera and the highest glocosinolate content and Opera had the lowest glocosinolate content (Figure 1).Turhan et al. (2010) also found the presence of negative correlation between glocosinolate and oleic acid content. In general, the present study can be helpful in developing 00-rapeseed cultivars (zero erucic, low glucosinolate content).

Results of the variance analysis of grain yield indicated that effect of sowing date (*P<0.01*), cultivar (*P<0.01*) and their interaction (*P<0.01*) were significant (Table 1). The interaction of treatments demonstrated that Opera and Okapi had

the highest grain yield in first sowing date (1 October) and Zarfam had the highest grain yield in delay cropping (31 October) that indicated the highest cold tolerance of Zarfam in this region (figure 2). Date of planting is an important management factor in the production of all crops, especially in regions where the growing season is haft. The response of canola to planting date will be influenced by environmental conditions during the growing season. Kirkland and Johnson (2000) stated that seed yield was greater in the early sowing dates and smaller in the later sowing dates. Horton (2006), found that highest yield of canola was observed from earlier sowings.In the study of Morrison and Stewart (2002) as well as genetic differences among the four varieties of canola seed yield has been reported.Oil content is one of the important components, which play a crucial role in the rapeseed seed quality (Alyari et al., 2000).Results of this experiment showed that cultivar ($P<0.05$) had significant effect on grain oil content (Table 1). The mean comparison of interaction treatments revealed thatZarfam and Opera cultivars had the highest oil content (figure 3).Results showed that effect of sowing date ($P<0.01$), cultivar ($P<0.01$) and their interaction ($P<0.01$) were significant on grain oil yield (Table 1). The mean comparison interaction of sowing date and cultivar Opera and Okapi had the highest grain oil yield in the first sowing date condition. The highest grain oil yield also was found in delay cropping (31 October) condition inZarfam (figure 4).

REFERENCES

1. Alyari, H., F. Shekari and F. Shekari. 2000. Oil Seed Crops (Agronomy and Physiology), Amidi Press, Tabriz, Iran.
2. Angadi, S.V., H.W. Cutforth, B.G. McConkey and Y. Gan. 2003. Yield adjustment by canola grown at different plant population under semiarid conditions. Crop Sci., 43: 1358-1366.
3. Asgari, A. and A. Moradie-dalini. 2008. Evaluation, yield components and vegetative characters of rapeseed cultivars in different planting date. Seed and Plant J., 23: 419-430.
4. Bhardwaj, H.L., Hamama, A.A., Porter, D.M., Reese Jr, P.F., 1996. Rapeseed meal as a natural pesticide. In: Janick, J. (Ed.), Progress in New Crops. ASHS, Alexandria, VA, pp. 646–649.
5. FAO, 2007.Food outlook.Global Market Analysis. Available in: http://www.fao.Food outlook.com.
6. Fenwick, G.R. and Curtis, R.E. 1980. Rapeseed meal in rations for laying chickens.A review of the effect on egg quality.J. Sci. Food Agric. 31,515-525.
7. Fink, N., S. Conley and E. Christmas, 2006.An evaluation of the effects of planting date and seeding rate on the yield of winter canola grown at three different geographic areas.The ASA-CSSA-SSSA International Annual Meetings.
8. Hocking, P.J., 2001. Effect of sowing time on nitrate and total nitrogen concentration in field-grown canola (*Brassica napus* L.) and implications for plant analysis. J. Plant Nutrition, 24(1): 43-59.
9. Horton, D.S. 2006.The ACSSA-SSSA.International Annual Meeting. http://a-c s.confex.com/ crops/ 2006am/tech programs tatic files/banner.jpg.
10. Kirkland, K. and E. Johnson .2000.J. Pl. Sci.80: 713-719.
11. Martin, V.L., 2006. Planting date effect on winter canola production in Kansas, the ACSSA-SSSA, International Annual Meeting.www.ksre.ksu. edu/water quality /KSNMHatch.htm.
12. Morrison M.J., and Stewart D.W. 2002. Crop Science ,42: 797-803.
13. Nanda, R., S.C. Bhargava, D.P.S. Tomar and H.M. Rawson, 1999.Phenological development of *Brassica compestris*. Field crops Res., 46(1-3): 93-103.
14. Naseri, A., 1996. Oil seed Crops, Astan Quds Razavi Press, Mashhad.
15. Ozer, H., 2003.Sowing date and nitrogen rate effects on growth, yield and yield components of two summer rapeseed cultivars. European J. Agronomy, 19(3): 453-463.
16. Robertson, M.J. and J.F. Holland, 2004.Production risk of canola in semi-arid subtropics of Australia. Aust. J. Agric. Res., 55(5): 525-538.
17. Taylor, A.J. and C.J. Smith, 1992.Effect of sowing date and seeding rate on yield and yield component of irrigated Canola (*Brassica napus* L.) grown on red brown earth in South-eastern Australia. Australian J. Agric. Res., 43(7): 1629-1641.

18.Turhan, H., M. K. Gul, C. O. Egesel, F. Kahriman. 2011. Effect of sowing time on grain yield, oil content, and fatty acids in rapeseed (*Brassica napus* subsp. oleifera). Turk J Agric, 35: 225-234.

19.Underhill, E., and Kirkland, D. F., 1980: Glucosinolates in secondary pland products: Encyclopedai of plant physiology, new series, ed. E.A. Bell and Charlwood. Berlin: Springer-Verlag. 8, 493-511.

Table 1: Mean squares of tested treatments effect on studied traits

S.O.V	DF	Glocosinolate content	Grain yield	Oil content	Grain oil yield
Sowing date	1	0.197 ^{ns}	54390197.373 **	145.200 ^{ns}	9129594.503 **
E_a	4	1.052	49155.537	5.151	22705.007
Cultivar	4	23.468 **	326803.85 **	7.834 *	44456.751 **
Sowing date × Cultivar	4	0.924 ^{ns}	291788.056 **	0.599 ^{ns}	34692.058 **
E_b	16	0.573	18827.55	2.185	56700.079
CV (%)		3.69	6.08	3.96	8.63

Note.* – p < 0.05, ** – p < 0.01, ns –non significant.

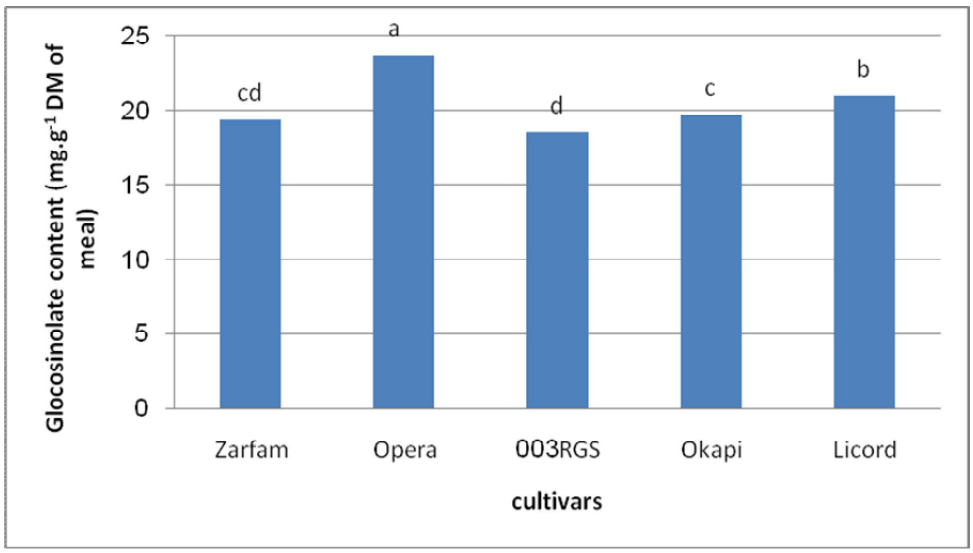

Figure 1.Effect of cultivar on glocosinolate content

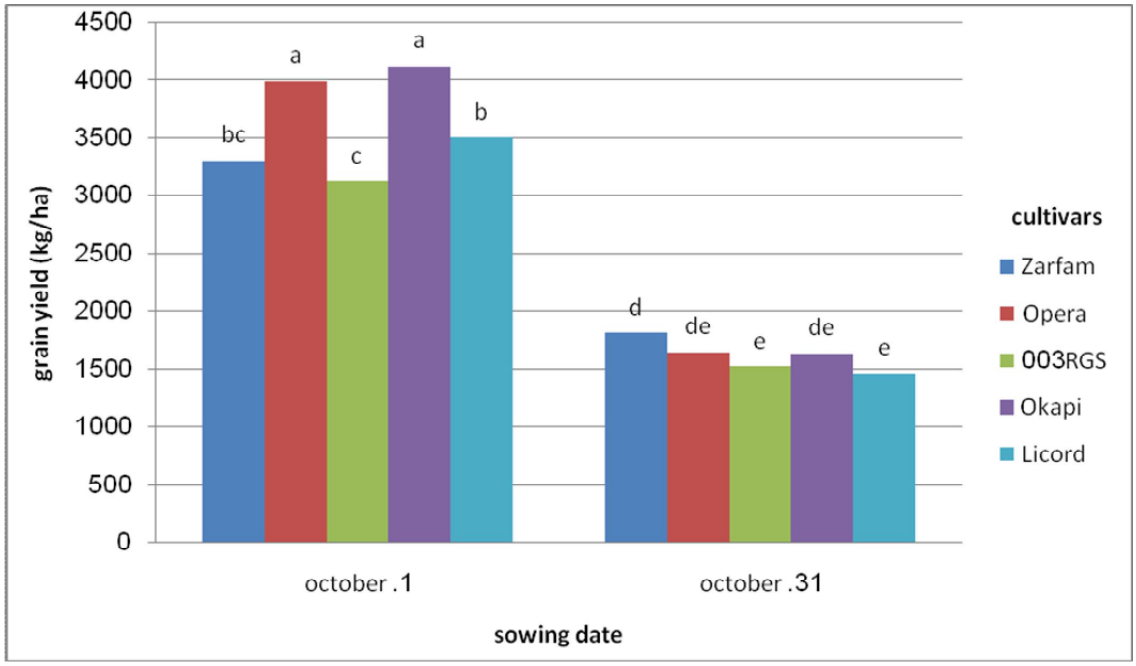

Figure 2. Interaction of sowing date and cultivars on grain yield

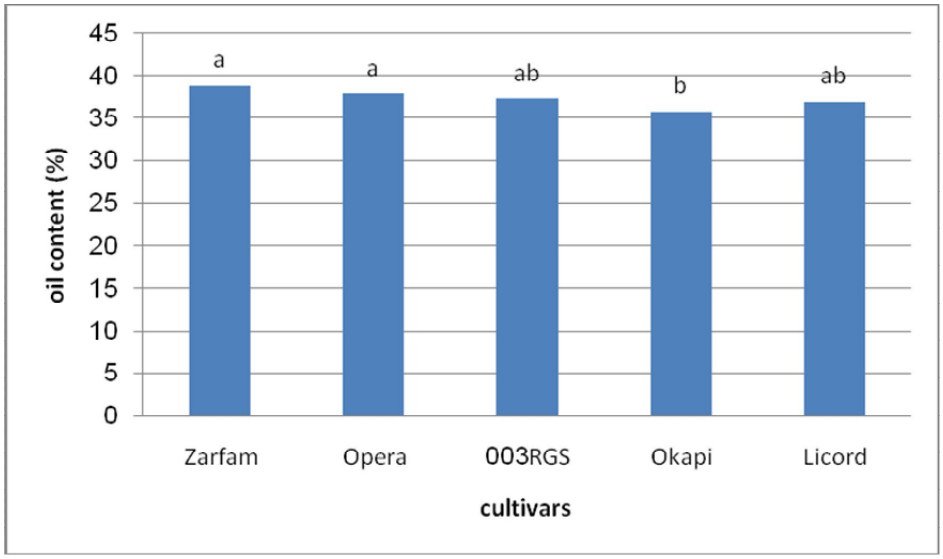

Figure 3. Effect of cultivar on oil content

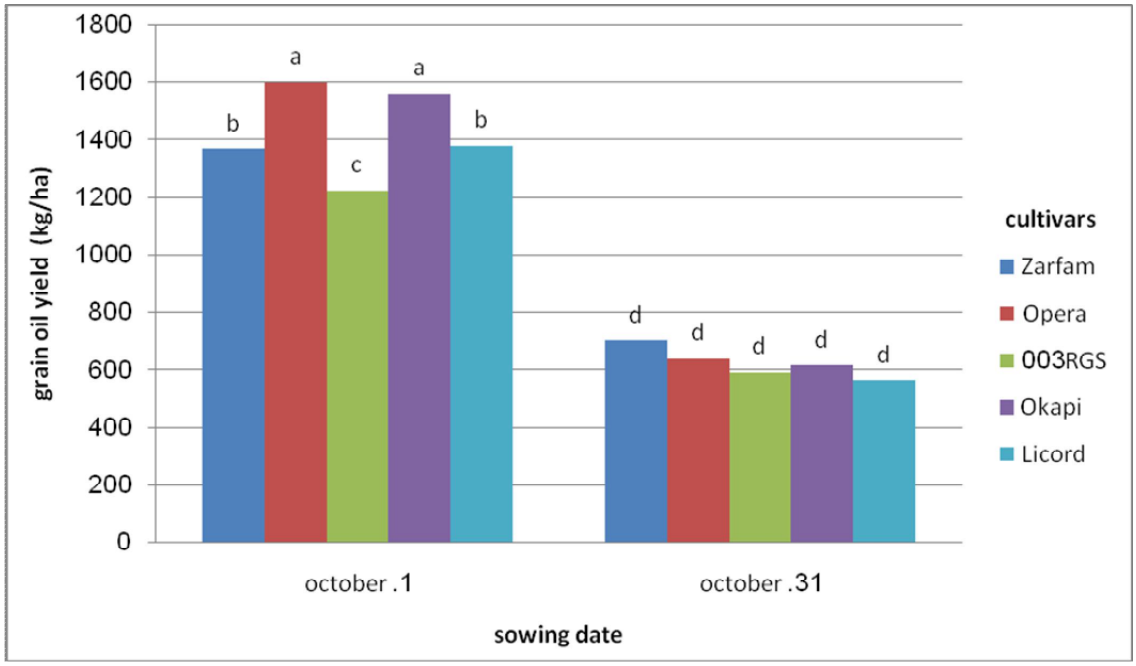

Figure 4. Interaction of sowing date and cultivar on grain oil yield

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RESEARCH ARTICLE

Effect of Corporate Governance Indices on the Managers' Investment Decision-Making

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ABSTRACT

This paper aims to study the effectiveness of corporate governance system on investment decisions among managers of companies. For this purpose, using targeted sampling method 100 companies were selected which were in stock exchange during 2006-2011 and their data were extracted. Then these data were analyzed by SPSS software to answer the research hypotheses. Results showed the effect of corporate governance mechanisms on the investment decision making of managers.

Keywords: corporate governance, investment decisions, corporate investment**,** institutional shareholder

INTRODUCTION

Various definitions have been presented for the corporate governance. Basically, corporate governance refers to a system that firms are directed and controlled by it. Therefore, corporate governance does not relate the management of firm operation but it relates to guiding, monitoring and controlling actions of executives and their accountability to all beneficiaries even on the community. Its limited definitions focus on the capabilities of legal system of a country for preserving minority shareholders' right. These definitions are basically suitable for comparison among countries and regulations of each country has definite role in corporate governance system. External factors like capital from outside to inside, global economy condition, supplying stock in the market of other countries and institutional international investment influence corporate governance system. Broader definitions of corporate governance emphasis on the broader accountability level toward shareholders and other beneficiaries. Generally, by reviewing these definitions in corporate governance and studying them, we can present a comprehensive definition; corporate governance is a multi-disciplinary concept which includes goals like accountability, fairness and observing right of beneficiaries (Afza and Adnan, 2006).

Regarding complexity of business transactions and specificity of management in the modern world, control of shareholders on the activities of firms has been reduced; therefore, major part of responsibilities belongs to managers of companies. According to statutes, company owners and managers as their representatives should allocate resources such that the highest profit achieves for managers.

Now, regarding commercial defeats and disclosing recent financial corruptions, facts indicate that in companies, some managers seek their own benefits instead of benefits of shareholders and beneficiaries. In order to solve this problem, empowering monitoring and controls on the performance of shareholders, board of directors, managers, supervisors and redefinition of strategy in the relationship between owners, managers and supervisors is the best control method. These monitoring reduces extra regulation which are posed because of uncertainty between shareholders and managers. Main purpose of corporate governance is determining controls and correct monitoring between shareholders, board of directors and executives and clarifying, accountability in capital market and in financial and administrative relations between companies. Therefore, if corporate governance principles have not being considered, there will be no reasonable framework for creating trust for investment. Different research investigates the effect of corporate governance on various economic dimensions inside and outside Iran.

Ditmar and Smith (2006) studied two criteria of corporate governance and their relationship with market value of company and concluded that in companies with weak governance, change in cash will cause about 0.42-0.88 change in the market value, while this is two-times higher in companies with good governance. Bernard Black (2001) in a research in Russia found that there is relationship between corporate governance and performance of firms. Using time-series and regression, he found that there is strong relationship between size of board and market value. In a similar study in US, Gompers, Istee and Metric (2003) reached the same conclusion, Ja Sung Buck, Junko and Luong Su (2004) concluded that better managers cause better corporate governance and pay attention to beneficiaries and companies' value has positive relationship with corporate governance. Demestz and Len (1985), Mark, Schelifer and Vishni (1988) studied the effect of ownership structure on the performance of the company. Research results shows that there is important and positive relationship between ownership structure and performance of company.

Few researches have been conducted about corporate governance in Iran. Yazdanian (2006) studied the effect of several criteria of corporate governance on reducing profit management. Results of research show that only presence of institutional shareholders influences profit management while presence of other members of board, differentiating role of director manager and head of board and also internal auditor has no influence on the profit management. Husseini (2007) studied the relationship between corporate governance and return of shareholders. In this research, by studying institutional shareholders and their effect on the return, it is tried to calculate the extra return of shareholders in companies with good governance. Results indicate that there is no relationship between institutional shareholders and return of shareholders in Iran. Ghanbari (2007) studied the presence effect of outside members, information transparency, internal auditors and institutional shareholders as criteria for corporate governance on the performance of firm.

By reviewing the literature about corporate governance, it become clear that there is no research about effect of corporate governance on the investment decisions. As a result, this article seeks to study the effect of corporate governance effect on the investment decisions.

Review of literature

Corporate governance has risen about 1990s in developed countries like UK, Australia and other European countries. History of it relates to an important report called "Cadbriber report" which was published in 1992. This report has emphasizes on the presence of guiding shareholders and establishing internal control system and internal auditing. This report was reviewed in 1995 by Greenbery committee and finalized by Hampel committee in 1998. Most countries such as UK. China, Korea, Canada, Australia and etc. have these systematic governance regulations. In US,

Watergate scandal and fraud in US capital marker in 2001 led to approval of Sarbens-Axely law or corporate governance.Corporate governance is one of the main and dynamic dimensions of business. This concept means guiding and indicates that it is based more on guiding than controlling. There are various methods for defining corporate governance but records show that there is no consensus about corporate governance. General study of definitions shows that all of them emphasis on the common and definite feature which is accountability and it is a set of relations among shareholders, managers and auditors which is required for establishing control system in order to observe rights of shareholders and correct implementation of assembly and preventing abuses. On the other hand, corporate governance is the relationship among different groups for determining the direction and performance of the company. These main groups are: shareholders, managing director, board of managers and other groups like creditors, sellers and community.

Schools and attitudes in corporate governance

Market-based model

This model develops in economic fields with strong capital markets with high liquidity and its major feature is dispersion of ownership rights among sectional shareholders. Support system for investors caused that shareholders diversify their portfolio and none of them remain in the situation to manage firm alone. Benefit of market-based model or American-English model is ease of collecting capital and distribution of investors' risk, strong capital market for controlling company and ready management labor market. Disadvantages of this model are internal transactions by managers and huge rewards of top management and publishing asymmetrical information and managers' abuse of shareholders (Gill and Mathur, 2011).

Relation-based model

In this model, institutional shareholders are firm owners instead of minor shareholders. Bank shareholders, holding companies and other major shareholders eliminate the agency costs because of high influence in the decisions of board and long-term share-holding. The major advantage of this model, which is called Japanese-Korean-German model, is constant shareholders and their optimized monitoring on the performance of managers. But on the other hand, institutional shareholders, by relying on the government power, bring government interventions in the corporations which is the major disadvantage of this corporate governance model (ibid).

Transient corporate governance model

In this model, capital market is weak and inactive and companies transforms from public form to companies with minor shareholders. Weakness in resisting governance problems, weak mechanisms for supporting investment and lack of financial discipline caused that government support many companies and also there were no strong institutional investors. Privatized companies have the problems of transforming public companies to private ones. In this model, which is found in central and eastern Europe and developing countries, privatized companies have the same bureaucratic problems because only their management has changed and their employees and governing culture is same (Michalski, 2008).

Emerging model

This model which is desired model in corporate governing is combination of positive points of other models and it is consisted of active capital markets, successful transformation of public companies to private companies, presence of official legal systems and etc. in this model, business groups govern and families which were traditionally owner, has been transformed to pioneers of national economy and management has moved from relation based model toward market based model through participation in capital markets. Finally, corporate governance in long-term can create

healthy governance because accepting its rules is based on the criteria other than profit and it is clear that in the healthy and efficient corporate governance, power does not completely belong to owners or managers (ibid).

Research hypotheses

There is a relationship between corporate governance and assets' return.
There is relationship between corporate governance mechanisms and capital costs.
There is relationship between corporate governance and cash flow.
There is relationship between corporate governance and total assets.

Statistical population and sampling method

Statistical population of this research is all firms accepted in Tehran Stock Exchange during 2006-2011. Sampling method in this research was systematic elimination; therefore, firms that have below conditions, were selected as research statistical sample and other companies were eliminated:
-In order to create comparability fiscal year of firms should end to March.
-they should not change their activity or fiscal year during 2006-2011.
-they were not banks and financial institutions.
-their information be accessible and there was no transaction lag more than three months in this period.
Considering above limitations, 100 companies were selected as sample. Data of this research were gathered from stock exchange internet database and Rahavard Novin software. Analysis of gathered data was done using SPSS software.

METHODOLOGY

This research is applied in terms of purpose and descriptive and semi-empirical in terms of method. Because this is field study and deals with real data of companies, different sources were used to provide statement information of firms accepted in Tehran stock exchange including CDs of Tehran stock exchange, Tadbirpardaz software and Rahavard Novin software. In order to test statistical hypotheses and data analysis, multiple linear regression with least square method. Data statistical analysis was done by SPSS software.

Independent variable

Size of board of directors: in order to obtain size of board of directors, number of boards was used with financial statements.
Independence of board of directors: In this research, outside managers to total members' ratio were used for measuring independence of board of directors. Outside member is one who lacks executive role in company.
Institutional shareholders: by institutional shareholders, we mean legal shareholders who are mediatory between individual and companies and prepare portfolio for individuals like banks, insurances and revolutionary institutions which is calculated through percent of share possession by institutional shareholders to total capital. This variable is shown by INOWN.
Concentration of institutional possession: in order to calculate concentration of institutional possession, Herfindal-Hirshman index was used. It is an economic index which is used to measure the monopoly in market. Percent of share for each institutional owners multiplied and summed:
$OC = \Sigma 2$ (possession percent of each company)

Dependent variable

Size of company: log of total assets

Asset return: net profit divided on assets

Capital costs: ratio of investment in fixed assets to capital
Cash flow: ratio of operational flow divided on capital
All assets

RESEARCH FINDINGS

Research findings were presented in two descriptive and inferential sections,

DISCUSSION AND CONCLUSION

Purpose of this research is investigating the relationship between corporate governance mechanisms and investment decision-making of firms listed in Tehran Stock Exchange. In this regard, 100 companies were selected by imposing sample selection as research sample. For corporate governance, mechanisms like size of board, independence of board, institutional shareholders and ownership concentration were used. In order to measure investment decision of managers the variables company size, asset return, capital cost, cash flow and total asset were used. Results showed that corporate governance mechanisms increase investment decisions. Results were consistent with results of Mark, Lipton and Lorsh, Gil and Mathur, Gill and Shah and Gill and Baker for effectiveness of corporate governance mechanisms. They showed that small boards have higher effectiveness in decision-making process than large boards.
Research suggestions.
1.According to research results, small boards improve the efficiency of cash flow. Therefore, it is suggested that number of boards should be considered for managing cash capital efficiency.
2.Results of the study showed that independence of board members helps increase in investment. Therefore, it is suggested that in order to increase investment decision, more outside managers should be used in board of directors.

REFERENCES

1. Afza, T. and Adnan, S.M. (2007), "Determinants of corporate cash holdings: a case study of Pakistan", Proceedings of Singapore Economic Review Conference (SERC) 2007, Singapore, August 1-4, Organized by Singapore Economics Review and The University of Manchester (Brooks World Poverty Institute), Singapore, pp. 164-5.
2. Besley, S. and Brigham, E.F. (2005), Essential of Managerial Finance, 13th ed., Thomson South-Western, Mason, OH.
3. Cossin, D. and Hricko, T. (2004), "The benefits of holding cash: a real options approach", Managerial Finance, Vol. 30 No. 5, pp. 29-43.
4. Dahya, J. and Travlos, N.G. (2000), "Does the one man show pay? Theory and evidence on the dual CEO revisited", European Financial Management, Vol. 6 No. 1, pp. 461-83.
5. Dittmar, A., Mahrt-Smith, J. and Servaes, H. (2003), "International corporate governance and corporate cash holdings", Journal of Financial and Quantitative Analysis, Vol. 3 No. 1, pp. 111-33.
6. Drobetz, W. and Gru¨ninger, M.C. (2007), "Corporate cash holdings: evidence from Switzerland", Financial Markets Portfolio, Vol. 21, pp. 293-324.
7. Fama, E.F. and Jensen, M.C. (1983), "Agency problems and residual claims", Journal of Law & Economics, Vol. 26, pp. 327-49.
8. Ferreira, M.A. and Vilela, A.S. (2004), "Why do firms hold cash? Evidence from EMU countries", European Financial Management, Vol. 10 No. 2, pp. 295-319.
9. Ganesan, V. (2007), "An analysis of working capital management efficiency in telecommunication equipment industry", River Academic Journal, Vol. 3 No. 2, pp. 1-10.

10. Gill, A. and Mathur, N. (2011), "The impact of board size, CEO duality, and corporate liquidity on the profitability of Canadian service firms", Journal of Applied Finance and Banking, Vol. 1 No. 3, pp. 83-95.
11. Gill, A. and Shah, C. (2012), "Determinants of corporate cash holdings: evidence from Canada", International Journal of Economics and Finance, Vol. 4 No. 1, pp. 70-9.
12. Isshaq, Z., Bokpin, G.A. and Onumah, J.M. (2009), "Corporate governance, ownership structure, cash holdings, and firm value on the Ghana Stock Exchange", The Journal of Risk Finance, Vol. 10 No. 5, pp. 488-99.
13. Jensen, M.C. (1993), "The modern industrial revolution, exit, and the failure of internal control systems", Journal of Finance, Vol. 48 No. 3, pp. 832-80.
14. Kim, J., Kim, H. and Woods, D. (2011), "Determinants of corporate cash-holding levels: an empirical examination of the restaurant industry", International Journal of Hospitality Management, Vol. 30 No. 3, pp. 568-74.
15. Kuan, T.H., Li, C.S. and Chu, S.H. (2011), "Cash holdings and corporate governance in family-controlled firms", Journal of Business Research, Vol. 64 No. 7, pp. 757-64.
16. Kyereboah-Coleman, A. (2007), "Corporate governance and firm performance in Africa: a dynamic panel data analysis", a paper prepared for the "International Conference on Corporate Governance in Emerging Markets.
17. Lipton, M. and Lorsch, J.W. (1992), "A modest proposal for improved corporate governance", Business Lawyer, Vol. 48 No. 1, pp. 59-78.
18. Michalski, G. (2008), "Determinants of accounts receivable level: portfolio approach in firm's trade credit policy", Acta Oeconomica Pragensia, Vol. 16 No. 5, pp. 47-56.
19. Myers, S. (1984), "The capital structure puzzle", Journal of Finance, Vol. 39, pp. 572-92.
20. Nadiri, M.I. (1969), "The determinants of real cash balances in the US total manufacturing sector", The Quarterly Journal of Economics, Vol. 83 No. 2, pp. 173-96.
21. Opler, T., Pinkowitz, L., Stulz, R. and Williamson, R. (1999), "The determinants and implications of corporate cash holdings", Journal of Financial Economics, Vol. 52 No. 1, pp. 3-46.
22. Saddour, K. (2006), "The determinants and the value of cash holdings: evidence from French firms", CEREG, pp. 1-33.
23. Taghizadeh Khanqah, V. Akbari Khosroshahi, M. Ebrati, M.R. (2012), An Investigation of the Association between Working Capital Management and Corporate Performance, Int. J. Manag. Bus. Res., 2 (3), 203- 218.
24. Valipour, H., Moradi, J. and Farsi, F.D. (2012), "The impact of company characteristics on working capital management", Journal of Applied Finance and Banking, Vol. 2 No. 1, pp. 105-25.

Table 1: Variables' descriptive features

Variable	Mean	Abbreviation	Standard deviation
Capital costs	0.3655	-0.0543	IK
Size of company	0.254	12.25	size
Asset return	0.658	0.248	ROA
Total asset	0.584	28.325	TA
Cash flow	0.987	-1.3452	CFK
Size of board	0.254	4.28	BRDSIZE
Independence of board	0.354	0.125	BRDIND
Institutional shareholders	0.357	0.287	INOWN
Ownership concentration	0.254	0.269	OWNCON

Inferential findings

In order to study the relationship among variables, Pearson correlation was used that its results are presented in following table.

Table 2: Results of correlation between variables

Variable	Capital costs	Size of company	Asset return	Total asset	Cash flow	Size of board	Independence of board	Institutional shareholders	Ownership concentration
Capital cost	1	0.254	0.287	0.398	0.287	-0.247	0.542	0.354	0.357
Size of company		1	-0.247	0.214	0.421	-0.278	-0.341	-0.248	0.354
Asset return			1	0.341	0.325	-0.321	0.218	0.874	0.214
Total asset				1	0.457	-0.248	0.357	0.218	0.641
Cash flow					1	-0.214	0.354	0.214	0.353
Size of board						1	0.218	0.384	0.315
Independence of board							1	0.158	0.354
Institutional shareholders								1	0.214
Ownership percent									1

In table 2, independent and dependent variables were calculated by Pearson correlation test. Results showed that there is correlation between independent and dependent variables.

Testing first hypothesis

There is relationship between corporate governance and asset return.

Table 3: Regression analysis of first hypothesis

Variable	beta	t	p-value
Size of board	-0.254	-2.258	0.01
Independence of board	0.215	3.254	0.001
Institutional shareholder	0.235	2.25	0.000
Ownership concentration	0.398	5.25	0.01

In above table, using regression analysis, effect of each corporate governance mechanism on asset return was measured. Regarding beta value obtained, ownership possession has the highest effect on the asset return.

Testing second hypothesis

There is relationship between corporate governance and capital costs.

Table 4: Second hypothesis regression analysis

Variable	beta	t	p-value
Size of board	0.145	2.261	0.01
Independence of board	0.215	3.328	0.001
Institutional shareholders	0.365	3.485	0.000
Ownership concentration	0.128	5.215	0.01

In table 4, using regression analysis, effect of each corporate governance mechanism on capital costs was measured. Regarding beta value, institutional shareholders have the highest effect on the capital cost.

Testing third hypothesis

There is relationship between corporate governance and cash flow.

Table 5: Regression analysis of third hypothesis

Variable	beta	t	p-value
Size of board	-0.412	-1.218	0.001
Independence of board	0.321	4.321	0.000
Institutional shareholders	0.248	6.547	0.000
Ownership concentration	0.287	3.658	0.000

In above table, using regression analysis, effect of each corporate governance mechanisms on cash flow was measured. Regarding beta value, size of board has the highest effect on the cash flow and this effect was reverse.

Testing fourth hypothesis

There is relationship between corporate governance and total assets.

Table 6: Regression analysis of fourth hypothesis

Variable	beta	t	p-value
Size of board	-0.321	-1.218	0.001
Independence of board	0.125	4.321	0.000
Institutional shareholders	0.318	6.547	0.000
Ownership concentration	0.215	3.658	0.000

In table 6, using regression analysis, effect of each corporate governance mechanisms on total assets was measured. Regarding beta value, size of board has the highest effect on the total asset.

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RESEARCH ARTICLE

Human-Carnivores' Conflict Risk Mapping in the Northwestern Iran

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ABSTRACT

Habitat destruction, fragmentation and declining prey abundance and density are some of the most important factors arising human-carnivores conflicts. Because of widespread habitat requirements and declining prey items, wolf-human conflicts are one of the major factors that threaten its conservation. We tried to map the areas where faced with high risk of wolf-human conflicts in the Ardabil province. The resulted risk maps can be used efficiently in wolf conservation action plan and identifying high risk areas on the other hand can lower livestock depredation economic costs.

Keywords: habitat modeling, wildlife negative values, risk mapping, Ardabil province, Iran.

INTRODUCTION

Nowadays increasing development destructed many suitable habitats of wildlife species. From another point of view it also leads to the increment of encountering and confronting the wildlife species with the human. Consequently, overlapping humanneeds and wildlife species welfare factors will lead to the Human-Wildlife Conflicts (Gurung et al., Treves et al., 2004). It is necessary for the natural resources managers and experts to investigate the human-carnivores' conflicts, in order to apply purposeful interventions in decreasing the pernicious out comings of these conflicts. A proper way for preventing these conflicts is to map places with high risk of such conflicts (Treves et al., 2004). Hereon awareness of ecological relations of these kinds of species for determining the effects of them on ecosystems and the existing communities are necessary and therefore it should be paid more attention in the first steps (Strubbe&Matthysen, 2008).The risk maps can predict the environmental damages such as the process of invasion, diseases prevalence and interruptingprey-predator relationships and human-wildlifeconflicts(Kaartinen et al., 2009; Venette et al., 2010). The investigation about wolf's attack by producing prediction models and risk maps is

one of the important tools in ecological investigations, nature conservation and land management (Williams et al., 2009) and one of the most low cost ways for managing human-carnivores conflicts (Leung et al., 2002).

MATERIALS AND METHODS

Study area

Markedly Mediterranean climate with prolonged cold winter and considerable rain and snow precipitation especially makes the area an excellent habitat for diverse wild speciesIn the study area dominantprey are wild goats (*Capraaegagrus*), wild sheep (*Ovisorientalis*), wild boars (*Suscrofa*), Lagomorphs (*Lepuscapensis*), that an isolated populations of large game speciesare limited only to some protected areas.

Data Analysis

By using MAXENT software the areas with the most potentiality of wolf's attack on human and domestic animals were mapped. The correlation of environmental variables with the zones that the presence of the species was estimated and with the correlation of variables with 10000 randomly spots of areas as background location or Pseudo-absence location were compared and by doing this the relative disorder between the presence of species and random spots decreased.

Finally a model obtained that has the most power of discretion for suitable habitat of the areas available for the species (Phillips et al., 2006; Elith et al., 2011).

RESULTS AND DISCUSSION

After reviewing the existing references and recorded authentic reports of wolf's attack and also field investigations, 84 points of wolf's attack identified and the risk map prepared in ArcGIS software (Fig. 1). Considering this, Meshkin-Shahr with 30 attacks has been experienced the most numbers of wolf's attacks and Kowsar and Nir cities are recorded with any attacks.

After entering the background location and required variables in MAXNET software the total potential of the area for showing the wolf's attack on human were simulated (Fig. 2). The results showed that 11 percent of Ardabil province zone has the most possibility of wolf's attacks. According to the results of the current study the most possibility of wolf's attack is occurred near the areas of agricultural lands especially water agricultural lands. Wolf packs that are consisted of Alpha male and females and the same year cubs or the last year, are often in the search of nutrition resources in agricultural lands (Tourani et al., 2014). Especially wolves have inclination to nest in these lands that have shelters and enough water resources that makes it accessible for females. The other researchers showed that in areas that are affected by humanistic activities and have been converted to agricultural lands, the huge carnivorous animals attack on humans and domestic animals by hiding themselves among the crops; an issue that is proved for the attack of tigers and leopards in India (Athreya et al., 2013) and wolf's attacks in Iran (Behdarvand et al., 2014).Destruction of habitats, separation of them and also inordinate exploitation from herbivorous species by the human beings caused in moving the domesticity latitude of carnivorous animals into the human areas and leaded to attack on domestic animals and humans and increasing the conflict (Graham et al., 2005). According to someinvestigationsone of the biggest problemsin carnivores'' protecting programs in the first step is related to the conflicts with human interests (Treves et al., 2011). These conflicts in addition to creating potential dangers for humans it causes imposing superabundant charges too (Jhala, 2003; Treves et al., 2011). Somestudies showed that generally the wolves avoid from dense and populated humansettlements (Jedrzejewski et al., 2009; Kaartinen et al.,

2009). Nonetheless in areas that the habitats are affected by human activities and are stricken by human changings and consequently the amount and number of wolf's preys are decreased, the existence of remained resources of human causes to attract wolves attention toward these areas and is used as the only available resource of this species (Jhala,2003; Wilson et al., 2006). Furthermore the high effect of distance from the pastures and gradient variables shows that the possibility of wolf's attack in the areas with fewer gradients and far from the rough lands of pasture will be more and by increase in gradient in rough lands the possibility of attack decreases. In fact the concentration of wolf's attack in agricultural lands especially water lands caused to the out breaking of this pattern. Behdarvandet al.(2014) also showed in a similar pattern with the results of the research that in flat areas near to agricultural zones and residential areas and far from the pasture lands in Hmadan province they have prepared conditions for out breaking of human and wolf conflict and the attack of this specie on human and domestic animals and the most possibility of wolf's attacks will be in these areas. Risk maps obtained from this study can be used as a useful tool in managing the habitat and decreasing the dangers of human-wolf conflicts in Ardabil province. By identifying the areas that have the most potentiality of conflict out breaking from one hand it is possible to do some predictive and purposeful actions in these areas and from another hand several methods of decreasing the conflicts and also doing future projects can be considered by focusing on this area (Treves et al., 2011; Behdarvan et al., 2014). Regardless of natural ability of the wolf in living in a common habitat with human beings, in the areas with altered landscape(Treves et al., 2011), human-wolf conflicts will be increased because ofhabitat destruction and consequently decliningwolves' natural preyitems.

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REFERENCES

1. Athreya, V., Odden, M., Linnell, J.D., Krishnaswamy, J., Karanth, U. 2013. Big cats in our backyards: persistence of large carnivores in a human dominated landscape in India. PLoS ONE, 8: e57872.
2. Behdarvand, N., Kaboli, M., Ahmadi, M., Nourani, E., Salman-Mahini, A. 2014.Spatial risk model and mitigation implications for wolf–human conflict in a highly modified agroecosystem in western Iran.BiolConserv 177: 156–164.
3. Elith, J., Phillips, S.J., Hastie, T., Dudík, M., Chee, Y.E., Yates, C.J., 2011.A statistical explanation of MaxEnt for ecologists.Divers.Distrib. 17, 43–57.
4. Graham, K., Beckerman, A.P., Thirgood, S., 2005. Human–predator–prey conflicts: ecological correlates, prey losses and patterns of management. Biol. Conserv. 122, 159–171.
5. Gurung, B., Smith, J.L.D., McDougal, C., Karki, J.B., Barlow, A., 2008. Factors associated with human-killing tigers in Chitwan National Park. Nepal. Biol. Conser. 141, 3069–3078.
6. Jhala, Y.V., 2003. Status, ecology and conservation of the Indian wolf Canis lupus pallipes Sykes. J. Bombay Nat. Hist. Soc. 100, 293–307.
7. Kaartinen, S., Luoto, M., Kojola, I., 2009. Carnivore-livestock conflicts: determinants of wolf (Canis lupus) depredation on sheep farms in Finland. Biodivers.Conserv. 18, 3503–3517.
8. Leung, B., Lodge, D. M., Finnoff, D., Shogren, J. F., Lewis, M. A., Lamberti, G., 2002. An ounce of prevention or a pound of cure: bioeconomic risk analysis of invasive species. The Royal Society. 269: 2407–2413.
9. Phillips, S.J., Anderson, R.P., Schapire, R.E., 2006. Maximum entropy modeling of species geographic distributions. Ecol. Model. 190, 231 –259.Rabinowitz, A., Zeller, K.A. (2010) A range-wide model of landscape connectivity and conservation for the jaguar, Pantheraonca.BiolConserv 143: 939–945.

10. Strubbe, D., Matthysen, E., 2008. Predicting the potential distribution of invasive ring-necked parakeets Psittaculakrameri in northern Belgium using an ecological niche modelling approach. Biological Invasions.11: 497-513.
11. Tourani, M., Moqanaki, E.M., Boitani, L., Ciucci, P., 2014.Anthropogenic effects on the feeding habits of wolves in an altered arid landscape of central Iran.Mammalia 78: 117– 121.
12. Treves, A., Martin, K.A., Wydeven, A.P., Wiedenhoeft, J.E., 201). Forecasting environmental hazards and the application of risk maps to predator attacks on livestock. Bioscience 61, 451–458.
13. Williams, J. N., Seo, C., Thorne, J., Nelson, J. K., Erwin, S., O'Brien, J. M., Schwartz, M. W., 2009.Using species distribution models to predict new occurrences for rare plants.Diversity and Distributions. 15: 565–576.
14. Wilson S.M., Madel M.J., Mattson D.J., Graham J.M., Burchfield J.A. And Belsky J.M.,2005 . Natural landscape features, human-related attractants, and conflict hotspots: a spatial analysis of human–grizzly bear conflicts. Ursus. 16(1):117–129.
15. Venette, R.C., Kriticos, D.J., Magarey, R.D., Koch, F.H., Baker, R.H., Worner, S.P., Raboteaux, N.N.G., McKenney, D.W., Dobesberger, E.J., Yemshanov, D., 2010. Pest risk maps for invasive alien species: a roadmap for improvement. Bioscience 60, 349–362.

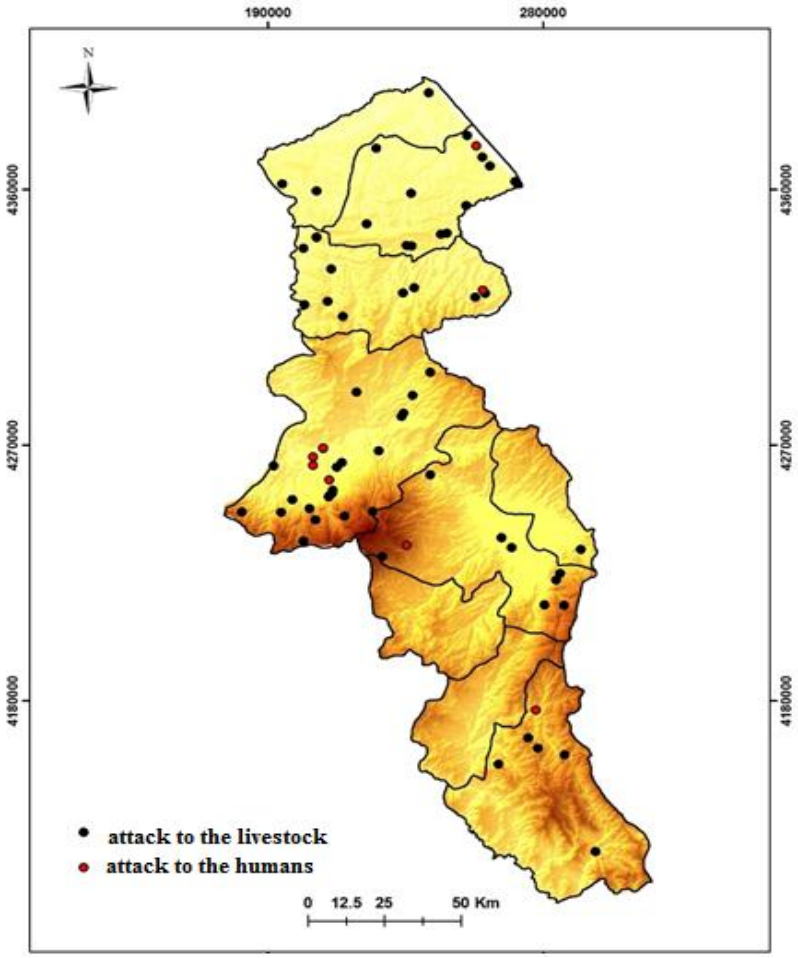

Figure 1: Points of wolf attacks

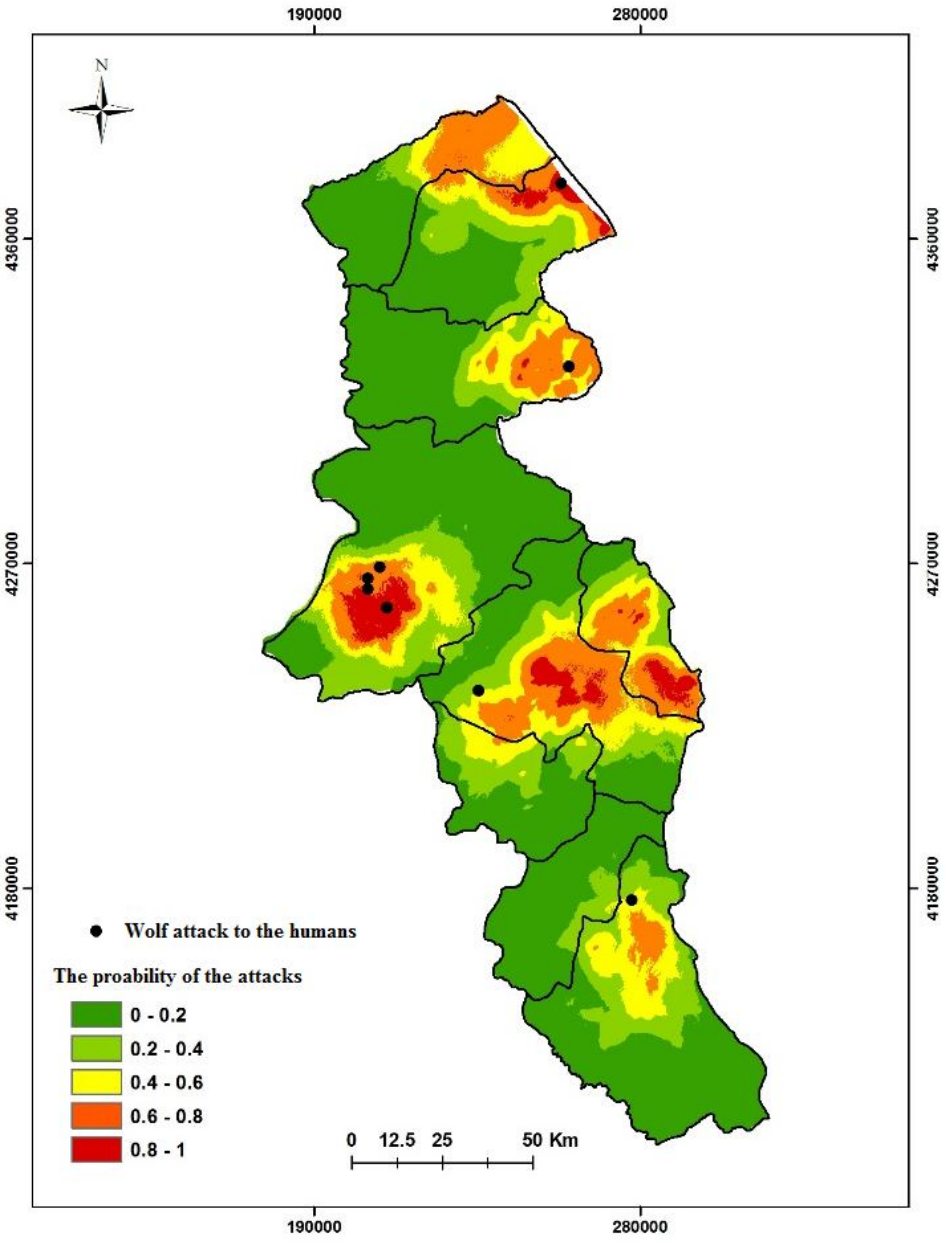

Figure 2: Points of wolf attacks to thehumans

BIOGRAPHY OF INDIAN SCIENTISTS

Prafulla Chandra Ray (1861-1944)

Prafulla Chandra was born on 2 August 1861 in Raruli-Katipara, a village in the District of Khulna (in present day Bangladesh). His early education started in his village school. He often played truant and spent his time resting comfortably on the branch of a tree, hidden under its leaves. After attending the village school, he went to Kolkata, where he studied at Hare School and the Metropolitan College. The lectures of Alexander Pedler in thePresidency College, which he used to attend, attracted him to chemistry, although his first love was literature. He continued to take interest in literature, and taught himself Latin and French at home. After obtaining a F.A. diploma from the University of Calcutta, he proceeded to the University of Edinburgh on a Gilchrist scholarship where he obtained both his B.Sc. and D.Sc. degrees.

In 1888, Prafulla Chandra made his journey home to India. Initially he spent a year working with his famous friend Jagadish Chandra Bose in his laboratory. In 1889, Prafulla Chandra was appointed an Assistant Professor ofChemistry in the Presidency College, Kolkata. His publications on mercurous nitrite and its derivatives brought him recognition from all over the world. Equally important was his role as a teacher - he inspired a generation of young chemists in India thereby building up an Indian school of chemistry. Famous Indian scientists like Meghnad Saha and Shanti Swarup Bhatnagar were among his students.

Prafulla Chandra believed that the progress of India could be achieved only by industrialization. He set up the first chemical factory in India, with very minimal resources, working from his home. In 1901, this pioneering effortresulted in the formation of the Bengal Chemical and Pharmaceutical Works Ltd.

He retired from the Presidency College in 1916, and was appointed as Professor of Chemistry at the University Science College. In 1921 when Prafulla Chandra reached 60 years, he donated, in advance, all his salary for the rest of his service in the University to the development of the Department of Chemistry and to the creation of two research fellowships. The value of this endowment was about two lakh rupees. He eventually retired at the age of 75. In Prafulla Chandra Ray, the qualities of both a scientist and an industrial entrepreneur were combined and he can be thought of as the father of the Indian Pharmaceutical industry.

BIOGRAPHY OF INDIAN SCIENTISTS

Satyendra Nath Bose (1894-1974)

Satyendra Nath Bose was born on New Year day, 1894 in Goabagan in Kolkata. His father was an accountant in Indian Railways. Satyendra Nath popularly known as Satyen Bose, did his schooling at Hindu School, Kolkata,and then joined Presidency College. He excelled in academics throughout his education – Intermediate, B.Sc. and M.Sc. with applied mathematics. His teacher at the Presidency College was Jagadish Chandra Bose - whose other stellar pupil was Meghnad Saha. Bose took his B.Sc. examination in 1913 and his M.Sc examination in 1915. He stood first in both the examinations, the second place going to Meghnad Saha.

He worked as a lecturer of physics in the Science College of the University of Calcutta (1916-21) and along with Meghnad Saha, introduced postgraduate courses in modern mathematics and physics. He derived with Saha, the Saha-Bose equation of state for a nonideal gas.

In 1921, Bose left Kolkata to become a Reader at the Dakha University. It was during this period that he wrote the famous paper on the statistics of photons. It was named *Bose statistics* after him and is now an integral part ofphysics. Paul Dirac, the legendary physicist, coined the term *boson* for particles obeying these statistics. Apart from this he did theoretical work on the general theory of relativity and also experimental work on crystallography, fluorescence, and thermoluminescence.

Bose spent about 10 months in Paris in 1924, doing research with Madame Curie and Louis de Broglie. Later he went to Berlin where he met Einstein. He returned to Dhaka in 1926 and became Professor. Shortly before Independence, Bose returned to Kolkata to become the Khaira Professor of Physics, a post he kept till 1956. He was elected Fellow of the Royal Society in 1958, and the Government of India named him a National Professor and awarded him the honor of Padma Vibhushan.

BIOGRAPHY OF INDIAN SCIENTISTS

C. R. Rao (1920 -)

Calyampudi Radhakrishna Rao was born to C.D. Naidu and A. Laxmikantamma on 10 September 1920 in Huvvina Hadagalli in present day Karnataka. He was the eighth in a family of 10 children. After his father'sretirement, the family settled down in Vishakapatnam in Andhra Pradesh. From his earliest years, Rao had an interest in mathematics. After completing high school he joined the Mrs. A.V.N. College at Vishakapatnam for the Intermediate course. He received his M.A. in Mathematics with first rank in 1940. Rao decided to pursue a research career in mathematics, but was denied a scholarship on the grounds of late submission of the application.

He then went to Kolkata for an interview for a job. He did not get the job, but by chance he visited the Indian Statistical Institute, then located in a couple of rooms in the Physics Department of the Presidency College, Kolkata. He applied for a one-year training course at the Institute and was admitted to the Training Section of the Institute from 1 January 1941. In July 1941 he joined the M.A Statistics program of the Calcutta University. By the time he passed the M.A. exam in 1943, winning the gold medal of the University, he had already published some research papers! In 1943 he joined ISI as a technical apprentice, doing research, teaching in the Training Section of the Institute and at Calcutta University and assisting Professor Mahalanobis in editing *Sankhya* the Indian Journal of Statistics.

In 1946 he was deputed to the Cambridge University on a project. While working full time on this, he also worked in the genetic laboratory of R.A. Fisher, the father of modern statistics and completed his Ph.D. under Fisher. By this time Rao had already completed some of the work which carries his name: Cramer-Rao inequality, Rao-Blackwell theorem, Rao's score test and Rao's orthogonal arrays. He returned to ISI in 1948 and in 1949 was made a Professor at the very young age of 29. He headed and developed the Research and Training Section of the ISI, and went on to become Director of the ISI. He became the associate editor of the *Sankhya* in 1964 and became the editor in 1972. He left ISI in 1978 and joined the University of Pittsburgh. In 1988 he moved to the Pennsylvania State University holding the Eberly Family Chair in Statistics and the Directorship of the Centre for Multivariate Analysis till 2001.

Dr. Rao is a Fellow of the Royal Society of London, and a Member of the National Academy of Sciences, U.S.A. He was awarded the Padma Vibhushan in 2001. The C.R. Rao Award for Statistics was instituted in his honor, to be given once in two years. In 2002 he was awarded the National Medal of Science of the U.S.A. The Advanced Institute of Mathematics, Statistics and Computer Science in the Osmania University Campus has been named after him.

BIOGRAPHY OF INDIAN SCIENTISTS

Vikram Sarabhai (1919-1971)

Vikram Sarabhai was born on 12 August 1919 at Ahmedabad. He had his early education in a private school, 'Retreat' run by his parents on Montessori lines. This atmosphere injected into the young boy the seeds ofscientific curiosity, ingenuity and creativity. With a natural inclination towards physics and mathematics, Vikram Sarabhai did not get into his family business. After school and college in Gujarat, he went to England and obtained his tripos at St. John's College in 1939. He returned to India for a while and worked alongside Sir C.V. Raman in the field of cosmic rays, at the Indian Institute of Science in Bangalore, after which he returned to Cambridge, England for further research in the area and completed his Ph.D. in 1947.

He established the Physical Research Laboratory in Ahmedabad in 1948, in a few rooms at the M.G. Science Institute with Professor K.K. Ramanathan as Director. In April 1954, PRL moved into a new building and Dr. Sarabhai made it the cradle of the Indian Space Programme. At the young age of 28, he was asked to organise and create the ATIRA, the Ahmedabad Textile Industry's Research Association and was its Honorary Director during 1949-56. He also helped build and direct the Indian Institute of Management, Ahmedabad from 1962-1965.

Sarabhai pioneered India's space age by expanding the Indian Space Research Organization. India's first satellite Aryabhata launched in 1975, was one of the many projects planned by him. Like Bhabha, Sarabhai wanted the practical application of science to reach the common man. Thus he saw a golden opportunity to harness space science to the development of the country in the fields of communication, meteorology, remote sensing and education. The Satellite Instructional Television Experiment (SITE) launched in 1975-76, brought education to five million people in 2,400 Indian villages. In 1965, he established the Community Science Centre in Ahmedabad with a view to popularise science among children. His deep cultural interests led him, along with his wife Mrinalini Sarabhai, to establish Darpana Academy, an institution devoted to performing arts and propagation of ancient culture of India.

He was the recipient of the Bhatnagar Memorial Award for Physics in 1962, the Padma Bhushan in 1966, and was posthumously awarded the Padma Vibhushan. He was the Chairman of the Atomic Energy Commission in 1966,Vice-President and Chairman of the UN Conference on peaceful uses of outer space in 1968, and President of the 14th General Conference of the International Atomic Energy Agency. The International Astronomical Union named a crater in the moon (in the Sea of Serenity) after him, in honour of his contributions to science .

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RESEARCH ARTICLE

Use of Image Processing in Evaluation of Rice Flour and Soybean Flour Effect on Texture and Structure Properties of Gluten-Free Biscuit

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ABSTRACT

In this study, effect of rice flour and soybean flour on gluten-free biscuit was investigated by image processing. Biscuit features selected for analysis were porosity, crumb texture, crumb pores shape, Fractal dimension of pores and boundaries. The results exhibited, the highest and lowest values of porosity were observed in witness and formulation2 (rice flour 40%, soybean flour 6% and lecithin 0.01%). According to crumb texture, formulation 1 (rice flour 60%, soybean flour 4.3% and lecithin 0.34%) and formulation 2, led to reduction of angular second moment, contrast, correlation, inverse diffrence moment and entropy in samples. The sample made with the formulation2 showed the lowest values of mean perimeter of gas cells, whereas control was characterized by the lowest values of this parameter. Fractal dimension of pores and boundaries in witness was lowest which indicated that rice flour and soy bean flour caused less regular and smooth pore boundaries.

Key words: Gluten free biscuit, Image analysis, Soybean flour, Rice flour,Image texture analysis

INTRODUCTION

Coeliac disease is a life-long intolerance to the gliadin fraction of wheat and the prolamins of rye (secalins), barley (hordeins) and possibly oats (avidins). The reaction to gluten ingestion by sufferers of coeliac disease is inflammation of the small intestine leading to the malabsorption of several important nutrients including iron, folic acid, calcium and fat-soluble vitamins. Symptoms associated with coeliac disease include diarrhoea or constipation, anaemia, mouth ulcers, abdominal pain, bloating, fatigue, infertility, neuropsychiatric symptoms (anxiety, depression) and osteoporosis (Gallagher et al., 2004). Gluten removal results in major problems for bakers, and currently, many gluten-free products available on the market are of low quality, exhibiting poor mouthfeel and flavor. This presents a major challenge to the cereal technologist and baker alike (Naji and Mohebbi., 2014).

Products formulated without gluten are of poor quality with low volume, poor texture, and flavor and fast staling. Since these products are not enriched and fortified, they do not contain adequate amount of vitamins, minerals, and fiber to meet the nutritional needs of celiac sufferers. Thus, gluten replacement remains to be one of the most challenging tasks for cereal technologist and scientists (Morshedi et al., 2014; Demirkesen et al., 2010). The keeping quality of baked foods such as crackers, cookies and biscuits is of great economic importance since these products are widely used and are often stored for extended periods before consumption (Reddy et al., 2005; Morshedi et al., 2014). To ensure acceptability of gluten free products, modifications in formulations by replacing wheat flour by alternative flours and by using ingredients such as hydrocolloids, emulsifiers, sugars, shortening, enzymes and fibers have long been established by the gluten-free baking industry (Morshedi et al., 2014; Demirkesen et al., 2010; Demirkesen et al., 2013; Demirkesen et al., 2011; Purhagen et al, 2012).

Image processing has been applied increasingly for quality evaluation of baking studies (Jahromi et al., 2013; Ozge et al., 2009; Wang et al., 2013; Wang et al., 2011). Based on image processing and analysis, computer vision is a novel technology for recognizing objects and extracting quantitative information of morphology, structure and microstructure from digital images in order to provide objective, rapid, non-contact, and non-destructive quality evaluation (Sun., 2008; Naji and Mohecci., 2014).

Image texture features are usually classified into four categories namely, statistical, structural, model-based and transform-based textures (Karimi et al, 2012; Bharati et al., 2004). In the food systems, statistical texture is the most commonly used method for quality evaluations. This method includes Grey Level Co-Occurrence Matrix (GLCM), grey level pixel-run length matrix, and neighboring grey level dependence matrix (Zheng et al., 2006). Haralick et al. (1973) proposed the widely applied statistical texture analysis method, in which texture features such as entropy, homogeneity, correlation and contrast are extracted by some statistical approaches from the co-occurrence matrix of gray scale image histogram. GLCM has been used for classification of cereal grain and dockage (Paliwal et al., 2003) and apple (Kavdir et al., 2002).

The absence of gluten has an impact on cell formation, crumb and crust characteristics, volume, porosity, quality parameters (Mohammadi et al., 2014; Naji and Mohebbi., 2014). Therefore, we decided to evaluate crumb cellular structure based on image process technique in free gluten biscuit. The aim of this study was to investigate the effect of soybean flour and rice flour on porosity, pore shape identification, fractal dimension and crumb texture of gluten-free biscuit.

MATERIALS AND METHODS

Rice flour (Podrineh, Iran), soybean flour (Behtaam, Iran), lecithin (Argentinien), oil (Ladan, Iran), invert syrup (Arian glucose, Iran), dried milk powder (Guigoz), sodium bicarbonate, citric acid (Kaselcit, China), suger, vanille and salt were purchased.

Preparation of biscuit

Bake trials were conducted under laboratory conditions. Dough mixing, processing and baking were performed on laboratory-scale equipment. The ingredients were weighed according to the proportions listed in Table 1 as determind by Morshedi et al., (2014). Morshedi et al., (2014) concluded formuation1 was choosen as a optimum formulation by RSM and formulation2 was determined as best formulation based on tase in sensory evulation test. The witness samples was provided with wheat flour.

Biscuits were prepared as per the following method (Morshedi et al., 2014; Reddy et al., 2005; Sai and Haridas Rao, 1999). Sugar, invert syrup, fat and lecithin were creamed for 3–4 min in a Hobart mixer. Rice flour, soybean flour, sodium bicarbonate, dried milk powder, citric acid, vanille and salt were mixed and sieved and then added to the above cream and mixed (and added water) for 5 min to obtain a homogenous dough. Dough were wrapped in polyethylene bags and left to rest at room temperature for an hour. Then the dough was sheeted to a thickness of 3.5 mm and cut into circular shapes using 45mm cutter and placed on an aluminium tray, baked at 160 ^{0}C for 10 min and then allowed to cool. The biscuits were stored in air-tight containers at ambient temperature (Morshedi et al., 2014; Reddy et al., 2005).

Image processing of gluten-free biscuit

A computer vision system generally consists of sample illumination was achieved with five fluorescent lights (Opple, 8 W, model: MX396-Y82; 60 cm in length) with a color index (Ra) close to 95 %. The illuminating lights were placed in a wooden box, 45 cm above the sample and at the angle of 458 with sample plane to give a uniform light intensity over the bread (Naji and Mohebbi 2014; Quevedo et al, 2010). The interior walls of the wooden box were painted black to minimize back ground light. So that stabilization the lighting system, it was switched on for about 30 min prior to acquiring images. A color digital camera (Canon EOS 1000D, Taiwan) with lens focal length of 35 mm for color analysis and 45 mm for investigation of pore properties was located vertically. The iris was operated in manual mode, with the lens aperture of 5.6, ISO 100 and shutter speed of 2 s to achieve high uniformity and repeatability. Images were captured with the mentioned digital camera at 2592 × 3888 pixels and connected to the USB port of a computer. Canon Digital Camera Solution Software (Canon Utilities Zoom Browser EX README File Version 6.1.1) was used to acquire the images in the computer in TIFF format. In this study, bakeds samples were cut into two halves vertically and these halves used for investigation.The image analysis was managed using ImageJ software (National Institutes of Health,USA) version 1.45. The features of color, porosity, pore area fraction, pore shape, crust thickness, fractal dimension of pore‘s boundaries and crumb texture were investigated (Naji and Mohebbi 2014).

Porosity

The pictures of gluten-free biscuit were taken using a digital camera (model Canon EOS 1000D, Taiwan). The digital images were saved in JPEG format with a resolution of 4 mega pixel. The images were reduced from a 32- bit to an 8-bit forma (Fig 1). The analysis of sample cavity was performed using Analyze option in image J software (Shahidi et al., 2011).

Image texture analysis

The Grey-level co-occurrence matrix (GLCM) was used to obtain the statistical texture features. The co-occurrence matrix describes the second-order statistics in the images and enables a calculation of the textural features that are expected to represent the textural characteristics of the image studied (Naji and Mohebbi 2014; Tournier et al., 2012). The center of each slice was cropped in a square of 100 × 100 pixels and converted to grey-level image (8 bits). The average of five textural features: angular second moment, contrast, correlation, inverse difference moment and entropy were studied (Naji and Mohebbi 2014; Tournier et al., 2012).

Fractal dimension

The center of each slice was cropped in a square of 100 × 100 pixels and converted to grey level image (8 bits). Then they were converted to binary images and the pore boundary was extracted and lastly the fractal dimension value was computed with box-counting method using the ImageJ software (Naji and Mohebbi 2014). Fig 2 showed steps of image processing to estimate fractal dimenson of gluten free biscuit. The fractal dimension quantifies the degree of irregularity or fragmentation of an object of spatial pattern.There is several ways to measure the fractal properties of an object or geometrical structure. One of the easiest and more common procedures to quantify fractality is the box counting method, whose result is the fractal dimension of an object or image. A box-counting fractal dimension indicates the level of complexity or the amount of details through scales (Naji and Mohebbi, 2014; Barros and Sobreira, 2005).

Shape identification

Image processing was performed and then Circularity, Aspect Ratio, Roundness and Solidity were studied with ImageJ software. As the value approaches 0.0, it indicates an increasingly elongated shape. Aspect Ratio is the ratio of the length of major axis to the length of minor axis which was evaluated. Roundness is inverse of aspect ratio and indicate a measure of how far the pore shape differs from a circle. Solidity describes the extent to which the shape is convex or concave (Naji and Mohebbi 2014).

Statistical analysis

Analysis of variance were computed using SPSS16 software. The Duncan multiple-comparison test ($P<0.05$) was used to compare means. Image j software (National Institutes of Health,USA) version 1.45 was used for investigation of sample porosity, pore shape, fractal dimension of pore's boundaries and crumb texture.

RESULTS AND DISCUSSION

Porosity

Porosity is a fraction of the volume of voids over the total volume, between 0 and 1, or as a percentage between 0 and 100% . In samples, formulation 1 (rice flour 60%, soybean flour 4.3% and lecithin 0.34%) resulted in similar porosity values to those of the control samples (Fig 3) ($p < 0.05$). Formulation2 (rice flour 40%, soybean flour 6% and lecithin 0.01%) led to porosity reduction in samples ($p<0.05$). Especially at formulation2 significant differences were noticed in comparison to other samples ($p < 0.05$). The highest and lowest values of porosity were mainly observed in witness and formulation2 (Fig3).

Mandala (2005) investigated the effect of flour types and containing guar or xanthan gum at low and high concentration (0.16 and 0.65 g/100 g flour, respectively) in physical properties of fresh breads and concluded the guar gum resulted generally in less desirable, final bread quality, while xanthan addition gave better bread properties at low concentration. Differences in respect to the flour type used were mainly observed in the porosity and secondarily in the failure deformation values after microwave heating. Increase in porosity (open structure) and softer crust, however, are obtained only at low concentrations of xanthan gum (0.16% flour basis).

Crumb texture: evaluation by gray level co-occurrence matrix (GLCM)

Texture features can be extracted in several methods, namely: statistical, structural, model-based, and transform information. Each method has different techniques. A well known algorithm to extract texture features is the use of gray level co-occurrence matrices (GLCMs), which belongs to the statistical methods (Shahbahrami et al., 2012).

The texture of an image corresponds to the spatial organization of pixels in the image and the co-occurrence matrix describes the occurrence of grey level between two pixels separated in the image by a given distance (Tournier et al., 2012). The former that has been proposed by Haralick et al. (1973), is the widely applied statistical texture analysis method, in which texture features such as entropy, homogeneity, correlation and contrast are extracted by some statistical approaches from the co-occurrence matrix of gray scale image histogram. GLCM has been used for classification of cereal grain and dockage (Paliwal et al., 2003), apple (Kavdir et al., 2005) and gluten-free bread (Naji and Mohebbi, 2014). The angular second moment is a measure of image homogeneity; it is high when the pixels are very similar or when image has very good homogeneity. Contrast measures local variations of grey levels and correlation measures the linear dependencies of grey levels in the image. Entropy measures the 'complexity' of the image with regards to the spatial location of grey levels in the image (Naji and Mohebbi 2014; Tournier et al., 2012).

As you can see in table 2, formulation 1 (rice flour 60%, soybean flour 4.3% and lecithin 0.34%) and formulation 2 (rice flour 40%, soybean flour 6% and lecithin 0.01%), led to reduction of angular second moment, contrast, correlation, inverse diffrence moment and entropy in samples ($p<0.05$). Especially at inverse difference moment of sample with formulation2 significant differences were noticed in comparison to other samples ($p<0.05$). The highest and lowest values of all parameters of texture were mainly observed in witness and formulation2 respectively (table2).

Crumb pores shape

Shape provides valuable information about the structural features of crumb. The crumb cell shape data were summarized in Table 3. The gas cell structures in sample crumb were analyzed which calculated the size of the cell (mean perimeter) and cell density (Table 3). The sample made with the formulation2 showed the lowest values of mean perimeter of gas cells, whereas control was characterized by the lowest values of this parameter. There were fewer and larger gas cells in sample with formulation2, indicated by lower cell density (Shi et al., 2013). As you can see in table 3, formulation 1 (rice flour 60%, soybean flour 4.3% and lecithin 0.34%) and formulation 2 (rice flour 40%, soybean flour 6% and lecithin 0.01%), led to reduction of total area, average size, circularity and area fraction of samples ($p<0.05$). The solidity values of witness was higher than formulation1 and formulation2 ($p<0.05$). Naji and Mohebbi (2014) said when solidity value is equal to 1, indicates solid object, but values lower than 1 shows irregular object or holes contained. As a result, the samples with formulation 1 and formulation 2 had pores with irregular shape and witness caused forming more regular and solids pores.

Fractal dimension of pores and boundaries

Fractal dimension of a two-dimensional profile ranges from 1 to 2. Fractal value close to 1 indicates that the border of the analyzed object has smooth boundaries, and a value close to 2 indicates a high degree of tortuosity or roughness (Chanona-Pe´rez et al., 2008). Fractal value of pore boundaries is related to the tortuosity of the cell wall of the binarised image, which can be conceptually related to the uniformity of pores cell wall (Naji and Mohebbi, 2014). Fig 10 showed steps of image processing to estimate Fractal dimenson of baked gluten free biscuit

As you can see in fig 5 fractal values of pore boundaries in witness was lowest which indicated that rice flour and soy bean flour caused less regular and smooth pore boundaries. The fractal dimension of boundaries increased with adding rice flour and soybean flour. As mentioned in table 3, pore area fraction decreased with adding rice flour and soybean flour which is the main reason for lower pore shrinkage and tortuosity in witness. Shrinkage caused more irregular and rougher boundaries; therefore, the fractal dimension of boundaries increased with adding rice flour and soybean flour.

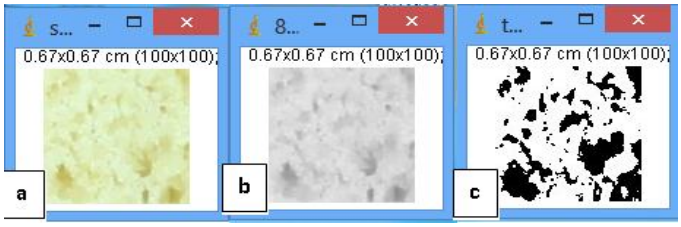
CONCLUSION

The present study revealed that formulation1 and formulation2 (contain rice flour, soybean flour and lecithin) led to porosity reduction in gluten free biscuits ($p<0.05$). According to crumb texture, the highest and lowest values of all parameters of texture (angular second moment, contrast, correlation and entropy) were mainly observed in witness and formulation2 respectively. The gas cell structures in sample crumb were analyzed which calculated the size of the cell (mean perimeter) and cell density. Baesd pn pore shape, a reduction of total area, average size, circularity and area fraction of samples was seen in formulation 1 and formulation 2. Furthermore the solidity values of witness was higher than formulation1 and formulation2. The results of Fractal dimension of pores and boundaries showed the FD increased with adding rice flour and soybean flour.

REFERENCES

1. Barros Filho M, Sobreira F. 2005. Assessing texture pattern in slum across scales: an unsupervised approach Vol. 87 (CASA Working Papers Series.
2. Bharati MH, Liu JJ, MacGregor JF. (2004) Image texture analysis: methods and comparisons. Chemometr Intell Lab 72, 57-71.
3. Chanona-Pe´rez J, Quevedo R, Jime´nez Aparicio AR, Gumeta Cha´vez C, Mendoza Pe´rez JAG, Caldero´n Domı´nguez, Alamilla-Beltra´n L, Gutie´rrez-Lo´pez GF. 2008. in Food engineering:,integrated approaches, ed. by G.V. B.-C. Gustavo, F. Gutie´rrez- Lo´pez, Jorge Welti Chanes, Efre´n Parada-Arias. Springer New York, pp. 277–286.
4. Demirkesen I, Sumnu G, Sahin S, Uysal N. 2011. Optimization of formulations and infrared-microwave combination baking conditions of chestnut-rice breads. International Journal of Food Science and Technology 46, 1809-1815.
5. Demirkesen I, Sumnu G, Sahin S. 2013. Image analysis of gluten-free breads prepared with chestnut and rice flour and baked in different ovens. Food Bioprocess and Technology 6, 1749-1758.
6. Gallagher E, Gormley T, Arendt E. 2004. IMPROVING THE QUALITY OF GLUTEN-FREE PRODUCTS. , Trends Food Sci. Technol. 15(3), 143.
7. Haralick RM, Shanmugam K, Dinstein I, 1973. Textural features for image classification. IEEE T Syst Man Cyb SMC3, 610-621.

8. Jahromi R, Hossein S, Karimi M, Yazdi FT, Mortazavi SA2013. Response Surface Optimization of Barbari Bread-Making Process Variables: Interrelationship of Texture, Image and Organoleptic Characteristics; Using Image Analysis for Quality and Shelf Life Prediction J Food Process. Preserv. ISSN 1745–4549
9. Karimi M, Fathi M, Sheykholeslam Z, Sahraiyan B, Naghipoor F. 2012. Effect of Different Processing Parameters on Quality Factors and Image Texture Features of Bread . Bioproces Biotechniq 2 (5), 2- 7.
10. Kavdir I, Guyer DE. 2002 Apple sorting using artificial neural networks and spectral imaging. T ASAE 45, 1995-2005.
11. Mahmoud R, Yousif E, Gadallah M, Alawneh A. 2013. Formulations and quality characterization of gluten-free Egyptian balady flat bread. Agric. Sci. 58(1), 19- 25 .
12. Mandala IG. 2005. Physical properties of fresh and frozen stored, microwave-reheated breads, containing hydrocolloids. Journal of Food Engineering 66, 291–300.
13. Mohammadi M, Sadeghnia N, Azizi MH, Neyestani, TR, Mortazavian AM. 2014. Development of gluten-free flat bread using hydrocolloids: Xanthan and CMC. Journal of Industrial and Engineering Chemistry 20 (4), 1812-1818.
14. Morshedi A, Poursharif Z, Haghighatasiabar A, Akbarian M, Khazani S. 2014. Optimization of formulation of gluten-free biscuit based on rice flour and soybean flour by RSM. Journal of Biodiversity and Environmental Sciences (JBES) 4 (4), 146-156.
15. Naji-Tabasi S., Mohebbi. 2014. Evaluation of cress seed gum and xanthan gum effect on macrostructure properties of gluten-free bread by image processing. Food Measure DOI 10.1007/s11694-014-9216-1
16. Ozge Ozkoc S, Sumnu G, Sahin S. 2009. The effects of gums on macro and micro-structure of breads baked in different ovens Food Hydrocoll. 23(8), 2182 -2189.
17. Paliwal J, Visen N. S, Jayas D. S, White N. D. G. 2003. Cereal Grain and Dockage Identification using Machine Vision. Biosyst Eng, 85, 51-57.
18. Reddy V, Urooj A, Kumar A. 2005 . Analytical, Nutritional and Clinical Methods Evaluation of antioxidant activity of some plant extracts and their application in biscuits. Food Chemistry 90, 317–321.
19. Sai Manohar R, Haridas Rao P. 1999. Effect of emulsifiers, fat level and type on the rheological characteristics of biscuit dough and quality of biscuits. Journal of Science of Food and Agriculture 79, 1223–1231.
20. Shahbahrami A, Pham TA, Bertels K, Supercomput, J. 2012. Parallel implementation of Gray Level Co-occurrence Matrices and Haralick texture features on cell architecture 59(3), 1455-1477.
21. Shi Ke, Hailong Yu, Tung-Ching Lee. 2013. A novel approach for improving yeast viability and baking quality of frozen dough by adding biogenic ice nucleators from Erwinia herbicola .Journal of Cereal Science 57, 237- 243.
22. Sun DW. 2008. Computer vision technology for food quality evaluation. Food science and technology International series (Academic Press, London)
23. Tournier C, Grass M, Zope, D., Salles, C., Bertrand, D. 2012. Characterization of bread breakdown during mastication by image texture analysis. Journal of Food Engineering, 113, 615–622.
24. Wang S, Austin P, Bell S. 2011. It's a maze: the pore structure of bread crumbs. J Cereal Sci. 54(2), 203.
25. Wang S, Karrech A, Regenauer-Lieb K, Chakrabati-Bell S. (2013). Digital bread crumb: Creation and application. J Food Eng. 116(4), 852-861
26. Zheng C, Sun DW, Zheng L. 2006. Recent applications of image texture for evaluation of food qualities-a review. Trends Food Sci Tech 17, 113-128.



Figur 1. Steps of image processing to estimate porosities of gluten- free biscuit with Image J software.: a) image of crumb b) 8-bit c) threshold

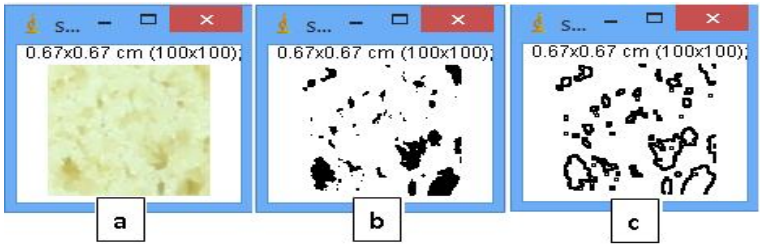


Fig 2. Steps of image processing to estimate Fractal Dimenson of gluten free biscuit with Image J software: a) image of sample b) binary c) find edge.

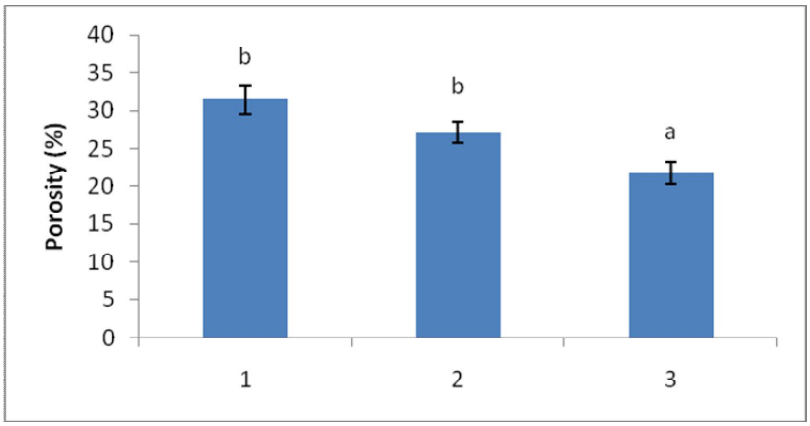


Fig 3 . Effect of different flour (1: witness, 2: formulation1, 3: formulation2) on porosity of gluten free biscuit. Different letters showed significant difference between samples in Duncan test (P < 0.5).

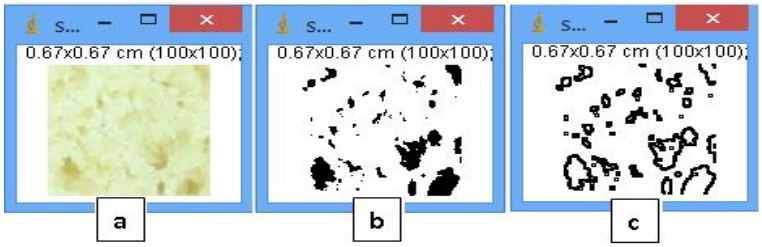


Fig 4. Steps of image processing to estimate Fractal Dimenson of gluten- free biscuit with Image J software: a) image of sample b) binary c) find edge

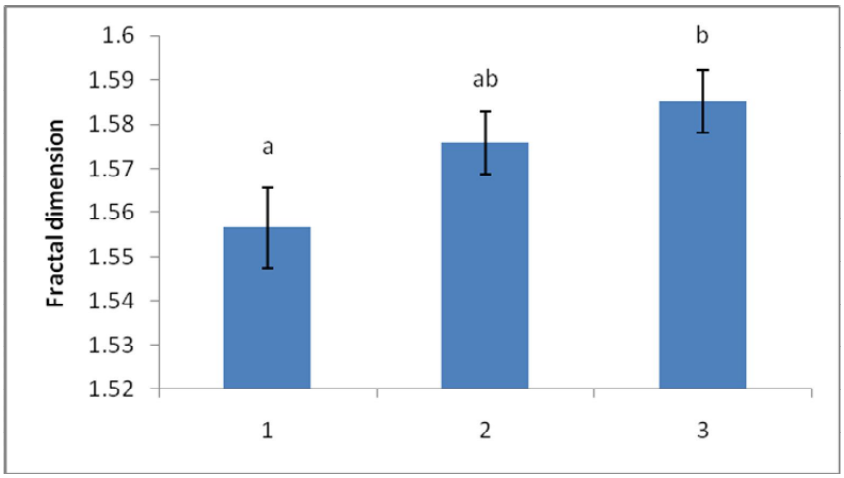


Fig 5 . Effect of different flour (1: witness, 2: formulation1, 3: formulation2) on fractal dimension of gluten free biscuit. Different letters showed significant difference between samples in Duncan test (P < 0.5).

Table 1.The formulation of gluten free biscuit.

Ingradients	Formulation1	Formulation2
Rice flour	60%	40%
Soy bean flour	4.30%	6.0%
Lecithin	0.34%	0.01
oil	4.6%	4.6%
Suger	11.4%	11.4%
Invert syrup	3.3%	3.3%
Dried milk powde	1.64%	1.64%
sodium bicarbonate and salt	0.15%	0.15%
citric acid and vanill	0.2%	0.2%
water	Variable according to dough	Variable according to dough

Table 2.Effect of different flour on crumb texture of gluten free biscuit

Parameters	Witness	Formulation1	Formulation2
angular second moment	0.00865^{b}	0.0079^{ab}	0.00605^{a}
contrast	421^{b}	416.5^{b}	408.5^{a}
correlation	0.0038^{b}	0.0033^{a}	0.003^{a}
inverse diffrence moment	0.5505^{b}	0.532^{b}	0.49945^{a}
entropy	6.0946^{b}	5.8125^{ab}	5.5875^{a}

Different letters showed significant difference between samples in Duncan test (P < 0.5).

Table3 .Effect of different flour on pore shape of gluten free biscuit

Parameters	Witness	Formulation1	Formulation2
Total Area	0.036[c]	0.0275[b]	0.021[a]
Average Size	0.0035[a]	0.0025[a]	0.0015[a]
Mean Perimeter(cm)	0.18[b]	0.145[a]	0.125[a]
Circularity	0.83[a]	0.785[a]	0.765[a]
Solidity	0.8495[b]	0.793[a]	0.77075[a]
Cell density (cells/cm^2)	94.068[a]	76.53 [a]	68.558 [a]
Aarea fraction	12.35 [a]	10.985 [a]	9.6 [a]

Different letters showed significant difference between samples in Duncan test (P < 0.5).

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RESEARCH ARTICLE

Evaluate the Effect of Trade Promotion Components on Customer Loyalty (Case Study: Bank Melat Branches of Ilam)

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ABSTRACT

According to the current competitive environment, the need to maintain and extend survival in any industry is customer loyalty. Today customer loyalty is the key for the success of any business. With increasing customer loyalty, market share and the profitability of enterprises increases. With the advancement of technology and more competitive in market conditions in the different sectors of production and services, customer loyalty is the main capital of any company. Today, with the increasing competition in the banking sector and creation of different types of financial and credit institutions, customer status has found more value and customer orientation today in banks has become a fundamental principle. Customers are considered as bank Intangible assets and banks durability and survival depends on customer satisfaction and loyalty. Therefore, due to the loyalty of our customers and identifying factors that can lead to improve customer loyalty, today has become a basic necessity for banks. The aim of this study was to evaluate the effect trade promotion components on customer loyalty (Case Study: Bank Melat branches of Elam). For this purpose, we conducted the theoretical and background research and then to analyze the assumptions we have used one sample t-test However, considering that research methodology based on the purpose of this study is placed as correlation researches using the casual model . SPSS statistical software is used in this research.

Key words: Advertising, sales, customer loyalty, Bank Mellat, Ilam Province

INTRODUCTION

Today marketers, for a greater share of the market, offer their goods and services with higher quality in order to satisfy and retain customers prevent their dispersion, and also they add new customers (Cutler, 2005; 648). In competitive environment managers requires marketing tools. One of the most important tools is trade promotion, are the variables promotion, direct marketing, the Public Relations, advertising and sales promotion are (Kotler, 2003; 211 Blech, 2001) that at different time attentions were different. Promotion plays an important role in the development of policies and strategies of marketing, such as the relationship with customers, introduce new products, improvement of customer perception and the audience about the company and its brand name (Raghubir, 2001; 211-222). "Integrated Marketing Communications" provide a framework by which the organizations develop their plans for the promotion activities in market (Duncan, 2002). Generally, advertising creates an umbrella and with guiding communications and real relationships creates potential customers (Bong & etal, 2009; 153-169). Direct marketing allows marketer to receive more direct response from customer and to mark the target market in a better way In the 1980s, the use of sales promotion tools began to grow and at the end of this decade, the cost of sales promotion surpassed than advertising, but yet very little academic research has been done in this area (Peattie, 2001; 195). Sales promotion tools, have the ability to attract new customers and keeping loyal customers and if interested in keeping their current customers should consider a place to promote the sale in their marketing program (Whith, 2003; 116). Marketing sales promotion is a special proposal that offers more benefits and profits of inner value that a customer has received condition of the sale of a product or service and provides a rapid effect on sales (Williams, 1995; 402). The use of sales promotion in the service industry also is growing because most service organizations need to communicate with their customers (Whith, 2003; 91). Price promotions are used to meet short-term goals and non price promotion is used to meet long-term goals (Lee, 2003; 202). For conducting loyalty programs cases should be considered that: First, the loyalty program best works For products and services that are hard to distinguish and are not unique and secondly it is more useful about the products and services that customers investe heavily over a long period of time (wansink & Seed, 2001; 203). Customers increasingly are known with marketing as a significant source that can guide us to manage the research and development (Gilbert and Friends, 2002). This issue is emerging in order to achieve the goal of developing solutions and management processes relationship with customer and facilitate understanding of the market opportunities (Daruch and Friends, 2003). Loyalty is referred to a strong commitment to repurchase a product or the best service in the future, so that the same brand or product is purchased despite the effects and potential marketing efforts of competitors. (Barrels, 2004). So this leads to purchase of trade brand continuously (Wang, 2003). Banking is the most profitable industry in the world, but with the arrival of computer in the field of banking since 1980, the range of banking services has expanded and the speed of related issues has increased by the same percentage (Christian Grnrvs, 2008). Bank managers to avoid the tendency of customers to competitors, must seek to understand the demands and needs of the customer more than ever, so they can better meet their needs and to establish long-term commercial relationships. Therefore, any approach that is better able to achieve these returns will be paid more attention. In today's complex economy and competitive market and the ability to attract and retain customer loyalty has been proposed as a critical factor for many organizations. (Karvana, 2002) hence bank also should seek different management strategies to improve its customer loyalty (Ahighi, 2006). Due to competition between public and private banks to attract depositors paying attention to the design of mixed promotion and its components in order to attract and retain and customer loyalty is essential. In this context, awareness of the needs and the loyalty of customers of banks, as well as the factors influencing this, will help in achieving their goals that is efficient production and distribution. The research is trying to examine the impact of commercial promotion on customer loyalty in bank branches, and prioritize these factors in terms of customers' opinions.

Research questions
The main question

Do the components of the trade promotion have impact on customer loyalty in branch of Bank Mellat?

Subsidiary questions

Do commercial have impact on customer loyalty in branch of Bank Mellat?
Do the direct sales (direct) have impact on customer loyalty in branch of Bank Mellat?
Do sales promotion have impact on customer loyalty in branch of Bank Mellat
Do the Public Relations have impact on customer loyalty in branch of Bank Mellat?

Research hypotheses

The main hypothesis

Trade promotion of components have impact on customer loyalty in branch of Bank Mellat

Secondary hypothesis

Advertisement have impact on customer loyalty in branch of Bank Mellat
direct sales (direct) have impact on customer loyalty in branch of Bank Mellat
the Public Relations have impact on customer loyalty in branch of Bank Mellat

Goals

This study is to evaluate the effectiveness of trade promotion measures on customer loyalty. The purpose of this study is attention to the topic of trade promotion marketing mix elements In competitive environment of monetary and banking Banks That at this context, issues related to the promotion and encouragement is considered so that by studying the factors affecting could offer basic guidelines for monetary policy and more accurate financial planning.

The specific goals of the research is as follows:
The main objective

Evaluate the effect the commercial components of promotion on customer loyalty of bank Mellat branches.

Secondary objectives

Evaluate the effect of advertising on customer loyalty of bank Mellat branches.
Evaluate the effect direct sales (direct) on customer loyalty of bank Mellat branches.
Evaluate the effect the Public Relations on customer loyalty of bank Mellat branches.

Research variables

Variables are divided into two categories, dependent and independent
The dependent variable in this research is the following:
Customer loyalty

Independent variables affecting customer loyalty in this study include: (trade Promotion components):
Advertising
direct sales (direct)
the Public Relations

MATERIALS AND METHODS

Methodology of research is considered as one of correlation research using the casual model. To determine the causal relationships between variables that are highly dependent, causal-comparative or experimental studies are needed. (Khaky- 2005 and 218) in the casual investigation, a causal relationship between the two variables is investigated. (Khaky- 2005 and 220) the present study, in terms of type, is an applied research that seeks to solve real executive and research is causal-comparative. In this study, a questionnaire was used to collect data. The questionnaire consisted of two parts the first part contains demographic information and the second part consist of specialized questions. The ability of reliability is technical characteristics of the measurement tool indicating that to what extent Measurement tool gives the same results under similar conditions. . One of the methods for calculating the ability of reliability is Cronbach's alpha coefficient.The minimum acceptable value for this coefficient should be 7.0. Cronbach's alpha coefficient calculated in this study was 86/0, showing that the appropriate reliability of questionnaire. Populations of the research are customer of Bank Mellat branches in the city of Sari. With regard to the distribution of statistical population of Subject and its extension on the one hand And researches emphasize on the calling of individual to members of the statistical population due to more accurate on the other hand, gathering data from the entire statistical population was very time consuming for researchers And the cost is not affordable for him. The aim of this study was to try to determine more accurately the sample size of the statistical population for being sampled. In this study to determine the sample size the following formula is used (Azar and Momeni, 2006, p. 72):

$$n = \frac{N \times Z^2_{\alpha/2} \times p \times q}{\varepsilon^2 \times (N-1) + Z^2_{\alpha/2} \times p \times q}$$

The number of samples using the above formula is 153. In this study, methods of descriptive statistics (frequency distribution tables, mean, standard deviation, variance and percentage) and inferential statistics (one-sample t-test) was used to summarize and analyze the data. . SPSS statistical software is used in this research.

DISCUSSION

Descriptive Statistics

The statistical distribution of variables such as gender, age, work experience, education level of respondents is as follows:

Of the sample, 20% are women and 80% are men. In terms of age, it can be stated that 28% of the members of the sample are in the range of twenty to thirty years, 49% within the thirty-one to forty, and 23% are higher than. A total of 13% of the sample are in the range of Diploma, 30% are in range of associate degree , 54%, in the range of undergraduate, and 3% are in range of postgraduate .

Inferential statistics Considering that a significant level less than detection level 05/0, and limit of top and bottom are both positive, Assumptions are confirmed and hypotheses are suitable and the commercial promotion components have a positive effect on customer loyalty.

CONCLUSION

Today customer loyalty is the key to the success of any business. With increasing the customer loyalty, market share and the profitability of enterprises increases. In this context, knowledge of the type and level of customer loyalty to the bank, as well as factors affecting this, contributed in achieving their goals, which is the effective and efficient production and distribution. The research is to examine the impact of commercial promote tools on customer loyalty in bank Mellat branches, and prioritize these factors in terms of their important from perspective of customers opinion. In this study, three variables of business promotion components were measured for the customer loyalty and this resulted in the identification of the most effective variable. Variable Public relations has relation with customer loyalty and variable advertising and direct sales are associated with customer loyalty respectively.

REFERENCES

1. Ambler, Tim (2000)," Marketing Metrics", Business Strategy Review, Vol. 11, Issue 2, pp: 59-66.
2. Bierly, P., Daly, P. (2004) , The strategic management of intellectual capital and organizational knowledge, Edited by: chan Wie choo & Bontis, N. Oxford university press
3. Blomer jose, ruyter kode, peeters pascal, "investing drivers of bank loyalty: the complex reltionship between image, service quality, satisfaction", international journal of bank marketing, ۱۶/۷, 2007.
4. Caruana M.(2002) " Knowledge management ". Business and Economic Review, Vol. 44 No. 4.
5. Darroch,Jneny&McNaughton Rod(2003), "Beyond market orientation- Knowledge management and the innovativeness of New Zealand firms", European Journal of arketing ,Vol.37No.3/4,pp.572-593
6. D'Esopo, Michael and Almquist, Eric (2007), "An Approach To Mastering The Marketing Mix", Business Strategy Series, Vol. 8, Issue. 2, pp: 122 – 131.
7. Dick, A. And Basu, K. (2007), "Customer loyalty: towards an integrated conceptual framework", Journal of Academy of Marketing Science, Vol. ۲۲ No. ۲, pp. ۹۹-۱۱۳.
8. Dibb, Sally, Wensley and Robin (2002), "Segmentation Analysis For Industrial Markets: Problems Of Integrating Customer Requirements Into Operations Strategy", European Journal Of Marketing, Vol. 36, Issue.1/2, pp: 231, 21.
9. Duncan, T. (2002), "IMC Using Advertising and Promotion To Build Brands", New York NY: Mcgraw Hill.
10. Ehrenberg A. S. C, and Brand N. R. (2000), "Building Models For Marketing Decisions: Past, Present And Future", International Journal Of Research In Marketing, Vol. 17, Issues 2-3, pp: 105-126.
11. Ehigie, B. O. (2006),"Correlates of customer loyalty to their bank: a case study in Nigeria", international Journal of Bank Marketing, Vol. 24, No.7, pp: 494-508
12. Feldman, D. C., (2004), the devil is in the detail: converting good research into 1-105.
13. Gibbert,M.,Lebold,M.,Probst,G.(2002), Five styles of customer knowledge management , European Management European Management
14. Journal,Vol.20 No.5, pp.459-469.
15. customer value oriented management", Journal of Consumer Marketing , Vol.18, No.1, p p . 4 1 - 5 3 .
16. Gronroos, Ch.(2008) " Knowledge Management Enablers, Processes, and Organizational Performance: An Integration and Empirical Examination ". APDSI 2000 Full Paper.
17. Huang, Leo. & Chen, Kaung-Hwa. & Wu, Ying-Wei., (2009), what kind of marketing distribution mix can maximize revenues: The wholesaler travel agencies' perspective? , Tourism Management, pp. 733- 739.
18. Keller, K. L. (2001), "Mastering The Marketing Communication Mix: Micro And Macro Perspectives On Integrated Marketing Communication Programs. Journal Of Marketing Management, Vol. 17, pp: 819-847.
19. Kimuli, Barlon. (2006), "The Concept Of The Marketing Mix" Presentation On Marketing Management, Vol. 1, pp: 2-7.
20. Kotler P. (2003), "Marketing Management: Analysis, Planning, And Control", Prentice-Hall, Inc, Englewood Cliffs, New Jersey.

21. Kustin, Richard Alan (2004), "Marketing Mix Standardization: A Cross Cultural Study Of Four Countries", International Business Review, Vol. 13, pp: 637–649.
22. Lee chung, (2003), Entry in telecommunication: customer loyalty, price sensitivity and access prices, Information Economics and Policy 15, 197–231.
23. Mason, R. B: (2007), "A Marketing Mix Model For A Complex And Turbulent Environment", Acta Commercii, pp: 236-254.
24. Moriarty, S. E. (2001), "PR And IMC: The Benefits Of Integration", Public Relations Quarterly, Vol. 39 Issue 3,. P. 38-44.
25. Oliver, R. (٢٠٠7), "A model of Loyality", Service Industries Journal, Vol. ٢٠ No. ١, pp. ١١٠-٣٨.
26. Na. Woon Bong&et al , 2009 "Decision system analysis of advertising agency decisions" International Marketing Review Vol.26 Nos 4/5 2009(153-169)
27. Oyedele Adesegun&et al , 2009 " Signals of global advertising appeals in emerging markets" International Marketing Review Vol.26 Nos 4/5 2009 (521-534)
28. Peattie E. Cretu & Roderick J. Brodie, (2001), The influence of brand image and company reputation where manufacturers market to small firms: A customer value perspective, Industrial Marketing Management 36, 175-206.
29. Raghubir,Priya And Corfman,Kim, (2001), "When Do Price Promotion Affect Pretrial Brand Evaluation", Journal Of Marketing Research, Vol.36, No.2, pp: 211-222.
30. Van der Deijl, Wesley., (2008), Swedbank versus Rabobank -A Comparison of The Services Marketing Mix, Thesis, Department of Business Administration and Economics, University of Gavle, Swed.
31. wansink,S.,T., & Seed,Y.,C., & Hauang,C.,H., (2001) , Determinants of guest loyalty to international tourist hotelsFaneural network approach,Jornal of Tourism Management ,
32. PP 197 –225.
33. Whith W.Wallace & Jean L.Johnson, (2003), Customer retailer loyalty in the context of multiple channel strategies, Journal of Retailing 80, 89-108.
34. Williams W.Mägi, (1995), Share of wallet in retailing: the effects of customer satisfaction, loyalty cards and shopper characteristics, Journal of Retailing 79, 397–425.
35. WilkinsonT Timothy j, (2007), Reaching the International Consumer, An Assessment of the International Direct Marketing Environment, Direct Marketing: An International Jornal, No.1.
36. Yonggui Wang, Hing Po Lo, Renyong Chi, Yongheng Yang,(2004),"An integrated framework for customer value and customer relationship management performance", Journal of Managing Service Quality, 14, 2/3, pp 169-182.

Table 1. Empirical research background

Description	Year	Researcher
He did a study titled "mixed promotion strategies to increase sales in national chain stores'. In conditions of uncertainty and turbulence environmental strategy differs from traditional approaches in certain and stable conditions. Chain stores, according to current and future environmental conditions and their ability should choose appropriate strategies to help to survive and grow in this competitive economy.	2009	Samoddin Nasery
He did a study, entitled "Determination of the promotion mix for dairy products using multi-criteria decision-making" . The aim of this study was to evaluate and determine the most effective promotion elements in terms of their impact on the positive attitude in the audience to dairy products used AHP method.	2007	Samadi Mansoor
In his MSc thesis entitled "determination of the factors affecting customer loyalty in Saderat Development Bank from the banking services based on	2007	Pooria Yoosefi

the concepts relationship management with customer " investigated different aspects of attract customer loyalty in banks. Loyalty, customer banking services and management of the marketing mix are the main pillars of this research		
In his Thesis examined on the subject of "identify and rank the factors affecting customer loyalty of Bank Sepah using multi-criteria decision-making techniques". Researcher has shown how multi-criteria decision-making techniques can by effecting on elements such as public relations, increase customer loyalty to banks	2007	Ali Nazarli
In his MSc thesis studied on the subject of "Factors influencing the selection and customer loyalty in banking". in the end, public relations in various aspects in Iran will be investigated	2006	Amir Hossein Fahimi
in MSc thesis entitled " studying the Effect of links to key customer loyalty Melat bank in Tehran," examined one of the most important elements of public relations, the audience.	2006	Monire Ghafoori
In a research in Shahid Beheshti University in Tehran started "to identify and rank the most important factors affecting customer loyalty in Maskan bank using multi-criteria decision-making". Based on this study, managers should ensure that attention is a trademark of the Services.	2006	Mohammad Javad Kardgar
In his thesis studied "evaluation of the impact of television advertising about the Agricultural Bank deposits in Gharzolhasane Pasandaz savings accounts ". In this study, he examined the role of one of the most important trade promotion, it means the advertising in attracting and retaining customers In this study evaluation of the impact of television advertising about the Agricultural Bank has done to attract customer to deposits in Gharzolhasane Pasandaz savings accounts That in relation to that four questions as the research question of the proposed project has been presented by the Agriculture Bank.	2004	Saman Khaje zadeh
In research studied "Factors influencing preserving and strengthening customer loyalty". In this study different dimensions of loyalty from the perspective of relationship management with customer and marketing relationship were discussed.	2003	Mohsen Varzeshkar
In his thesis studied "Evaluation and selection proper promotion mix for marketing research companies (based on group decision-making method AHP)". With opinion of the experts and those involved in marketing research and analysis of responses using group decision AHP, the best way to promote to achieve the success of marketing research is direct sales and The best way to raise awareness about the company and its services to potential buyers was identified to be advertising in specialized journals.	2000	Mohammad Reza Haghparast
Tried to check a variety of marketing channels that effects on the activities of marketing and distributing marketing mix optimization when different distribution channels are used for wholesalers travel agents. The study inspected twelve large-scale travel agency in Taiwan and proposed seven direct and indirect distribution channels to create marketing mix and	2009	Huang et al.

identify the optimal distribution of different forms, including distribution.		
The differences and similarities in marketing mix examined two banks services. It also focuses on supporting the activities of the marketing mix and marketing services company in terms of their marketing activities to support the services and obtain the consent of the consumer	2008	Van Dyjl
To answer this question, extensive field studies conducted in the United States banks and found that all organizations surveyed have realized the necessity of paying attention to customer loyalty and by using business promotion mix elements in particular using advertising and the Public Relations try to attract and keep customers. In this viewThe researchers from other banks cannot simply attract customers by giving more interest .	2007	Dick and Basu
They presented results of the survey of employees and customers of private banks in the United States in order to determine the effects of advertising, customer loyalty to banks. The results showed that proper budgeting In promotion mixed according to the wishes of the customer and how market research can be based on customer loyalty to increase several times	2007	Jose Blumer
He presented The results of the three years in recognition of the relationship between customer loyalty and advertising service company as "customer loyalty and promotion strategies In service organizations". According to him, loyalty, is a bilateral and based on cooperation. But when it comes to customer loyalty other traditional definition is not valid. Customer loyalty theory in international management literature is relatively new.	2007	Richard Oliver

Table 2. One-sample t-test

variables	t	Freedom degree	Significance number	state
Advertising	9/875	152	0/026	suitable
Direct sale	3/115	152	0/004	suitable
Public relation	6/047	152	0/001	suitable

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RESEARCH ARTICLE

Evaluating the Effects of Mehran Border Market on Economic, Cultural and Security Components of Sustainable Development

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ABSTRACT

Border areas are considered sensitive and strategic points. border areas can play an essential role in Economic progress and development of the economic, development of border areas, improving people's living standards, poverty reduction, proper income distribution, reduce smuggling, Increase security, trade, create friendship relationships and more familiarity and accelerating more cooperation between border areas. Mehran border market is one of the most important border markets of the country. The aim of this study was to investigate the effect of market Mehran border market on economic, cultural and security components of sustainable development that a descriptive – survey method and questionnaires were used. Research statistical population consisted of all individuals, including businessmen, workers and pilgrims that have used the Mehran border market. To analyze the assumptions Spss used. All the hypotheses were confirmed after analyzing. The results showed a positive and significant impact of Mehran border market on sustainable development of the country.

Key words: border market development, sustainable development, Mehran

INTRODUCTION

One of the best modes of communication between neighboring countries is cross-border transactions as well as providing cost of living for the people residing in border regions so that residents on both sides of the border areas

together use the opportunities and common resources. One of these programs, is dynamic the economy of border areas that is a key indicator of relations between neighboring countries and to improve the livelihoods of the people residing in border regions Meaning that the people living in border areas of neighboring countries can together use the opportunities and common resources This could lead to friendship and understanding, by both parties, the security and prosperity and development and creation of job opportunities and the development of a relative advantage in the border regions (Chandoevwit, 2004: 145). Development of border markets is as one of the advantages and capabilities of marginal provinces and is one of the most important tools to promote exports and economic activities with neighboring and target countries. Development and increase Mehran border market is important since in addition to prosperity of the national economy and exchange technology it can create sustainable employment, growth in exports of goods, solve the problem of youth unemployment and to run the wheels of the industrial and manufacturing, the well-being and economic development. Some trade and export of Mehran border activists believe that the development of market Mehran border due to the unique conditions prevailing on both sides of the Iran-Iraq border in the province can create great revolutionary in The development of the business and weak economy of Ilam, And to establish these markets has technical and economic feasibility, and in case of a growing number of markets we can exporte more goods to Iraq. On the other hand the development of Ilam border markets as an efficient tool can be effective in the near and further expansion of economic ties, cultural and even political Islamic Republic of Iran and Iraq (http://sahebnews.ir). Today we consider the concept of development, as the overall process (not only economic development) which is to improve all aspects of living in a society (that is required as necessary). Therefore these changes are for the man; Development is not a goal, but is a tool to bring human to worthy position according to a place where he lives (Firouznia and Eftekhari, 2003: 141). Development needs a powerful planning and should be done in appropriate to the circumstances of each country, to be realized. Todaro believes that development should be known as a multidimensional process involving major changes in social structures and national institutions as well as to accelerate economic growth, reduce inequalities and the eradication of poverty. Development Originally, must show that the social system in accordance with the diverse needs and individuals and social groups has gone out of undesirable last life And is moving toward conditions which are better in terms of moral and material (Todaro, 1999).

Theoretical Foundations and literature

Development

Development is the transition from a state to another, and means, changes, evolution and development (Roknodin Eftekhari, 2003: 141). Thus knowledge and understanding of the needs and requirements of human societies in material and spiritual dimensions is considered of the basic steps on the path of development (figueroa, 2006: 5).

Sustainable development

Sustainable development is development that provides the world needs today without risking the ability of future generations to meet their own needs. Some have been imagined three pillars of sustainable development: Environmental sustainability, ecological, economic sustainability and social sustainability (shriberg, 2002). The effectiveness of the system is by applying three dimensions of sustainability (ecological, economic and social). Sustainable development is a process that integrates the goals of economic, social and environmental community, wherever possible, through state policies, doing necessary action and support operations And whenever the combination is not possible, establish trade relationship between them and evaluate and coordinate the exchange (Zahedi, 2007: 106).

The border markets

Border Markets are areas in zero-point border that do Customs registering in authorized customs or are places that are determined by agreements concluded between the Islamic Republic of Iran and neighboring countries and people on both sides of the border can present their own production according to the import and export regulations to trade in these markets. Customs establishment at the door of for entry and exit Markets to apply export and import regulation and monitoring compliance with market to apply the import and export regulation and monitoring compliance with the Markets is essential and it is the responsibility of Customs. Entry and clearance of goods at the border markets merely is possible by providing sales invoice that are confirmed by the governor and Trade Representative in the Markets and border booth of another country And there is no need to provide other documents such as bill of lading. All authorized goods can be traded at the border markets. The entry of any goods through the border markets is due to export goods before importing and registering goods statistically in the Department of Commerce (the website of the Ministry of Mines and Trade, 2013).

Goals for establishing Border Market
Regional goals

1.Reducing obvious and hidden unemployment crisis through healthy job creation in exchange of goods;
2.Consolidation will of the government supervision during the movement of goods within the framework of government policies and strategies;
3.Organizing the Common informal exchanges to regulate and reduce the mood to deal with illegalities and create appropriate and legal conditions for those who provide their livelihood from it;
4.Promoting economic, social and cultural levels of borders by providing legitimate income and provide the daily needs of the residents from border exchanges.

National goals

1.Create a calm environment through active participation in the process of foreign trade in sensitive parts of Country;
2. Reduction in Stress and economic- social crisis and reduce government security costs in these areas;
3. The transfer part of the operation and administration of government in supplying commodity to the residents of border areas to the mechanism of action in market and determining role for border regions in the national division of labor. As well as reduce the cost of distribution, transportation and storage that will be possible in this way;
5. Create emotional relationships between frontiersmen and confided them to perform their border duties honestly (Ismail-Zadeh, 2006: 46).

Potential and capabilities of Mehran border Markets.

Although the common border between Ilam and Iraq, during the war, was considered a major threat to the region, so that border town of Mehran was counted as front line of war. But with the end of the war, the border not only is not a threat but also has become an opportunity for efficient use, especially exports to neighboring countries. The Iraqi border that has long been the source of the threat, conspiracy and destruction for Iran's Ilam province and is reportedly one of the main causes of capital flight and lack of industrial investment in the private sector and even government section However the new situation created conditions turning the threat too opportunities for Ilam and Iran. As with the collapse of the Baath regime in Iraq, new opportunities for prosperity and economic development of Ilam is marked resulting from traffic of pilgrims and export of Iranian goods to Iraq and Today has become, the center of gravity of Iranian pilgrims entering Iraq to visit religious sites.

The effects of Border markets creation on the economy of regional

One of the main objectives of the establishment of the border markets is helping the economy of the border region. Since the border has a double disadvantage compared to other parts of the country, the establishment of the border markets can be helpful in this regard, And save a lot of economic hardship. As it can be said Border markets are objective manifestation of the people in economic matters (kasraie, 2010: 21). In fact, Border markets are part of foreign trade, which is intended to exchange of the frontier folk and as one of the important levers to create jobs and develop trade relations with neighboring countries in the past year continuously have a significant impact on economic activity of country. Although their function is associated with failure, but the markets in order to achieve economic goals such as the development of non-oil trade took effective steps and created jobs opportunity. The main purpose of the establishment of Border markets is, the rise and development of non-oil exports and activating the commercial potential commodities (Falahati and others, 2010: 81).

Research questions and hypotheses
Research questions

1. Do Mehran Border markets have a positive impact on reducing poverty and deprivation?
2. Do Mehran Border markets have a positive impact on increasing the purchasing power of luxury goods?
3. Do Mehran Border markets have a positive impact on reducing smuggling?
4. Do Mehran Border markets have a positive impact on stability and security in the area of trade?

The hypothesis of this study

1. It seems that the Mehran Border markets had positive effects on the reduction of poverty and deprivation;
2. It seems that Mehran Border market has positive impact on increasing the purchasing power of luxury goods;
3. Mehran Border market seems to have a positive impact on reducing smuggling.
4. It seems Mehran Border market seems to have a positive impact on stability and security in the area of trade.

The current research by methods employed is trying to approve or reject hypotheses in the research. This conceptual model is in Figure 1.

MATERIALS AND METHODS

This study in terms of purpose is practical and in terms of method is descriptive- survey. In terms of time is cross sectional and in terms of location is limited to the city of Ilam in Mehran province. To gather the information needed for literature and research background, Books, professional articles and magazines and to collect the required data, field research by questionnaire method is used. In the first part of the questionnaire, questions, such as age, sex, education, income has been raised. In the second part of the questionnaire contains 20 questions and 5-choice Likert spectrum, have been used to measure the variables. To answer the questions likert spectrum is used that rating from 1, which represents minimum to 5, which represents the maximum acceptability of any indicator. questions 1-7 is related to the first hypothesis, questions 8-14 to the second hypothesis and questions 15-20 to the third theory research. Statistical populations in this study are all people that have used The Mehran Border market at least once in order to trade, labor, transport to Iraq or any other. According to Morgan and based on unlimited population, sample consisted of 428 individuals that by using of descriptive and inferential statistics investigated the research hypotheses. To determine the validity of the content, the questionnaires were provided to professional academics to apply their opinions transparently about questions being right that eventually validity and content validity of the questionnaire was confirmed. For reliability of the questionnaire using Cronbach's alpha was calculated by spss software version 16 Amount of 82/0 was found that shows the high reliability and validity of the questionnaire.

Data analysis

Data collected from media by means of the above mentioned tool such as questionnaires, interviews and documentation review after coding will be studied and described By SPSS version 16. Then, in addition to their classification, descriptive statistics were calculated and will be analyzed using t-test. Also to studying all the questions, the significance level ($5/0 = \alpha$) is considered

.

FINDINGS

Descriptive statistics

Analysis of data related to gender: Results in Table 1 shows that according to gender 85% are men and 15% are women.

The results in Table 2 show that the 54 percent are below deploma, 21% have diploma and 17 percent are master and 8% have higher education.

The results of Table 3 shows that according to age groups 15% of the population are less than 25 years, 38% are between 25 to 35 years, 34% between 36 to 45 years, 10% between 46 to 55 years and 3% are more than 56 years.

Inferentialstatistics

Normalization

Kolmogorov-Smirnov test is a simple non-parametric test to determine fit experimental data with chosen statistical distribution. in bilateral KS test that was conducted On data mean from a questionnaire related to each of the factors, assumptions of normality of the distribution of means(as the null hypothesis)is against mismatch distribution means with normal distribution (as Suppose the contrary hypothesis). Summary of results obtained using spss statistical computing software are in the following table:

Given that one of the assumptions of Kolmogorov-Smirnov test is normal assumption. All significance levels are greater than 05/0 and this indicates that normality of data assumption is not rejected and to evaluate the data parametric tests can be used.

Test assumptions

First hypothesis: It seems that the Mehran Border markets had positive effects on the reduction of poverty and deprivation; in order to study the effect due to the moderate (4) the univariable t test was used.

The statistical findings in table (5) indicate that observed univariable t (13.08) with significant level of 10/0 p = 0/002 <is significant. As a result, the research hypothesis is confirmed. Mehran Border market has positive impact on reducing poverty and deprivation;

Second hypothesis: Mehran Border market has positive effects on increasing the power of purchasing luxury goods; in order to study the effect due to the moderate (4) the univariable t test was used.

The statistical findings in tables (6) indicates that observed univariable t (11.43) with a significant level 10/0 p = 0/012 <is significant. As a result, the research hypothesis is confirmed. Mehran Border market has positive impact on increasing the power of purchasing luxury goods;

Third hypothesis :Mehran Border market seems to have a positive impact on reducing smuggling. In order to study the effect due to the moderate (4) the univariable t test was used.

The statistical findings in tables (7) show that observed univariable t (0.279) with a significant level. 10/0 p = 0/005 <is significant. As a result research hypothesis is not rejected and Mehran Border markets have a positive impact on reducing smuggling.

Third hypothesis: Mehran Border market seems to have a positive impact on stability and security trade. In order to study the effect due to the moderate (4) the univariable t test was used.

The statistical findings in tables (8) indicate that observed variable t (6.27) with a significant level of 10/0 p = 0/0033 <is significant. As a result of research hypothesis is not rejected the Mehran Border markets have a positive impact on stability and security trade.

CONCLUSION

Customs revenues, in markets can be considered as a source of income for the government, these markets by providing areas of exchange and foreign can help growth and development of economic in the country. This study consists of three hypotheses as follows:

1. It seems that the Mehran Border markets had positive effects on the reduction of poverty and deprivation;
2. It seems that Mehran Border market has positive impact on increasing the purchasing power of luxury goods;
3. Mehran Border market seems to have a positive impact on reducing smuggling.
4. It seems Mehran Border market seems to have a positive impact on stability and security in the area of trade.

After analysis the following results were obtained

The results of the first hypothesis analysis

The statistical findings) indicate that observed univariable t (13.08) with significant level of 10/0 p = 0/002 < is significant. As a result, the research hypothesis is confirmed. Mehran Border market has positive impact on reducing poverty and deprivation;

The results of the second hypothesis analysis

The statistical findings indicates that observed univariable t (11.43) with a significant level 10/0 p = 0/012 <is significant. As a result, the research hypothesis is confirmed. Mehran Border market has positive impact on increasing the power of purchasing luxury goods;

The results of the third hypothesis analysis

The statistical findings show that observed univariable t (0.279) with a significant level.10/0 p = 0/005 <is significant. As a result research hypothesis is not rejected and Mehran Border markets have a positive impact on reducing smuggling.

REFERENCES

1. Ismail-Zadeh, Khaled (1385). Study of trans-boundary Marketplace anthropological with approach to economic anthropology, Anthropology Newsletter, No. 9, p. 46.

2. Todaro, Michael: economic development in the Third World, translated by Ali erudite, Institute for Research in Planning and Development, ninth edition, 1378.

3. Falahati, Ali, Nazifi, Minou and Abbaspoor, Sahar (1389). Review and prediction border export markets using neural network techniques during the period 1385-1375, Proceedings of the National Conference of terminals and border markets, opportunities and challenges, Ilam University.
4. Kasraie, Zeinab (1389). Markets and border terminals, the prospect of the fifth development plan of economic, social and cultural, Proceedings of the National Conference of terminals and border markets, opportunities and challenges, Ilam University.
5. Customsof Islamic Republic of Iran, the website of the Ministry of Mines and trade Islamic Republic of Iran, in 1392.
6. Shriberg,M,(2002),Sastainability in a.s higher Eduction:Organizational factors influencing compus Enuiyon montal performance and leadership.Dissertation the university of Mechigan.
7. figueroa.adolfo.2006.department of economicscatholic ,university of peru ,lima.

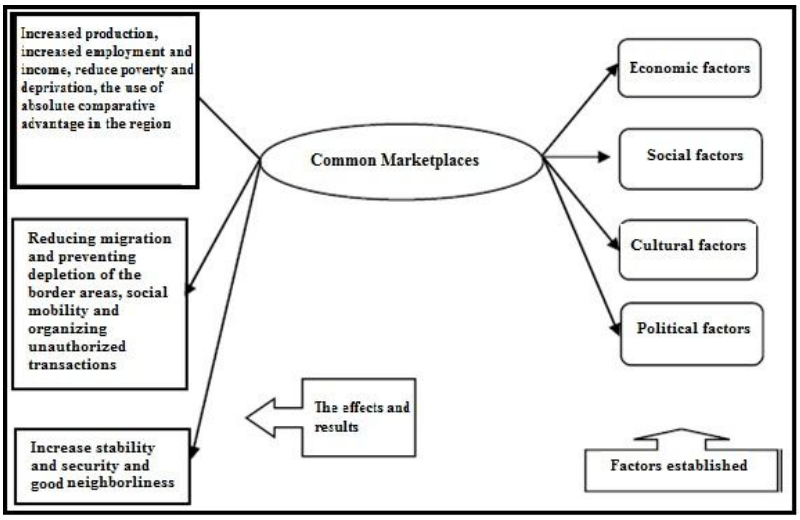

Figure 1.conceptual model Source: Pir boodaghi, 2000

Table 1. gender Individuals

Gender / index	Frequency	Percent
men	346	85
woman	82	15
total	428	100

Table 2. Education of People

Education / index	Frequency	Percent
Below diploma	217	54
diploma	101	21
master	77	17
Higher than master	43	8
total	428	100

Table 3. Age Individuals

Age / index	Frequency	Percent
Less than 25	68	15
25 to 35	156	38
36 to 45	140	34
46 to 55	45	10
More than 56	19	3
total	428	100

Table 4. Kolmogorov-Smirnov test results table

Variables	Kolmogorov-Smirnov Z	Sig	Normality Situation	The type of test used
Reducing poverty and exclusion	1/258	0/065	normal*	Parametric
Increasing the power of purchasing luxury goods	1/223	0/069	normal*	Parametric
Reduce smuggling	1/189	0/161	normal*	Parametric
Increase stability and trade security,	1/321	0/08	normal*	Parametric

Table 5. Univariate t test results

Indices / variable	Mean	Number	Test Value= 4		
			Univariate t	Freedom degree	Significance level
Reducing poverty and exclusion	4.93	428	13.08	289	0/002**

Table 6. Univariable t test results

Indices / variable	Mean	Number	Test Value= 4		
			Univariate t	Freedom degree	Significance level
increasing the power of purchasing luxury goods	4.93	428	11.43	345	0/012**

Table 7. Univariable t test results

Indices / variable	Mean	Number	Test Value= 4		
			Univariate t	Freedom degree	Significance level
Reducing smuggling.	4.93	428	9.27	392	0/005**

Table 8. Univariable t test results

Test Value= 4			Number	Mean	Indices / variable
Significance	Freedom degree	Univariat t			
0/0033**	408	6.27	428	4.93	Increase stability and security, trade

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RESEARCH ARTICLE

Evaluating the Impact of Marketing Training on Staff Sales Empowerment Case Study of Khuzestan Sales and Marketing Staff in Gas Company

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ABSTRACT

In today's competitive environment, empowerment is one of the tools to help managers to promoting the organization and development of markets. Empowerment can be enhancing the resources and human forces for effectiveness and efficiency of the organization's activities. In recent years, there has been a high focus on market development in the field of human resources that has left a significant impact on the productivity of human resources. And we can note some cases such as marketing in the field of human resource training, human resources outsourcing, supply of skilled human resources, set priorities of the Human Resources Development, Accordingly present study has been done with aim to evaluate the impact of marketing training on Empowerment of sale staff services (Case Study of Khuzestan sales and marketing staff in Gas Company). Method is descriptive -survey and tools for data collection is questionnaire and sample size is 78 personnel of the specialized company's marketing and sales of the country's airports. The results of the research findings indicate that there is a significant relationship at level of 0.05 percent between training marketing, and empowerments of sales staff.

Key words: training marketing, empowerment, sales, and marketing.

INTRODUCTION

In recent years, there has been a high focus on market development in the field of human resources that has left a significant impact on the productivity of human resources. And we can note some cases such as marketing in the field of human resource training, human resources outsourcing, supply of skilled human resources, set priorities of

the Human Resources Development. In this regard, companies and organizations that have competitive products at the international level by understanding the importance of human resources in organization seeks to increase the knowledge and productivity of its staff And because it wants to increase its competitive strength (Behboodi, 49: ¬2012). By understanding importance and impact on the productivity of human resources, many companies have been established to provide develop the productivity of human resources services to their customers. Success in achieving full productivity was due to the use of appropriate methods of advertising and human resources marketing services was a strategy that has recently been considered. Adopting Successful marketing method, especially marketing to these companies was part of the requirements of business success And using marketing items related to activities, as well as purposeful marketing (customers), and face-to-face marketing in contact with managers and agencies In recent years, could pave the way for increased participation of some companies in line with the main company in increasing human resources productivity (Rezaeian, 198: ¬2007). Labor productivity is the ratio of certain goods or services output or the value of monetary to input work or the work that is adopted to produce those products. In this regard, this study by identifying the components of marketing services to increase the productivity of human resources and empowering employees, and their comprehensive review , plans, With importance grading of these components in the country, act with presenting a key strategy to identify service in creating manpower productivity. Gas Company from its inception has been established with the aim of providing services to people with different sections ranging from operational and service. With increasing competition in the field of energy (gas) and in connection with the issue of privatization of state-owned enterprises in the country, including the country's gas company, one of the issues and threats faced, is creating a competitive environment for the development of sailing service market to the customer. Gas Company of Khuzestan province, which includes marketing and sales personnel, In order to overcome the problems related to the new services development and introducing them to increase profitability, has provide solutions to increase their market share and customer satisfaction. One of the important issues that the management of the organization, should pay attention and consider as in line with the noble objectives of its marketing and sales organization, is The issue of increasing empowerment of employees by providing training-effective services and innovative marketing. This has caused the present study to be done in order to evaluate the impact of training on empowerment of service sales staff, case study of sale staff and marketing og Khuzestan Gas Company. In strategic marketing services, one of the key priorities in order to increase the effectiveness and efficiency of marketing programs, is personnel training related to work and consistent with the marketing and sales activities. Sales and marketing staff training of Khuzestan Gas Company can promote their customer service quality and quantity of subsequent profitability. Necessary measures to assess Sales and airport marketing performance and quality of service, is one of the major problems in supplying gas. In this regard, Fernandes and Pacheco in 2002 emphasized on the inadequacy of information in some countries that have limited local parameters and noted the necessity of using other parameters in other private companies. Service and marketing services to passengers is a product that the quality of it depends on the inner attitude aspects of different activities associated with this type of service And includes all activities that are carried out from time of passengers arrival until the time of exist. Turning to methods to increase the ability of personnel sail services at airports, requires an optimal surface Induction of scientific training and expertise based on conditions at the airport in order to increase the level of sales.

Theoretical Foundations of Research

The importance and need for performing research

The term education and training market, although seems familiar in the context of management and marketing management concept, Most managers and executives programs are familiar with the meaning and nature of it. Different interpretations of organization management from the concept of teaching and marketing training can leave positive or negative influence on their attitude toward increasing the capacity and capabilities in their employees and how to work. Research has shown that successful employees in the sales of services in organization were those

employees who have first become familiar with the principles of knowing market and the professional market and then by understanding how to interact with customers, they have been able to have training on marketing in company to promote their services. In other words, the ability of this group of employees is due to previous training that has been supplied to them in a programmed way. Today, the success of organizations and increase organizational efficiency is due to basic principles of management principles based on the understanding of market needs and customers and the management efforts is based on cohesion programs of organization and rectify aims to create standard implementation basic infrastructure, particularly in the field of marketing. Resorting managers to marketing programs and personnel training related to organization customer is always involved in presenting current and planned service in organization With the correct marketing principles and consistent with the activities of the organization, was important to improve their ability to perform their job properly And these employees will not feel lack of knowledge and scientific knowledge in the field of marketing and business development.

The productivity of human resources

Productivity is a concept that is used for showing the output of one person, unit and organization. The more productivity of an organization the less unit labor costs will be. In today's competitive world, if we want to increase the productivity of our work in organization we should have more production with less manpower, less money, less time, less space and generally With fewer resources. Productivity of an organization, more than any other factor depends on knowledge, skills, abilities, attitudes and behavior of its staff. There is positive correlation between productivity and quality of work, and to better understand the concept of productivity is necessary to get familiar with the definition of the quality of work. Quality is including aspects of goods and services that meet the needs of consumers and providing income. The important point is that the quality of a product is at the highest and the price is at the lowest level (Saatchi, 1999, 29).

Market research

Marketing research (Marketing Research), is one of the important parts of the business information system with a marketing view. By Using Marketing research we can communicate with consumers, producers, buyers, marketing managers and in general with public and through this exchange information. Marketing research is one of the major components of marketing science that its duties are as follows: Determine, collect, analyze and provide systematic and objective information to improve decisions associated with the identification of opportunities and solve marketing problems. Philip Kotler as one of the main theorists of knowledge defined it as follows: Marketing research is defined as the relating factor between consumers, customers and the community through marketer to information (manufacturer). In fact, market research tries to identify collect and analysis information comes from those who provide better opportunities for the supply of goods or services Or with problems and threats facing explains the marketing of certain goods or services and offers ways out of problems (Philip Kotler: 2004).

Organizational communication

Organizational communication can be studied by cultural attitudes. In this approach, internal and external environment of organization with strong cultural or privileged and composed of elements such as values, heroes, rituals and cultural network is considered. In cultural attitudes to the organization, attention to relationships with clients to organizational bureaucracy structure has more valuable. Image and time identity is important in this approach (¬Mahdavi 2010 p 55).

Organizational atmosphere: Organizational atmosphere is a set of features that describes an organization and distinguish it from other organizations, is almost stable over time and affect the behavior of individuals within the organization (forehand, Gylmr 1964). Organizational atmosphere can be simply stated: "organizational atmosphere

understands of staff from the environment in which they work (Baker, -1992). With this vision we could know Organizational atmosphere as the result of manager leadership. For example, research suggests organizational atmosphere has a direct relationship with the director's ability to motivate staff with meeting the psychological needs, like success demanding, power and so on. On the other hand, Hay Group forty-year research shows that organizational atmosphere has great influence on employee behavior and organizational performance. These studies suggest that transcendental atmosphere of organization on the one hand reduces costs of staff relocation and their resistance to change and On the other hand improve the quality of products, innovation and risk-taking that the end results of these effects is increase profitability and customer loyalty.

Targeted marketing

This type of marketing requires an understanding of the needs of individual customers and satisfying them in the highest degree of satisfaction. If the firm's product range and the price of products is the same as price of rivals, relationship marketing can be considered one of the main principles of difference. Traditional grocery is one of the best examples of relationship marketing in our country. Many service companies such as post even knows what kind of service and when he loves, what is his favorite communication channels, or what type of immediate system does he need (Cutler, 2004).

Training Marketing

Marketing Training is series that attempts to predict, identify and conduct staff training needs and design programs to meet these needs and to encourage individuals and organizations to accept training. . "Marketing Training" is trying to appropriately understand educate audience and potential customers and create and strengthen their interest to believe in education and training (Alvany, 2006, S47).

Empirical research background

In the field of Training marketing no research has been conducted in the country Therefore, most of research investigated the role of education in enabling and empowering employees that here we mention some of them: According to Fox (1998) Empowerment employees is a process through which a culture of empowerment develops Where the ideals, goals, decisions border and results of effects of their efforts is shared throughout the organization. In such cultural resources and competition for resources needed are supported and provided to effectiveness of their activities support to (Rajaeepour et al., 2005). Blanchard et al. (1999), Empowerment one of the most promising concepts in the business world, which is less important, but now it has become a matter of days despite much discussion about the benefits of Empowerment, although its exploitation is a little and enables Empowerment managers to use knowledge, skills and experience of all employees Unfortunately, the number of directors and groups who know how to create a culture of Empowerment is little (Talebian and desertion, 2009¬). Monavvarian and Niazi (2005) examined the factors affecting the empowerment of planning and management. The findings suggest that empowerment, creates potential capacity to exploit source of human capital capabilities. The leadership of the organization could use this tool to improve employee productivity and organizational excellence (Niazi and Monavvarian, 2005). Ghanbari (2005) conducted a research entitled factors affecting the empowerment of human resources in water utilization and distribution of Golestan province. The findings suggest that there is relation between the level factor of in-service training for employees, empowering employees, job enrichment, intrinsic and individual motivation and amount of applying participative management of staff and the amount of ability (¬Qanbry, 2007¬) . Mohammadi (2001) in a research called assessing the Empowerment of Birjand University staff , has stated that Job enrichment, delegation of authority, performance-based bonuses, participatory management, and formation of working teams are considered as main ways of empowerment (Mohammadi, 2001). Bakhtiari Ahmadi Moghaddam (2010) in their review studied the management strategies of manager's empowerment. The results

showed that among management, resources provision factor had the most impact and structure factor have the lowest impact on the empowerment of managers (Bakhtiari and Ahmadi Moghaddam, 2010, p. 45). Vaio and shert (1996) in A study found the correlate between psychological empowerment of teacher and jobs commitment. Aspertizer and Vebian (1995) with studying the Empowerment of staff concluded that employees Confidence , access to information about the mission of the organization, employees performance and the creative and innovative behavior has a positive and significant correlation with psychological empowerment. And have suggested that there is a relation between the components of psychological empowerment and professional growth (Karroubi and methane, 1388, p. 18). Ebrahim-Zadeh et al (2010) found that the factors affecting the performance of human resources in Payam Noor University staff of Golestan province are as follows: individual Motivation with an average of 69.4 had greatest effect on performance. In the next stage, job enrichment with average of 69.1, delegation of authority with average of 68.9, job training, with an average of 64.4, participative management with average of 54.5 and employment approach with an average of 48.3 had the least effect on performance (Ebrahim-Zadeh et al., 2010).

In our country a number of studies about the employees Empowerment has formed that are as followed:
Mohammad Mohammadi (¬2001¬) to evaluate ways to employees Empowerment in Birjand University
Mojtaba Eskandari (2002) designing and explain Empowerment of managers model (managers of Hajj caravans Islamic Republic of Iran).Mohammad Sadeq Hassan Zadeh (2004) studing the effect of organizational culture on empowerment in one of the firms active in car.Sudabeh Taheri Tarigh(2004) examine the role of staff empowerment on performance of Refah bank inTehran.Amir Hossein Mazia Abadi. (2004) Effect of IT on staff business empowerment (Social Security Organization of Qom)Majid Farahani Harabadi (2005) examine the relationship between organizational structure and employee empowerment.Haniyeh Mohammad Zadeh Taheri (2005) studying the Factors affecting employee empowerment (social security).Remarkable Point about employee empowerment is lack of adequate resources and the lack of reliable pattern in performing empowerment programs within organizations. The lack of research in this area has caused managers to avoid this.

Research objectives and hypotheses
Overall goals

The main purpose of this study is to evaluate the effect of training on empowering of marketing services employees (Case of sales and marketing staff of Khuzestan in Gas Company)

Partial goals

1 examine the relationship between training marketing and a sense of significant in jobs
2 examine the relationship between training marketing and a sense of competence in the job
3 examine the relationship between training marketing and a sense of choice in the job
4 examine the relationship between training marketing and a sense of being effective in the job
5 examine the relationship between training marketing and a sense of partnership with others in the job

Hypotheses

In this study the proposed assumptions in terms of appropriateness are as follows:
1 there is a correlation between training marketing and sense of significant in the job.
2 there is a correlation between training marketing and a sense of competence in the job.
3 there is a correlation between training marketing and a sense of choice in the job
4. There is a correlation between training marketing and sense of being effective in the job
5. There is a correlation between training marketing and a sense of partnership with others in the job.

MATERIALS AND METHODS

Present research is applicable. In terms of method is descriptive and survey. To measure the variables, data were collected through questionnaires and were then coded , scored and were analyzed using spss software. By calculating the Descriptive characteristics of variables and extraction of tables and charts, the distribution of variable traits were studied and hypotheses were tested. Statistical population in this research is all sales and marketing staff of mother specialized company of the country's airports That their number was 102, of which 78 were selected as the sample size. In this study sampling method is simple random. After performing a preliminary study based on a sample size of Morgan, where the sample size determined according to considering all factor (accuracy and reliability) (Danaee Fard, Alvani and Azar, 1383, 434) is used that by Using this table, 78 people were selected as sample. To gather the information needed in the research, field methods have been used with referring to staff of political ideology (Aja). In this study was to assess the validity of the former and the Delphi method is used. To ensure that the validity of the questionnaire survey is high, the initial questionnaires have given to professors and advisors after limited distribution in the sample and removal of defects and making any necessary modifications and approval of supervisor, the final questionnaire was prepared. Cronbach's alpha was used for reliability of questionnaire as well as the Cronbach Alpha of component and dimension of training marketing was / 92. Cronbach's alpha scores of employees empowerments was obtained 93 /.

DISCUSSION

Descriptive Statistics
Part I: Description of Information

The table above shows the distribution of respondents frequency by gender that based on results obtained, 60.3% of respondents were men and 38.1 percent of respondents were women.

The table above shows the distribution of respondents according to education based on results obtained, 27% of respondents have diploma and Associate Degree and 38.1 percent of respondents are Undergraduate and 28.6 percent have master's degree or higher.

According to the chart and table it is observed that marketing education variable had the lowest amount of 3, and the highest amount of 6.54, 5.3423 mean, 0.82487 of standard deviation and 0.680 of variance.

According to the graph and the table above it can be seen that the minimum amount of variable competence is 3.75, with maximum of 6.75, mean of 5.8116, 0.7130 of standard deviation and variance of 0.508.

According to the graph and the table above it can be seen that selection variable has a minimum of 1, maximum of 5, mean of 3.4516, 0.82548 of standard deviation and variance of 0.649.

According to the graph and the table above it can be seen that the effectiveness component had minimum amount of score of 1, maximum of 4.67, 3.7527 of mean, standard deviation of 0.75852 and variance of 0.5775.

According to the graph and the table above it can be seen that the participation component had minimum amount of 1.33, maximum of 4.83 the mean of 3.4167, 0.73101 of variance, standard deviation of 0.534.

Data Analysis

First hypothesis: There is a significant relationship between training marketing and sense of significant in job.

H 0: there is a significant relationship between training marketing and sense of significant in job.
H 1: there is a significant relationship between training marketing and sense of significant in job.

According table is observed that the amount of 05/0 <100/0 Sig = therefore with a 95% confidence assumption H_0 is rejected and assumption H_1 is confirmed and this impact is significance. Also Based on this table it is said that correlation intensity between marketing education and sense of significant in job is 244/0.

Due to the significant level which less than 05/0 sense of significant has significant impact on training marketing at level of 95%, and the intensity of the effect is equal to 244%. To determine the effect According to beta coefficient it is observed that the effect is direct and positive.

The second hypothesis: There is a significance relationship between training marketing and sense of competence in the job.

H 0: is a significance relationship between training marketing and sense of competence in the job.

H 1: There is a significance relationship between training marketing and sense of competence in the job.

According table is observed that the amount of 05/0 < 02/0 Sig = therefore with a 95% confidence assumption H_0 is rejected and assumption H_1 is confirmed and this impact is significance. Based on this table, we can say that the intensity of the correlation between training marketing and a sense of competence in the job is 569/0.

Due to the significant level that is less than 05/0 sense of feeling competence in job , at 95% has effects on the training marketing and severity of the impact is equal to 569% To determine the effect According to beta coefficient it is observed that the effect is direct and positive In addition, the coefficient of determination is of 309/0 that independent variable can predict 9.30 percent of the variability.

Third hypothesis: There is a significant relationship between the training marketing and a sense of choice in job.

H 0: there is a significant relationship between the training marketing and a sense of choice in job.
H 1: there is a significant relationship between the training marketing and a sense of choice in job.

According table is observed that the amount of 05/0 < 003/0 Sig = therefore with a 95% confidence assumption H_0 is rejected and assumption H_1 is confirmed and this impact is significant. Based on this table, we can say that the intensity of the correlation between the training marketing and a sense of choice in job is 389/0.

Due to the significant level that is less than 05/0 a sense of choice in job at 95% has effects on the training marketing and severity of the impact is equal to 389% To determine the effect According to beta coefficient it is observed that the effect is direct and positive. In addition, the coefficient of determination is of 0/189 that independent variable can predict 18/9 percent of dependent variable.

The fourth hypothesis: There is a significant relationship between training marketing and sense of effectiveness in job .

H 0: There is a significant relationship between training marketing and sense of effectiveness in job .

H 1: There is a significant relationship between training marketing and sense of effectiveness in job.

According table is observed that the amount of 05/0 < 000/0 Sig =therefore with a 95% confidence assumption H0 is rejected and assumption H_1 is confirmed and this impact is significant. Based on this table, we can say that the intensity of the correlation between the training marketing and a sense of effectiveness in job is 0/468.

Due to the significant level that is less than 05/0 a sense of choice in job at 95% has effects on the training marketing and severity of the impact is equal to %468 To determine the effect According to beta coefficient it is observed that the effect is direct and positive. In addition, the coefficient of determination is of 0/219 that independent variable can predict 21/9 percent of dependent variable.

Fifth hypothesis: There is significant relationship between the training marketing and a sense of partnership with others in the job.

H 0 :There is significant relationship between the training marketing and a sense of partnership with others in the job

H 1 :There is significant relationship between the training marketing and a sense of partnership with others in the job

Due to the significant level that is less than 05/0 a sense of choice in job at 95% has effects on the training marketing and severity of the impact is equal to %411 To determine the effect According to beta coefficient it is observed that the effect is direct and positive. In addition, the coefficient of determination is of 0/361that independent variable can predict 36/1percent of dependent variable.

CONCLUSION

The findings suggest that training marketing has a significant role in increasing employee empowerment , This means that enhance their ability in different aspects, sense of significance in job , sense of competence in the job, sense of selection in job, the sense of effectiveness in the job and sense of partnerships with others in the job. Given that each of the employees, experts or managers can be as a marketer Therefore use of specialists and experienced, in-service training and professional work forces holding seminars and meetings between managers and employees, experts, using a system of motivation and competition between experts and managers, can have a tremendous impact To increase the efficiency of labor and resources, and customers However, Care should be that the training should be done according to the needs of the considered parts This means that sales training should be provided for employees that increase Knowledge in marketing and sales and improve their performance in attracting customers.

REFERENCES

1. Bakhtiari, Hassan Ahmadi Moghaddam, Esmail (2010), the role of management strategies in empowerment, the Police Management Studies, First Issue, 53-39.
2. Ebrahimzadeh, Fariman. Koohestani, Hossein Ali. And Ishmael, Mehrangize (2010). The Role of empowerment methods to enhance the performance of human resources in Golestan University of Payam Noor. master thesis. Birjand University.
3. Alvani, Seyyed Mehdi (2006) educational marketing need today for management and personnel training, knowledge management publications.

4. Blanchard, Kenneth. Carlos, John. Randolph, Alan. (1995) management of employee empowerment. Translation of Mahdi Iran Nejad. Tehran. Publishing executives.
5. Rajaeepour, Said. Jamshidian, Abdul Rasul. And Nahid, Naderi (2010). Concepts and strategies to empowerment of staff. Eighteenth year. No. 186.
6. Ghanbari, Hossein (2007), the factors affecting the empowerment of human resources exploitation and the water distribution of Golestan. Centre of Public Administration in Golestan province. master thesis. Birjand University.
7. Monavarian, Abbas Niazi, Hamid Reza (2006). Factors affecting the planning and management of employee empowerment. Third International Conference on Human Resource Development. Tehran.
8. Danayi Fard, Hassan Alvani, Seyyed Mehdi and Adel Azar, 2006, quantitative research methods in the management of Tehran Safar publications.
9. Talebian, Ahmad Reza. And Fatima, Vafaee (2009). A comprehensive model of empowerment. No. 203 Tadbir monthly magazine twentieth year.
10. Karroubi, Mehdi. And Mehrdad, methane. (2009). Strengthening human resources through in-service training. Journal of beyond Management. 9, pp. 30-7.
11. Mohammadi, Mohammad. (2001) empowerment of human resources, management studies. Numbers 31 and 32.
12. Foxall G.R., "ConsumerBehaviour: a practical guide", R.P.A. (Books), England, 1998

Table 1. Distribution of respondents' frequency by gender

gender	frequency	percent
women	29	38.1
men	43	60.3
Not mentioned	6	1.6
total	78	100

Table 2. Distribution of respondents' frequency according to education

education	frequency	percent
Diploma and Associate Degree	22	27
Undergraduate	33	44.4
Master's degree or higher	23	28.6
total	78	100

Table 3. The results of educational marketing

Scores of educational marketing	The amount of scores
mean	5.3423
middle	5.6154
mode	6.23
Standard deviation	0.82487
variance	0.680
minimum	3
maximum	6.54
total	78

Table 4. Scores of competence component

scores for competence	Amount of score
mean	5.8116
middle	6
mode	6.25
Standard deviation	0.7130
variance	0.508
minimum	3.75
maximum	6.75
total	78

Table 5. Scores of the selection component

scores for the selection	Amount of scores
mean	3.4516
middle	3.6667
mode	3.67
Standard deviation	0.80548
variance	0.649
minimum	1
maximum	5
total	63

Table 6. Scores of effectiveness components

Scores for effectiveness	Amount of scores
mean	3.7527
middle	4
mode	4.33
Standard deviation	0.75852
variance	0.575
minimum	1
maximum	4.67
total	78

Table 7. Scores of Participation component

Scores for Participation	Amount of
mean	3.4167
middle	3.5
mode	3.33
Standard deviation	0.73101
variance	0.534
minimum	1.33
maximum	4.83
total	78

Table 8. The Correlation coefficients of training marketing impact and sense of significant in job

variables	number	Correlation coefficients	Significance level	result
	78	20/44	10/00	confirm

Table 9. Regression Analysis between training marketing and sense of significant in job

variables	Amount of R	The coefficient of determination	Beta coefficient	constant	significance
	20/44	200/2	20/44	680/5	10/00

Table 10. The Correlation coefficients between training marketing and sense of competence in the job.

variables	number	Correlation coefficient	Significance level	result
	78	0/569	0/02	confirm

Table 11 - Regression Analysis between training marketing and a sense of feeling competence in the job

variables	R amount	The coefficient of determination	The beta coefficient	constant	Significance level
	0/569	0/309	0/569	0/854	0/02

Table 12. The Correlation coefficients between the training marketing and a sense of choice in job

variables	number	Correlation coefficient	Significance level	result
	78	0/389	0/003	confirm

Table 13. Regression Analysis between the training marketing and a sense of choice in job

variables	The amount of R	The coefficient of determination	Beta coefficient	constant	Significance level
	0/389	0/189	0/389	1/658	0/003

Table 14. The Correlation coefficients between training marketing and sense of effectiveness in job

variables	number	Correlation coefficient	Significance level	result
	78	0/468	0/000	confirm

Table 15. Regression Analysis between training marketing and sense of effectiveness in job

variables	R amount	The determination of coefficient	Beta coefficient	constant	Significance level
	0/468	0/219	0/468	1/433	0/000

Table 16 - Correlation coefficients between the training marketing and a sense of partnership with others in the job

variables	number	Correlation coefficient	Significance level	result
	78	0/411	0/021	confirm

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RESEARCH ARTICLE

Reviewing and Ranking the Methods of Constructing Buildings with Steel and Concrete Frames in Iran by using TOPSIS Technique: (Case Study: Constructing Contracted Companies of Lorestan Province)

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ABSTRACT

For years, contractors and engineers have disputed over the selection and superiority of building methods. The reason behind this stems from the fact that it is a multi-criteria decision making process, and it is a function of many effective factors such as economic, climatic, executive conditions, designing techniques, accessibility to the building materials, life span, necessary facilities, environmental issues etc. It is also necessary to consider goals such as cost, time and quality in the selection of appropriate method. In other words, none of the methods are superior to other ; rather, depending on the circumstances, each of them may get superiority over the others, and a lack of attention to the effective items imposes huge costs on the project. In this study, by identifying and considering factors affecting the selection of the most suitable methods for the construction of buildings with steel and concrete frames, we have attempted to analyze and rank the building methods by using the TOPSIS multi-criteria decision making method. So, developed model in this study will help active organizations in the construction industry, and that it will contribute to more knowledgeable decisions of big companies. Moreover, it is hoped that,

engineers and consulters in the building industry can choose the most suitable method by considering efficient items proposed in the present study. So, in this way, unnecessary costs resulting from applying inappropriate methods will be prevented.

Key words: Building Systems, Selection Criteria, Construction Management, TOPSIS

INTRODUCTION

Selection of an appropriate construction method in the conventional projects, is one of the services provided by consultant engineering companies in charge of designing and supervising the projects. Consulting engineers have to study different methods, and they must report the results of their study in the first phase of the project. Depending on the form and nature of the project, the background and experience of the company, the orders of the owner,etc. , the final report may have different dimensions[1].

In Iran, in particular, for projects related to studies of new towns or large residential complexes, indicates that most of such studies put emphasis on such issues as the financial conditions governing project, the availability of materials and executive capabilities. In these reports, one can hardly see any considerations for the executive aspects, such as speed and accuracy of execution and any perspectives for the operational specifications.

Regarding modern systems is not observed. One of the most important reasons for this is the absence of documented and verified technical information on many of these systems. In addition, it is difficult and sometimes impossible for consulting companies to conduct complete technical studies or experiments for each system since such studies require enough time and money. Experience shows that officials and authorites can play key roles in the evaluayion of construction and structural systems in terms of providing the necessary certificates and other documents including the report of technical specifications. Efficient use of manpower, materials, safety, and security can serveas technical tools for supporting the investments not of employer and manufacturer at the national level. Additionally, continuous evaluation of procedures on the basis of standards and regulationswill help consumers to have a better choice[2][4]. Therefore, it is necessary to choose a scientific approach which can satisfy all the above expectations. The most important tool for studies and researches is the presence of scientific and systematic methods of evaluation and the selection of best option.

Process of Evaluating the Building Systems

In the process of evaluating the building systems, criteria for evaluation should first be specified on the basis of the situations and perspectives of the projects. It is important to determine the value and the authenticity of each criterion. Moreover, it is necessary to know how to apply each criterion, document, and capability on the basis of scientific principles. [3] [8]

A building is a phenomenon or a composite product which is the result of different scientific and administrative activities and specialties in different levels of decision making, designing and construction. In other words, evaluation, comparison, designing, selection or classification of buildings systems should be conducted by a team consisting of main specialists of building, namely, architects, experts of structure, and experts of mechanical and electrical installations. This is important at the beginning of planning and designing for any project, and particularly for a massive housing projects. The team of specialists examines and studies all aspects of designing or other executive activities for the project with regard to the possibilities, and limitations under certain conditions of time and place in a way to define and or select a system of construction in a deliberate manner. [6]

Check list is one of the most important tools in the process. It determines the criteria for a project, and it shows the procedure of evaluation on the basis of grouping or classification of systems in response to each criterion. In addition, it can assess the validity of criteria in explicit terms, and finally, it can guide the technical specifications. In order to prepare the check list of assessments, it is first necessary to have a general list of all criteria of evaluation for each project. Given the above expectations for the evaluation of building systems, and given the experience in Iran and other countries, a general list of the evaluating criteria can be prepared under some groups of assessment. In the present study, common building systems used for the construction of steel and concrete buildings in iran will be examined as case studies. These building systems include:

Steel structure building system with welded joints, Steel structure building system with bolted connections, Reinforced concrete building system, Prestressed concrete building systems.

The Sampling Method and Sample Size

In this study, the sampling method will be simple random sampling method, and Cochran formula is the formula used in determining the sample size.

$$n = \frac{Z^2_{1-\alpha/2} pq}{d^2} \qquad (1)$$

In the above formula, regarding the safety factor 0.95, the amount of $Z^2_{1-\alpha/2}$ = 1.96 is determined with a confidence of 0.95. Also, if we consider the probability p = 1-q to be equal to the maximum of its amount that is 0.5, with a 0.1 error, the amount of sample size would be 96.

The Questionnaire and Variables under study

The variables studied in this questionnaire is the effectiveness of specified measures in choosing the most appropriate method for the construction of concrete and steel buildings. The respondents were asked to specify the amount of the effectiveness of the criteria by selecting the appropriate option.

The questionnaire, the five-point Likert spectrum was used. Table 1-4 shows the form as well as the scoring system in the spectrum.

The content validity of the questionnaire has been confirmed by professors and knowledgeable experts, in order to determine the reliability of the questionnaire, Cronbach's alpha and SPSS software will be used. Moreover, the value of Cronbach's alpha is more than 0.7, and therefore, the reliability of the questionnaire is acceptable.

Building Systems Evaluation Criteria

Evaluating and selecting the appropriate structural systems depend on many factors and criteria In order to make a right choice in which all aspects are considered, and in order to avoid selecting improper building systems, it is necessary to consider all factors in the selection. To this end, 50 criteria were selected for the evaluation of structural systems from the existing reservoir of criteria recorded in the literature through a comprehensive review. Then, the selected criteria were examined by experienced experts were classified into 7 group as follows:

1. Factors related with cost
2. Factors related with time
3. Factors related with quality
4. Factors related with health and safety
5. Factors related with sustainability
6. Factors related with process
7. Factors related with logistics

Each of these factors might be divided into smaller groups depending on conditions of intended civil projects[4][7] .

Selection of the most Fundamental Criteria

After identifying and determining the criteria affecting the process of selecting the method of constructing the steel and concrete buildings through library studies and in accordance with the guide lines of experts, initial screening of criteria is done in order to identify the most crucial factors by using the SPSS statistical tests. One of the benefits of reducing the factors to more fundamental factors is that a more accurate model will emerge with fewer errors. In order to determine the degree of importance and weight of each criterion and select the most fundamental criteria, a questionnaire was developed and distributed among 96 experts of the construction industry , who are working for construction contractors companies in Lorestan Province. The collected data obtained from the questionnaires were statistically analyzed by tools of descriptive and inferential statistics. In the descriptive analysis, the most frequent options chosen by respondents were the options of ,Average, and High, about the importance of criteria.in the inferential analysis, the criteria with statistically significant importance were determined so that the crucial factors in the evaluation of optimum building systems could be determined by means of T test and wilcoxon test and SPSS Software. In this section, based on the results of statistical tests, about 20 criteria (p-value were selected as the

most fundamental criteria, as follows: The cost of Construction of system, cost finality, speed of construction, conformity with the building regulations, construction control during construction, customer satisfaction and acceptance, construct strength, seismic resistance, resistance to fire, use of materials, longevity of buildings, previous experiences of the builder, compatibility with the environment, height restrictions, required manpower, ease of implementation, the availability of the systems market, structure weight, structure beauty, implementation expertise, and the need for professional manpower. These criteria were selected on the basis of tests mentioned above.

Calculation of the RII index for the determination of the Weight of Basic Criteria

In the previous section, 20 criteria were selected as the basic criteria for evaluating the steel and concrete building systems in iran. In this section, the relative importance index is used in order to determine the weights of criteria for entering the TOPSIS technique. The relative importance index is calculated by the following formula:

$$\text{Relative important index}(\%) = \frac{5(n_5)+4(n_4)+3(n_3)+2(n_2)+(n_1)}{5(n_5+n_4+n_3+n_2+n_1)}\times 100 \quad (2)$$

Where n_5, n_4, n_3, n_2, n_1 show number of respondents who have chosen options 1 (very low), option 2 (low), option 3 (average), option 4 (high) and option 5 (very much), respectively.

Ranking of Steel and Concrete Building Systems by means of TOPSIS Technique

Thank to available tests and statistical analyses, the basic criteria affecting the evaluation of Steel and concrete Building Systems were specified in iran, and the weight of each criterion was calculated by using the relative importance index in order to enter the TOPSIS technique. In this part, selected criteria along with their normalized weights and also the desired options are evaluated. They are as follows: the steel building system with welded joints, the steel building system with screw joints, the reinforced concrete building system, and the prestressed concrete building system within the framework of Multi Criteria decision-making TOPSIS technique. The first phase of this method is the development of decision making matrix. Given the criteria and the options in the present study, tables(3) to (4) show the decision making matrix. Each component of the matrix (xij) represents the amount of performance of option (Ai) relative to the criterion (Cj), each being marked by the 5- point spectrum: Very low (1), Low (3), Medium (5), High (7), Too high (9) .

Step One :Obtaining the decision matrix without the scale

It is shown in Table 4.

Step Two:Obtaining the weighty Matrix without Scale

In this step, the matrix without scale of the previous step in the weight criteria matrix, determined by using normalized RII index, is multiplied

The weighty matrix without scale is shown in Table 5.

Step Three : Determining the ideal solution (A +) and negative ideal (A-)

Given the nature of the selected criteria for evaluating the most appropriate structural system, the following, criteria have negative effectiveness: Cost of manufacturing system, the use of materials, height limitations, required manpower, the weight of the structure and the need for specialist staff; and other criteria have a positive effectiveness. Tables 4-8 show the positive and negative ideal value of each criterion.

Step four :Calculating the distance of option (i) from the ideal option by means of the Euclidean Method

In this step, the amount of Euclidean distance of each option from the positive and negative ideal is calculated. These values have been presented in the table 7.

Step five :Calculating the relative proximity of (Ai) to the ideal solution and sorting the options

In this step, options are ranked on the basis of the amount of relative proximity to the ideal solution by determining the distance index. Now, the option with the greatest relative interval in comparison to other options will have the highest rank. These values have been reported in Table 9-8. Accordingly, the prestressed concrete building systems have the highest rank (A4), and the reinforced concrete building system (A3), the steel structure building system with welded joints (A1), and the steel structure building system with bolted connections (A2) have the next ranks.

CONCLUSION

Based on the results of the present study, and given the economic, executive, technical, and other conditions, the steel frame structural systems with welded joints are much more superior to other steel and concrete systems under study because they have the maximum distance from the ideal, being (0/59863959). Steel structure frames with welded joints are more widely used than other building systems since they have many favourable features including strength, good mechanical properties and high strength under stretch and pressure, fast installation, , capacity for being developed, possibility of built-up parts, occupying less space, being applicable in high altitude. Moreover, these structures are produced in factories under better quality control conditions.

The rest of the options, namely, the reinforced concrete structural system, with a distance of (0/512784966), from the ideal, the prestressed concrete structural system and the metal fram building system with bolted connections have the next rankings with (0.457348406), and (0.427009715) of the distance, respectively.

Using the multi attribute decision making model presented in this study, the structural engineers, designers, and executives can develop the best and most suitable method of constructing the ideal building. In this way, they are able to avoid the unnecessary costs resulting from inappropriate methods. The model developed in this study is a general framework and can be used for comparing and ranking structural systems in different situations. It is hoped this model will help the organizations which are active in the building industry to make the wisest decisions in the their operations.

REFERENCES

1. W. Pan, A. R. J. Dainty, M. Asce, and A. G. F. Gibb, “Establishing and Weighting Decision Criteria for Building System Selection in Housing Construction,” no. NOVEMBER, pp. 1239–1250, 2012.
2. Y. Chen, G. E. Okudan, and D. R. Riley, “Decision support for construction method selection in concrete buildings: Prefabrication adoption and optimization,” Autom. Constr., vol. 19, no. 6, pp. 665–675, Oct. 2010.
3. J. Allen, E., and Iano, “The Architect’s Studio Companion: Rules of Thumb for Preliminary Design,” Wiley, Hoboken, NJ., 2002.
4. Construction of new technologies, "Building and Housing Research Center," 2009.
5. Tahvny, Shapur. Rahim LabafZadeh, Mohammad Saleh., Metal building technology,. Tehran: Iran's textbooks publishing company., 2008.
6. Regulations of Iran the National Building, Ninth topics: design and implementation of reinforced concrete buildings,. Office building development and promotion of national regulations, the Department of Housing and urbanization, Affairs Department Housing and Construction, development, publishing, Tehran,, 2006.
7. Golabchi, Mahmoud. Mzahryan, H., Construction of new technologies. Publication of Tehran University, 2013.
8. Neshatghalibaf, K., "The implementation of industrial steel structures," Tehran University, 2008.
9. Khaki, GR., Research Methodology in Management. Tehran: Center Islamic Azad University Publishing, 2000, p. 158.
10. Asgharpour, MJ., Multi Criteria decisions of. Institute of Publication of Tehran University., 20013

Table 1. 5- point Likert Scale

Very Low	Low	Average	High	Very High
1	2	3	4	5

Table 2. Ranking and the relative importance index of each of the 20 basic criteria affecting the evaluation of steel and concrete building systems

Group	Row	Criterion Title	RII	RII Normalized	Rank
Factors related with cost	1	The cost of Construction of system	0.787	0.05278	5
	7	Cost Finality	0.685	0.04593	16
Factors related with time	8	Speed of construction	0.789	0.05292	4
Factors related with quality	11	Conformity with the building regulations	0.764	0.05121	9
	12	Construction control during construction	0.686	0.06401	15
	14	Customer satisfaction and acceptance	0.679	0.04550	17
	16	Construct strength	0.806	0/05406	2
	17	SEISMIC resistance	0.804	0.05392	3
	18	Resistance to fire	0.674	0.04518	18
Factors related with sustainability	26	The use of materials	0.748	0.05017	14
	27	Longevity of buildings	0.785	0.05263	6
Factors related with process	34	Builder Previou s experience	0.781	0.05236	8
Factors related with logistics	35	Compatibility with the environment	0.783	0.05250	7
	36	Height restriction	0.664	0.04450	19
	37	Required manpower	0.749	0.05021	13
	38	Ease of implementation	0.762	0.05106	10
	39	The availability of the systems market	0.752	0.05038	11
	44	Structure weight	0.752	0.05038	12
	47	Structure beauty	0.658	0.04410	20
	48	Implementation expertise, and the need for professional manpower	0.808	0.05420	1

Table 3. Decision Matrix

	C1	C2	C3	C4	C5
A1	7	7	7	7	7
A2	7	7	7	7	7
A3	5	5	3	5	7
A4	7	7	3	5	7
	C6	C7	C8	C9	C10
A1	7	7	5	5	7
A2	5	7	5	5	7
A3	5	7	7	7	7
A4	7	9	9	7	7
	C11	C12	C13	C14	C15
A1	7	7	7	7	5
A2	5	3	5	5	5
A3	7	7	7	7	7
A4	7	5	5	7	**5**
	C16	C17	C18	C19	C20
A1	7	7	7	7	7
A2	5	3	5	7	7
A3	5	7	7	5	5
A4	5	3	5	7	5

Table 4. Decision matrix without Scale

	C1	C2	C3	C4	C5
A1	0.560448538	848874688.0	673575314.0	560448538.0	673575314.0
A2	0.560448538	848874688.0	673575314.0	560448538.0	673575314.0
A3	0.400320385	0.606339063	0.288675135	0.400320385	0.673575314
A4	0.560448538	0.848874688	0.288675135	0.400320385	0.673575314
	C6	C7	C8	C9	C10
A1	0.560448538	0.521749195	0.390434405	0.43519414	0.609271796
A2	0.400320385	0.521749195	0.390434405	0.43519414	0.609271796
A3	0.400320385	0.521749195	0.546608167	0.609271796	0.609271796
A4	0.560448538	0.670820393	0.702781928	0.609271796	0.609271796
	C11	C12	C13	C14	C15
A1	0.546608167	0.7	0.575396456	1.055289706	0.325472277
A2	0.390434405	0.3	0.410997468	0.753778361	0.325472277
A3	0.546608167	0.7	0.575396456	1.055289706	0.455661188
A4	0.546608167	0.5	0.410997468	1.055289706	0.325472277
	C16	C17	C18	C19	C20
A1	0.546608167	0.763762616	0.673575314	0.560448538	0.609271796
A2	0.390434405	0.32726835	0.481125224	0.560448538	0.609271796
A3	0.390434405	0.763762616	0.673575314	0.400320385	0.43519414
A4	0.390434405	0.32726835	0.481125224	0.560448538	0.43519414

Table 5. Weighty decision matrix without Scale

	C1	C2	C3	C4	C5
A1	0.029580474	0.038988814	0.035645606	0.02870057	0.0309912
A2	0.029580474	0.038988814	0.035645606	0.02870057	0.0309912
A3	0.02112891	0.027849153	0.015276688	0.020500407	0.0309912
A4	0.029580474	0.038988814	0.015276688	0.020500407	0.0309912
	C6	C7	C8	C9	C10
A1	0.025500408	0.028205761	0.021052223	0.019662071	0.030567166
A2	0.018214577	0.028205761	0.021052223	0.019662071	0.030567166
A3	0.018214577	0.028205761	0.029473112	0.0275269	0.030567166
A4	0.025500408	0.03626455	0.037894002	0.0275269	0.030567166
	C11	C12	C13	C14	C15
A1	0.028767988	0.036652	0.030208314	0.046960392	0.016341963
A2	0.020548563	0.015708	0.021577367	0.033543137	0.016341963
A3	0.028767988	0.036652	0.030208314	0.046960392	0.027445
A4	0.028767988	0.02618	0.021577367	0.046960392	0.016341963
	C16	C17	C18	C19	C20
A1	0.027909813	0.038478361	0.033934724	0.024715781	0.033022531
A2	0.019935581	0.016490726	0.024239089	0.024715781	0.033022531
A3	0.019935581	0.038478361	0.033934724	0.017654129	0.023587522
A4	0.019935581	0.016490726	0.024239089	0.024715781	0.023587522

Table 6. Positive and negative ideal value of criteria

	C1	C2	C3	C4	C5
Ideal of positive	0.02112891	0.038988814	0.035645606	0.02870057	0.0309912
Ideal of negative	0.029580474	0.027849153	0.015276688	0.020500407	0.0309912
	C6	C7	C8	C9	C10
Ideal of positive	0.025500408	0.03626455	0.037894002	0.0275269	030567166
Ideal of negative	0.018214577	0.028205761	0.021052223	0.019662071	030567166
	C11	C12	C13	C14	C15
Ideal of positive	0.028767988	0.036652	0.030208314	0.033543137	0.016341963
Ideal of negative	0.020548563	0.015708	0.021577367	0.046960392	0.022878748
	C16	C17	C18	C19	C20
Ideal of positive	0.027909813	0.038478361	0.024239089	0.024715781	0.023587522
Ideal of negative	0.019935581	0.016490726	0.033934724	0.017654129	0.033022531

Table 7. Distance of each option from positive and negative ideal

Options	Distance from ideal positive	Distance from ideal negative
A1	0.029067534	0.04335499
A2	0.041853609	0.031190577
A3	0.035005417	0.036842566
A4	0.038272544	0.032256216

Table 8. The relative interval of each option

Options	The relative interval of the ideal	Rank
A1	0.59863959	**1**
A2	0.427009715	**4**
A3	0.512784966	**2**
A4	0.457348406	**3**

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RESEARCH ARTICLE

Prioritizing Earthquake Crisis Risk Assessment Criteria in Kerman by using MCDM Techniques

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ABSTRACT

Natural hazards such as earthquake, flood and storm as repeatable phenomena have been existed during the life of the planet and considers as a serious risk for development especially in developing countries. Although risks are not always controllable, people and organizations have a major impact on their own vulnerability rate in the face of crisis. For this reason, managing and controlling crisis in emergency situations and disasters need the knowledge and experience of professional managers of emergency situations. Iran is one of the world's seismic areas, which is considered as an unstable area, tectonically, because of situating the Arabian plate in its south and Turan plate in its north. Kerman as one of the important cities of Iran faces earthquake high risk because of situating various active faults around it. Accordingly, reviews related to the risk of earthquake occurrence in this city is of necessities of crisis management and this necessity is seriously felt that evaluating earthquake crisis risk in Kerman can be addressed by generating an appropriate model and applying various types of spatial and non-spatial data and performing the related analyses in geographical information system and multi criteria decision making techniques. So, this research seeks to address prioritizing the effective criteria in earthquake crisis risk assessment in Kerman by using MCDM techniques.

Key words: Risk assessment, Natural hazard, Earthquake, MCDM

INTRODUCTION

Disasters, such as the Indian Ocean Tsunami in December 2004, Hurricane Katrina and the Pakistan Earthquake in 2005, attract a great deal of attention in the media and in the disaster assistance community. Focusing on disasters after they occur is essential from a humanitarian point of view, but not sufficient for reducing their tragic consequences to people, economies and the environment. Identifying and measuring risks and vulnerabilities before a disaster occurs and also after disasters have happened are essential tasks for effective and longterm disaster-risk reduction. In this regard, 'measuring vulnerability' is not limited to quantitative approaches; rather, it encompasses both quantitative and qualitative methods to describe and operationalize vulnerability (Birkmann, Wisner, 2006). Earthquakes are among the most dangerous geologic phenomena on our planet. There are many thousands of earthquakes every year on Earth and the timing as well as the magnitude of earthquakes still remain unpredictable. Since earthquake is an unpredictable disaster, it usually evokes the idea that one cannot prepare for it (Oral et al,. 2015). Risk assessment and management are important tasks in environmental monitoring applications. Particular attention is paid on critical processes that can put people life at risk such as landslides. Although landslide is a natural phenomenon, it can be cause of damages and death if it happens next to inhabited areas (Morello et al,. 2014). Since risk is generally defined as the product of the hazard probability and its consequences, risk can be viewed as a function of the hazard event and the vulnerability of the elements exposed. Vulnerability is often viewed as an intrinsic characteristic of a system or element (Thywissen, 2006). The earthquake risk will be assessed by through the determination of high potential seismic region and the seismic hazard analysis of large earthquakes, the seismic life and economic vulnerability models corresponding to the regional disaster reduction ability, the generalized social wealth such as population, GDP and building data (Zhang, Xie, 2001). The purposes of the assessment are (1) to assist policy makers in identifying investment priorities to reduce risk, (2) to identify national risk-management capacities and evaluate the effects of policies and investments on risk management, (3) to promote the exchange of information, and (4) to gauge a country's relative position and compare its evolution over time (Cardona, 2006). So, this research seeks to address prioritizing the effective criteria in earthquake crisis risk assessment in Kerman by using MCDM techniques.

The studied geographic area

Kerman, one of Iran's metropolises and Kerman province's center, the largest province of Iran is situated in the country's north-east. Kerman is one the five historical cities of Iran. Kerman area is 13000 hectares and because of Kerman's urban area and population, this city is among the classified metropolises of Iran and is the eighth city of Iran in view of urban area. Kerman is a population center and the biggest city in the north-east of the country, industrially, politically, culturally and scientifically. This (Figure 1) province is limited to southern Khorasan and Yazd from north, to Hormozgan province from south, to Sistan and Baluchistan province from east and to Fars province from west (Jalali Far et al,. 2012).

Natural hazard :A potentially damaging physical event, phenomenon, or human activity that may cause loss of life or injury, property damage, social and economic disruption, or environmental degradation. This event has a probability of occurrence within a specified period of time and within a given area, and has a given intensity (Van Westen, 2013).

Earthquake: Earthquake is the sudden release of excess energy under the earth's crust that is released in very short time if turbulence is occurred. In fact, earthquake is generated from releasing sudden accumulated energy in the earth's crust stones (Erdic et al,. 2005)

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Vulnerability :The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards can be subdivided in physical, social, economic and environmental vulnerability.

Capacity: The positive managerial capabilities of individuals, households, and communities to confront the threat of disasters (e.g., through awareness raising, early warning, and preparedness planning) (Van Westen, 2013).

Urban Disaster Risk

Risk is the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions. Conventionally risk is expressed by the notation: Risk = Hazards * Vulnerability. Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability (United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction [UN/ISDR], 2004).

Risk assessment

Risk assessment consisting of hazard analysis and vulnerability analysis is a basic instrument of DRM that is used to study the factors of disaster risk and provides the basis for planning and implementing measures to reduce risks and impacts of disasters. Action Planning is the follow-up process that engages with the local stakeholders and leads to actionable plans that are based on the assessed risk and focus to reduce it, and that are more dependent on local aspirations and capacities than external support. Finally, implementation management is the key process that translates the plans into ground reality, and needs to be founded on principles that are in tandem with those of action planning so as to ensure implementation that is true to the essence of local plans and is sustainable beyond project durations. RA is used here to refer to a method of determining the quantitative or qualitative degree of risk.

Concept of Risk Analysis

RA consists of hazard analysis and vulnerability analysis, together with analysis of protective capabilities. Some authors treat the analysis of the protective capabilities of the local population (coping strategies) as part of vulnerability analysis, others as a third component of RA, others see it as an additional chapter, and as such a component of risk assessment and not RA. Here, the analysis of self-protection capabilities is treated as part of vulnerability analysis (Figure 2) (Kohler et al,. 2005).

RA is based on the recognition that risk is the result of the link between hazard and vulnerability of elements affected by the hazard. The goal of RA is to use this link to estimate and evaluate the possible consequences and impacts of extreme natural events on a population group and their basis for life. This involves impacts at the social, economic, and environmental levels. Hazard and vulnerability analyses are parts of RA, and are inseparable activities – vulnerability analysis is not possible without hazard analysis, and vice versa. Thus, risk is understood here as the expected value of the loss of human life or damage to objects, infrastructure and the environment. Determining the disaster risk as a result of the RA is analytically based on documenting and assessing the hazard, followed by valuation of the vulnerability of a population or region to this hazard. In determining the overall risk, all the elements at risk (e.g., population, property, infrastructure, economic activities, etc.) are taken into account with their specific vulnerability (Wisner et al,. 2004).

Hazard Analysis

A hazard analysis investigates, identifies, and documents natural hazards (drought, floods, landslides, earthquakes, etc.), their causes and impact chains. In hazard analysis, natural disasters (droughts, floods, landslides, earthquakes, etc.) and their causes and the resulting impact chains are identified, analyzed, and documented. Knowledge of the types of hazard is essential for analyzing and assessing risks. The resources required for an analysis depend on the situation. A simple analysis with modest data input may be sufficient, or comprehensive investigations and elaborate studies may be required to document hazard potentials.

Vulnerability and Capacity Analysis

Vulnerability analysis studies the ability of a system (or element) to withstand, avoid, neutralize, or absorb the impacts of hazardous natural events. Before starting an analysis of the vulnerability of a population group and its bases for living, the extreme natural events and the locations they threaten must be identified and studied. Without extreme natural events as a hazard, there are no vulnerable elements, and hence no risk. Conversely, without threatened locations with vulnerable elements, there is no risk, and hence no need for either hazard or vulnerability analysis. The vulnerability of a group of people or region is inseparably linked to the social, cultural, and economic processes developing there and the agricultural and ecological transformation of the region. Vulnerabilities are created, they are the product of social development or faulty development; they reflect deficits, shortages, or disruptions within social development. Vulnerability is assessed by the potential loss resulting from a natural event. It expresses the degree of possible loss or damage to an element threatened by a natural event of specific force. Damage can be to the population (life, health, wellbeing), material assets (buildings, infrastructure), or natural assets (woods, forest, agricultural land).

Structural vulnerability factors :location, technical construction type and quality of the settlements and buildings, population growth and density.

Social factors :education, legal reliability, human rights, participation of civil society, social organizations and institutions, legal framework, statutes, politics, corruption, gender aspects, minorities, dependent population (old, young, sick), traditional knowledge systems, power structures, access to information and social networks.

Economic factors :socioeconomic status, poverty, food insecurity, lack of diversity of seed and economic activities (e.g., monoculture in agriculture), lack of access to basic infrastructure (water, energy, health, transport), lack of reserves and financing (Shaw et al,. 2009).

MATERIALS AND METHODS

The database of risk estimation of catastrophe earthquakes (CEREDB) is designed and the instance is created in which the disaster data of cases of historical catastrophe earthquakes, the hazard analysis results, the vulnerability models, the basic social and economic data, the related geographical information and RS images are installed (Ding et al,. 2011). At the moment, landslide hazard assessment and prediction models are based on two possible approaches (Pan, Cheng, 2013). The first approach uses hydrogeological information to predict or estimate a possible landslide event. Typically, these models are used to estimate the probability of a landslide event by means of historical or statistical analysis of previous events happened in the monitored area (Guzzetti, 2005).

In this research, according to the comments of the experts of crisis prevention and management organization and university professors, the effective criteria in earthquake crisis risk assessment are determined. Then an appropriate

weight is determined for these criteria. In this way, there are different methods for weighting that it can be referred to methods including mathematical mean, entropy, multi criteria decision making technique and etc. Since a weight is devoted to each one of the criteria in multi criteria decision making, according to the experts' comments and this technique has been used more by researchers, these MCDM techniques are also used in this research.

Multi criteria decision making (MCDM)

Decision makings are often multi criteria in the real world and the criterion of appropriate or inappropriate decisions is more than one criterion. For this reason, some methods named multi criteria decision making has been developed that help to solve the aforementioned problems (Koksalan et al,. 2011). In today's complex and changing conditions, human can't see his around in one dimensional form and only by considering one criterion and bases his judgments on this information. Therefore, human always has to compare his goals with various criteria and rank them; this case may be the biggest problem of the today's human itself. On the other hand, in most cases, decision makings are desirable when the decision making is based on multi criteria. Multi goals and sometimes opposite and with multi criteria cause the complexities of decision making process for the managers of the today's organizations. Solving a decision making problem by multi criteria was started from 1980's and in the 1980's the world met prodigious change and developments in this type of decision making processes (Ghodsi Pour, 2010). These processes are divided into two branches, generally:

Multi criteria decision making models

Multi criteria decision making models can be divided as follows (Figure 3) (Mohammad Moradi, Akhtar Karavan, 2009)

Analytical hierarchical process (AHP)

One of the most efficient decision making techniques is analytical hierarchical process that was invented for the first time by Thomas Saaty in 1980 that has been based on paired comparisons and gives the possibility of reviewing different scenarios to the managers. Analytical hierarchical process is a strong and flexible multi criteria decision making method. It is a quantitative method that helps the decision maker to choose the best one among different alternatives, according to the all considered criteria. Analytical hierarchical process is one the most comprehensive designed systems for multi criteria decision making. This technique, meanwhile solving the found major problems in this kind of decision makings, has had a theoretical base and has been based on axioms (Ghodsi Pour, 2013). Using AHP in order to model and analyze the real world's problems can be performed very easier by using method implementation in a micro-computer such as Expert Choice software. This affair causes the simplicity and speed of hierarchy's structuring and correction and deletes its boring calculations.

RESULTS

Three main criteria were chosen in order to assess Kerman's earthquake risk, which are as follows: social-economic vulnerability, physical vulnerability and capacities. Each one of these three criteria has sub-criteria that the hierarchical structure of the criteria has been shown in figure 4.

In this study, a total number of 32 questionnaires were provided for the experts in order to estimate criteria's value to determine the reviewed criteria's importance. Since Kerman has four areas and our main goal was to prioritize risk assessment criteria of different areas of Kerman against earthquake, the questionnaires have been filled by experts related to the discussed subject in the 4 areas. Finally, a model was also provided for the considered criteria in Expert

Choice software per each one of 32 questionnaires that have their own special values and diagrams were also drawn for each one, separately. The diagram of general values of the three main criteria and their sub-criteria has been offered for Kerman areas. The incompatibility rate was lower than 0.03 in all diagrams.

It is specified in the above diagram that the values of each one of the three determinant criteria are almost equal in earthquake crisis risk assessment and the importance of the criterion of capacities is a bit more than the other two criteria, that has been shown in figure 5.

It is specified in the above diagram that among the sub-criteria of social-economic vulnerability factor, criteria of distance from vulnerable groups with the weight of 0.339 and population density with the weight of 0.327 are the most important criteria f this factor and are more vulnerable than other criteria, that has been shown in figure 6.

It is specified in the above diagram that among the sub-criteria of physical vulnerability factor, the criteria of distance from fault with the weight of 0.171 and structure type with the weight of 0.127 are the most important criteria of this factor; in other words, it is situated in a higher priority than all other criteria and in a city such as Kerman with many earthquakes, the more the distance from fault and the structures are of concrete type, the less the risk rate in that area to decrease physical vulnerability (figure 7).

It is observed in the above diagram that among the sub-criteria of capacity factor, criteria of distance from grade 1 way (highways and main streets of the city), desirable distance from health centers and fire station are situated in a higher priority than other criteria and the more the capacities and abilities of a city, the less human and financial losses it has at the time of probable events occurrence; so, it can be said that the risk rate of the city has been decreased against crisis (figure 8).

CONCLUSION

The obtained results from research showed that many factors and criteria are effective in earthquake crisis risk assessment. In this research, 3 main criteria and 24 sub-criteria have been identified and have been weighed by one of the most practical MCDM techniques and their importance and prioritizing have been determined. These criteria include criteria such as social-economic vulnerability, physical vulnerability and capacities. It should be mentioned that the risk factor that is one of the main factors and criteria of risk assessment, has been discussed descriptively and the criteria of two other factors of earthquake crisis risk assessment i.e. vulnerability and capacities have been reviewed and prioritized through AHP process. The final tables (table 1, 2 and 3) of criteria prioritizing of earthquake crisis risk assessment are offered in the following.

In general, what has been offered in this research is an improved sample of the common method of analytical hierarchical process for weighting the elements of a problem that has hierarchical structure. The research findings show that among the said factors, the capacity factor with importance degree of (0.352) has the highest effect in decreasing earthquake crisis risk and then the criteria of physical vulnerability with importance degree of (0.331) and social economic vulnerability (0.316) are of factors that intensify earthquake crisis occurrence risk and also increase damage and losses intensity at the time of earthquake crisis occurrence.

Suggestions

Risk Assessment is expected to contribute to the following

Planning, and specifically spatial and land use planning. This makes it possible to take into account the risks of natural hazards in land use and other activities with spatial impact, including development and zoning plans of communities, agencies, and specialist institutions which are formulated using the information from RA and whose implementation contributes to reducing disaster risks.

Planning for emergency aid measures, by making it possible to create the conditions for sustainable reconstruction work and development measures.

Efforts to integrate DRM into the various areas of development.

REFERENCES

1. Birkmann J, Wisner B, 2006. Measuring the un-measurable. The challenge of vulnerability. Source, No. 5, United Nations University—Institute for Environment and Human Security, Bonn. Available at: /http://www.ehs.unu.edu/file.php?id=212S.
2. Cardona OD, 2006. A system of indicators for disaster risk management in the Americas. In: Birkmann, J. (Ed.), Measuring Vulnerability to Natural Hazards—Towards Disaster Resilient Societies. UNUPress, Tokyo, New York, Paris.
3. Ding X, Wang X, Wang L, Zheng Y, 2011. The Development Of Catastrophe Earthquake Risk Estimation System Based On Gis, Institute of Earthquake Science, IEEE, Vol 3, pp 4352-4354.
4. Erdic M, Rashidor T, Safat E, Turduku lov E, 2005. Assessment of seismic risk in tashkand, Uzbekistan and Bishkek, Soil Dynamic and Earthquake Engineering, p25.
5. Ghodsi Pour H, 2010. Discussions in Multi Criteria Decision Making: Multi Goal Planning (Weighting Methods After Solving), Ninth Edition, Tehran: Amir Kabir Sanati University Publishing.
6. Ghodsi Pour H, 2013. Analytical hierarchical process (AHP), Eleventh Edition, Tehran: Amir Kabir Sanati University Publishing.
7. Guzzetti F, 2005. Probabilistic landslide hazard assessment at the basin scale, Geomorphology, Vol 72, (1–4), pp. 272–299.
8. Jalali Far M, Kalantari MH, Naderi M, Moradi M, Pour Dehghan D, Dehesh Kh, Latif Kar M, Naderi AA, Rooholamini F, 2012. Kerman Province Knowing, Ministry Of Education: Research & Planning Organization, Second Edition.
9. Kohler A, Ju¨ lich S, Bloemertz L, 2005. Guidelines risk analysis – A basis for disaster risk management, GTZ.
10. Koksalan M. Wallenius J, Zionts S, 2011. Multiple Criteria Decision Making: From Early History to The 21st Century, Singapore: World Scientific.
11. Mohammad Moradi A, Akhtar Karavan M, 2009. Methodology of the Multi-Criteria Decision-Making Models, Journal of Armanshahr, No 2, pp 113- 125.
12. Morello R, De Capua C, Lugarà M, Lamonaca F, Fabbiano L, 2014. Risk model for landslide hazard assessment, The Institution of Engineering and Technology, Vol. 8, Iss. 3, pp. 129–134.
13. Oral M, Yenel A, Oral E, Aydin N, Tuncay T, 2015. Research Paper Earthquake experience and preparedness in Turkey, Disaster Prevention and Management Vol. 24 No. 1, pp. 21-37.
14. Pan F, Cheng S, 2013. The profiles and the analysis of the features on the typical landslides in the history of the Three Gorges Reservoir area, Proc. IEEE Int. Conf. Intelligent System Design and Engineering Applications (ISDEA), Hong Kong, pp 1494–1497.
15. Shaw R, Srinivas H, Sharma A, 2009. Urban Risk Reduction: An Asian Perspective, Community, Environment and Disaster Risk Management, Emerald Group Publishing Limited, Volume 1, pp 3–12.
16. Thywissen K, 2006. Core terminology of disaster reduction: a comparative glossary. In: Birkmann, J. (Ed.), Measuring Vulnerability to Natural Hazards—Towards Disaster Resilient Societies. UNUPress, Tokyo, New York, Paris.

17. United Nations Inter-Agency Secretariat of The International Strategy For Disaster Reduction (UN/ISDR), 2004. Living With Risk: A Global Review of Disaster Reduction Initiatives. New York: United Nations Publications.
18. Van Westen CJ, 2013. Remote Sensing and GIS for Natural Hazards Assessment and Disaster Risk Management, Treatise on Geomorphology, Volume 3, pp 259-298.
19. Wisner B, Blaikie P, Cannon T, Davis I, 2004. At risk second edition: Natural hazards, people's vulnerability, and disasters. London: Routledge.
20.
21. Zhang F, Xie L, 2001. Study on evaluation of city's ability reducing earthquake disasters, Journal of Natural Disasters, Vol 10, No 4, pp 59-64.
22. Josie S, Zarei M, 2010. the provision of waste management strategic plan by A'WOT (Case study: city of Minab), the Journal of Ecology.

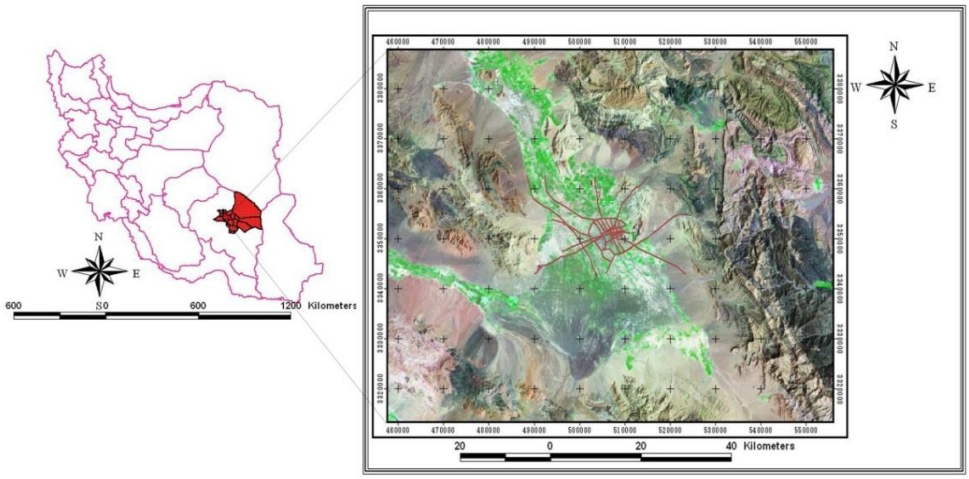

Fig. 1. Kerman's geographic location.

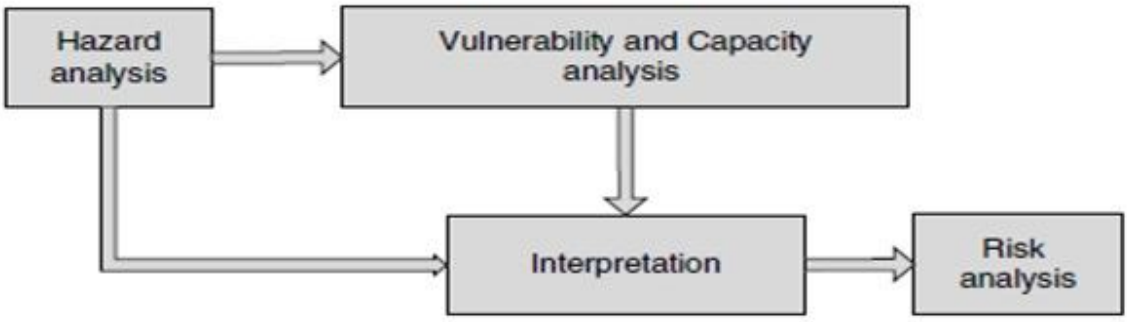

Fig. 2. Concept of Risk Analysis.

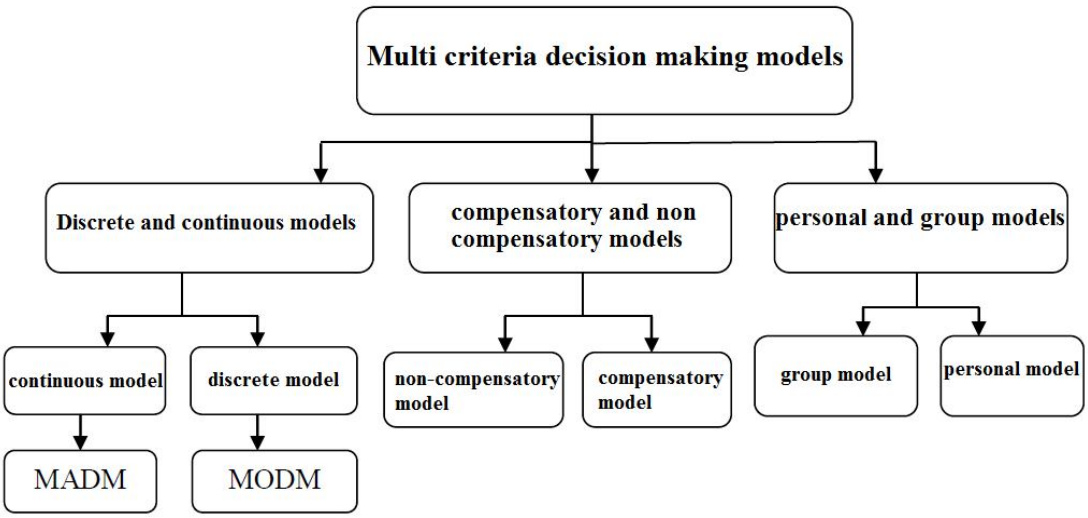

Fig. 3. Multi criteria decision making models.

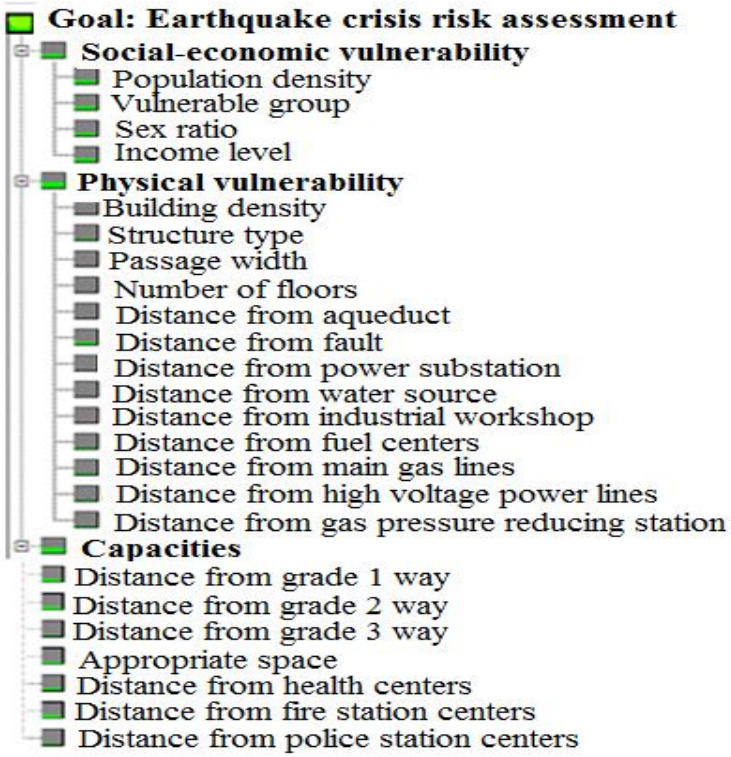

Fig. 4. Hierarchical structure of the criteria.

Fig. 5. The diagram of the weights of the three main criteria of Kerman's different areas.

Fig. 6. The diagram of the weights of the sub-criteria of the criterion of social-economic vulnerability

Fig. 7. The diagram of the weights of the sub-criteria of physical vulnerability factor

Fig. 8. The diagram of the weights of the sub-criteria of capacity factor

Table. 1. The final table of Prioritizing the sub-criteria of social-economic vulnerability factor.

social-economic vulnerability factor (weight – 0.316)		
Criterion	**Weight**	**Priority**
Population density	0.327	2
Vulnerable groups	0.339	1
Sex ratio	0.156	4
Income level	0.178	3

Table. 2. The final table of Prioritizing the sub-criteria of physical vulnerability factor.

physical vulnerability factor (weight – 0.331)		
Criterion	**Weight**	**Priority**
Building density	0.059	9
Structure type	0.127	2
Passage width	0.067	7
Number of floors	0.063	8
Distance from aqueduct	0.045	11
Distance from fault	0.171	1
Distance from power substation	0.055	10
Distance from water source	0.037	12
Distance from industrial workshop	0.034	13
Distance from fuel centers	0.085	4
Distance from gas lines	0.095	3
Distance from high voltage power lines	0.081	5
Distance from gas pressure reducing station	0.079	6

Table. 3. The final table of Prioritizing the sub-criteria of capacity factor.

Capacity Factor (weight – 0.352)		
Criterion	**Weight**	**Priority**
Distance from grade 1 way	0.208	1
Distance from grade 2 way	0.117	5
Distance from grade 3 way	0.049	7
Appropriate space	0.127	4
Distance from health centers	0.200	3
Distance from fire station centers	0.204	2
Distance from police station centers	0.095	6

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1. Devi KV, Pai RS. Antiretrovirals: Need for an Effective Drug Delivery. Indian J Pharm Sci 2006;68:1-6.
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2. Volume with supplement: Shen HM, Zhang QF. Risk assessment of nickel carcinogenicity and occupational lung cancer. Environ Health Perspect 1994; 102 Suppl 1:275-82.
3. Issue with supplement: Payne DK, Sullivan MD, Massie MJ. Women's psychological reactions to breast cancer. Semin Oncol 1996;23(1, Suppl 2):89-97.

Books and other Monographs

4. Personal author(s): Ringsven MK, Bond D. Gerontology and leadership skills for nurses. 2nd ed. Albany (NY): Delmar Publishers; 1996.
5. Editor(s), compiler(s) as author: Norman IJ, Redfern SJ, editors. Mental health care for elderly people. New York: Churchill Livingstone; 1996.
6. Chapter in a book: Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Brenner BM, editors. Hypertension: pathophysiology, diagnosis, and management. 2nd ed. New York: Raven Press; 1995. p. 465-78.

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RESEARCH ARTICLE

Introducing the Influence of Tourism Industry on Development of Sistan and Balouchestan Province using SWOT Planning Model

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ABSTRACT

Tourism development in the denuded areas is considered as one of the main income sources besides generating employment and functional structures. There are many historical, cultural and natural places where the potential of tourism need to be tapped. In Iran there might be many similar areas where tourism economy, if supported, could promote stable development. This study identifies tourism industry as a new step to develop Sistan and Balouchestan Province. Methodology of this study is measurement- descriptive- analyzed method that used SWOT planning model. All weaknesses and strengths, threats and opportunities and providing approaches to solve these problems have been performed by SWOT model. It is concluded that there are many obstacles and problems in tourism industry of Sistan and Balouchestan Province such as lack of integral planning, ineffective presentation of historical and visual works of province, deficit of welfare and residential facilities and special credits.

Key words: tourism, development, Sistan and Balouchestan Province, SWOT model.

INTRODUCTION

In 21 century, technological development provides human the luxury of wealth, leisure hours and globally well-connected destinations. In fact, the second half of 21 century can be marked with tourism industry. Tourism with the annual income of about 1000 billion dollars is considered as an important tool in creating jobs for the poor people [3]. In the present years, the sustainable development includes the social justice, and perseverance of the resources [5]. According to Statistical Association of United Nations (1993), tourism includes people' actions such as traveling out of their residential places and staying on for less than one year in order to trade and to consider the other objectives [19]. On the basis of official expectations of tourism organization (UN WTO), tourists will be increased to 1.5000,000,000 people in 2020 all over the world [22]. 0.7 % to 0.9% of tourism bazaars has been allocated to Iran, in planning of 2025; this number has been considered about 2%. Therefore, 20 million tourists are expected to visit Iran and it can not be fulfilled without precise planning [20].

However, there are significant obstacles to participate community in tourism planning especially in developing countries such as Iran. Some of these obstacles are related to the instruction of decision making in the governing system. Since the central government administration structures, ministries and agencies worked on sectorial basis, it became a norm for development of planning and management to work on the basis, that is to say that it uses sectorial and from top to bottom. Hence, there are two main problems of the development planning system namely: 1.Sectorally fragmented system and 2. Lack of community participation in the planning and management process [13].

According to Pear Larose, a tourist is one who travels to enjoy and to be pleased [11]. The term tourism was first used in 1811 A.D. in English literature and was recorded in 1841 A.D. by the French Larose dictionary [4].This issue was so important that in 1963, the World Tourism Conference was held in Rome, Italy, in this conference the term tourist was defined as follows: "Tourist is a person who travels temporarily and stays in his/her favorite country for 24 hours. Meanwhile, his/her travel purpose is one of the followings: enjoying the holidays, health care, study and research, religious cases and sport, experience and business, family issues, mission, and conference attendance [14].The first reason to develop tourism industry is to utilize economical interests. Tourism imparts economical, social, environmental and cultural changes. Tourism development has social and cultural effects positively such as: 1-familiarizing with other cultures, 2- increasing welfare and quality of life, 3- increasing information, awareness and knowledge, 4- rich cultural trade, 5- transfering cultural values of the other countries, 5- keeping and conserving historical and cultural heritages, 7- reviving the national traditions, 8- using amusement and cultural facilities, 9-increasing the public spaces and places, 10- mutual respect to people in various cultures [22]. Additionally, it is the main power to recover and develop economics in many countries. It can also change local economy and promote entrepreneurship and to increase values of imports to local areas [23].

This research attempts to consider tourist absorption, status and its effects.

METHODOLOGY

SWOT analysis has been used to provide proper strategy to remove and decrease the weaknesses and threats and to increase the strengths.

Study Area

Sistan and Balouchestan Province with181785 km^2 in Iran is the biggest province. It is located between 25° 31' and 31° 27' circles of northern latitude from the equator and between 58° 50' and 63° 21' circles of eastern longitude from Greenwich meridian. It has low density in population. This province is limited to southern Khorassan Province from

north and to Afghanistan from east and to Pakistan and Afghanistan from south and to Kerman Province from west (Fig 1). Its area is as much as 11.4% of total areas of Iran that this area is equal to 11 provinces of Iran. On the basis of divisions of the country, this province has 14 towns, 36 cities, 40 sections, 102 rural districts and more than 10,000 villages. Zahedan is the capital city of Sistan and Balouchestan.

Sistan and Balouchestan Province is the rich ancient cultural heritages and arts that are yet linked with world tourism. Some of its ancient places are: Sarpoush Bazaar, Ayoubi House, Iranshahr Naseri Castle, Bampour Castle, Iranshahr Leader House, Chabahar Portuguese Castle and Zabol burnt city (151 hects, 5000 years old) which popularly known as the archeologist's paradise. Natural absorptions of province include: Hamoon Lake, Taftan Mount, Bahu Kalat River, Gol Feshan Konarak, Miniature Mounts, Merikhi hills with high Chabahar Mounts, Oman Sea Bank, Rock and Sand Banks of Chabahar and Konarak [17].

SWOT analysis

Matrix SWOT can collect 4 methods. Some overlap in performance or they perform simultaneously. In fact, it can collect 4 groups of methods that differ from action degree as follows:

Defensive Strategy its general goal or minimum- minimum one that also called survival method is to decrease weaknesses of system to decrease and neutralize threats.

Adjustment Strategy (minimum –maximum2) it tries to decrease weaknesses to use opportunities maximally. An organization can find some opportunities outside but unable to utilize them due to some weaknesses. Then, this strategy can provide some conditions to use these opportunities.

Necessity Strategy (maximum- minimum) it is gathered on the basis of utilizing strengths to confront threats and its goal is to maximize strengths and minimize the weaknesses. Additionally, it is evidenced that improper using of power can cause undesirable results. Organizations should not use their powers to remove threats rashly.

Offensive Strategy (maximum- maximum) all systems want a position to be able to maximize strengths and opportunities simultaneously. Contrary to defensive strategy that is a reaction solution, it is an action solution. In these circumstances, the organization proceeds to develop its products and services bazaars by using strengths [9] (Fig 2).

Short-term and long-term development strategy

Analyzing effective factors on tourism in Sistan and Balouchestan Province

From Interviewers' point of view, the most important strengths of Sistan and Balouchestan Province in the field of tourism include rich historical works and Cultural Heritages with 0.36 in weigh mark in the first row. This province is located on bank band of Oman Sea with 0.28 in weigh mark in the second row. There are various natural environments and virgin lands that get 0.28% in weigh mark in the third row, there are 54 tourism areas with 0.18% in weigh mark in the fourth row (Table 1). Also, there three important factors such as weakness in management and lake of stability in management, International highway to import drugs and security problems and absence of publicities with 0.32 in weigh mark totally. Also, minimum facilities in all tourism sits with 0.18 in weigh mark and distance from the main development centers with 0.15 in weigh mark are other weaknesses (Table 2).It should be noted that total weight of internal factors is 1 and their weigh mark is 3.50.

According to the above-mentioned tables, Entrepreneurship and making foreign exchange are the main tourism opportunities in Sistan and Balouchestan Province that gets 0.36% of the weight mark. In the second opportunity, there aren't any natural and cultural resources in competitor areas; it is 0.32% in weight mark. In the third opportunity, the important underline installations include road, rail and air transportation system with 0.28% in weight mark (Table 3). Then, many countries have publicized against Iran negatively and regional competition with 0.28 in weight mark that is the most important threats. The next threats are environmental pollution and damages to historical, cultural and natural works as a result of visiting tourists with 0.18 in weigh mark (Table 4).It should be noted that total weight of internal factors is 1 and their weigh mark is 3.18%.

Strategic Factor Analysis

In this model, the most important strategic factors have been provided on tourism in Sistan and Balouchestan Province using table of analyzing internal and external factors and its combination (Fig 3). In fact, the planners that make strategic decisions can limit strengths, weaknesses, threats and opportunities to the lesser factors by strategic factor analysis. It has been done by reviewing each weight of available factors in this table. In fact, the heaviest of these factors should be transferred to this table in regard to weight [9]. The effective strategic factors on tourism in Sistan and Balouchestan Province are provided in Table 5.

CONCLUSION

There are many natural places and historic works in Sistan and Balouchestan Province that can absorb national and international tourists. It is found that Sistan and Balouchestan Province has many various natural and environmental amusements. There are also special geo-tourist absorptions in addition to beautify the virgin natures and traditional and rich culture and historic works that make one of the best and most beautiful tourism places on a faraway point near to the beautiful banks of Oman Sea. It indicates that this place is able to transform to the best tourism sample in the country. It is concluded that Sistan and Balouchestan Province with many tourism places can be one of the most important tourism axis in the country. With respect to the study on current condition and to identify weaknesses, strengths of developing tourism on one hand and weaknesses and threats in tourism development process on the other hand, there is an effective approach that affected on this process named SWOT. It indicates that weakness and instability in management and publicities, disharmony in the related organizations in the field of tourism, negative publicities based on lake of security in this area that they are the main reasons that preclude tourism development in Sistan and Balouchestan Province. Strategies of development and improving management institutes and employing specialty management in tourism departments and stable management to perform long-term plans, strengthening publicities and information in the field of regional tourism potentials and promote optimism about security and cultural position, thinking alike between regional responsible persons of tourism organizations, using watery and winter sports and reinforcing ecotourism have been determined as the most important strategies. There are also other strategies such as using business tourism potentials in Chabahar Area, developing airline to transit passengers and developing medical tourism.

There are some methods for solving tourism problems to make efficient management as following:

- Investing for tourism facilities as natives either are able to own these possibilities or to improve economical conditions.
- Private section should be participated to invest in the field of tourism development.
- Developing varieties in tourism places especially in the field of marine tourism.
- Security promotes development of tourism industry. If there is national and international security in the province, many tourists can visit this area willingly and safely. It promotes tourist attraction and result in greater revenue.

- Developing transition can affect tourism industry development positively. It is very important to transfer tourism to the other provinces and cities.
- Introducing tourism places of province especially unique ancient works and provides necessary conditions to absorb tourist and it can play important role on entrepreneurship in the field of tourism.
- Establishing service centers in the burnt city, Khajeh Mount, Gholaman Opening, Nimeh Well, Bank of Hamoon Sea.
- Using Chabahar tourism potential and other ancient works with security can provide many new occupational opportunities in Sistan and Balouchestan Province.
- Employing the experienced managers in the field of tourism and applying them in the head of administrative and executive affairs.
- Cooperation between province managers and other institutes and organizations related to tourism industry.
- Inviting people and people's participation to make decisions and perform tourism projects.

REFERENCES

1- Barimani, F., Raeispour ,K.and Nouri, Gh (2011)," Study on Geo-tourism and Ecotourism potentials of Sistan and Balouchestan Province along with accessing to Stable Development ", the first national tourism and Stable Development Congress in Sistan and Balouchestan Province.

2-Bahrami, R.,(2010) ,"Study on abilities and problems of rural tourism development in Kordestsn Province", A set of Papers of the forth International Islamic Geographists Congress, Iran- Zahedan.

3- Dritsakis N (2004), Tourism as a long-run Economic Growth Factor, An EmpiricalInvestigation for Greece. Tourism Economics Page 305-316.

4- Daylamani F (2000), Expanding tourism in Iran instead of selling oil, 1st ed.cheshm andaz puplashing.

5- English Tourist Board (2000), the green light; a guide to sustainable tourism, London.

6- Hekmat Nia, H., Mousavi, M. (2006), Application of Model in Geography in Urban and Regional Planning, New Sciences Publication, Yazd, 150.

7- Hejrati, M. H (2000), Geography and Rural Development, Abad Cultural Center, the first Press, Tehran.

8-Harrison, J., John, K (2003), "Strategic Management", Translated byGhasemi,B., Heyat Publication, The first Press, Tehran.

9-Ibrahimzadeh, I(2009)," Aghassizadeh, Abdollah Analyzing effective factors on developing Tourism in Chabahar Area by using SWOT ", Urban and Regional studies and Researches journal , the first year, No.1, Summer 2009.

10- John , L. (1999) ,Tourism and Development in the Third World, Translated by Eftekhari ,R ,& Salehi Amin,M , Chap and Nashr Co., the first Press Tehran .

11- Mahallati, S (2001), Introduction on Tourism, Shahid Beheshtu University.

12- Mahdavi, D (2004), Role of Tourism to develop rural areas surrounding cities and providing Strategic Model (Case- Sample: Small Lavasan Rural District, Thesis of Master's degree program, Tarbiat Moddares University.

13- Mohammadi, H (2010), Citizen Participation in Urban Planning and management, the Case of Iran, Shiraz city, Saadi community. Cassel: Cassel University press.

14- Monshizade R (1998), Tourism, 1st ed.maaie pupleshing.

15- Nouri , Gh. , Taghizadeh, Z.,(2010) , "Measurement of Mirage Potentials of Kermanshah Province from Ecotourism and Tourism Point of view", Congress of Hamedan Islamic Azad University , Pressed on 2011.

16-Sharifzadeh, A., Moradi Nezhad, H (2002)," Rural Tourism Stable Development " , Socio- economic Journal of Tehran Construction Jihad .

17- Tavangar, M., (2010),"Importance of Ecotourism of Sistan and Balouchestan Province", the forth International Islamic Geographists Congress, Iran- Zahedan

18- Tavallaiee, S. (2006), Reviewing Tourism Industry, Publication of Teacher Training University, Tehran.

19- Tabibi, S. K., Babaki, R., Jabbari,A (2007)," Study on relation between Tourism Development and Economical Development in Iran (1959-2005)", Social and Human Research Letter ,« Especially for Economy» , the seventh year, No.26, Fall 2007.

20- Zand Moghadam, (2009)," Study on Desert Potentials as the big Geo-Park of Central Iran and its role in Stable Development of Semnan Province", Preparation Geographical Quarterly ,No. 6.

21- Ziari, K. (2004), Schools, Theories and Models of Philosophic Planning, Yazd University, 22.

22- Zarrabi, A., Eslami Parikhani, S(2011)," Measuring Economic, Socio- Cultural and Environmental Effects of Tourism Development (Case Study on Meshkin Shahr) ", Human Geographical Researches, No.75, spring 2011, Page 37-52.

23- Yazdchi, M., April 5, 2008, World of Economy Newspaper, Page 1.

Fig 1: The Study Area (Barimani et al 2011)

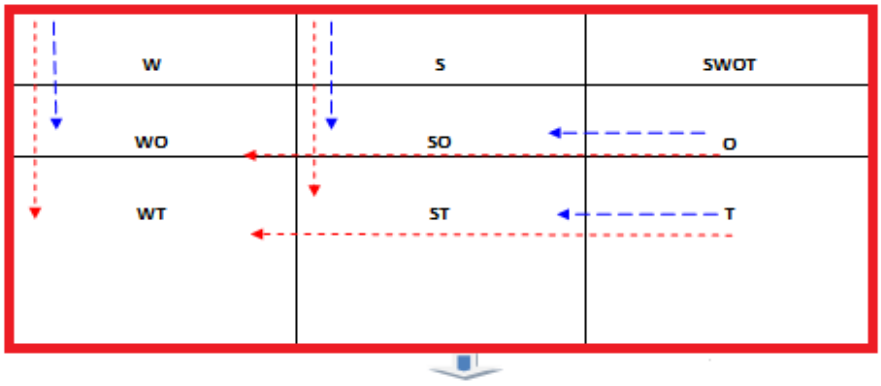

Fig.2: SWOT matrix

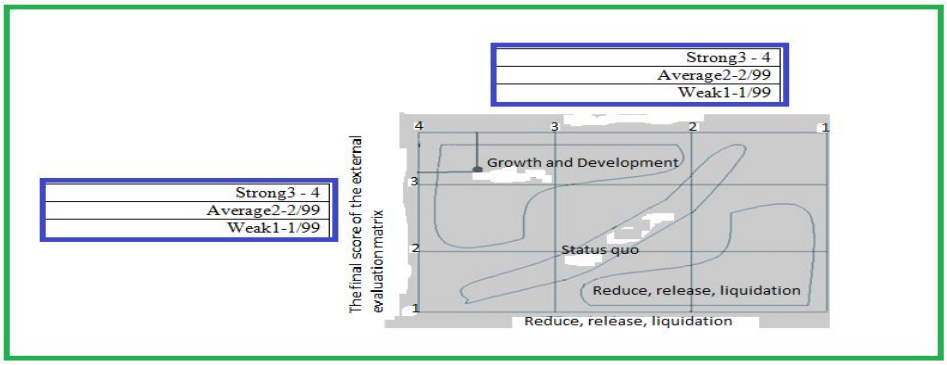

Fig 3: External Factor Evaluation (EFE) Matrix & Internal Factor Evaluation (IFE) Matrix

Table 1: Results of analyzing internal factors (Strengths)

Strengths	Weight	Grade	Weight mark
1- Rich Historical Works and Cultural Heritages	%9	4	0/36
2- Various natural areas and Virgin Lands and geographical landscapes	%6	4	0/24
The enjoyment of the coastline of Oman	7%	4	0/28
Uniting all districts for investigation in the field of tourism	%4	4	0/16
Providing air and marine transportation	%5	3	0/15
54 tourism areas	%6	3	0/18
Unique arts in the south	%3	2	%6
Total	%40		1/ 43

Table 2: Results of analyzing internal factors (weaknesses)

Weaknesses	Weight	Grade	Weight mark
Sandy Environments and Climatological Problems	%4	3	0/12
Management weaknesses and lake of stability in management	%8	4	0/32
Distance from centers and	%5	3	0/15

the main development axis			
Weakness in Publicities	%8	4	0/32
Deficit of health, medical and service facilities	%5	3	0/15
International highway to import drugs and security problems	%8	4	0/32
Absence of minimum possibilities in all tourism sites	%6	4	0/24
Investors can't bring to himself to invest in this area because of security problems	%4	3	0/12
Lack of resources and trained professionals in this area	%4	3	0/12
Undesirable environmental underlines	%5	3	0/15
Undesirable sport and amusement installations and equipments	%3	2	%6
Total	0/60		2/07

Table 3: Analyze Results of External Factors (Opportunities)

Opportunities	Weight	Grade	Weight mark
Special situation and actions of province in respect to be near to Afghanistan and Pakistan	%4	3	0/12
Lake of natural and cultural resources and landscapes in competitor areas	%8	4	0/32
Entrepreneurship and making foreign exchange for country	%9	4	0/36
Investment in underline installations	%6	3	0/18
Access to international sea out of Hormoz Channel and relation to eastern Asian	%4	3	0/12

country , India and gulf countries			
Present of extent road, rail and air transportation	%7	4	0/28
Pay attention to planning and investing in tourism	%3	2	%6
High willing of private section to invest in these areas	%3	2	%6
Chabahar Port as the most important port in Oman Sea	%4	3	0/12
Desired climate to develop actions of tourism in Oman Sea and Taftan Mountain Slop	%3	2	%6
Total	./51		1/ 68

Table 4: Analyze Results of External Factors (Threats)

Threats	Weight	Grade	Weight mark
Universal Negative Publicities against Iran	%7	4	0/28
Ignoring traditional and local culture	%3	3	%9
Not considering to renovating and reconstructing the historic buildings	%4	3	0/12
Regional competition with other tourism regions and southern areas of Persian Gulf	%7	4	0/28
Environmental Pollutions and damages to historical, cultural and natural works as a result of visiting tourists	%6	3	0/18
Increasing common violations in presenting tourists in this region than the last time	%4	3	0/12
The low foreign investment in the field of tourism	%6	3	0/18
High density of population	%4	3	0/12

Lowering health level and deficit of medical possibilities	%4	3	0/12
Internal disputes	%4	3	0/12
Total	0/49		1/ 61

Table 5: Effective strategic factors of tourism in Sistan and Balouchestan Province

Strategic Factors	Weight	Grade	Weight Mark
S1= Rich historic Works and Cultural Heritages	./. 9	4	./ 36
S2= Near to Oman Sea Band	./. 6	3	./ 18
S3= 54 Tourism Areas	./. 7	4	./ 28
W1= Weaknesses of Publicities	./. 8	4	./ 32
W2= lake welfare potentialities in tourism sites	./. 7	4	./ 28
W3= International highway to import drugs and security problems	./. 7	4	./ 28
W4= Weakness of management and lake of stability in management	./. 7	4	./ 28
O1= Entrepreneurship and making foreign exchange for country	./. 8	4	./ 32
O2= Lake of natural and cultural resources and landscapes in competitor areas	./. 8	4	./ 32
O3= The important Underline installations such as Transportation Systems	./. 7	4	./ 28
O4= Investing in installations	./. 6	3	./ 18
T1= Negative publicities against Iran	./. 8	4	./ 32
T2= Regional competition with other tourism areas in Iran	./. 7	4	./ 28
T3= Environmental Pollutions and damages to historical, cultural and natural works as a result of visiting tourists	./. 5	3	./ 15
Total	100		3/ 83

Gathering Strategy

Offensive/Competition Strategy (SO)	**Variety Strategy (ST)**
1- Developing air lines and marine transportation to transit passengers and goods 2- Renovation and Repairing Historic and natural abilities by using underline opportunities 3- Developing offshore installation such as beaches, marine hotels and restaurant and using beautiful and virgin banks of Oman Sea. 4- Tourist and new occupation for natives 5- Increasing investment in Regional Tourism Section; because of unique tourism works and making income as result of providing underline installations. 6- Transforming Tourism to one of the most important strategy o make income and Entrepreneurship because of 54 tourism areas and Investigating to develop Underline Installations	1- Developing Tourism Information Net and Tourism Educational and Information Services 2- Strengthening Publicities and informing about tourism nationally and internationally by media and proper publicities about regional security 3- Investing and managing correct publicities in the field of absorbing tourist and passing through competitor areas 4- Equipping these areas to modern technologies to decrease environmental problems as results from increasing tourists

Reviewing Strategy(WO)	**Defensive Strategy (WT)**
1. Improving and promoting Tourism Products (Scientific, Medical, Business and Amusement) and public-private investment in the field of making and advertising underlines and Regional Tourism Products for Iranian and Foreign Tourists 2. Developing and improving Welfare facilities in Tourism Sites and absorbing tourists because there aren't any similar works in competitor areas. 3. Thinking alike between responsible persons , organizations and departments	1. Gathering regulations and Standards in the field of developing and improving Management Institutes and applying Specialized Management in Tourism and also stability in management to perform long term plans correctly 2. Attracting People's participations to promote, preserve and utilize natural, historical, cultural tourism resources and prevent their environmental, historical and cultural deteriorations. 3. Promoting Health Level in the area and constructing modern specialized hospitals

related to Tourism along developing and leading Tourism plans 4. Using People's Participation in all Tourism Planning Processes	and employing specialists and equipping current centers with modern technologies to absorb passenger who would like to apply Scientific and medical Tourism Products. 4. Increasing frontier localities coefficients via strengthening frontier regulations and providing financial rewards to frontiersmen 5. Native and tribal settlement of province by using tribes' participation policy to manage local affairs and diplomacy and planning 6. Controlling borders to prevent drug imports and increasing security 7. Employing experienced and effective mangers in the field of Tourism 8. Training managers and meetings to promote the responsible persons' scientific efficiency

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RESEARCH ARTICLE

Reviews Retrofitting of Excavated Dusty Walls in Ahwaz in Diaphragm Wall Method (Case study: Central Oxin Hotel Project of Ahwaz)

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ABSTRACT

Based on the definition provided in paragraph 7 of the introduction of chapter 3 list of buildings price, deep is called a location that is lower than ground's natural level from all directions and its average depth isn't less than 60 cm after excavation and reach to ultimate level. Retrofitting deep wall and construction guard structure fits geotechnical and executive terms of structure is a problem that we are facing with today to build massive structures and follow it deep excavation. Nowadays we have to build height instruments and number of underground floors because of increasing density of urban buildings. We should be ensuring that there is a sufficient safety factor for life duration of stable structures for designing excavation. The proper method of excavation is selected according to condition and gender of soil, levels of underground water, the depth and dimensions of excavation, the position and placement of deep, the position and conditions of adjacent, seismicity of the area, the legal requirements of construction, the principle of supply safety of adjacent in particular human, retrofitting costs, costs caused by disrupt or reforming of excavation walls and executive limitations and problems. Between existing methods, nailing and diaphragm wall methods have relative significant benefits. These methods are the best methods of stabilization excavation wall in the term of performance speed, acceptable cost, quick and easy compliance with the terms of various sites, fast and secure implementation, moisture insulation and lack of interference of guardian structural or original building operations. Hence need to be familiar with methods of design and implementation of these methods is very important. A maximum of 20 meters of excavation is intended for construction of central oxin hotel project of Ahwaz. The nailing system is used

as guardian structure for retrofitting excavation wall in this project that this creates some problems in implementation of aforementioned project. In this research it was trying to diaphragm wall method be offered as alternative guardian structure with regard to special circumstances and the type of operation, and reviews the existing procedures for implementation of project up to obtained results give a substantial help in the process of better implementation of Central Auxin hotel project and same construction.

Key words: excavation, guardian structure, diaphragm wall, nailing

INTRODUCTION

On urban and non-urban massive construction, whatever the height of structure to be more the depth of excavation will increase according to geotechnical conditions of the Earth to the point that this depth was so large that existing soil will not be steady-state and it is called slide idiomatically. There is different ways in order to prevent loss of excavated walls that each one is applicable according to terms and conditions of area and project. The following structures can be noted as existing methods:

Reinforced Retaining Walls
Retaining walls
Diaphragm wall
Piling
Sheet pilling
Micropile
Truss construction
Anchorge
Tie back
soil nailing

Three methods as piling, nailing and diaphragm wall were selected for stability excavated walls of central oxin hotel of Ahwaz according to the Geotechnical reports and project requirements and after check out construction management from the perspective of cost, time, hard working and assigning some points to compare provided procedures finally a method will select as a superior method that it will be suggested as superior method for implementing similar projects.

Characteristic of Project

The target project will be built in a land in 3000 square meters and in the range of clock square of Ahwaz. This project includes 20 Office and trading floors, parking and has one hundred percent occupancy level and will perform in clock square. Noted building has five floors below ground and the floor parameter of foundation is about the depth of 20 meters of natural ground level.

Geotechnical Conditions of the Study Area

2 bores to a depth of 45 meters and one bore to a depth of 48.5 meters have been dug. According to triangular form of case study land, layouts are done in such a way that place near three centers of the triangle. There is no stone

platform in excavated speculations and clay, sand, ciliate, tiny seed, alluvial lies were seen. It can be said that after passing through the depths of 12-9 yards, layers have been seen with a relatively high density and hardness. In the initial 10-meters of BH2 and BH1 speculation the layers are in moderate to high hardness but BH3 has encountered to very soft to soft sediments in the depths of 4 to 8 meters. Manual soil has been seen up to 100-130 cm depth of boreholes that this has been deleted due to existing uncertainty of specification and how to handle of anlasma or a dense and good mixture has been replaced. Of course there is no need to replacing dense mixture in no need to using superficial peels and manually soil will lift as well along with other layers. In General allowed layers can be counted as subsurface layers according to kind of layers and amount of their hardness and density. All of these layers are not seen in all boreholes also common layers of boreholes aren't seen in different deeps.seen layers in the speculation include:Brown layered clay medium to hard with mid-layers of layered clay,Brown, clay mud tightens up too hard along with clay and sand layers,hard brown clay and mud with sand mid-layers,layered sand and dense sand-bearing mudhard and clear brown layered clay along with crystals dense and hard brown layered sand Very soft brown clay and mud up to soft along with sand.

Above layers have selected with taking into account the technical requirements of the project and abstain from taking into over need for multiple layers alluvial nature of subsurface layers in the region and the adjacent of Karun River cause that mid-layers and multiple lenses and alternation between different layers be seen in Ahwaz and neighboring areas, which these terms is visible in the project. The status of placement of mentioned layers is provided in different boreholes in the following table. One part of the layer 1 is placed on top of the underground water level (At a depth of 4 meters) and it often is placed at the bottom of the underground water that has been tried to critical state (located part in the section of the underground water) be considered in estimation its Geotechnical parameters.

The Final Report

As you see excavation is 20 meters in mentioned project and according to under cross terms and geotechnical report based on being weakening soil of location, need to guard structures design in order to fixing excavated wall is an imperative matter. According to the terms of region and geotechnical reports for construction of guardian structures, three methods of pile, nailing and diaphragm wall have special advantage compared to other methods that triple methods should be compared together in terms of construction management to select the best way so that the best method for retrofitting the wall is choice.

As it is known diaphragm wall technique run time to a depth of 20 feet has been 170 days, but it last over five months that this is the result of defining two days Saturday and Sunday as a holiday in the Gregorian calendar that these two days are added to days of project every month and 170 days means the number of working days.

The duration of nailing project in depth of 20 meters is 130 days as it has specified in above picture.

Observed time for nailing method is 307 days for 20 meters deep. This issue that initially structures is implemented in Earth then wall has excavated in both methods of in-situ pile method and diaphragm wall is one of the reasons that nailing method cost more time than piling and diaphragm wall. But in nailing method, excavation is done step by step in nailing method concurrently with execution of guardian structures that the time of excavation will be added to the time of performing method.

Comparing Procedures Discusses

Now we compare the cost of each method and level of difficulty of each method in type and depth of discussed soils according to having time and expense of discussed methods according to the time of performing procedure. To do

this, we introduce a concession called total rating which consists of three parameters as cost points and time and hard working points for all three methods.

Total points=Ac+At+Ap
Ac=cost point
At=time point
Ap=hard working point
Due to importance of hard work implementation, this scale is placed on rating with coefficient of 2

Points of Total Discussed methods

Point's classification of nailing method
Total point=Ac+At+Ap=60
Ac=20
At=10
Ap=30

Point's classification of piling method
Total points+Ac+At+Ap=55
Ac=25
At=20
Ap=10

Point's classification of diaphragm wall method
Total points+Ac+At+Ap=60
Ac=15
At=15
Ap=30

Research Doing Study

According to previous taken research in guardian structure to retrofit excavated walls it was tried to select three methods that each one had specific perspective than other methods, for example pile in situ method is important in terms of cost of implementation structure, nailing method has a special significance from the perspective of ease in massive excavation and diaphragm method has a special significance from the perspective of sustainably in excavation wall. In following it was trying that the best option in sustainable building Central oxin hotel projects was selected with presenting above procedures and reviews construction management in the way of cost, time and difficulty. According to performed reviews and calculations and presenting points for triple comparing of sustainability methods, it was seen that the total points of nailing method and diaphragm method was equaled and pile in situ method was at the next station. According to above results and the importance of final cost for implementation of project nailing method was selected. But there were seen significant changes in deformation of surrounding lands with little progress of implementation of project that this matter show alternative guardian construct as an essential thing.

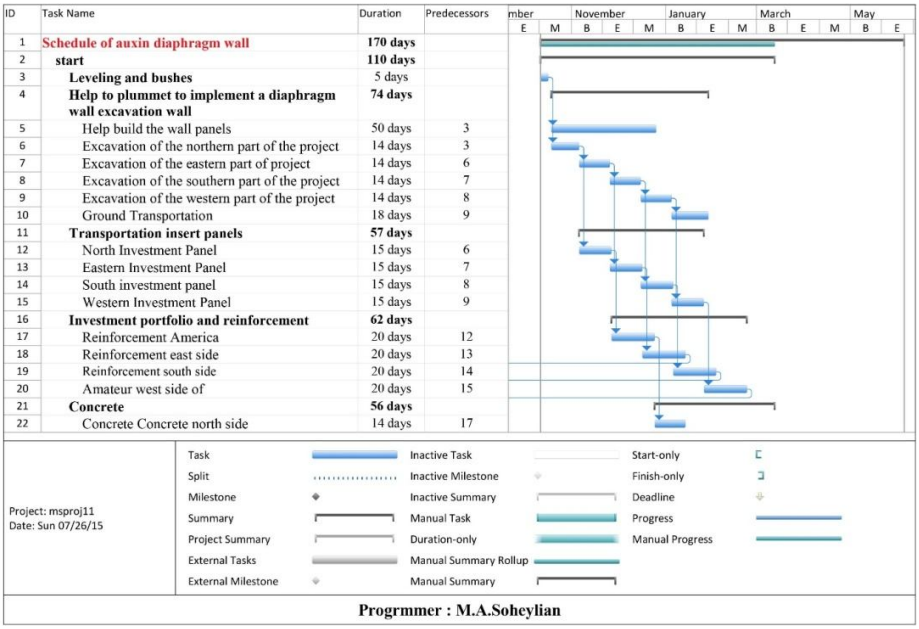
CONCLUSION

Two parameters are determiner in designing control guardian structures and guiding surface and underground waters, in the location of project and control wall changing. Two above said parameters are so important in project of

central oxin hotel according to profiles of subsurface layers that have mainly composed of clay layers of soft saturated. The most common combination of monobar and shotcrete (nailing) was used in initial plan of guardian structure but important changes were seen in guardian structure due to the relatively so deep (20 m) and shear strength and low elongation of subsurface sediments. These changing that are with settlement of accompanied lands can be serious damage to adjacent streets and structures therefore, for this reason it was tried that improve plans and reduce rate of change. Alternative plan should be higher than initial plan of monobar and shotcrete to reduce amount of available reforms. According to the results of triple methods of alternative plan, using of diaphragm wall is for this regard to reduce the amount of changes with increasing thickness of wall up to 30 cm. It should be explained that implementation wall with thickness more than 20cm using shotcrete technique will be associated with a lot of problems indeed that it give significance to using shotcrete wall with high thickness. On the other hand, performing shotcrete along with drainage and guarding surface and underground waters in the workshop can create several problems to traffic personnel and machinery and slows down guardian of structure implementation while there is no need to drainage groundwater with proper implementation of diaphragm wall and ceiling it off, although water pressure should be on count on wall in designing them.

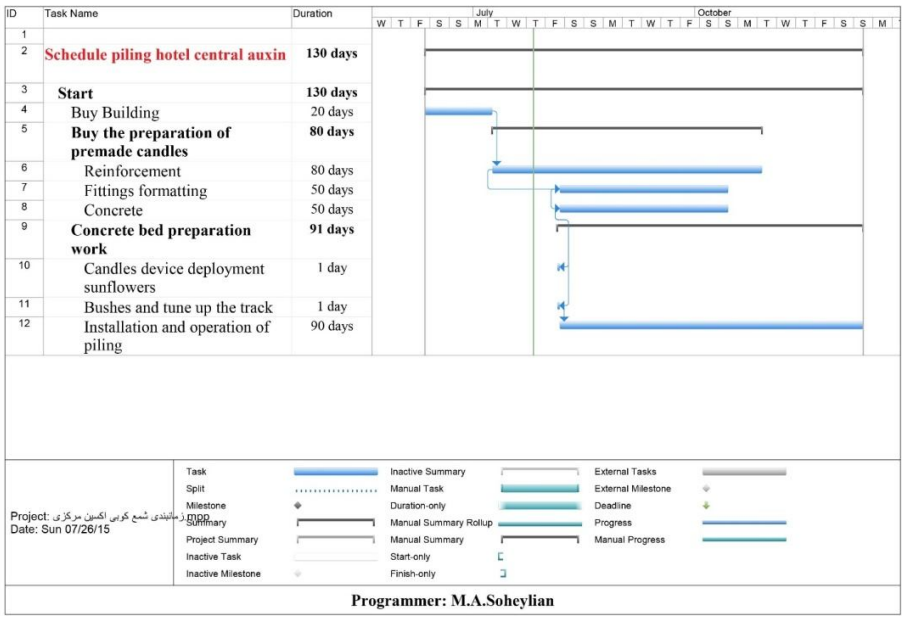
REFERENCES

1. Depertmant of Civil Engineering, Khouzestan Scince And Reasearch Branch, Islamic Azad University, Ahvaz, Iran
2. Depertmant of Civil Engineering, Ahvaz Branch, Islamic Azad University, ahvaz, Iran
3. Aghaniaee, S.A (1989), geology of Iran, first printing, Geology organization and mineral exploration of country, 606 pages
4. Islamic, A (2005), Different methods to determine axial load capacity of candles and executive Instructions
5. Ashrafi, H (2006) the principles of excavation and guardian structures of housing research center
6. Memarian, H, (2002) Engineering geology and Geotechnics of Tehran: Tehran University publications
7. Department of civil engineering, University of science and research branch of Khuzestan, , Islamic Azad University, Ahwaz, Iran
8. Department of civil engineering, branch of Ahwaz, Azad University, Ahwaz, Iran
9. Bachy – CohetaneheWebsike : http: //www.bachy.com
10. Basement Desigh, Barry Lenane, PowerpointShide Show
11. Civil Design Criteria for Road and Rail Transitsystems| , 2002, Revision A4 , Published by hand Transport Avthority.
12. Design and Construction faihuresCavsed Singapore Tunnel- Extracted from New Civil Eengiheer, 2005.
13. journal of the geotechnical engineering division ,asce,vol .104,NO.GT2،267-279
14. Safety News", 2005, Spccial Edition, Land Transport Authority.
15. Skanska Company Websit: Uhttp://wwwU. Skanska.co. UK.
16. Soilnailing of highway slopes and excavations FHWA-RD. 84-93
17. Soilnailing technical report ISSMFE TC . 17،2004
18. Stent Website: http: //www.Stent.co. UK



ID	Task Name	Duration	Predecessors
1	**Schedule of auxin diaphragm wall**	**170 days**	
2	**start**	**110 days**	
3	**Leveling and bushes**	5 days	
4	**Help to plummet to implement a diaphragm wall excavation wall**	**74 days**	
5	Help build the wall panels	50 days	3
6	Excavation of the northern part of the project	14 days	3
7	Excavation of the eastern part of project	14 days	6
8	Excavation of the southern part of the project	14 days	7
9	Excavation of the western part of the project	14 days	8
10	Ground Transportation	18 days	9
11	**Transportation insert panels**	**57 days**	
12	North Investment Panel	15 days	6
13	Eastern Investment Panel	15 days	7
14	South investment panel	15 days	8
15	Western Investment Panel	15 days	9
16	**Investment portfolio and reinforcement**	**62 days**	
17	Reinforcement America	20 days	12
18	Reinforcement east side	20 days	13
19	Reinforcement south side	20 days	14
20	Amateur west side of	20 days	15
21	**Concrete**	**56 days**	
22	Concrete Concrete north side	14 days	17

Figure 1-Schedule of diaphragm wall method



ID	Task Name	Duration
1		
2	**Schedule piling hotel central auxin**	**130 days**
3	**Start**	**130 days**
4	Buy Building	20 days
5	**Buy the preparation of premade candles**	**80 days**
6	Reinforcement	80 days
7	Fittings formatting	50 days
8	Concrete	50 days
9	**Concrete bed preparation work**	**91 days**
10	Candles device deployment sunflowers	1 day
11	Bushes and tune up the track	1 day
12	Installation and operation of piling	90 days

Figure2- Schedule of in-situ pile method

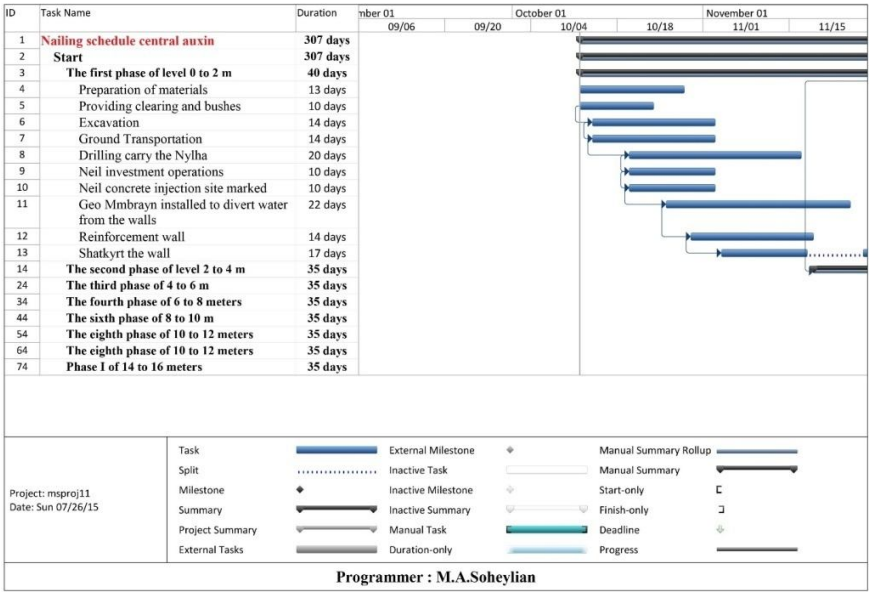


Figure 3- Schedule of nailing method

Table 1: Align locating different layers in boreholes

borehole	Dig method	deep	Water surface	Sample quantity	touched Sample quantity	Untouched Sample quantity
BH1	CONTUNIUS CORNING	48.5	-3.5	17	24	4
BH2	CONTUNIUS CORNING	45	-4	21	31	4
BH3	CONTUNIUS CORNING	45	-4	21	29	4

Table 2: Cost of diaphragm wall method

Diaphragm Wall Financial Summary					
The percentage of non-base rows To subtotal rows	sum			year	List of string prices
	Base & non-base	Non-base	base		
	8,283,950,313		8,283,950,313	2015	building

	8,283,950,313		8,283,950,313	2015	way, runway, airport and rail infrastructure
	73,406,211,264		73,406,211,264		sum
	3,670,310,563				Equipping workshop
	77,076,521,827				Counted price for performing project

Table 3: cost of nailing method

diaphragm wall financial summary					
The percentage of non-base rows To subtotal rows	**sum**			**year**	**List of string prices**
	Base & non-base	**Non-base**	**base**		
	67,156,687,047		67,156,687,047	2015	way, runway, airport and rail infrastructure
	67,156,687,047		67,156,687,047		sum
	3,357,834,352				Equipping workshop
	70,514,521,399				Counted price for performing project

Table 4: The cost of pile in situ method

pile in situ financial summary					
The percentage of non-base rows To subtotal rows	**sum**			**year**	**List of string prices**
	Base & non-base	**Non-base**	**base**		
			02404043811	2015	building
			25056573240	2015	way, runway, airport and rail infrastructure

			27460517052		sum
	2635306082				Equipping workshop
	53713577954				Counted price for performing project

Table: Comparing costs of triple methods

Method cost	Ac	Diaphragm wall	Nailing	pile in situ
Less than 50 billion rials	30			
From 50 to 60 billion rials	25			*
From 60 to 70 billion rials	20		*	
From 70 to 80 billion rials	15	*		
Higher than 80 billion rials	10			

Table 6: Comparing times of triple methods

Method time	At	Diaphragm wall	Nailing	pile in situ
Less than 100 days	25			
From 100 to 150 days	20			*
From 150 to 200 days	15	*		
Higher than 200 days	10		*	

Table 7: Comparing hardness of triple methods

Method time	Ap	Diaphragm wall	Nailing	pile in situ
E (easy)	30	*	*	
M (middle)	20			
H (hard)	10			*

Total Comparison of Triple Methods

Explain	Paling method	Nailing method	Diaphragm Wall Method
Total point	55	60	60

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RESEARCH ARTICLE

Project and Challenges Management through Achieving Objectives of Buildings and Roads Projects of Khuzestan Province

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ABSTRACT

Although project management tries to find suitable program and plan in order to operate projects by reducing time and costs, unexpected factors such as Failuretoprovidecredit, the lack of using skillful labors, the lack of keeping elements, materials and machines, weather conditions, etc. will prevent and disrupt in final consequences. Because of large extend and large volume of operating various constructive projects and also weather conditions as well as some challenges in which are obvious in buildings and roads projects of Iran and also particular effective factors, identifying and measurement them, some questionnaires were delivered to executive agents of buildings and roads projects of Khuzestan province in order to determine the rate of cost and time after completing questionnaires and analyzing data.Dataanalysis was performed by analytical hierarchy process. These results will prepare and deliver better plans in order to operate projects, reduce costs and times of projects and also determine Interfering factors and finally make a suitable situation for gaining main goals of projects. It will prepare the way of operating projects for experts who need some information for investigation and using results of researches.

Key words: buildings and roads projects of Khuzestan province, Project Management, time and cost, analytical hierarchy process.

INTRODUCTION

Although project management tries to find suitable program and plan in order to operate projects by reducing time and costs, unexpected factors such as Failuretoprovidecredit, the lack of using skillful labors, the lack of keeping elements, materials and machines, weather conditions, etc.will prevent and disrupt in final consequences. Thus, final time and cost will be much more than expected value. For that reason, identifying effective factors in increasing time and costs of buildings and roads projects of Khuzestan province, research and using experience and ideas of executive agents in order to conclude and analysis data in reducing or ceasing mentioned factors will be necessary for a realistic plan.

Project management

PMBOK as the project management institute defines project management as follow:

Project management is a elements for knowing skills and is a technical method in order to access main objectives of a project. At first we must ensure that a project has been defined with specific limits. Then optimization of resources and matching necessary data in order to access objectives of a project will be important. In fact a project consists of obvious activities such as funds, human resource, materials, energy, chance, communication, preparation, etc. in order to access preset aims and objectives. Project management will be a framework of plan and project guidance on the basis of time, cost and quality toward its consequences. Project management will be a group of activities planned, organized and under control in order to guide project operations and try to use resources in a correct way and provide specific results according to agreed cost at fixed time. In the other hand, project management may be defining as the applying knowledge, skills, elements and techniques in order to execute activities and provide proctors' Expectations. Project management uses plan and control of a project as two levels of power. At the beginning of this study, effective factors in time and cost of buildings and roads projects of Khuzestan province will be prepared by studying and council with experts. Achieved data will be classified and few questionnaires spread between agents of projects. In the end, the rate of importance of every factor and expected results will be analyzed.

Identifying effective factors in increasing time and costs of projects and their impact

The effective indices in increasing time and cost of:buildings and roads projects of Khuzestan province

Identifying effective indices increasing time and cost of:buildings and roads projects of Khuzestan province will be the first step for performing analytical hierarchy process (AHP). For that reason 9 indices between all of effective indices in increasing cost and time of project were selected as follow: equipment, materials, and external factors, special condition of a project, laws and rules, contract situation, employer, contractor, counselor.

Preparation of original table of index and sub-indices

After determining the effective indexes for each of these indexes, a number of sub-index is determined and for each of the sub- indexes that after the completion of questionnaires based on these weights, calculations were performed and the effect determined.

Determine the impact of factors

In this step the percentage of each of the factors in specified weight is determined to define the importance of each indicator in relation to the specified index.

Establishing a binary comparison matrix

Until this stage, indices were separately weighted and also the rate of their effectiveness (factors related to equipment, materials, external factors, special condition of a project, laws and rules, contract situation, employer, contractor, counselor) were evaluated. According to systematic view, identifying the rate of effectiveness won't be possible with an index and Simultaneous research will be necessary. It can be said that mentioned indices won't be al the same level even superiority of an index compared with others will be feasible. Thus, at this stage, indices will be compared toward one another and AHP method will be used inj order to realize their roles in increasing time and cost. This method used a basic scale with amounts of 1 to 9 in order to determine relative Priority of Two criteria.

In fact, in order to determine importance criteria (weight), we compared them as mutually (pairwise). Pairwise comparisons will be fixed in n×n matrix (9×9) as "binary comparison matrix indices". All of elements are positive and with due to attention to reverse conditions in AHP process. Numerical amount of ija and 1/ija will be possible if I importance toward j is equal to k and j importance toward I will be 1/k. binary comparison matrix indices for mentioned problem is available in table (12). In order to determine effective factors in increasing time and cost of buildings and roads projects of Khuzestan province and the amount of their importance. We used various resources such as studies, reports and experts' ideas in which their results are shown in tablet (13). These information and data were used in order to analyze overall indices**.**

Calculating of criteria weights manually (the details of this step and methods of calculation)

This phase includes the following steps:

Multiplying the value of each row of columns in each binary comparison matrix in each other

Which are described in the following equation (Thapalia, 2006)

$$V = \sum \text{factor 1} \times \text{factor 2} \times \ldots\ldots\ldots \quad (1)$$

$$V = 9\times9 \times 9 \times \ldots\ldots\ldots \times9 = 4782969$$

Calculation of abnormal weight

In order to calculate abnormal weights, the total of multiply of each row of columns should be exponentiation.

$$\text{abnormal weight} = (\text{By multiplying the weight of each row})^{1/n} \quad (2)$$

Calculation of the final weights of indicators

$$\text{final standards weight} = \text{abnormal weight} / \text{total abnormal weight} \quad (3)$$

$$\text{final standards weight} = (1.0723) / (10.037) = 0.1068$$

Estimation of agreement ratio

One of the analytical hierarchy process benefits will be Adjustment check in view made for determining either importance Criterion or sub-reiteration. In other word, matrix binary comparison criteria must determine the amount of consistency during review. When the importance of standards toward each other was evaluated, the possibility of Inconsistency will be existence. It means that if Ai is more important than Aj and also Aj is more important than Ak, thus Ai is more important than Ak. Despite of all struggles, preference and feeling of people is Uncoordinated. For that reason a measure will be needed in order to clear in Adjustment of judgments (Zebardast quoted to Tofigh). According to above examination, if the amount of agreement ratio is less than 0.1($CR \leq 0.1$) , Adjustments observed in review and under $CR \geq 1$ situation a review will be necessary.

Agreement vector calculation

Equation 4 is used to calculate 1 agreement vector in AHP method Where calculated values for each row (vector) on final weight calculated will be divided for each criterion and its result will be multiplied by 1/n:

$$L = \frac{1}{n}\sum_{i=1}^{n} \quad (4)$$

$$\begin{bmatrix} 1 & 0.5 & 5 & 2 & 3 & 1 & 0.5 & 0.5 & 0.5 \\ 2 & 1 & 0.5 & 3 & 5 & 2 & 1 & 1 & 1 \\ 0.2 & 2 & 1 & 5 & 7 & 2 & 2 & 2 & 2 \\ 0.5 & 0.33 & 0.2 & 1 & 1 & 0.5 & 0.33 & 0.33 & 0.33 \\ 0.33 & 0.2 & 0.14 & 1 & 1 & 0.33 & 0.25 & 0.2 & 0.2 \\ 1 & 0.5 & 0.5 & 2 & 3 & 1 & 0.5 & 0.5 & 0.5 \\ 2 & 1 & 0.5 & 3 & 4 & 2 & 1 & 1 & 1 \\ 2 & 1 & 0.5 & 3 & 5 & 2 & 1 & 1 & 1 \\ 2 & 1 & 0.5 & 3 & 5 & 2 & 1 & 1 & 1 \end{bmatrix} \times \begin{bmatrix} 0.106 \\ 0.139 \\ 0.171 \\ 0.047 \\ 0.033 \\ 0.084 \\ 0.136 \\ 0.139 \\ 0.139 \end{bmatrix} = \begin{bmatrix} 1.514 \\ 1.230 \\ 1.932 \\ 0.391 \\ 0.204 \\ 0.745 \\ 1.291 \\ 1.324 \\ 1.324 \end{bmatrix}$$

$$L = \frac{1}{9}\left[\frac{1.514}{0.106} + \frac{1.230}{0.139} + \frac{1.932}{0.171} + \frac{0.391}{0.047} + \frac{0.204}{0.033} + \frac{0.745}{0.084} + \frac{1.291}{0.136} + \frac{1.324}{0.139} + \frac{1.324}{0.139}\right] = 9.047$$

Adjustment index calculation

After calculating agreement vector and its value, Adjustment index calculation will be necessary as follow:

$$CI = \frac{L-n}{n-1} = \frac{9.047-9}{9-1} = 0.0059 \quad (5)$$

Adjustment coefficient or agreement ratio

It can be evaluated by Equation (6)

$$CR = \frac{CI}{RI} \quad (6)$$

Where RI indicates random index which its value will be extracted from table 16-4. This table has been provided by saati and harker. According to table, PairedComparisonMatrix has been established randomly. After that Adjustment index will be evaluated whether its amount is less than 10%, as like as bootstrap technique. Adjustment index average for samples (n=500) of matrix dimensions are in Adjustment index row. For greater dimensions, also, using this method for RI calculation will be possible and we can use it in Adjustment index calculation of paired comparisons.

$$CR = \frac{0.0059}{1.45} = 0.004$$

If CR≤0.1 thus suitable adjustment has been observed in judgment and review, while under CR≥0.1 situation a review will be necessary. In this study the value if agreement ratio has evaluated 0.004. It means that necessary adjustment has made.

CONCLUSION

This study was about ranking and identifying effective factors in increasing time and cost of buildings and roads projects of Khuzestan province and a questionnaire with 9 indices and 55 sub-indices was designed and was offered to employers, contactors and counselors. Results of this study can be effective in preparing suitable approached in order to optimize operations and reduce delays and costs of buildings and roads projects of Khuzestan province. According to results of questionnaire analyzing , external factors with Inflation sub-indices , environmental unsuitable conditions impact such ashaze, overheating, flood, etc. , false prices fluctuations, economical sanctions and Lack of banking deficiency are the most effective factors on the basis of delay and increasing cost in buildings and roads projects of Khuzestan province(17.1% rates) and after mentioned above factors, the factors related to contactor, counselor and materials are available (14 %). The factors related to employer have a small difference with three previous factors (13.7%). It can be said that factors related to equipments and machines are important cases (10.7%).

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REFERENCES

1. A Guide to the Project Management Body of Knowledge , PMBOK Guide 2004 edition, Project Management Institute .
2. Aldrich, Howard: “Organizations & Environments”; USA, Prentice-Hall, 1979.
3. Becker, Gregory M.; “A Practical Risk Management Approach”; USA, PMI Global Congress, 2004.

4. Carmichahelhel, Disputes and International Project, 2002.
5. Causes of construction delay: traditional contracts traditional contracts Odeh, A.M. / Battaineh,H.T.,International Journal of project Management , 20 p. 67-73,Jan 2002.
6. Chan DWM, kumaraswamy MM.(2002), Compressing construction duration: lessonslearned from Hong Kong building projects. Int project manage.
7. Choudhury, S., (1990"project management", McGraw-Hill, New Delhi.
8. C/NBCC Joint Working Party. No Dispute , 1990.
9. Degarmo E. Paul & et- al.; "Engineering Economy"; 10th ed., USA, Prentice- Hall, 1997.
10. Dale, C.W., (1977), "Engineering management", Prentice-Hall, Inc.
11. Fooks, P.G., (1982), "Planning and management", John Wiley & Sons, New York.
12. Forsberg, Kevin & et- al.; "Visualizing Project Management"; 2nd ed., USA, John Wiley & Sons, 2000.
13. Frimpong ,Yaw , Oluwoye, Jacob , Crawford, Lynn ,,(2003), Causes of delay andcost overruns in construction of groundwater projects in a developing countries , internationaljournal of project management.
14. Gonen, Turan; "Engineering Economy for Engineering Managers"; USA, John Wiley & Sons, 1990.
15. Hillson, David; "Earned Value Management & RiskManagement: A Practical Synergy"; USA, PMI Global
16. Congress, 2004.
17. International Standard Organization; "Quality ManagementSystems Guidelines for Quality Management in Projects";ISO, UK, 2003.
18. Kerzner, Harold; "Project Management: A SystemsApproach to Planning, scheduling & Controlling"; 5thed.,USA, Van Nostrand Reinhold, 1995.
19. Mansfield, N. /Ugwu,O./Doran,T.," Causes of delay and cost overruns in Nigerian construction ptojects "International Journal of project management, 12 p. 254-260,nov1994.
20. Mantel, Samuel & et- al.; "Project Management in Practice"; USA, John Wiley & Sons, 2001.
21. Mansfield NR, Ugwu OO, Doran T. (1994), Causes of delay and cost overruns inNigerian construction projects. International Journal of project management.
22. Marsh, P.V.D., (1988), "Contracting for engineering and construction projects", Gower, USA.
23. Martin, Paula & Karen Tate; "Getting Started in ProjectManagement"; USA, John Wiley & Sons, 2001.
24. Odeyinka HA, Yusif A, (1997), The causes and effects of construction delays oncompletion cost of housing project in Nigeria. J Financial manage property construction.
25. Ogunlana, Stephen O. and Promkuntong K., Construction delay in fast-growing economy:comparing Thailand with other economies, International Journal of Project Management, Vol.14, Pages 37-45, 1996.
26. Project Management Institute; "A Guide to the ProjectManagement Body of Knowledge"; 3rd ed., USA, PMI, 2004.
27. Project Management Institute; "A Guide to the ProjectManagement Body of Knowledge"; USA, PMI, 2000.
28. Project Management Institute; "Practice Standard WorkBreakdown Structure"; USA, PMI, 2001.
29. Pugh, D.S.; "The Measurement of Organization Structure:Does Context Determine Form?" Organizational Dynamics1, Spring 1973.
30. Schumacher ,Lee , PE. Quantifying and Apportioning Delay on Construction projects. CostEngineering 37,no.2(February 1995)
31. The Wikipediya: Free encyclopedia: http://www.wikipediya.com.
32. Turner, J. Rodeny; "The Handbook of Project- based Management"; UK, McGraw- Hill, 1999.
33. Yates J. (1993), Construction decision support system for delay analysis. Journal ofconstruction engineering and management, ASCE.

Table 1: Indexes, sub-indexes and coded based on effectiveness

Very high	High	Avera -ge	Little	very little	Sub-index	index	row
9	7	5	3	1			
			*		lack of appropriate equipment and machinery	factors related to equipme nt	1
		*			Machinery fatigue		
		*			Unskillful members at the use of machinery		
			*		Failure to provide appropriate service after selling machinery		
				*	the problem in the preparation of materials according to current prices and official	factors related to materials	2
			*		no mandatory standardization of materials		
	*				waste material		
	*				improper storage of materials		
	*				inflation	external factors	3
		*			poor environmental conditions (Dust storms, excessive heat , flooding , and…)		
	*				fluctuation in prices (false)		
	*				lack of banking facilities		
	*				Economic boycott		
		*			the complexity of the method of implementation of the project	special condition s of the project	4
			*		Problems in directives and contradictory and frequent changes	factors related to laws and regulatio ns	5
			*		Some failures in general condition		
			*		lack of timely adjustment index and disproportion to the actual conditions of the day		
				*	Inefficient settlement of dispute		
			*		choosing the wrong type of contract for the project	factors related to the	6
	*				the lack of clear contract		

	*				legal claims and arguments of the contract	contract	
	*				problems of coordination and enough communication between the different elements of the project		
			*		failure to forecast crime and encouraging to increase incentives in the contract		
	*				Improper appropriation process in the development plans and validation return rules	factors related to the employer	7
	*				Incorrectly contractor selection based on the lowest price		
	*				the accuracy and adequacy of the design and tender documents		
		*			difficulty in obtaining government licenses		
		*			Imposed by the employer to the contractor for the contract unrealistic		
			*		failure to run the opposition and delivery problems and a lack of suitable project location		
		*			multiplicity of decision centers in creating project		
		*			lack of technical experts in employers		
			*		changes in the description and the scope of work		
	*				lack of foreign investor participation or the private sector for giving finance and lack of financial resources		
		*			frequent changes of employer management		
		*			suspension of work by the employer		
	*				lack of sufficient financial , logistical and administrative contractor	factors related to contrac-tor	8
	*				non- application of project management knowledge on the run		
	*				Poor management and planning of workshop		
		*			lack of proper planning and calculation of the cost of each sources		
	*				lack of clear and detailed construction schedule defects		
		*			unexpected events and accidents resulting from non-compliance with safety issues in the workplace		

		*			poor implementation methods		
				*	no consequences for contractor in case of non-compliance with contractual obligations		
				*	Contractors problems		
*					Shortage of skilled and trained workers		
	*				low productivity		
		*			Incorrect studies of poject feasibility	factors associated with advisor	9
	*				delays in the adoption and approval of drawings, instructions, documents and contractor licenses		
		*			delays in the design		
		*			lack of information and design errors		
	*				lack of supervision		
				*	lack of attention to value engineering		
	*				lack of accurate estimate of workload, materials, equipment and projects		
			*		lack of standards and technical specifications in the plans		
	*				Study and performance simultaneously		

Table 2: The impact of factors related to equipment and machinery according to time and cost of projects

Effectiveness	Percentage of total	Factors Related to Machinery and Equipment
very little	7.14 %	12
little	25 %	42
average	33.93 %	57
high	30.36 %	51
Very high	3.57 %	6

Table 3: The impact of external factors according to time and cost of projects

effectiveness	percentage of total	External factors
very little	8.93%	15
little	19.64%	33
average	26.79%	45
high	37.5%	63
Very high	7.14%	12

Table 4: The impact of external factors according to time and cost of projects

effectiveness	percentage of total	external factors
very little	2.86%	6
little	8.57%	18
average	21.43%	45
high	44.28%	93
Very high	22.86%	48

Table 5: The impact of special conditions of the project factors according to time and cost of projects

effectiveness	percentage of total	special conditions of the project
very little	0	0
little	42.86 %	18
average	42.86 %	18
high	14.28 %	6
Very high	0	0

Table 6: The impact of factors related to laws and regulations according to time and cost of projects

Effectiveness	Percentage of total	Factors related to laws and regulations
very little	5.36 %	9
little	44.64 %	75
average	39.28 %	66
high	8.93 %	15
Very high	1.79 %	3

Table 7: The impact of factors related to contract according to time and cost of projects

Effectiveness	Percentage of total	Factors relating to the contract
very little	2.86 %	6
little	31.43 %	66
average	32.86 %	69
high	28.57 %	60
Very high	4.28 %	9

Table 8: The impact of factors related to the employer according to time and cost of projects

Effectiveness	Percentage of total	Factors related to the employer
very little	2.38 %	12
little	20.24 %	102
average	35.71 %	180
high	35.71 %	180
Very high	5.96 %	30

Table 9: The impact of factors related to contractor according to time and cost of projects

Effectiveness	Percentage of total	Factors related to contractor
very little	3.9 %	18
little	16.88 %	78
average	33.12 %	153
high	31.82 %	147
Very high	14.28 %	66

Table 10: The impact of factors related to advisor according to time and cost of projects

effectiveness	percentage of total	factors associated with advisor
very little	3.97 %	15
little	16.67 %	63
average	33.33 %	126
high	38.89 %	147
Very high	7.14 %	27

Table11: a scale of 9 saati quantity for binary comparisons of options

level importance	definition
1	Equal importance
2	equal importance to moderate
3	Moderate importance
4	Moderate importance to strong
5	Strong importance
6	Strong importance to extra strong
7	extra strong importance
8	extra strong importance to super strong
9	Super strong importance

Table 12: Comparison Matrix of Binary Indica

Index	factors related to equipment	factors related to materials	external factors	special conditions of the project	factors related to laws and regulations	factors related to the contract	factors related to the employer	factors related to contractor	factors associated with advisor
factors related to equipment	1	0.5	5	2	3	1	0.5	0.5	0.5
factors related to materials	2	1	0.5	3	5	2	1	1	1
external factors	0.2	2	1	5	7	2	2	2	2
special conditions of the project	0.5	0.33	0.2	1	1	0.5	0.33	0.33	0.33
factors related to laws and regulations	0.2	0.2	0.14	1	1	0.33	0.25	0.2	0.2
factors related to the contract	1	0.5	0.5	2	3	1	0.5	0.5	0.5
factors related to the employer	2	1	0.5	3	4	2	1	1	1
factors related to contractor	2	1	0.5	3	5	2	1	1	1
factors associated with advisor	2	1	0.5	3	5	2	1	1	1

Table 13: The final weight of the indexes in binary comparison matrix

index	factors related to equipment	factors related to materials	external factors	special conditions of the project	factors related to laws and regulations	factors related to the contract	factors related to the employer	factors related to contractor	factors associated with advisor	Product weight	Not normal weight	The final weight indicators	The final weight indicators (Percent)
factors related to equipment	1	0.5	5	2	3	1	0.5	0.5	0.5	1.875	1.072342	0.106833	%10.7
factors related to materials	2	1	0.5	3	5	2	1	1	1	30	1.405116	0.139985	%14
external factors	0.2	2	1	5	7	2	2	2	2	224	1.718006	0.171157	%17.1
special conditions of the project	0.5	0.33	0.2	1	1	0.5	0.33	0.33	0.33	0.000593	0.475667	0.047389	%4.7
factors related to laws and regulations	0.2	0.2	0.14	1	1	0.33	0.25	0.2	0.2	0.000018	0.336256	0.0335	%3.3
factors related to the contract	1	0.5	0.5	2	3	1	0.5	0.5	0.5	0.1875	0.845863	0.08427	%8.4
factors related to the employer	2	1	0.5	3	4	2	1	1	1	24	1.374109	0.136896	%13.7
factors related to contractor	2	1	0.5	3	5	2	1	1	1	30	1.405116	0.139985	%14
factors associated with advisor	2	1	0.5	3	5	2	1	1	1	30	1.405116	0.139985	%14
Total										340.063111	10.037591	1	%100

Table 14: Random Index

15	14	13	12	11	10	9	8	7	6	5	4	3	2	N
1.59	1.57	1.56	1.48	1.51	1.49	1.45	1.41	1.32	1.24	1.12	0.9	0.58	0	RI

Reference: (Zebardast)

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RESEARCH ARTICLE

Effect of Planting Date and Herbicide Application on yield and Biological Nitrogen Fixation in the Cultivars Chintzy Bean

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ABSTRACT

In this study the effect of different planting dates and weed control method on the yield and biological nitrogen fixation Chintzy bean cultivars were evaluated. This study experiment a split block (strip plots) based on a randomized complete block with 4 replications for two years from 2012 Kheirabad research was conducted at the station. The main factor of 4 levels of planting date (a_1=10 may, a_2=26 may, a_3=10 June and a_4=26 June) and subplot in 4 levels of herbicide application (b_1=Pursuit, b_2=Trflan, b_3=Hand b_4=Weeding weeds and Control) and the sub-subplot Chintzy bean cultivars, two levels of (c_1=Talash and c_2=COS-16), respectively. The results were observed in the highest yield and biological nitrogen fixation (BNF) in Cultivar COS-16 and second planting dates respectively. In both years was observed the fourth planting date is due to early cold autumn and reduce the number of active nodes and reducing biological nitrogen fixation, resulting in a drastic reduction of chintzy bean is not suitable for planting. In the end, it is recommended that Cultivar Talash best and most suitable planting dates chintzy beans the perfect weeding grass-weeds, planting dates thirds (10 June) and second (26 May) is. Given the impossibility of complete weeding weeds in beans, chintzy beans, Cultivar best treatment for harvesting the maximum yield in cultivar Talash, application herbicide Pursuit the third planting date (10 June) and second (26

May) is. The results obtained from varieties of Talash can also be fitted in the case of varieties of generalized COS-16 said.

Keywords: Planting date, Herbicide, Yield, Biological nitrogen fixation.

INTRODUCTION

Cereals after wheat and rice, consumption of the world's major agricultural products are to reach is an important part of the protein needed to provide [14]. Inappropriate planting date and weeds are the most important factors that greatly reduce bean yield [3]. The main problems bean growers in the region, the growth of weeds and their control is in the field. Because the existence of weeds in addition to the quantity of the product, its quality, the cost of harvesting and the diversity and abundance of pests and beneficial insects to significantly affect the price. For each year of the farmers use herbicides to control weeds in bean fields, large quantities are causing environmental problems and weed resistance to Herbicide [8]. In recent years, increasing weed density and increased use of pesticides and herbicides in soil and reduce consumption of bean plant causes loss plant beans and ultimately reducing the yield [2]. According to some experiments, weeds can reduce more than 75% of the bean crop [5]. Pigweed, Purslane, nightshade, claw crow, barnyard grass, foxtail, Johnson grass, Bermuda grass and weeds Nut grass bean fields are important. Critical period of weed competition with the crop is between 10 to 30 or 40 days after germination. In addition, the quality and quantity of beans affected by twining weeds in the late period of vegetative or reproductive growth stage of the plant sprouts are likely affected [16]. Legumes in rotation of agricultural products are beneficial. One of the important the role legumes in rotation crops that produce inexpensive nitrogen fertilizer nitrogen production of Cereals and legumes then decreases [17]. Foliar applied herbicides in conventional values have no apparent effect on the Rhizobium bacteria. But that early emergence, plant damage and short-stay host plant and the number of nodules and nitrogen fixation can have adverse effects [1]. In this study, the effects of planting date and method of combating weeds on yield and yield component and biological nitrogen fixation (BNF) chintzy beans were studied.

MATERIALS AND METHODS

The study design was a Split-block (strip plots) based on a randomized complete block with 4 replications was conducted in 2012 at the research station Kheirabad. Because of the high amount of weed plant, so the plan was carried out under conditions of natural infection. Seedbed preparation, including plowing and disk harrows for crushing clod and leveling the ground with a leveler. To implement the plan, 10 days before the date listed separately in each of tillage operations were conducted. After preparing substrates indicated to the cultivation and spraying on land. Furthermore, the study of biological nitrogen fixation and soil did not use any chemical fertilizer before the project to determine the physical and chemical properties of soil, soil samples were taken and the EC, Ph, N and soil organic matter, as well as other factors were measured.

Mersurment of grain yield and yield components

To determine the yield on six rows of each plot was harvested by removing the 1 meter from the beginning and end of each plot and the elimination of the margin, Box put a square meter and grain yield per square meter was harvested. Then the seed in a square box of pods were separated manually and were exposed to the air for a week and then seeds sensitive digital weighing scales and economic yield was achieved. To determine the weight of 100-Grains using a device seed number, seed number 1 randomly from each treatment were counted and the sensitive digital weighing scale with 100-Grain weight in grams, respectively.

Number and weight of the nodes

To get the number and weight of nodules formed on beans, Two days after farm irrigation at 50% flowering plant to take samples from two randomly with 40cm^3 of the soil around plant. After washing and drying the surface soil around and after thorough washing, the Binokular nodes were counted. Then the number of the active node, the passive node and number of total nodes were counted. As well as fresh and dry weight of nodes with detailed scale (one milligram) were determined [15]. To determine the color of the nodes, the counted of middle and half below the tuber is diagnosed Binokular color.

Amount of biologica nitrogen fixation (bnf)

Based on the needs of the laboratory, some of the samples were dried and the powder was placed in the laboratory, plant nitrogen content was measured by Foss. Then the amount of nitrogen fixation, nitrogen was obtained by method difference. Nitrogen fixation by way of comparison Yield and given the amount of nitrogen plants grow along with the bacteria was estimated and stabilization without them. Nitrogen in the control plants (without the presence of diazotrophs) is an indicator of nitrogen from the soil and Symbiosis plant nitrogen (With diazotrophs) will be deducted. The difference is the amount of nitrogen fixation [11]. In the present experiment the non-symbiotic nitrogen plant sunflower plants as indicators of nitrogen utilization and average value of 3 is considered

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Statical analysis

SAS software was used for statistical analysis. Combined variance analysis was performed after Bartlet Test for checking uniformity of data variance (p=0.05) on targeted traits. Duncan multiple range tests were used to determine the significance of differences between treatment means at 0.05 levels.

RESULTS AND DISCUSSION

Yield and yield components

According to the analysis of variance table, yield and yield components of Chintzy Bean (Table 1) the view that the effect year on number of seed and yield of 5%level and 100-Grain weight at the level of 1% is significant (Tables 1). According to the comparison table is the main effect of Year, Planting date, Herbicides and Cultivar on yield and yield components (Table 2) can be observed that in the first year of grain number, grain yield and 100-Grain weight were significantly more than the second. The number of pods per plant was also no significant difference in the first and second years. Therefore, due to Sharp fluctuations weather during the second year, all traits will be interpreted an annual basis.

Number of pods per plant

According to the analysis of variance yield Chintzy beans, applying different herbicide causes significant difference between the number of pods per plant, the 1% level (Table 1). Effect of planting date interaction in herbicide causes a significant difference in the number of pods was at the 5% level. The main effects of Cultivar and interaction effects of Planting date × Cultivar of pod per plant were significant at 1%. According to the comparison table (Table 2), the main effects of Year, Planting date, Cultivar and Herbicides on yield and yield components were observed during two years with the highest number of pod per plant for weeding treatment (10.23) Trflan (10.07) and Pursuit (9.81), the differences were not significant, and the lowest number of pod per plant (8.55) on the control. The highest number of pod per plant (10.77) of Cultivar Talash a significant difference between Cultivar COS-16 (8.57) was obtained. More number of pod per plant during the two years in which the Cultivar Talash is due to the efforts of

scrollable. Interaction between Planting date × Herbicides on yield and yield components of Chintzy beans over two years showed that the highest number of pod per plant (12.34) of the First Planting date (May 10) × Weeding and the lowest number of pod per plant (8.23) for the Second Planting date (May 26) × Control, with control treatments were not significantly different planting dates. Juza [1989] observed that the number of pod per plant trait among the most variable components of Cereal. Potential ability of legumes in the formation of flower buds, flowers and pod are very high, but achieving this potential depends on conditions inside the plant, and in particular environmental conditions. This variability is because of the very high number of pod. Graman [1972] showed that delayed planting flower buds will cause the loss of 30 to 40 percent and varieties, which have lower reproductive organs seeds are larger numbers of seeds are small or medium. The process of reducing the reproductive organs during flowering continues. Flowering situation is different in each year and the maximum number of flowers is also variable. Graman [1972] showed that the time limit bean plant photosynthetic material production pod loss to increase 73.20 percent. The number of pod and seeds are not only significantly affected by the seed at time planting, but affected by planting date is placed. Graman [1972] reported that late planting peas and broad bean, pods the formed, number of seeds per plant drastically reduced. These results are consistent with the results of the present experiment. Effect of Planting date × Cultivar interaction on Chintzy Bean yield over two years it was observed that the highest number of pods per plant is related to the First Planting date (10 May) × Cultivar Talash (12.29) and the lowest number of pods from the First Planting date (10 May) and Second (26 May) × Cultivar COS-16 (8.20 and 8.49), respectively.

Number of seeds per pod

The results of the comparison and analysis of variance (Tables 1, 2, 3, 4, 5 and 6), Chintzy Bean yield and yield component in years 2012 and 2013 was observed that the effect of planting date on the number of seeds per pod in the first year at 5% level and second year was significant at the 1% level. The main effect of the Herbicide, Cultivar main effect and interaction in the First Planting date × Cultivar of seeds per pod was significant at 1% level. According to the comparison table, the simple effect of Planting date, Herbicides and Variety on yield and yield components Chintzy Bean in years 2012 and 2013 (Table 5) were significant. In terms of number of seeds per pod, in the first year, the lowest number of seed (3.50) in the Fourth Planting date (26 June), respectively. Considering that the highest 100-Grain weight in the first year on the Fourth Planting (50.39 g), this indicates that the lower grain to make more food grains has increased, resulting in 100-Grain weight. In the second year, the lowest number of seeds per pod (2.72) of the Fourth Planting date (26 June) and the highest number of seeds (3.69) of the Third Planting date (10 June), respectively. Apply a treatments in the first year to form the highest number of seeds per pod in treatments weeding (4.03), Trflan (3.85) and the Pursuit (3.75) that were not significantly different, but least number of seeds per pod was significant decrease than the Control treatment (3.50) showed Weeding.

Treatments in the second year had not a significant effect on the number of seeds per pod. Due to the interaction between Planting date × Cultivars on yield and yield components in 2012 beans (Table 6), the highest number of seeds per pod (4.20) is related to the First Planting dates × Cultivar Talash and lowest number of seeds per pod (3.46) is related to the First Planting date × Cultivars C.O.S-16 respectively. In the second year, the Planting date × Cultivar interaction was not significant. The number of seeds per pod is the most stable yield component in the Cereals. So the number of seeds per pod, and the same effect as reducing the number of seed pod are fluctuations in yield. Agronomic methods and climatic fluctuations make little difference in the number of seeds. Juza (1989) and other researchers have shown that the reduction in the yield of crops planted late, is not due to a decrease in the number of seeds per pod. The number of seeds per pod, the Pods per plant depends on the situation. Pod of the lower internodes, Containing greater seeds and seed number per pod reduced upward. The number of seeds is substantially affected by the Insemination. That is why the conditions during pollination, seed number per pod is determines. Since the bean is self pollinated plant, so the weather can be less the number of visitors and insect-pollinated plants. During the period of elongation as the number of seeds per the pod and pod seed filling is effective. During the formation of reproductive organs to shoot down along the pod that was created, and the pod

are forming at the top of the stem is shorter. But the severity of the environmental conditions such as soil moisture, temperature and air humidity depends [13].

100-grain weight

The results of the comparison and analysis of variance tables, see the conceptual framework Chintzy Bean yield in years 2012 and 2013 (Tables 3 and 5) in the first year effect of planting date, the effect of the interaction between Planting date and Cultivar all of the 100-Grain weight was significant at 1%. In the second, the simple effect of Planting date at 1% and the simple effect of Cultivar and Planting date × Cultivar interaction was significant both at the 5% level. According to the comparison table, the simple effect of Planting date and Cultivar on yield and yield component, and Chintzy Beans in 2012 and 2013 (Tables 3 and 5) were observed, the highest 100-Grain weight in the first year (50.39 g) on the Fourth Planting date (26 June) was not the significant difference with the 100-Grain weight on the other Planting dates. In the same year Cultivar Talash,100-Grain weight (40.93 g) than Cultivar COS-16 (39.55 g) production(Fig 1). The size of grains, beans, Chintzy Beans Talash Cultivar are larger than Cultivar COS-16. In the second year, the highest 100-Grain weight (39.01 g) in the First Planting date (10 May) and the lowest 100-Grain weight (33.72 g) of the Fourth Planting date (26 June) and Cultivar COS-16 in this year's 100-Grain weight than Cultivar Talash(Fig 1). With regard to the First Planting seeds on a greater opportunity to take advantage of better weather conditions, on the other hand during the maturity they do not encounter with the heat. The data is justified. The results of Tables Comparison of effects of Planting date × Cultivar on yield and yield components Chintzy Bean in years 2012 and 2013 (Tables 11 and 10) were observed in the first experiment, the highest 100-Grain weight beans on the effects of Fourth Planting date (26 June) × Talash (52.56 g) and the lowest related for the Second Planting date (26 May) × Talash (34.06 g). In the second year, the highest amount of 100-Grain weight of First Planting date (10 May) × Cultivar Talash (39.28) and the lowest 100-Grain weight of the Fourth Planting date (26 June) × Cultivar was Talash (31.69). 100-Grain weight is one of the characteristic of varieties, but its value is affected by the maturity period as well. These conditions may be changed from 20 to 30% of the 100-Grain weight. The lower pod always has the larger levels with more than 100-Grain weight to pod higher and those that have been produced are later [13]. In the present experiments the influence of different environmental conditions in both years have the 100-Grain weight. In the first year of cooling air in September (during grain filling) makes more starch in the grain storage and 100-Grain weight (50.39 g) was highest in the Fourth Planting date. In the second year, the plant in the First Planting date had ample opportunity to grow and be able to provide the highest 100-Grain weight (39.01 g). In the second year, due to early autumn chill in the region and consequently shorten the growth period, the lowest 100-Grain weight was the Fourth Planting date (33.72 g).

Grain yield

According to the tables of data analysis for yield and yield components of 2012 and 2013 (Tables 3, 4 and 5) showed that in the first year, simple effect Planting date, Herbicide, Cultivar and interaction between Planting date × Herbicides, respectively at 5%, 1%, 5% and 5% on the yield was significant. In the second year simple effect of Planting date and Herbicides, both at 1% and Planting date × Herbicide interaction was significant at 5% level. According to the results tables (3, 4 and 5), the highest grain yield in the First and Second years, respectively, 3352.3 and 2177.3 kg.ha^{-1}, for the Second Planting date (26 May) and the First Planting date, and the lowest yield 2108.2 and 1548.4 kg.ha^{-1} jointly owned by the Fourth Planting date (26 June), respectively. The results of a two-years review of the experiments shows that the Third Planting date (10 June) the average highest yield is allocated to the product. Effect of different treatments on yield, showed that in the first year of the highest yield (3259.2 kg.ha^{-1}) was related to Weeding treatment wiche the treatment Pursuit (3017.5 kg.ha^{-1}) was not significantly different and the lowest yield of the treatment Control (2340.3 kg.ha^{-1}) with treatment Herbicide Trflan (2562.5 kg ha^{-1}) was not significantly different (Tables 3 and 5). In the second year, as well as the highest yield (2158 kg.ha^{-1}) related to Weeding was that treatment with Pursuit (2071.1 kg.ha^{-1}) was not a significant difference and the lowest yield Control treatment (1358.2 kg ha^{-1}) which the application with Herbicide Trflan (1920.1 kg ha^{-1}) was not a significant difference(Fig 2).

Treatment Pursuit, in terms of the extent to Weeding, which was not significantly different from Control Weeds in the treatment and elimination of competition between weeds and beans which may ultimately result in increased yield of the product. Stive and Geff Beldak (2003) observed the herbicides to slow the growth peas and reduce grain yield. This is particularly observed in alkaline soils. In the present experiments the use of herbicides, especially herbicides Pursuit, causing significant difference between treatments was not weeding. The results (Table 3 and 5) in the first year, the highest grain yield of beans (2892.70 kg ha^{-1}) of Chintzy Bean cultivars were Talash. In the second year the effect of cultivar on bean yield was not significant. One of the important features of Cultivars Chintzy Beans COS-16, standing and thus growth is limited. But Cultivars Talash a cultivars perfectly scrollable and growth is unlimited as long as the weather is favorable for the growth and flowering and pod. According to the comparison table of Planting date × Herbicides on yield and yield components of 2012 and 2013 years (Fig 3), it was observed that in the first year, the highest grain yield (3885.38 kg ha^{-1}) for the Second Planting date × was Weeding. The lowest grain yield (1826.18 kg ha^{-1}) also allocated the Fourth Planting date × Control.

In the second year, as well as the highest grain yield (2468.8 kg ha^{-1}) was for the First Planting date × Pursuit, wiche the Third Planting date × Pursuit and the Third of Planting date × Weeding was not significantly different, and the lowest grain yield (950.0 kg ha^{-1}) for the Second Planting date × Control. Early planting is one of the most important operations in achieving maximum grain yield of peas and broad bean. Early planting at low temperature, thus increasing the duration from planting to emergence of grown beans are low. The positive effect of low temperature on yield formation usually compensates this loss. If delayed planting date, higher temperature and germination is faster and more complete, but often there is a risk of water shortage. Considering that legumes are germination need a lot of water, dryness, possibly causing them to be incomplete emergence. According Fosiman [1977] planting late, reduce the number of bean plants and thus reduce performance. In addition to late planting increasing the risk of diseases and insects and reduce the yield of the plant. These results correspond with the results of the present experiment. The results show that the overall yield Cultivars Talash than C.O.S-16 Cultivars is higher. But in conditions herbicide application, Cultivars COS-16's yield is higher. Also in conditions of weed, Talash Cultivar due to vegetative growth rate scrollable and more toward COS-16 Cultivars more competitive with weeds, and its yield is higher. Ghanbari and Taheri-Mazandarani (2003) investigated the effect of planting date on Chintzy Bean (Local Khomein, Talash and COS-16) at three of Planting date (25 May, 9 June, 24 June) observed that delay in planting increases yield has found its highest (2235 kg ha^{-1}) of Planting date was 24 June. The highest grain yield (2221 kg ha^{-1}) obtained from the Cultivar Talash. The main cause of the present results for the sake of reducing the damage the disease at the farm shall be later than date. In the present experiment, Cultivars Talash highest grain yield in the Third Planting date, respectively which confirms the results above.

Number of active, inactive and total nods and Biological Nitrogen Fixation(BNF)

According to table analysis of variance (7 and 8) observed that the effect of planting date on the number of active nodes, the number of inactive nodes and the total number of nodes in the 1%, and biological nitrogen fixation was significant at the 5% level. Effect of Planting date × Herbicides on the number of active nodes and inactive nodes at 1%, and the total number of nodes was significant at the 5% level. Effect of planting date on the number of active nodes in the treatment of active and inactive nodes and the total number of nodes, respectively, at 1%, 1% and 5% were significant. According to the comparison table interaction between Planting date × Herbicide effects on the number of active nodes Chintzy Beans (Fig 3) showed that the highest number of active nodes related to the Third Planting date × Control (49.38), Third Planting date × Trflan (47.38) and Third Planting date × Weeding (44.25) which, of course, all three groups had a statistically significant difference not. The lowest number of active nodes related to Planting date × Pursuit (7.38), the First Planting date × Control (14.88) and the First Planting date × Trflan (16.13), which all three no significant differences with each other but significantly lower than the Third Planting date indicated. Generally, the reports on the effects of pesticides, especially herbicides, insecticides and fungicides show that different plant species and traits different sensitivity to pesticides show, and generally negative effects of pesticides and herbicides negative impact herbicides before planting more herbicides are from. In addition, with increasing doses of herbicide, pesticides increased negative effects [1]. In this experiment, the herbicide before

planting Trflan effect of weeding that is inconsistent with the results of previous experiments. According to analysis of variance (Table 7) showed that cultivars effect on the number of active nodes and inactive nodes at 5% and 1%, respectively, were significant. According to analysis of variance (Table 8) showed that the effect of Planting date × Cultivar on the number of active nodes, the number of inactive nodes, the total number of nodes and biological nitrogen fixation(BNF) was significant. According to the comparison table, Planting date × Cultivar interaction of Chintzy Beans on the number of active nodes (Table 8) demonstrated that the highest number of active nodes (42.44) and biological nitrogen fixation (1.88) for the Second Planting date × Cultivar COS- 16. The lowest number of active nodes in the First Planting date × Cultivar COS-16 (17.00) is the First Planting date × Talash (19.50) and Fourth Planting date × Talash (21.94) in a group are statistically significant (Fig 4). The lowest percentage of biological nitrogen fixation in the order related to the Fourth Planting date × Talash (0.75%) respectively. The highest number of passive nodes related the Fourth Planting date × Cultivar COS-16 (19.94) respectively. The lowest number of passive nodes related to the Third Planting date × Cultivar C.O.S-16 (7.81). In terms of the number of nodes, the highest number of nodes for the Second Planting date × Cultivar Talash (67.50) and the lowest number of nodes in the Third Planting date × Cultivar Talash (30.50), respectively (Fig 5). According to analysis of variance showed that the effect of Planting date × Herbicide × Cultivars, the number of active nodes, the number of passive nodes and the total number of nodes is significant at the 1% level. According to the comparison table herbicide interaction between Planting date × Herbicide × Cultivar on the number of active nodes Chintzy Beans (Fig 6) demonstrated that the highest number of active nodes related to the Third Planting date × Control × Cultivar Talash (56.75) and Second Planting date × Weeding × COS-16 (55.75) and Third Planting date × Trflan × COS-16 (52.25), the three terms one group had a statistically significant difference was observed. The lowest number of active nodes related to the First Planting date × Trflan × Cultivar COS-16 (12.25) and the First Planting date × Control × Cultivar Talash (13.00) and the First Planting date × Pursuit × Cultivar COS-16 (13.00) that all three groups had a statistically significant difference was observed. Trifluralin is one of the most commonly used herbicides in agriculture is the bean. This is the root nodulation reduces the herbicide, grain yield and grain protein percentage in the beans and dry weight of nodes can be applied (Graham, 1978). In the present study herbicide Trflan and Pursuit has reduced the number of active nodes.

The highest number of inacive nodes related to the Second Planting date × Control × COS-16 (28.50) and the Second Planting date × Control × Talash (27.25) and Fourth Planting date × Weeding × Talash (26.25) and the lowest number inactive node of the Second Planting date × Pursuit × Talash (3.00) and Second Planting date × Pursuit × COS-16 (3.00), respectively(Fig 7). The most total number of nodes respectively Second Planting date × Weeding × Talash (83.25) and the lowest number of nodes of the First Planting date × Trflan × COS-16 (19.25), respectively (Fig 8). Beans with low potential nitrogen fixation can be identified. Bean research focuses on fixing N, take this discussion to the short period of beans (90-70 Days), one of the reasons that nitrogen fixation in beans such as soybeans (140 days or more) is not efficient. The production of carbohydrates at the same time the beans are the Rhizobium in most need carbohydrates. So the heavy competition between bacteria and host comes to carbohydrate [4]. In the present experiments the highest number of active nodes (42.44) and biological nitrogen fixation (1.88) was the Second Planting date × Cultivar COS-16. For fixing nitrogen, the plant must store enough energy from photosynthesis to supply materials necessary for the revival of the molecular nitrogen [13]. Many scholars including Wilson [1979] attention to the fact that the legume family of compounds (C: N) ratio is nearly constant and can not be changed using fertilizers or other operations. Thus increasing the amount of carbohydrates increases the biological nitrogen fixation and photosynthesis synthesis of mineral nitrogen assimilation, the reverse is also true [13]. In the present experiments, due to the fact that most of the photosynthesis on Second and Third Planting, It seems that the bean plant could provide energy for biological nitrogen fixation. In the Fourth Planting date the lowest amount of photosynthesis and the lowest amount of biological nitrogen fixation (0.75), we saw that it is confirming previous research results. Stive and Geff Beldak [2003] observed that the use of residual herbicides or Amyotrophic Lateral Sclerosis (ALS) can reduce growth and ability of nitrogen fixation in legumes. In experiment the effects of different herbicides on biological nitrogen fixation was not significant, but lowest number active nodes and the total number of nodes of treated application herbicide Trflan and Pursuit, which confirms the results of previous experiments.

CONCLUSION

The results showed that the highest number of pod per plant and 100-Grain weight belongs to the fourth planting date (26 June) and the highest amount of the number of seeds per pod and yield beans belong to the third planting date (10 June) and second (26 May), respectively. Since the number of seeds per pod and grain weight inverse relationship exists, therefore, the lowest number of seeds per pod in the fourth of planting date (26 June) was observed, because the reduction in the number of seeds per pod, seed has more food and seed weight increased. Also, despite the high dry matter and leaf area on the fourth planting beans, its yield for lack of sufficient time for completion of plant growth (especially in physiological maturity beans) and early the chill planting dates is lower than others. The highest number of pod per plant owned by complete weeding and was the application Pursuit herbicides. As well as the highest number of seeds per pod owned by was complete weeding and application Pursuit herbicides. In terms of the extent of the impact of herbicide Pursuit with the same, and in some patients the full steps for weeding is even better than it was, therefore, with respect to the cost of operations is on weeding in agriculture and to reduce the cost of production, the use of these herbicides can be a good alternative to replace the will be weeding operations. The highest number of pods per plant, number of seeds per pod and 100-Grain weight was owned by Cultivars Talash. The highest yield chintzy beans, was owned by Cultivars Talash. This can be due to differences in the type of growth is two cultivars chintzy beans. Because cultivar COS-16 is a cultivar stood medium maturity (100 to 95 days during the growing season) and growth is limited, while the cultivar Talash a growing and late maturity (growing period 110 days) and unlimited growth and when the weather is conducive to the growth and gives flowers and pod. The highest total number of nodes in order of Second planting date × Weeding × Talash cultivars was the lowest number of nodes of the First planting date × Trflan × Cultivars COS-16's. The highest amount on biological nitrogen fixation related to the third planting and Cultivars C.O.S-16 and Talash, and biological nitrogen fixation the lowest amount is related to the Fourth planting date × Talash and C.O.S -16 figures respectively. Finally, as regards the fourth planting date due to early cold autumn, drastic reduction in growing period, reduce the number of active nodes, reducing the biological nitrogen fixation and reducing the yield is not suitable for planting cultivars of chintzy beans. The best and most appropriate date of planting Chintzy beans Varieties of Talash, if weeding weeds it complete, the third planting date (June 10) and second (26 May) will be offered. Also, due to the impossibility of complete weeding weeds in beans, The best treatment for removing Chintzy Bean highest yield in cultivars Talash and Pursuit herbicide application in the third planting date (10 June) and second (26 May) is. Also, due to the lack of possibility of weeding weeds in beans, full of the best patients for maximum yield in harvest beans varieties Talash and Pursuit herbicide application on the third planting date (June 10) and the second (26 May) is.

REFERENCES

1. Aliasgharzad, N. (2010). Soil Micro biology and biochemistry. Publications Jahad Daneshgahi Tabriz. Page 425.
2. Avarseji, Z., & Rashed mohasel, M. H. (2006). Proceedings of the Third Conference of Weed Science. 28 and 29 Bahman 2013. Page 369-378.
3. Badawy MI, Montaser Y, Ghaly MY. (2006). Advanced oxidation processes for the removal of organophosphorus pesticides from wastewater. J Desalination. 194: 166–175.
4. Bagheri A, Mahmudi A, Ghezeli F. (2001). Common Beans, Research for Crop Improvement. Mashhad University Jihad Press, Mashhad, Iran. 556 pp. (in Persian).
5. Blackshaw, RE., and Brandt RN. (2008). Nitrogen fertilizer rate effect on weed competitiveness is species dependent. Weed Sci. 56 (5): 743-747.
6. Fosiman, L. (1977). Some aspects of yield formation in the horse bean. Abronik AF –VSZ v Praze, pp.58-68.
7. Ghanbari, AA., and Taheri-Mazandarani. M. (2003). Effects of sowing date and plant density on yield of spotted bean. Seed and Plant J. 19(4): 384-496.
8. Ghanbari Motlahg M, Rastgoo M, Poor Yousef M, Ebrahimi M. 17 to 19 February 2011. Abstracts of the Fourth Conference of Weed Science.

9. Graham, P.H., (1978). Some problems and potentials of field beans (*Phaseolus vulgaris*) in Latin America. Field Crops. Res. 1: 295-317.S
10. Graman, J. (1972). Stadium tvorby reprodukcnich organo a kvetni biologie u bobou obecneho. (studies on the formation of reproduction organs and flower biology in the broad bean). concl. report , PEF ceske Budjovica, 1972)
11. Jahan M, Mehdi Nassiri M. Mahallati N. (2012). Soil fertility and biofertilizers. University of Mashhad. 250 pages.
12. Juza, J. (1989). The role of some biological and commercial properties of selected cultivars of pea (Pisium sativum L.) in yield formation. Candidate-of- Science dissertation, VSZ Parha.
13. Koocheki, A., and Banaian Aval. M. (1994). Physiology of Agricultural Crops Yield (Translated). Jihad Daneshgahi of Mashhad Press. 380 Pp.
14. Majnoon Hosseini, N. (1996). Bean in Iran.Tehran University Press jihad. Page 49-240.
15. Mehrpuyan M. Karamati A. Ja'fari A. (2006). Biological Fertilizer consumption as a supplement to reduce the use of chemical fertilizers. Abstracts of articles First National Conference on consumption patterns and sustainable development of agriculture. 29 May 2009.
16. Rashed mohasel M.H, Rahimiyan H, Banaian Aval M. (2001). Weeds and their control. Press Mashhad Jahad Daneshgahi. 576 pages.
17. Stive. R., and Geff. B. (2003). Inflience of herbicide on Biological nitrogen fixation on legume plants. Canadian Jornal of Botany. 69:78-86.
18. Wilson, J.R. et al (1979). Comparison between pressure – volum and dew point-hygrometry techniques for determining the water relation characteristics of grass and legume leaves. Oecologia. 41(1):77-88.

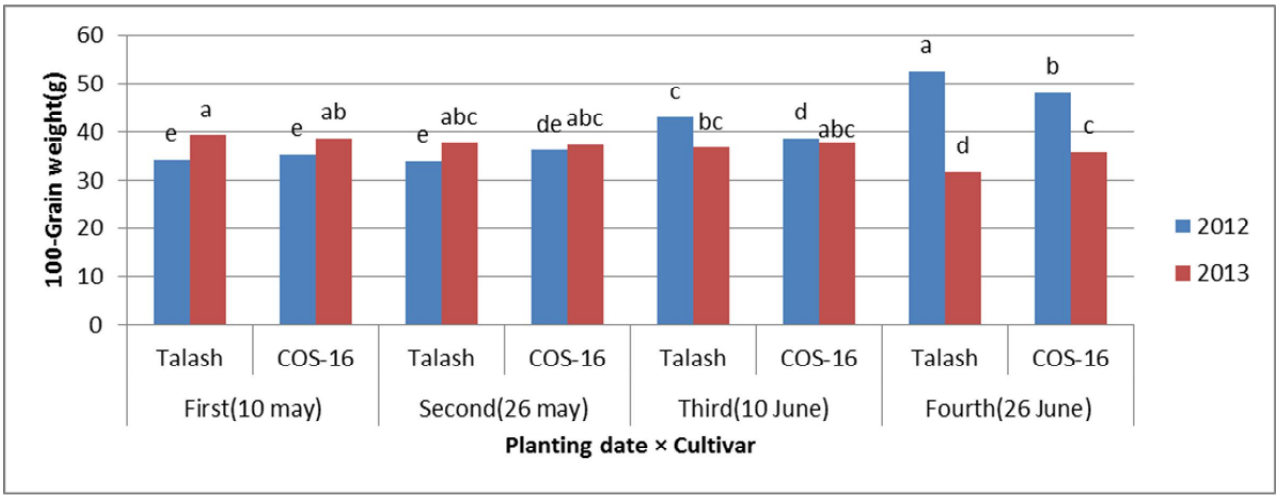

Fig 1- Mean comparison of interaction Planting date × Cultivar on 100-Grain weight of Chintzy Beans in 2012 and 2013.

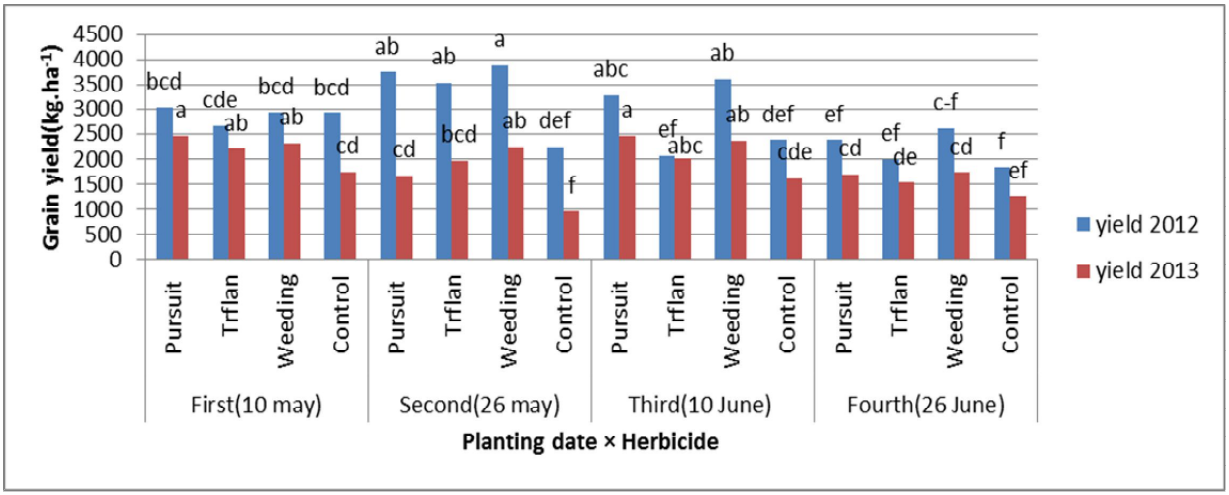

Fig 2- Mean comparison of interaction Planting date × Herbicide on grain yield in years 2012 and 2013.

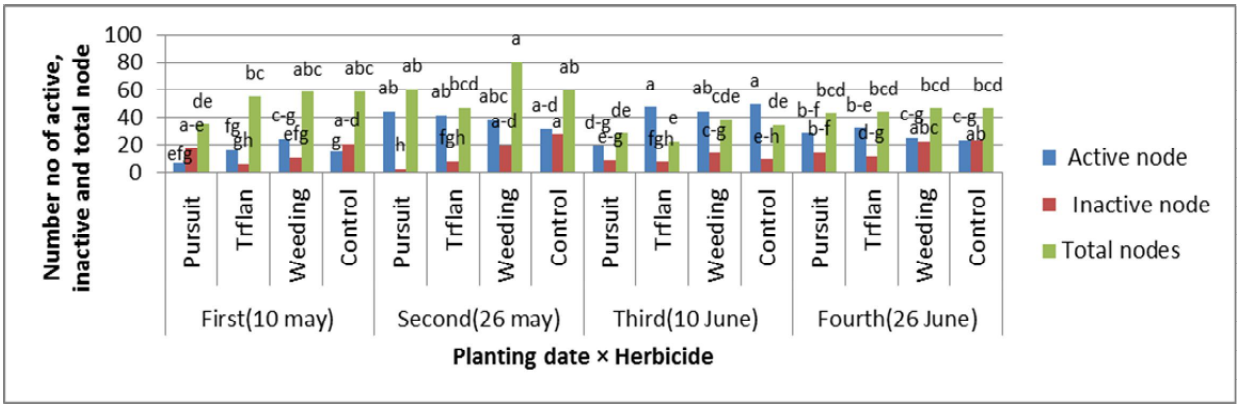

Fig 3- Mean comparison of interaction between Planting date × Herbicide on the nodes of Chintzy Beans.

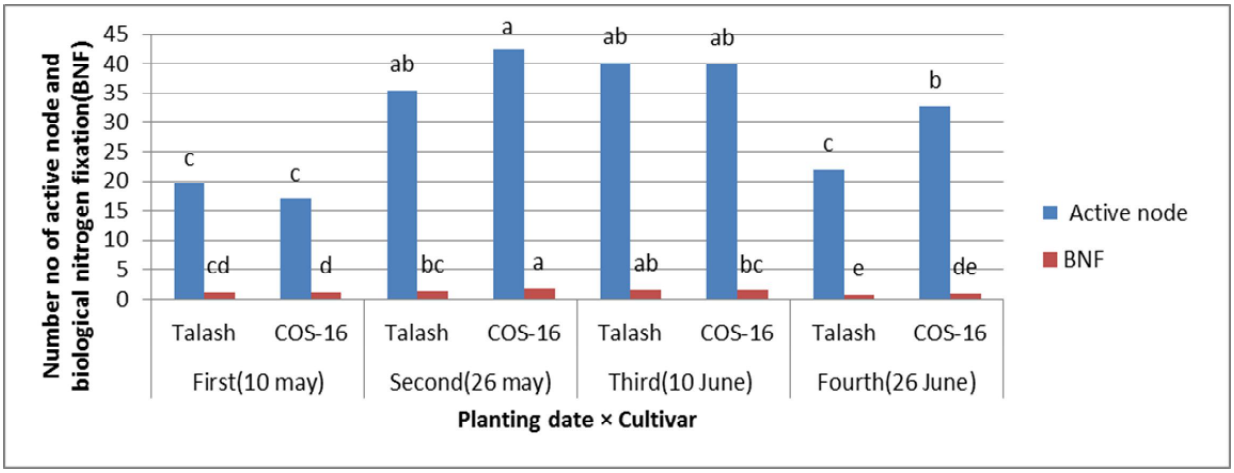

Fig 4- Mean comparison of interaction Planting date × Cultivar on the nodulation and biological nitrogen fixation (BNF) in Chintzy Beans.

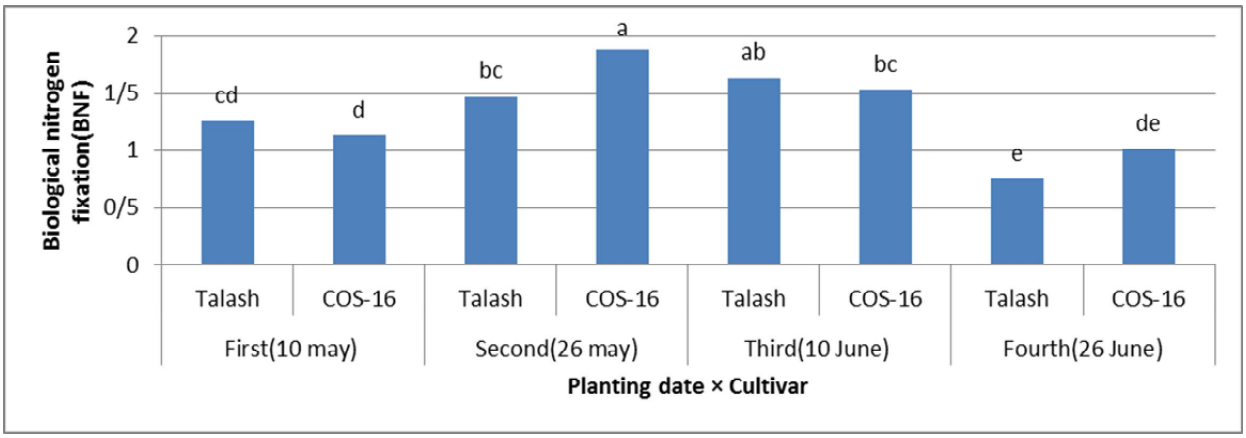

Fig 5- Mean comparison of interaction Planting date × Cultivar on the biological nitrogen fixation (BNF) in Chintzy Beans.

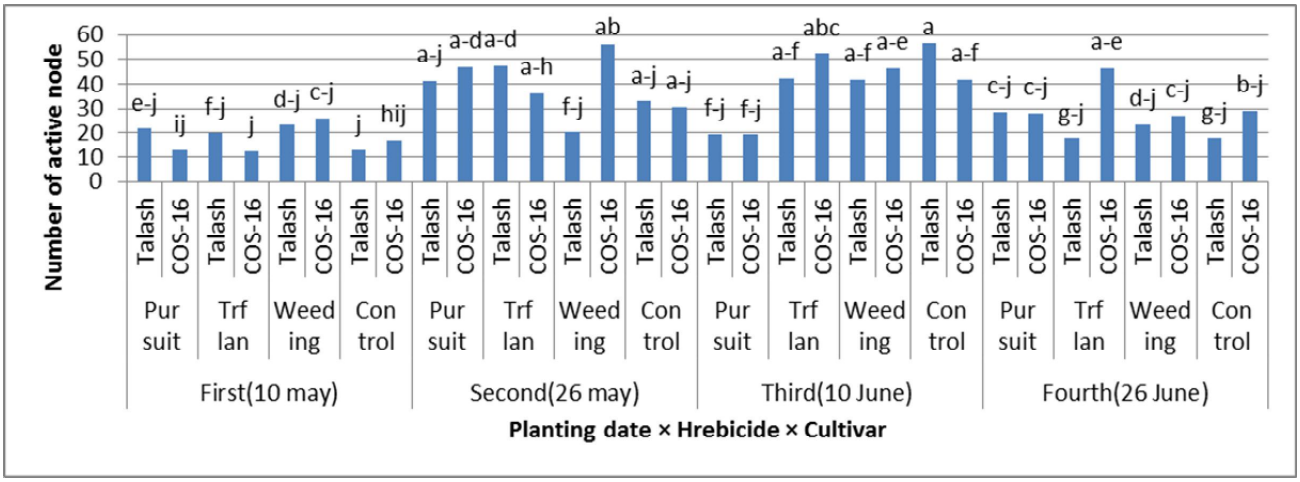

Fig 6- Mean comparison of interaction effect of Planting date × Herbicide × Cultivars on number of active nodes in Chintzy Beans.

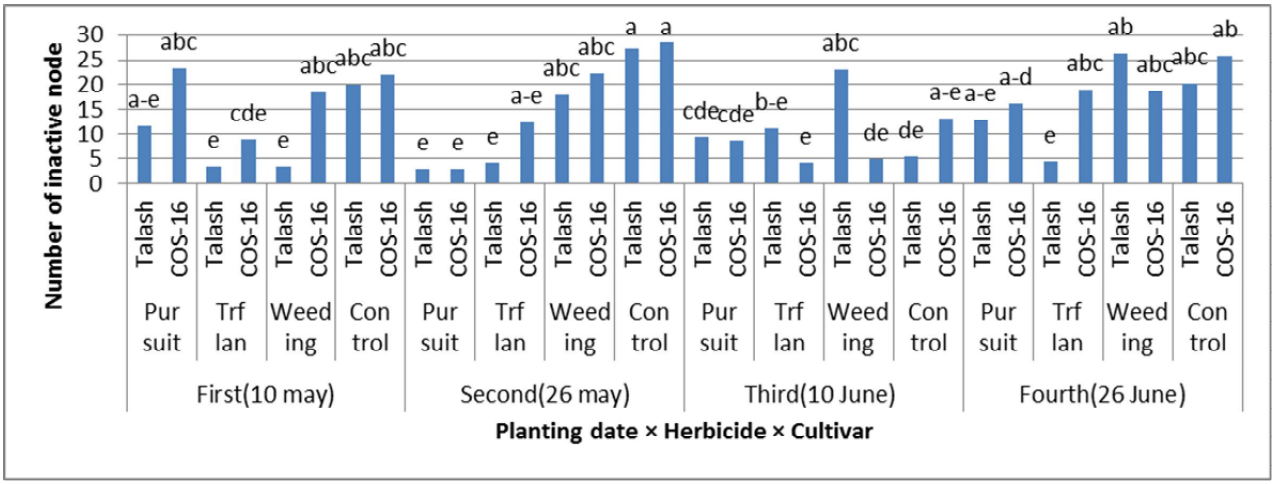

Fig 7- Mean comparison of interaction effect of Planting date × Herbicide × Cultivars on number of inactive nodes in Chintzy Beans.

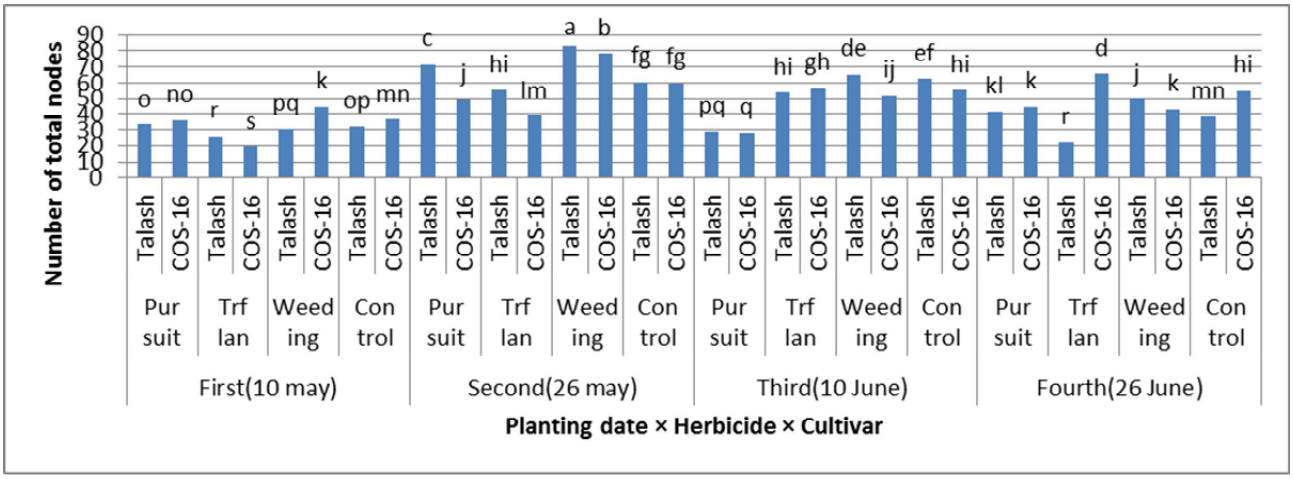

Fig 8- Mean comparison of interaction effect of Planting date × Herbicide × Cultivars on number of total nodes in Chintzy Beans.

Table 1 – Compound analysis of variance Chintzy Bean yield and yield components in two years.

Sources of variation	df	Mean square			
		No. of pod per plant	No. of seeds per pod	Grain yield	100- Grain weight
Year	1	5.51^{ns}	22.83*	4532374.88*	724.99**
First Experimental error	6	21.72	2.93	604627.26	20.20
Planting date	3	10.77^{ns}	8.81*	5351620.36**	431.25**
Year * Planting date	3	80.36**	5.17*	2663928.82*	1436.17**
Second Experimental error	18	9.28	1.94	674631.11	21.01
Herbicides	3	36.26**	0.1785^{ns}	6761575.84**	26.91*
Year * Herbicides	3	4.28^{ns}	1.0735^{ns}	402990.42^{ns}	16.90^{ns}
Third Experimental error	18	5.56	1.16	427412.68	12.02
Planting date * Herbicide	9	11.30*	0.9365^{ns}	915753.59**	11.00^{ns}
Year * Planting date * Herbicides	9	1.80^{ns}	1.09^{ns}	282029.24^{ns}	18.33*
Four Experimental error	53	4.62	1.09	224631.26	8.86
Cultivar	1	308.11**	0.03^{ns}	86711.84*	1.72^{ns}
Cultivar * Years	1	3.48^{ns}	0.17^{ns}	828270.63*	94.68**
Planting date * Cultivar	3	31.75**	3.26*	78820.14^{ns}	18.61^{ns}
Planting date * Cultivar *Year	3	7.23*	2.88^{ns}	353205.62^{ns}	114.63**
Herbicide * Cultivar	3	2.72^{ns}	0.78^{ns}	31061.25^{ns}	3.73^{ns}
Year * Herbicide * Cultivar	3	9.04*	1.62^{ns}	236721.60^{ns}	4.13^{ns}
Planting date * Herbicide * Cultivar	9	2.92^{ns}	0.99^{ns}	133066.67^{ns}	6.20^{ns}
Year*Planting date*Herbicide*Cultivar	9	4.20^{ns}	1.25^{ns}	139433.92^{ns}	8.72^{ns}
Experimental error	95	2.98	1.32	244123.70	8.88
Coefficient of variation (%)	--	17.86	31.69	24.50	7.73

Ns, * and **, respectively, non-significant and significant at the 5 and 1 percent levels.

Table 2 – Comparison of main effects of Year, Planting date, Herbicides and Cultivar on yield and yield components in two years.

Year	Planting date	Herbicides	Cultivar	Mean square			
				No. of pod per plant	No. of seeds per pod	Grain yield (kg ha^{-1})	100- Grain weight(g)
First				9.53 a	3.92 a	2149.91 a	40.24 a
Second				9.82 a	3.32 b	1883.79 b	36.88 b
	First (10 may)			10.24 a	3.64 ab	2199.60 a	36.86 bc
	Second (26 may)			9.69 a	4.03 a	2139.70 a	36.34 c
	Third (10 June)			9.38 a	3.68 a	2143.00 a	38.99 b
	Fourth (26 June)			9.36 a	3.12 b	1585.10 b	42.05 a
		Pursuit		9.81 a	3.58 a	2196.10 ab	38.69 ab
		Trflan		10.07 a	3.61 a	1945.70 a	38.37 ab
		Weeding		10.23 a	3.70 a	2332.80 a	39.37 a
		Control		8.55 b	3.60 a	1592.70 c	37.81 b
			Talash	10.77 a	3.63 a	2998.44 a	38.64 a
			COS-16	8.57 b	3.61 a	2035.25 b	38.48 a

Mean followed by similar letters in each column are not significantly different.

Table 3 - Analysis of variance Chintzy Bean yield and yield components in 2012 years.

Sources of variation	df	Mean square			
		No. of pod per plant	No. of seeds per pod	100-Grain weight	Grain Yield
Replication	3	12.21^{ns}	0.7611^{ns}	10.96^{ns}	1176824.73^{ns}
Planting date	3	47.55*	2.16*	1706.59**	8450787.84*
First experimental error	9	8.49	0.3606	36.34	1773112.86
Herbicide	3	25.67*	1.58**	2.34	5608254.30**
Second experimental error	9	4.34	0.1600	8.08	705990.45
Planting date * Herbicide	9	6.58^{ns}	0.2345^{ns}	16.09^{ns}	1466904.13*
Third experimental error	27	4.34	0.1865	9.97	504892.10
Cultivar	1	189.76**	2.05**	60.95**	1226070.34*
Planting date * Cultivar	3	27.34**	1.14**	96.86**	175654.46^{ns}
Herbicide * Cultivar	3	2.68^{ns}	0.0886^{ns}	2.31^{ns}	274038.52^{ns}
Planting date * Herbicide *Cultivar	9	4.21^{ns}	0.1036^{ns}	9.62^{ns}	301368.75^{ns}
Experimental error	48	2.35	0.1446	8.17	384437.10
C. V (%)	----	16.11	10.06	7.10	22.18

Ns, * and **, respectively, non-significant and significant at the 5 and 1 percent levels.

Table 4- Analysis of variance for number of pod per plant and number of seeds per pod, Chintzy Beans at different stages of sampling (2013).

Sources of variation	df	Mean square			
		No. of pod per plant	No. of Seeds per pod	100-Grain weight	Grain Yield
Replication	3	31.23 ns	0.196 ns	0.1832 ns	7.85 ns
Planting date	3	43.57*	5.30**	1.09**	39.99**
First experimental error	9	10.08	0.42	0.03	3.52
Herbicide	3	14.87 ns	0.5750 ns	0.2604 ns	62.23**
Second experimental error	9	6.89	0.3890	0.1016	8.05
Planting date * Herbicide	9	6.16 ns	0.1666 ns	0.0895 ns	4.43*
Third experimental error	27	4.91	0.1450	0.0510	2.06
Cultivar	1	121.83**	0.1820 ns	0.2601 ns	2.49 ns
Planting date * Cultivar	3	11.64*	0.1980 ns	0.2584*	4.18 ns
Herbicide * Cultivar	3	9.08*	0.2870 ns	0.0408 ns	2.34 ns
Planting date* Herbicide*Cultivar	9	2.90 ns	0.083 ns	0.0338 ns	1.1610 ns
Experimental error	48	3.63	0.1610	0.0636	3.31
Coefficient of variation (%)	---	19.38	12.08	4.13	13.44

Ns, * and **, respectively, non-significant and significant at the 5 and 1 percent levels.

Table 5 - Comparison of the effects of planting date, herbicides and cultivar Chintzy Bean on yield and yield components in the sample (2012 and 2013 years).

Planting date	No. of pod per plant		No. of seeds per pod		100-Grain weight (g)		Grain yield (kg ha^{-1})	
	2012	2013	2012	2013	2012	2013	2012	2013
First(10 may)	10.24 ab	10.25 ab	3.83 b	3.44 a	34.71 c	39.01 a	2888.5 b	2177.3 a
Second(26 may)	9.58 b	9.81 ab	4.11 a	3.39 a	35.12 c	37.56 a	3352.3 a	1700.8 b
Third(10 June)	7.79 c	10.97 a	3.68b c	3.69 a	40.76 b	37.23 a	2830.6 b	2108.6 a
Fourth(26 June)	10.50 a	8.16 b	3.50 c	2.72 b	50.39 a	33.72 b	2108.2 c	1548.4 b
Herbicide								
Pursuit	10.02 a	9.53 a	3.75 a	3.75 a	40.55 a	39.89 a	3017.5 a	2071.1 a
Trflan	9.74 a	10.41 a	3.85 ab	3.85 ab	40.25 a	40.29 a	2562.5 b	1920.1 ab
Weeding	10.14 a	10.31 a	4.03 a	4.03 a	40.29 a	40.38 a	3259.5 a	2158.6 a
Control	8.21 b	8.92 a	3.50 c	3.50 c	39.89 a	40.35 a	2340.3 b	1358.2 b
Cultivars								
Talash	10.74 a	10.80 a	3.91 a	3.91 a	40.93 a	36.35 b	2892.7 a	2072.70 a
COS-16	8.31 b	8.84 b	3.65 b	3.65 b	39.55 b	37.41 a	2697.0 b	2013.40 a

Mean followed by similar letters in each column are not significantly different.

Table 6 - Comparison of Planting date × Cultivar interaction on Chintzy Beans on yield and yield components in 2012 and 2013 years.

Planting date	Cultivars	2012 year			2013 year	
		No. of pod per plant	No. of seeds per pod	100-Grain weight (g)	No. of pod per plant	100-Grain weight (g)
First(10 may)	Talash	12.74 a	4.20 a	34.16 e	11.84 a	39.28 a
	COS-16	7.75 de	3.46 b	35.26 e	8.65 b	38.73 ab
Second(26 may)	Talash	10.59 b	4.05 a	34.06 e	11.19 a	37.75 abc
	COS-16	8.56 d	4.18 a	36.18 de	8.43 b	37.37 abc
Third(10 June)	Talash	8.88 cd	3.85 ab	42.96 c	11.31 a	36.68 bc
	COS-16	6.71 e	3.50 b	38.56 d	10.63 a	37.77 abc
Fourth(26 June)	Talash	10.78 b	3.53 b	52.56 a	8.75 b	31.69 d
	COS-16	10.21 bc	3.48 b	48.21 b	7.57 b	35.75 c

Mean followed by similar letters in each column are not significantly different.

Table 7 - Analysis of variance of growth, nodulation and biological nitrogen fixation (BNF) of Chintzy Beans.

Sources of variation	df	Mean square			
		No. of Active node	No. of Inactive node	No. of total nodes	Biological nitrogen fixation (BNF)
Replication	3	1.4411	3.3559	3.2788	1.69
Planting date	3	28.01**	6.14**	25.70**	3.08*
First experimental error	9	0.9937	0.5893	2.59	0.6503
Herbicide	3	2.38*	14.60**	8.21*	0.12 ns
Second experimental error	9	0.4136	0.6636	1.86	0.14
Planting date * Herbicide	9	4.45**	4.64**	3.87*	0.0789 ns
Third experimental error	27	0.7469	0.5717	1.63	0.0925
Cultivar	1	36.68*	5.81**	0.1275 ns	0.0043 ns
Planting date * Cultivar	3	2.82*	4.32**	4.75**	0.6509**
Herbicide * Cultivar	3	1.91 ns	1.38 ns	0.9932 ns	0.0919 ns
Planting date * Herbicide *Cultivar	9	2.85**	2.91**	2.40**	0.0597 ns
Experimental error	48	0.8746	0.6372	0.0169	0.0669
Coefficient of variation (%)	---	17.03	21.74	14.64	19.45

Ns, * and **, respectively, non-significant and significant at the 5 and 1 percent levels.

Table 8 - Comparison of interaction Planting date × Cultivar on the nodulation and biological nitrogen fixation (BNF) Chintzy Beans.

Planting date	Cultivars	No. of Active node	No. of Inactive node	No. of total nodes	Biological nitrogen fixation (BNF)
First(10 may)	Talash	19.50 c	9.69 d	52.50 c	1.25 cd
	COS-16	17.00 c	18.19 ab	47.81 d	1.13 d
Second(26 may)	Talash	35.44 ab	13.13 bcd	67.50 a	1.47 bc
	COS-16	42.44 a	16.56 abc	56.44 b	1.88 a
Third(10 June)	Talash	40.19 ab	12.31 cd	30.50 g	1.63 ab
	COS-16	40.00 ab	7.81 d	34.06 f	1.53 bc
Fourth(26 June)	Talash	21.94 c	16.00 abc	37.94 e	0.75 e
	COS-16	32.75 b	19.94 a	52.06 c	1.01 de

Mean followed by similar letters in each column are not significantly different.

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RESEARCH ARTICLE

Compilation of optimal strategies for environmental management (A case study: Municipal Solid Waste of Ardabil city)

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ABSTRACT

This study carried out for determining the strategic management of solid waste in Ardabil city. Type of this study is survey using AHP and SWOT analysis. For this purpose, weaknesses, strengths, opportunities and threats in the field of municipal solid waste management in Ardabil city were determined by field service personnel, central municipalities and municipal waste management of Ardabil. Then, to evaluate strengths and weaknesses and the opportunities and threats, AHP method was used and IFE and EFE matrix weighted scores were determined. Through weighted scores of internal and external environment condition of the current management of municipal wastes in the area was analyzed And then Through SWOT matrix, wastes management strategies in Ardabil were identified. By using QSPM matrix strategies obtained were evaluated and prioritized. The results showed that the main causes of internal and external factors affecting the management of solid waste in the city of Ardabil 8 factors as strengths and factor 11 as weaknesses And 10 factor as external opportunities and 13 factor as external threats, facing the city have been identified. Reduce pollution caused by storage and collection of non-normative solid waste in Ardebil with a total score of 047/6 was the first priority. Supply equipment for urban wastes with 89/5 points and closer attention to the current location and the need for hygienic disposal operations at the landfill, with a total score of 841/5 And changes in consumption patterns of people with 296/5 points and eventually formed the Steering Committee of the wastes in wastes organization in the city of Ardabil with 092/5 respectively, were in the following priorities of strategies. The results indicated that use a combination of methods SWOT and AHP in strategic planning by weighting and determine the degree of importance of internal and external factors in the delivery of the strategic plan can provide more accurate results than the SWOT method.

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Keywords: environmental planning, Municipal Solid Waste, strategic management, AHP, SWOT

INTRODUCTION

Engineering and management of municipal solid waste is one of the most advanced in the first world countries and some developing countries is And due to the use of technologies and use of new international technologies in urban management organization is one of the main elements to assess strategies, health and environmental policies in the countries. Solid waste management system in order to reduce the volume of waste production and recycling, information on the chemical and physical composition of solid waste to determine how to reduce And the type of process of recycling contaminants and assessing comprehensive peer review of physical and chemical properties wastes is imperative (salvato, 2003). Today, an integral part of human waste are, in the past two decades, municipal solid waste management has become a major concern and is now one of the major issues discussed publicly. Therefore, proper collection and disposal of waste in a way that would reduce the direct and indirect risks related to public health and damage to the environment is very important (HICPAC, 2001). (Kajanus *et al,.* 2004) in the field of providing strategic management program Development of Tourism in "Turku" Finland conducted study using the combined method A'WOT. The results showed SWOT and AHP in strategic planning techniques by determining the weighting and importance of internal and external factors affecting on delivery of the strategic plan can provide more accurate results compared to the SWOT method. In another study using the combination of AHP and SWOT, strategic planning was done in 2007 in Venezuela, each strategic plan was studied. The results of this study showed that, AHP method in combination with SWOT can be used to make proposed programs more realistic. (Osuna, Aranda, 2007. Seyed Ali Jozi *et al,.* in order to provide rural waste management strategic plan used A'WOT (a combination of methods, SWOT and AHP) that is a multi-criteria decision-making techniques in the field of environment. After identification of factors affecting waste management, in order to develop a strategic plan, the weight of each factor was determined through the Analytical Hierarchy Process-with adjustment 02/0. . Then, the factors considered in the assessment table of internal factors and external factors evaluated and were obtained between 105/2 and 367/2 respectively. The obtained data were positioned in the process of integrating. The following table, quantitative strategic planning was formed and possible strategies were identified on the basis of attractiveness scores. The results of this study showed that the strategy of "enlightening the public opinion through media advertising and public awareness about pollution caused by waste and how to manage them and by help of Dhyary" is as the most important strategy facing with a score of 224/5. Municipal waste includes all waste resulting from activities that are done in the city. Constantly with the scope of urbanization and population growth, more diversity and quantity of solid waste as one of the main pollutants of the environment have been added. The lack of efficient waste management system can seriously harm the health and safety of society and the environment (Almasi, 2004). The solid waste management has different solutions for waste disposal that a variety of today's four main solid waste management, based on the priorities are as follows: Reduce production, recycling, chemical conversion and disposal (khani, 2009). Physical and chemical composition as well as the amount of solid waste produced in different seasons, days of the week, cultures and traditions, food habits, income levels and other factors have changed dramatically (Chobanoglous, 1993). Strategy and planning to implementation is an essential scientific management of urban wastes. Therefore there has been no comprehensive program for the management of urban wastes; in the present study Ardebil waste management strategies were investigated.

MATERIALS AND METHODS

The research was carried out in several stages, with design questions and questionnaires. Statistical population to complete environmental factors and Weight comparison, included the president, vice presidents and managers and all professionals related to the field of waste management of Ardebil Municipal. To compare the environmental factors to determine each weight, L-hour scale, analysis hierarchy process AHP and paired comparisons were used. The relative weight of each of the groups of strengths, weaknesses, opportunities and threats were calculated. Finally,

in order to logic analyze the combining of SWOT and AHP method was used. After determining the attractiveness of strategies using QSPM analytical methods strategies were prioritized (Saaty, TL 2000).

Analytical Hierarchy Process (AHP):

This method was founded on the basis of a hierarchical structure and helps the analyst to manage critical aspects of the problem within a hierarchical structure similar to the management of the family tree. This method by reducing complex decisions to the number of comparison and simple rankings and extracting results Not only helps the analyst to reach the best decision, but provides a clear rationale for the selection of offers. The purpose of using the Analytical Hierarchy Process is to identify preferred options and define the rate of options with regard to the simultaneous decision criteria (Saaty, TL 2000). Analytical Hierarchy Process AHP (MADM) is a multi-criteria decision-making method In order to make a decision and a choice of several options between different decision options, is used according to the indicators that decision maker determines. Analytical Hierarchy Process reflects normal behavior and human thought. The technique studies complex issues based on their interactions and change them to easy form and solve them.

Using this procedure involves four main steps:
The first step: modeling (the hierarchy): In this step the issue and the purpose of decision making as a hierarchy of elements that are associated with each other. Design elements include making decisions and decision choices index.
Step two: preferred judge (paired comparisons) making comparisons between different options, depending on each indicator and the importance of the decision taken by paired comparisons.

Step Three: calculate the relative weights: the weight and importance of the decision elements are determined through a set of numerical calculations.

Step Four: The integration of the relative weight and final weight: This step is done to rank decision options (Qodsypour, 2009).

SWOT matrix (SWOT):

Matrix methods and analysis strategies and strategic factor analysis (SWOT) is one of the best techniques of planning and strategy of matrix SWOT (analysis of strengths, weaknesses, opportunities, threats) that are Today, as a new tool for performance analysis and the gap used by designers and strategies evaluators (Nilsson, M .2009). Therefore, in this study, this method was used. SWOT matrix is an extensive territory that is actually a conceptual framework for the analysis of the system thay provides possibility to compare bottlenecks, threats, damaging aspects, opportunities, demands and opportunities of the external environment with the strengths and weaknesses of strategies (Esty, D, 2001). The combinations of these factors together, in fact, are the basis on the development of four types of strategy as follows:
1-Strength-Opportunities **SO**
2-Strength-Threats **ST**
3-Weakness-Opportunities **WO**
4-Weakness-Threats **WT**
These strategies can provide a strategic choices framework for audit strategic.

Evaluation matrix and Internal and external factors (EFE & IFE):

After identifying the strengths, weaknesses, opportunities and threats affecting on the waste management, internal strengths and weaknesses in matrix IFE, and the opportunities and external threats in the matrix EFE, were entered and analyzed. Finally, after the evaluation of internal factors by IFE matrix and external factors in EFE matrix, the

results in Table 1 and Table 2 were obtained. It is worth noting that the choice of each factor is expressed in the column Description and the situation is described in a way that it justifies the scores, and weight. As is clear from Table IFE, total weighted score of internal environment is 226/2, which is higher than 2 and Shows urban waste management organization of Ardebil in the use of strengths to deal with the weakness has worked relatively good but not optimal. The results of the external environment, including opportunities and threats of urban waste management organization presented in Table 2.

The formation of a strategic planning matrix (QSPM):

By forming a quantitative strategic planning matrix (QSPM), strategies to the houses of SWOT matrix were prioritized. Steps of quantitative strategic planning matrix were performed as fallow:

1. The opportunities and external threats and internal strengths and weaknesses were listed in the right QSPM column. Then second column rates of each of these critical success factors, according to EFE and IFE matrix were inserted.
2. With regard to the second stage of formulating (the integration and composition) doable and workable strategy or WT combination of strategies that aim is to prioritize them was written in the top row of the matrix QSPM. Each strategy consists of two columns of the attractiveness and attraction strategy.
3. grade rating by managers, experts and officials and according to the effects and attraction of Each internal and external factors in limit, score between 1 and 4 was devoted to the strategy that is called attraction. So that the desired factor has no impact on the selection or developed strategy, it was given a zero or indifference score.
4. Multiplying the weight of each factor in the attraction and attraction strategy was calculated.
5. For determining the attraction of each strategy, attraction numbers of columns of each strategy was summed.
6. Strategies based on the results of the attraction of each strategy, will be prioritized from the highest score to lowest score. Table (4) and in Table 5 shows prioritized strategies.

Scores of attraction were considered in the strategic matrix table (QSPM).

= 1 is not acceptable;
= 2 can be accepted;
= 3 may be acceptable;
4 = very acceptable.

Results

The results of the internal environment factors, including the strengths and weaknesses in the area of urban waste management of Ardebil are presented in Table 1.

Table 1 shows the total weighted rating of the external environment, which is equal to 226/2 Indicates the relative desirability of waste management in the city of Ardabil in use of strengths to eliminate weaknesses. The results of the internal environment factors, including the opportunities and threats in the field of urban waste management of Ardebil is presented in Table 2.

Table 2 shows the total weighted rating of the external environment, which is equal to 336/2, Indicates that the relative desirability of waste management in the city of Ardabil is the opportunity to deal with threats. Provide strategic strategy on management of solid waste in Ardabil: Based on internal and external environmental factors obtained. SWOT matrix, including opportunities, threats, strengths and weaknesses based on 4 strategies SO, ST, WO 3 was obtained in the table. Following the determination of strategic goals, according to the final targets and main

strategic approaches of development of solid waste management and support urban solid wastes of Ardebil were adjusted. types of specified strategies are as in Table 3.

The formation of a quantitative strategic planning matrix (QSPM):

The results of the evaluation strategies identified in the SWOT matrix through a quantitative strategic planning evaluation (QSPM) are presented in Table 4. Since the volume of tables of all internal and external evaluation of matrix for Quad strategies from the SWOT analysis is very high, Thus, for example, only scoring WT strategies outlined in Table 4 and based on the same scoring method for other strategies SO, WT, ST weighted scores were determined and priorities of Quad strategies in the field of urban waste management Ardabil are provided in Table 5

The results of prioritization strategies of strategy through QSPM matrix is presented in Table 5.

DISCUSSIONS

Based on the model SWAT there are four strategic SO, WO, WT, ST. the results of Strategies based on the scores obtained from the evaluation of internal and external factors in the position of 2.22 and 2.33, respectively, showed Waste Management situationof Ardebil isin defensive positions ofinside and outside matrix that is shown in Figure 1.

Since evaluation matrix of internal and external factors, the strategies that should be considered is WT strategies (defensive strategy). Quantitative and qualitative study to establish solid waste collection and disposal of solid waste management system, including those that is required To control waste production, saving and planning for the Hygiene of the waste disposal system To eventually we have paid special attention to environmental issues and to prevent environmental pollution. Lack of attention to the collection and disposal of solid waste in our society due to the variety of qualitative and quantitative composition, uncontrolled urban development and lack of appropriate technology is causing particular problems and fixing the problem is only possible by careful examination and coordination of knowledge and experience within the framework of a correct management. SOWT matrix analysis and matrix calculation results of the QSPM evaluation showed priority strategies in the field of waste management in Ardabil, include: Reduce pollution caused by unethical solid waste storage of Ardebil, supply of machinery and required equipment of urban waste management, Closer attention to the current location of the landfill and the need for landfill operations at the landfill, changing consumption pattern of the people through education and culture, and legislation are needed, Steering committee residual waste in the city of Ardabil, satisfaction of citizens and to share them directly or indirectly from the benefits of recycling, Promoting awareness and information Ardabil officials through specialized training collection and recycling transportation for staff of municipal, Encourage citizens to isolation and separation from the source of recyclable materials through incentive programs and environmental awareness and attracting participation through the NGO, Implementation of inter-sectoral cooperation in education and public awareness at the local level, supply machinery and equipment needed for the implementation of automated systems for collecting and disposal of municipal solid waste, Cooperation and coordination between the municipalities of Ardabil, for the construction and operation of the recycling industry jointly , promoting awareness and changing attitudes of citizens towards the proper management of solid waste in the city of Ardabil, Design and implementation of recycling bins from the origin in the streets, organizing informal groups for separation and recycling of waste through the formation of cooperatives collecting and selling recyclables, Origin separation of recyclable materials through incentive programs and increase awareness and environmental participation through the NGO, Science and Technology Committee to examine the recycling of solid waste in terms of economic and environmental. The results showed the first priority is paying attention to the problems of waste from citizens. One of the main weaknesses in the planning of waste management of Ardabil is lack of training on dealing with solid waste material factors that causes citizens to have poor participation in waste collection.

CONCLUSION

In this study, to develop a waste management strategy of Ardabil, combination of AHP and SWOT technique was used. For these purpose, internal and external environmental factors affecting urban waste management were determined and evaluated in EFE and IFE matrix. Internal and external factors in the evaluation matrix and applying rating the status quo of Each factor , according to the common key or the internal factors and external and internal factors were studied. Assessment strategies based on the results of the evaluation of internal and external factors is 226/2 and 336/2 respectively So internal and external matrices were in defensive position. Then through the formation of SWOT matrix strategic factors were determined. Obtained strategies were prioritize through the QSPM matrix. Among the internal factors Isolation and separation of waste with the highest rating was 433/0 weight that had the first place. Education and culture among the citizens in the field of recycling of with a score of 248/0 weight respectively placed in the second and third priorities among the internal factors. Including weight rating of internal factors, the total weighted scores obtained for internal strategic factors Swat was 219/2. Attention to the problems of waste from citizens with weight rating of 399/0 has the highest rating among the Swat external factors. Then the private sector willingness to invest in the recycling was the second sub-criteria in the external factor with weight rating of 336/0. Cooperation and public participation in recycling, the grassroots environmental organizations, Less attention of local and regional authorities in the field of waste management were the next sub- criteria in terms of weight rating. The lowest score was related to, rodents, vermin and stray dogs and cats in the city and rip garbage bags and messing them that was in the last place Among the external factors. This study found that using a combination of methods, SWOT and AHP (A "WOT) in the strategic planning of urban waste with Weight determine and the degree of importance of internal and external factors affecting on the strategic plan present more accurate results for the SWOT method that is Consistent with the research of Kajanus et al (2004) and ((Osuna, Aranda, 2007 and Seyed Ali Jozi et al (2012).

REFERENCE

Josie S, Zarei M, 2010. the provision of waste management strategic plan by A'WOT (Case study: city of Minab), the Journal of Ecology.

Ghodsi Pour h. 2009. Issues in Multi-criteria decision of analysis process hierarchy. Tehran: Amir Kabir publication.

Almasi H, 2004. Mofrad MR. components of the economic importance of recycling and waste khagy village of Kashan. Iranian Journal of faiz , **31** : 66 _ 74

Elías Osuna E, A Aranda. 2007 . Combining SWOT and AHP Techniques for Strategic. Viña Del Mar. Chile, 2-6.

Esty D, ME Porter, 2001. Ranking national environmental regulation and performance: a leading indicator of future competitiveness Oxford University Press.

HICPAC, 2001. Centers for disease control and prevention Healthcare Infection control practices advisory committee, Draft guideline for Environmental Infection ,113-124

Kajanus M J, Kangas M Kurttila. 2004. The use of value focused thinking and the A'WOT hybrid method in tourism management. Tourism Management.. **25**:499-506.

Kajanus M. 2004. The Use of Value Focused thinking and the A و WOT hybrid Method in Tourism Management, Tourism Management Journal, **56**: 499-506.

Khani M , 2009. Practical Guide to waste management Tehran; Khaniran Pub. , 240

Salvato JA , Nemerow NL & Agardy FJ , 2003 . Environmental Enjineering . 5th ed. New York : John wileyand sons Pub. ,432

Nilsson, M. 2004**,** Research and advice onstrategic environmental assessment, Stockholm Environment Institute Publications.

Saaty T L, 2000, Fundamentals of Decision Making and Priority Theory. 2nd ed. Pittsburgh, PA: RWS Publications, pp.11..

Tchobanoglous G, Theisen H, Vigil S. 1993. Integrated solid waste management. NewYork: McGraw-Hill,: 69-73.

Table 1. evaluation matrix of internal factors IFE of Waste Management Ardebil

Weighted score	score	weight	Strategic internal factors
Strength sub-criteria			
0.231	**3**	**0.077**	Create sustainable income sources for waste management
0.432	**3**	**0.144**	Isolation and separation of waste
0.142	**2**	**0.071**	Management of Centralized unit on municipal solid waste management
0.248	**4**	**0.062**	Education and culture among the citizens in the field of recycling
0.074	**2**	**0.037**	Compliance with the schedule for garbage collection by municipal Forces
0.156	**3**	**0.052**	Mechanized garbage collection
0.108	**3**	**0.036**	the improvement of The main factors and waste management support
0.072	**3**	**0.024**	Attract specialists in the field of urban waste management
Strength sub-criteria			
0.135	**1**	**0.135**	The lack of educational programs in the field of dealing with solid waste
0.144	**2**	**0.072**	Lack of planning for source reduction of waste
0.25	**2**	**0.125**	Incorrect disposal of waste and a contamination incident
0.037	**1**	**0.037**	Lack of a unified management system in the field of management of solid municipal
0.068	**2**	**0.034**	Lack of public participation in recycling
0.05	**2**	**0.025**	Lack of organizing itinerant and non-formal factor the field of informal recycling
0.021	**1**	**0.021**	The rising cost of waste collection due to lack of plan for collecting waste
0.014	**1**	**0.014**	Emissions from non-normative burning of waste in the open environment
0.016	**1**	**0.016**	Lack of supervision and extensive process of collecting
0.01	**1**	**0.01**	Mess of garbage in the city, especially during the transition to boxes
0.018	**2**	**0.009**	use of Inefficient staff to collect garbage
2.226	**-**	**1.001**	**total**

Table 2. evaluation matrix of external factors EFE of Waste Management Ardebil

External Strategic Factors	weigh	score	Weighted scores
opportunity sub-criteria			
Attention to the problems of waste from citizens	**0.133**	**3**	**0.399**
The private sector's willingness to invest in recycling	**0.084**	**4**	**0.336**
Cooperation and public participation in recycling	**0.085**	**3**	**0.255**
Existence of governmental environmental organizations	**0.036**	**3**	**0.108**
Welcomed the plans and programs of separation of waste from the source	**0.041**	**2**	**0.082**
Existence of waste recycling industry	**0.06**	**3**	**0.18**
Organizations and agencies working in the field of waste	**0.033**	**3**	**0.099**
Knowledge of Housewives	**0.018**	**4**	**0.072**
Advertising in line with culture to separate and reducing the volume of waste	**0.014**	**2**	**0.028**
Using the legal tools to better implementation of waste management	**0.009**	**1**	**0.009**
Threats sub-criteria			
Low levels of public awareness in the field recycling	**0.0505**	**2**	**0.094**
Changes in consumption patterns of people	**0.064**	**1**	**0.071**
urban areas Density	**0.1175**	**2**	**0.204**
Less attention of local and regional authorities in the field of waste management	**0.0745**	**2**	**0.078**
Cultural and economic differences between the people of the city	**0.057**	**2**	**0.11**
Environmental pollution in the region due to lack of proper management of solid waste	**0.023**	**2**	**0.052**
Social dissatisfaction with the performance of municipal in field of solid waste	**0.029**	**1**	**0.028**
Lack of using durable and recyclable products	**0.022**	**2**	**0.054**
Create landscapes unworthy of landfill...	**0.0165**	**2**	**0.032**
Lack of coordination between different departments and agencies in the field of recycling	**0.0125**	**1**	**0.011**
Existence informal groups to sale recyclables	**0.0105**	**2**	**0.02**
There is no formal market for the sale of recyclables	**0.0075**	**1**	**0.008**
Existence vermin, rodents and stray animals such as dogs and cats in the city and rip garbage bags and mess them	**0.0065**	**1**	**0.006**
total	**1**	-	**2.336**

Table 3. SWOT matrix (SWOT)

	Strength points (S)	**Weaknesses points (W)**
	Create sustainable income sources for waste management [Isolation and separation of waste Centralized unit management of municipal waste-management Education and culture among citizens in the field of recycling -Compliance with the schedule for garbage collection by The mayor force Mechanized garbage collection _ improvement of The main factors and support waste management _ attracting experts in the field of urban waste management	_ Lack of educational planning in dealing with solid waste factors_ Lack of planning for reduction from source waste _ Incorrect disposal of waste and a contamination incident _ Lack of unified management system in the field of management of municipal solid [Lack of public participation in recycling_ Lack of organizing in informal itinerant in the field of non-formal recycling _ Increase the cost of waste collection due to lack of collected waste _ Emissions from non-normative burning waste in the open environment _ Lack of supervision and extensive process of collecting _ Mess of garbage in the city, especially during the transition to boxes use of Inefficient staff in collection
opportunity (O)	**strategies (SO)**	**strategies (WO)**
Pay attentions to the problems of waste from citizens _ willingness of private sector to invest in recycling _ Cooperation and public participation in recycling Existence of environmental-grassroots organizations People welcomed the plans and programs of waste separation from origin Waste-recycling industries _ Organizations and agencies working in the field of waste Knowledge Housewives _ Advertising in line with culture to separate and reducing the volume of waste-	- Raising awareness and changing attitudes of citizens towards the proper management of solid waste in the city of Ardabil. - Satisfaction of citizens, and to share them directly or indirectly from the benefits of recycling - Changes in the consumption pattern of the people through education and culture, and Legislation of laws are needed include: [Share them directly or indirectly from the benefits of recycling _ Buy and use of durable goods, prepare enough food, recycling	_ supply machinery and equipment required for the implementation of automated systems for collecting and disposal of municipal waste. _ Science and Technology Committee to examine the economic and environmental recycling solid waste. _ Promoting knowledge Ardabil authorities through specialized training courses for staff of municipal of recycling collection and transportation. _ Encourage citizens to isolation and separation from the source of recyclable materials through incentive programs and awareness and attract environmental participation through NGO's

Use legal tools to better implementation of waste management	and reuse at the source of production. _ Design and establishment of recycling bins from origin in passages of origin. _ Cooperation and coordination between the municipalities of Ardabil, for the construction and operation of recycling industry jointly.	
threats (T)	**Strategies (ST)**	**Strategies (WT)**
_Low level of public and social awareness in the field Of recycling _ Changes in the consumption pattern of the people _ urban areas Density _ Less attention of Local and regional authorities on waste management _Economic and cultural differences between the people of the city _ The environmental pollution due to lack of proper management of solid waste _ Social dissatisfaction with the performance of municipal solid waste _ lack of using durable and recyclable products Create ugly scenery of landfill_ _ Lack of coordination between different departments and agencies in the field of recycling _existence of informal groups for the sale of recyclables _ Lack of a formal market for the sale of recyclables Existence of vermin and rodent like animals stray dogs and cats in the city and rip garbage bags and mess them	_ Organizing groups of informal waste separation and recycling through the formation of cooperatives collecting and selling recyclables**.** _ The use of environmental NGO in the education for citizens splitting from the origin _ Implementation of inter-sectoral cooperation in education and public awareness at the local level	_ Reduce pollution from non-systematic collection of solid waste storage in Ardebil. _ Closer attention to the current location in landfill waste disposal and the need for hygienic disposal operations. _Supply equipment for municipal waste. _ Form a steering committee of waste in waste organization in the city of Ardabil.

Table 4. a quantitative strategic planning matrix (QSPM)

Internal Strategic Factors	Normalized weight	Wt1		Wt2		Wt3		Wt4	
		AS	TAS	AS	TAS	AS	TAS	AS	TAS
Create sustainable income sources for waste management	0.077	4	0.308	3	0.231	3	0.231	2	0.154
Isolation and separation of waste	0.144	1	0.144	2	0.288	2	0.288	3	0.432
Managing Centralized unit in field of management of municipal waste	0.071	2	0.142	3	0.213	3	0.213	4	0.284
Education and culture among the citizens in the field of recycling	0.062	2	0.124	4	0.248	4	0.248	2	0.124
Compliance with the schedule for garbage collection by Municipality forces	0.037	3	0.111	3	0.111	2	0.074	2	0.074
Mechanized garbage collection	0.052	2	0.104	2	0.104	3	0.156	1	0.052
improvement of The main factors and support waste management	0.036	3	0.108	3	0.108	2	0.072	2	0.072
attracting specialists in the field of urban waste management	0.024	2	0.048	2	0.048	2	0.048	2	0.048
The lack of educational programs in the field of dealing with solid waste	0.135	4	0.54	3	0.405	3	0.405	2	0.27
Lack of planning for reduction of waste from origin	0.072	3	0.216	2	0.144	3	0.216	3	0.216
Incorrect disposal of waste and a contamination incident	0.125	4	0.5	3	0.375	3	0.375	2	0.25
Lack of a unified management system in the field of management of municipal solid	0.037	4	0.148	4	0.148	3	0.111	3	0.111

Lack of public participation in recycling	0.034	2	0.068	1	0.034	2	0.068	4	0.136
Lack of organizing in the field of informal itinerant in field of non-formal recycling	0.025	4	0.1	4	0.1	4	0.1	1	0.025
The rising cost of waste collection due to lack of plan for collecting waste	0.021	4	0.084	3	0.063	3	0.063	2	0.042
Emissions from non-normative burning waste in the open environment	0.014	3	0.042	2	0.028	3	0.042	1	0.014
Lack of extensive supervision in process of collecting	0.016	4	0.064	4	0.064	3	0.048	2	0.032
Mess of garbage in the city, especially during the transition to boxes	0.01	4	0.04	4	0.04	3	0.03	2	0.02
The use of Inefficient staff to collect garbage	0.009	4	0.036	4	0.036	4	0.036	2	0.018
total	1.001	-	2.927	-	2.788	-	2.824	-	2.374

Continued Table (4)

External Strategic Factors	**Normalized weight**	**Wt1**		**Wt2**		**Wt3**		**Wt4**	
		AS	**TAS**	**AS**	**TAS**	**AS**	**TAS**	**AS**	**TAS**
Attention to the problems of waste from citizens	0.133	3	0.399	3	0.399	4	0.532	2	0.266
The private sector willingness to invest in recycling	0.084	4	0.336	4	0.336	3	0.252	4	0.336
Cooperation and public participation in recycling	0.085	3	0.255	3	0.255	4	0.34	4	0.34
Existence of grassroots environmental organizations	0.036	3	0.108	2	0.072	3	0.108	3	0.108
Peoples welcoming the plans and programs of the separation of waste	0.041	3	0.123	2	0.082	2	0.082	2	0.082

from origin									
Existence of waste recycling of industry	0.06	3	0.18	3	0.18	2	0.12	2	0.12
Organizations and agencies participation in the field of waste	0.033	4	0.132	3	0.099	3	0.099	4	0.132
Knowledge Housewives	0.018	2	0.036	2	0.036	3	0.054	2	0.036
Advertising in line with society culture to separate and reduce the volume of waste	0.014	3	0.042	3	0.042	4	0.056	4	0.056
The use of legal tools to better implementation of waste management	0.009	3	0.027	2	0.018	3	0.027	3	0.027
Low levels of public and social awareness in field of recycling	0.047	2	0.094	3	0.141	3	0.141	2	0.094
Changes in consumption patterns of people	0.071	4	0.284	4	0.284	3	0.213	2	0.142
urban areas Density	0.102	4	0.408	4	0.408	4	0.408	3	0.306
Less attention of local and regional authorities in the field of waste management	0.078	2	0.156	2	0.156	1	0.078	1	0.078
Cultural and economic differences between the people of the city	0.055	3	0.165	3	0.165	4	0.22	3	0.165
Environmental pollution in the region due to lack of proper management of solid waste	0.026	4	0.104	4	0.104	3	0.078	4	0.104
Social dissatisfaction with the performance of Municipalities in terms of solid waste	0.028	2	0.056	2	0.056	2	0.056	3	0.084
lack of use of durable and recyclable products	0.027	2	0.054	3	0.081	2	0.054	3	0.081
Create ugly scenes in landfill	0.016	3	0.048	2	0.032	3	0.048	3	0.048
Lack of coordination between different departments and agencies in the field of	0.011	3	0.033	3	0.033	4	0.044	3	0.033

recycling									
Existence of informal groups and sale recyclables	0.01	3	0.03	3	0.03	2	0.02	3	0.03
The absence of formal market for the sale of recyclables	0.008	4	0.032	4	0.032	3	0.024	4	0.032
Existence vermin, rodents and stray animals such as dogs and cats in the city and rip garbage bags and mess them	0.006	3	0.018	2	0.012	2	0.012	3	0.018
total	0.998	-	3.12	-	3.053	-	3.066	-	2.718

Table 5. prioritize strategies

strategy	**Strategy code**	**Internal factors evaluation**	**External factors evaluation**	**Total score**
Reduce pollution caused by unethical collection of solid waste storage of Ardebil.	**WT1**	**2/927**	**3/ 12**	**6/047**
Supply equipment for municipal waste.	**WT3**	**2/824**	**3/066**	**5/89**
Closer attention to the current location of the landfill and the need for hygienic disposal operations at the landfill.	**WT2**	**2/788**	**3/053**	**5/841**
Changing consumption pattern of the people through education and culture, and legislation needed	**SO3**	**2/23**	**3/066**	**5/296**
Steering committee of waste of waste organization in the city of Ardabil.	**WT4**	**2/374**	**2/718**	**5/092**
Satisfaction of citizens, and to share them directly or indirectly from the benefits of recycling	**SO2**	**1/981**	**3/053**	**5/034**
Promoting awareness and information of Ardabil officials through specialized training collection and recycling transportation for staff of municipal.	**WO3**	**1/757**	**3/12**	**4/877**
Encourage citizens to isolation and separation from the source of recyclable materials through incentive programs and environmental awareness and participation through NGO's	**ST2**	**2/251**	**2**	**4/251**
Implementation of inter-sectoral cooperation in education and public awareness at the local	**ST3**	**2/235**	**2/013**	**4/248**

level				
supply of machinery and equipment required for the implementation of automated systems for collecting and disposal of municipal waste.	**WO1**	**1/801**	**2/444**	**4/245**
Cooperation and coordination between the municipalities, of cities of Ardabil, recycling industry for the jointly construction and operation	**SO5**	**1/725**	**2/429**	**4/154**
Raise awareness and change the attitudes of citizens in Ardabil to properly manage solid waste	**SO1**	**2/ 206**	**1/936**	**4/142**
Design and installation recycling of containers in streets from origin.	**SO4**	**1/421**	**2/718**	**4/139**
Organizing groups of informal waste separation and recycling of through the formation of cooperatives collecting firms and selling recyclables.	**ST1**	**1/943**	**2/18**	**4/123**
Origin separation of recyclable materials through incentive programs and environmental awareness and participation through NGO's	**WO4**	**2/074**	**1/654**	**3/728**
Science and Technology Committee to examine recycling of solid waste in terms of the economic and environmental.	**WO2**	**33.2**	**1/926**	**3/626**

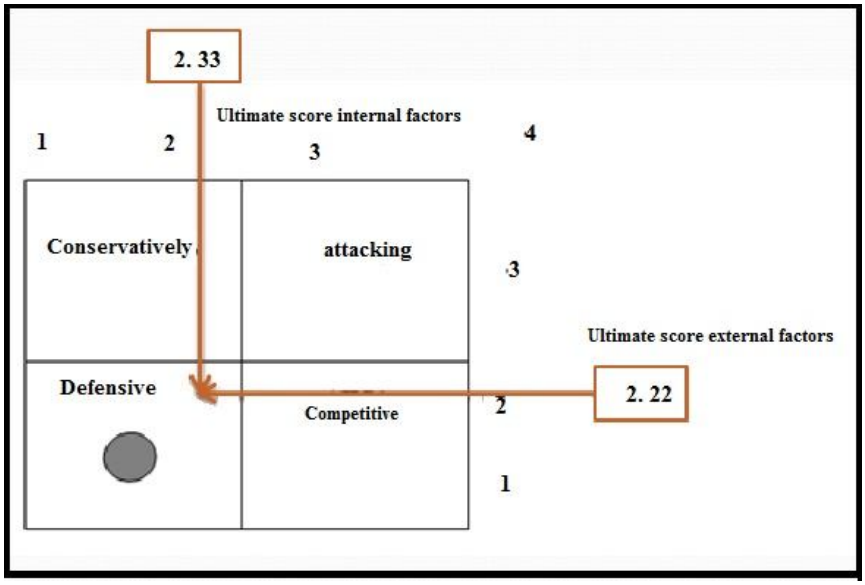

Figure 1: Diagram of internal and external factors matrix