Abstract for the special issue

SOCIO-ECOLOGICAL-HEALTH STUDY IN IRAN

Development of the society, health and ecology are dependent on each other in all the countries including developed or developing countries like Iran. The influence of the society on health and life style is enormous. It also influences the development of the child, which in-turn produces an untoward impact on the marital relationship of parents. Ecological factors also produce both good and adverse impact on the health of human. Presence of non-biodegradable heavy metals in the soil causes untoward conditions to the ecological system as well as to the human of that society. In Iran, the presence of date palm tree can reduce the heavy metal content of the soil, has been reported by many researchers. As per many studies, the adverse environmental conditions as well as the human diseases like AIDS, cancer and many other psychological disorders may pull back the development of the society of Iran. Moreover, the Law of Iran also plays an important role in the society, which must be bit strict in regulation of spreading diseases like HIV infection and adverse health conditions due to untoward ecological effects on human health. The research findings in this special issue focuses on these issues and would believe that these would address those issues for betterment of the society.

Keywords: Society, health, ecology, Law etc.

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SEXUAL SELF-ESTEEM AS A PREDICTOR OF MARITAL SATISFACTION IN MOTHERS WITH NORMAL OR MENTALLY RETARDED CHILDREN

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ABSTRACT

The present study was designed to compare marital satisfaction in mothers with normal children and mothers with mentally retarded children and to establish the role of sexual self-esteem as a forecaster of marital satisfaction in mothers in Qaen, Iran (2014). 120 mothers were participated in this study. 60 mothers with mentally retarded children were selected through census and another 60 mothers with normal children were selected by multi-stage random sampling and were assigned in case and control groups respectively. The results showed that marital satisfaction and all of its components in mothers with normal children were significantly more compared to mothers with mentally retarded children ($P<0.05$). Sexual self-esteem and each of its components was significantly ($P<0.05$) increased in mothers with normal children. The results of multiple regression showed that sexual self-esteem can explain 0.741 and 0.766 of the variance related to marital satisfaction in mothers with normal and mentally retarded children respectively. Thus, marital adjustment training is recommended for mothers with mentally retarded children and sexual self-esteem training can be considered as one of the solutions to increase marital satisfaction especially in women.

Keywords*: Sexual Self-Esteem, Marital Satisfaction, Normal Children, Mentally Retarded Children*

INTRODUCTION

The presence of a mentally retarded child in the family may negatively affect the mental health of family members, especially to the mothers [1]. Mothers experience too much stress which may affect the marital relationships. Several, studies have been reported that parents with mentally retarded children experience more stress as a result they have worse mental health status compared to parents with normal children [2-4]. Mothers with mentally retarded children sometimes blame themselves for the subsistence of such a child and thus, many problems arise. Mothers develop a negative self-concept which damages their marital relationships [5-6]. Many parents believe that the birth of a mentally retarded child not only can affect parents and siblings' relationships but also relationships outside the family. Parents with mentally retarded children also experience emotions such as fear, culpability and resentment, leading to increased domestic sadism and sometimes divorce also [7]. Sexual self-esteem means individual's pleasant or unpleasant feeling to opposite gender [8] which includes the emotional response to the evaluation of thoughts, emotions and sexual behavior [9]. Whereas, the marital satisfaction means conformity between individual's expectations and experience of marital life [10]. According to Hawkins, marital satisfaction is subjective feelings of happiness and pleasure between spouses considering all aspects of marriage [11]. Happy couples are more satisfied from their sexual life and have more sexual relations than unhappy couples. He found that sexual intimacy in marriage is linked to emotional closeness; but the reason is not clear. Possibly, as sexual satisfaction increases the rewards associated with couples it leads to a happy marriage. But it is

also likely that in a good marriage, especially when there is a good communication between couples, it is important to know what is sexually pleasurable for the other side [12]. Some studies have explained the relationship between sexual self-esteem and normal sexual performance and finally the sexual satisfaction [13]. It has also been reported that sexual self-esteem highly predicts satisfying sexual behaviors with the spouse [14]. Sexual satisfaction of the spouse is related to marital satisfaction [15-16]. According to some researchers, sexual satisfaction is effective on marital life survival and without positive sexual self-esteem marital life lacks real meaning [17-18]. In their study they explained a significant relationship between sexual self-efficacy and marital satisfaction and highlighted that gender differences between couples are the most important factors of marital disagreement and divorce in Iran [17]. Several studies have been so far conducted on marital satisfaction in parents with normal / mentally retarded children [19]. A research study showed the effect of mentally retarded children on the mentality of parents with in terms of marital satisfaction. It was found that mothers with mentally retarded children report less marital satisfaction than fathers [20]. The results also revealed the lack of marital adjustment between fathers and mothers with mentally retarded children [21]. In another study conducted on 196 married female athletes in Tehran confirmed a significant positive relationship between sexual self-esteem and all of its components and marital satisfaction. The results of studies showed a significant difference between marital satisfactions in parents with disabled or mental retardation and normal children [22]. A study on 72 parents with disabled children in Hong Kong showed that dealing with emotions and behaviors of these children was the most stressful experience for parents. Linear regression analysis showed that sharing child care responsibilities and time allocation stress were significant predictors for marital satisfaction [23]. In addition to this, another study on 387 couples using regression analysis showed that the relationship between the couple and sexual satisfaction predicts independently the marital satisfaction [24]. If couples are successful in effective relationship communication, sexual dissatisfaction will decrease marital satisfaction. Alternatively, if couples have problems in their communication, but are sexually satisfied, they will experience more marital satisfaction than those who have less sexual satisfaction. Therefore, sexual satisfaction may compensate the negative effects of poor communication on marital satisfaction. How mentally retarded children can affect mothers' marital satisfaction and sexual self-esteem has not yet been studied nationally or internationally. Thus, the present study was aimed to compare marital satisfaction in mothers with normal retarded children and also to forecaster of self-esteem as a predictor of marital satisfaction in mothers in Qaen, Iran (2014).

MATERIALS AND METHODS

The study population consisting of all mothers (n=60) with mentally retarded girl children in elementary school in year 2013-2014 in Qaen and all mothers with normal girls in elementary school in the same year (n=5800) in Qaen were considered. 60 mothers with mentally retarded children (case group) and 60 mothers with normal children (control group) were selected through census and multi-stage random sampling respectively. To observe research ethics, the necessary explanations were given, the objectives were explained and confidentiality was emphasized and then the subjects were asked to complete the sexual self-esteem inventory and marital satisfaction questionnaire (ENRICH). In 1996 Zeanah and Schwarz designed sexual self-esteem inventory consists of 43 items and 5 subscales, including skill and experience (13 items), attractiveness (9 items), control (5 items), adaptiveness (5 items) and moral judgment (11 items). This questionnaire assessed subjective emotional reactions of women to their thoughts and feelings about sexual behavior. The creator of the inventory calculated Cronbach's alpha and reported the value of attractiveness 0.94, control 0.88, adaptiveness 0.85, moral judgment 0.85 and skill and experience 0.93. For construct validity, the correlation of this inventory with Rosenberg self-esteem questionnaire has been calculated and the value was reported for attractiveness 0.56, control 0.45, adaptiveness 0.45, moral judgment 0.38 and skill and experience 0.44 and the total score was reported 0.57. Construct validity of this inventory with respect to the number of variables such as sexual experience, frequency of sexual intercourse, number of sexual partners and also the number of romantic appointments and sexual partners were approved. The creators of this inventory believe that two subscales

(1) skill and experience

(2) control
This was done to give better information for sexual self-esteem [25]. In this study, Cronbach's alpha was obtained for subscales of attractiveness 0.89, control 0.74, adaptiveness 0.85, moral judgment 0.91 and skill and experience 0.94 and the total scale was obtained 0.98. To determine the strengths of marital relationships Dyadic Adjustment Scale (DAS) was designed by Olson. The original version of this questionnaire, which contains 115 items, was used in the short form with 47 items with nine aspects. Five-option items (completely agree, agree, neither agree nor disagree, disagree and completely disagree) were used and scored from one to five. Finally the sum of the scores were taken. Olson reported the reliability of the questionnaire is 0.92 by using Cronbach's alpha. Marital satisfaction aspects in this questionnaire were personality issues, marital relationship, conflict resolution, financial management, leisure time, sexual relations, marriage of children, relatives, friends and religious orientation. Mahdavian obtained the reliability coefficient of this questionnaire 0.94 for men and women by test-retest. The correlation coefficient of this questionnaire was obtained from 0.32 to 0.41 with life satisfaction scale and from 0.41 to 0.60 with family satisfaction scale, indicates its construction validity. All aspects of this questionnaire differentiate between satisfied and unsatisfied couples and show that it has good criterion validity. In this study, the reliability coefficient of the test was obtained by Cronbach's alpha for the total scale 0.96 and for the mentioned dimensions as follows: 0.83, 0.80, 0.85, 0.26, 0.74, 0.71, 0.76, 0.62, and 0.71, respectively. The issue was approved and questionnaires were prepared. The introduction letter for Education Organization of Qaen was taken from Islamic Azad University and the relevant permission was taken from the department and the schools. The samples of each school were selected. The researcher attended schools and justified the authorities and the mothers were ensured about the confidentiality of information. Apart from this they were requested to honestly answer the items in the questionnaires.

Statistical analysis
The data obtained were analyzed by using SPSS-15, independent t-test, Fisher test, ANOVA and stepwise regression.

RESULTS

The mean age of mothers with normal and mentally retarded children was 37.20±8.29 and 33.18±8.06 years respectively. Their mean length of marriage was 13.12±7.66 and 9.97±7.71 years respectively. For the number of children, the majority of mothers with normal children (93.3%) had up to four children and the majority of mothers with mentally retarded children (93.3%) had up to five children. Also, the mean age of husbands of mothers with normal and mentally retarded children was 41.22±10.26 and 36.08±9.31 years respectively. 70% of husbands of mothers with normal children had high school diploma or associate's degree and 30% had a bachelor's degree or higher degrees. 53.3% of husbands of mothers with mentally retarded children had high school diploma or associate's degree and 46.7% had a bachelor's degree or higher degrees. 55% of husbands of mothers with normal children were self-employed and 45% of them were employees. Also, 51.7% of husbands of women with mentally retarded children were employees and 48.3% of them were self-employed. The calculated t (-9.06) is greater than t-table (Table 1) and thus, we conclude (with 95% confidence) that there is a significant difference between the mothers with normal children and mothers with mentally retarded children in terms of marital satisfaction ($P<0.05$). So, that the marital satisfaction among mothers with normal children was greater than mothers with mentally retarded children.

Table 1
Independent t-test in comparison of marital satisfaction among mothers with normal children and mothers with mentally retarded children

Variable	Mothers with children	Mean	Standard deviation	Standard error of the mean	Degrees of freedom	T	P
Marital satisfaction	Mentally retarded	2.72	0.49	0.06	118	-9.06	0.000
	Normal	3.61	0.58	0.07			

The results of independent t-test for significant difference in marital satisfaction factors in mothers with normal and mentally retarded children is shown in Table 2. The significant difference ($P<0.05$) between these mothers in all components of marital satisfaction. Thus, the mean of all marital satisfaction components was greater in mothers with normal children compared to mothers with mentally retarded children.

Table 2

Independent t-test in comparison of marital satisfaction components among mothers with normal children and mothers with mentally retarded children

Marital satisfaction components	Mothers with children	Mean	Standard deviation	Standard error of the mean	Degrees of freedom	T	P
Personality issues	Mentally retarded	2.62	0.70	0.09	118	-7.45	0.000
	Normal	3.65	0.81	0.10			
Marital relationship	Mentally retarded	2.41	0.57	0.07	118	-10.55	0.000
	Normal	3.59	0.65	0.08			
Conflict resolution	Mentally retarded	2.56	0.61	0.08	118	-8.07	0.000
	Normal	3.61	0.79	0.10			
Financial management	Mentally retarded	2.83	0.47	0.06	118	-6.06	0.000
	Normal	3.38	0.51	0.06			
Leisure time activities	Mentally retarded	2.82	0.66	0.08	118	-6.94	
	Normal	3.71	0.73	0.09			
Sexual relations	Mentally retarded	2.82	0.84	0.10	118	-5.33	0.000
	Normal	3.56	0.64	0.08			
Marriage of children	Mentally retarded	2.61	0.69	0.09	118	-7.72	0.000
	Normal	3.58	0.68	0.08			
Relatives and friends	Mentally retarded	2.97	0.67	0.08	118	-5.32	0.000
	Normal	3.62	0.67	0.08			
Religious orientation	Mentally retarded	2.81	0.57	0.07	118	-8.67	0.000
	Normal	3.80	0.67	0.08			

Table 3

Correlation between sexual self-esteem and marital satisfaction in mothers with normal children and mothers with mentally retarded children

Sexual Self-esteem and its components	Marital Satisfaction			
	Mothers with normal children		Mothers with mentally retarded children	
	R	Significance level	R	Significance level
Skill and experience	0.80	0.000	0.90	0.000
Attractiveness	0.71	0.000	0.65	0.000
Control	0.80	0.000	0.83	0.000
Adaptiveness	0.81	0.000	0.84	0.000
Moral judgment	0.81	0.000	0.79	0.000
Sexual self-esteem (total)	0.86	0.000	0.87	0.000

The results of correlation test shows that there is a significant positive direct relationship between sexual self-esteem (overall) and its components, i.e. with the increase in sexual self-esteem and each of its components the marital satisfaction also increased in mothers with normal children. The results of correlation test is given in Table 3 also shows that there is a significant positive direct relationship between sexual self-esteem (total) and its components, i.e. with an increase in sexual self-esteem and each of its components, marital satisfaction is also increased in mothers with mentally retarded children.

Table 4
Summary of regression analysis (the relationship between sexual self-esteem and marital satisfaction) in mothers with normal children

Model	Predictor variables	Source of Changes	Sum of squares (SS)	Degrees of freedom (df)	F ratio	B	Beta	Significance level	t	Sig t	R	R2
1	Sexual self-esteem and its components	Regression	14.69	1								
		Remaining	5.14	58	165.78	0.59	0.86	0.000	12.88	0.000	0.86	0.74
		Total	19.83	59								

The correlation coefficient between the variables of sexual self-esteem and marital satisfaction was obtained 0.86. According to the Table 4, the observed F-statistic (F=165.78) with 1 and 58 degrees of freedom and at a confidence level of 95% (α=0.05) is significant for sexual self-esteem (P<0.05). The R2 value indicates that 0.74% of points are exactly on the regression line, in other words, 0.74% of changes in criterion variable (marital satisfaction) are related to sexual self-esteem (0.74% of the variance of satisfaction marital is explained by sexual self-esteem). The regression coefficient of sexual self-esteem shows that this variable can significantly explain marital satisfaction. The impact factor of sexual self-esteem (B=0.59) with respect to t-statistics shows that sexual self-esteem with a 95% confidence can predict 0.74% of changes related to marital satisfaction.

Table 5
Summary of regression analysis (the relationship between sexual self-esteem and marital satisfaction) in mothers with mentally retarded children

Model	Predictor variables	Source of Changes	Sum of squares (SS)	Degrees of freedom (df)	F ratio	B	Beta	Significance level	t	Sig t	R	R2
1	Sexual self-esteem and its components	Regression	11.26	1								
		Remaining	3.44	58	189.61	0.52	0.87	0.000	0.77	0.000	0.87	0.77
		Total	14.70	59								

The correlation coefficient between the variables of sexual self-esteem and marital satisfaction was obtained 0.87 (Table 5). The observed F-statistic (F=189.61) with 1 and 58 degrees of freedom and at a confidence level of 95% (α=0.05) was significant for sexual self-esteem (P<0.05). The R2 value indicates that 0.77% of points are on the regression line, in other words, 0.77% of changes in criterion variable (marital satisfaction) are related to sexual self-esteem (0.77% of the variance of satisfaction marital is explained by sexual self-esteem). The regression coefficient of sexual self-esteem shows that this variable can significantly explain marital satisfaction. The impact factor of sexual self-esteem (B=0.52) with respect to t-statistics shows that sexual self-esteem with a 95% confidence can predict 0.77% of changes related to marital satisfaction.

DISCUSSION

The results shows that, there is a significant difference between mothers with normal children and mothers with mentally retarded children in terms of overall marital satisfaction and all of its components. So, that overall marital satisfaction and all of its components were more in the mothers with normal children than with mentally retarded children. The findings of this study are consistent with the results of previous studies [19-23]. It seems the presence of mentally retarded children in families causes stress on the parents, especially mothers who take more care of them and in turn reduces their marital satisfaction. Marital dissatisfaction occurs when marital relationships status quo is not consistent with couples' expected and desired status quo. Therefore, the birth of a child with mental retardation may lead to parent's marital

dissatisfaction. Many studies shown that there is a correlation between stress and marital satisfaction in parents with normal or mentally retarded children. Parents with mentally retarded children suffer more stress and have less marital satisfaction than parents with normal children. Ellis (1986) also believes that exceptional children are one of the factors that can affect marital life. Parents with such children – particularly mothers – sometimes instead of protecting and accepting the child, blame themselves for the existence of such a child and problems arising from it, and have a negative self-concept which severely and negatively affects their marital relationships [5]. The present findings shows, there is a significant positive direct relationship between overall sexual self-esteem and its components, including skill and experience, attractiveness, control, adaptiveness and moral judgment and overall marital satisfaction in mothers with normal / mentally retarded children, i.e. with the increase in sexual self-esteem and each of its components, marital satisfaction is increased in these mothers. The results of regression coefficient in mothers with normal children show that sexual self-esteem can significantly explain marital satisfaction, in other words, 0.74% of variance related to marital satisfaction is explained by sexual self-esteem. Apart from this, the results of the regression coefficient in mothers with mentally retarded children show that sexual self-esteem can significantly explain marital satisfaction, in other words, 0.77% of variance related to marital satisfaction is explained by sexual self-esteem. Therefore, high sexual self-esteem plays an important role in improving marital satisfaction in mothers with normal / mentally retarded children. The results of this part of the research are consistent with findings of studies conducted by other researchers [18-26]. According to a study [14], high sexual self-esteem or low satisfying sexual behaviors in mothers with normal or mentally retarded children can increase or decrease marital satisfaction and given the relationship between sexual satisfaction and marital satisfaction. Marital satisfaction can be increased or decreased in mothers with normal or mentally retarded children. Stress and negative emotions which are created by the birth of a mentally retarded child can also negatively affect mothers' sexual self-esteem and marital satisfaction. This finding is consistent with the results of [5]. Self-esteem, positive attitude and husbands' empathy are associated with better and more complete sexual satisfaction and happiness, and they increase sexual relationships, expression of love and marital adjustment [16]. Patoul and Virnig also in their studies have noted that sexual intimacy in marriage is related to emotional intimacy. Perhaps, as sexual satisfaction increases the rewards associated with couples it leads to a happy marriage. But in a good marriage that there is a good communication between couples, it is important to know what is sexually pleasurable for the other side. The limitations in this study included information resources limited to self-assessment tools and the possibility of being biased, and also subjects' shame may have affected the correct answers as sexual self-esteem questionnaire is related to privacy issues.

CONCLUSION

According to these results obtained from this study we can conclude that the marital adjustment training is essential for mothers with mentally retarded children by experienced staff and the sexual self-esteem training can be consider as one of the solutions to increase marital satisfaction in spouses, especially in women.

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OPTIMAL STRATEGY SELECTION BY USING SWOT-ANP METHOD

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ABSTRACT

The present study is based on optimal strategy selection using strengths and weaknesses and opportunities and threats (SWOT) and its combination with network analysis method (ANP) method for a factory in food business. After identifying SWOT and specifying possible, applicable and appropriate strategies to them, the best applicable strategy was assessed by ANP. After ranking these strategies the sensitivity analysis was used in order to study the change degree of the ranking following any change in measures.

Keywords: *Strategic, ANP, SWOT, sensitivity.*

INTRODUCTION

Strategy identifies main opportunities in order to achieve the respective benefits [1]. In fact, strategies are tools by which a company can reach its long term objectives [2]. Program is a kind of commitment to do certain activities for the achievement of goals[3]. Planning is the process of thinking about and organizing the activities required to achieve a desired goal i.e; decision making about what thing to do [4]. Indeed, planning is a process in which production process, flow and coordination of information in expert section are linked to decision making sector in an organized manner [5]. Strategic planning process provides an attitude and analysis of the company and its environment and identifies the key conditions affecting on its success [6]. Set of decisions and measures adopted by top management and consulting with other levels of organization in order to determine long term activities is called strategic planning [7]. Strategic planning is followed by selection, i.e; one can select among goals, objectives and strategies [8]. Strategic planning is focused on objectives and addresses to selecting alternatives, appropriate methods, and necessary resource assignment to achieve those objectives [4]. In other words, strategic planning is an art and science of comprehensive codification, implementation and assessment of decisions in order to enabling organization to achieve the desired goals [9]. When strategic planning is successful, it affects all the operational areas of organization and becomes a part of its philosophy and culture [8]. Every company is faced with some various internal and external factors which have a potential incentive and limiting role in the path of its goal achievement. Identifying and assessing strategic factors acting as either support or barrier to reaching company's potential is the first step concerned by managers in strategic planning [7]. Process of strategic management is the way in which strategists began goal setting and make decisions considering three crucial factors of strategy development, such as, strategy implementation, strategy control and monitoring of strategy [10]. Strategic management plays an influential role in creating competitive advantage in organizations [11-12].One of the strategic management`s applications is to apply it in

project's context which is followed by determining principles of strategy development. In order to explain project strategy management application there is a need to define perspective principles, mission and values [13]. Major features of perspectives are being realistic, realizable, energizing, attractive, futuristic, challenging and centralizing [14]. In order to achieve competitive advantage in market and create value for customer's organizations we need detailed planning and using effective tools of strategy selection. These tools analyze attractive situations and environmental threats of organization by providing a proper framework, and improve strategies by considering strengths and eliminating weaknesses [15]. One of the best strategic techniques of planning and strategy analysis is the method of analyzing strengths and weaknesses and opportunities and threats (SWOT) which is a new tool for performance analyzing by strategic planners. Strategic management is consisted of three crucial steps of strategy development, strategy implementation, and strategy control and assessment. Strategy formulation is a process to develop long term programs in response to external opportunities and threats regarding company`s strength and weaknesses [2]. Various methods are used in strategic management to analyze strategic issues among which SWOT is common [10]. SWOT analysis is an important supportive and a frequently used tools in systematic analysis [16-17-18]. SWOT collects the most important internal and external factors affecting the future of organization, known as strategic. [19].

Ahp & anp application in swot analysis

SWOT analysis can be baseline served in strategy formulation if it is use in a proper manner. But it is not a sufficient analytical tool in determining relative importance of factors and evaluating appropriateness of decision options based of these factors [20]. SWOT helps decision maker in order to group factors in the forms of internal and external factors. In addition it also allows comparing opportunities and threats with strengths and weaknesses [21]. Generally, it is concluded that SWOT analysis is an inaccurate and surface listing or incomplete qualitative analysis of internal and external factors. Kurttila *et al.,* developed a hybrid model to remove weaknesses of SWOT in assessment and measurement steps. The proposed decision making analysis tool is hierarchical and a mathematical tool to solve complex decision making problems with several variables [22]. Hierarchical analysis in hybrid mood comparing used alone results in more realistic and promising decisions. So today, particularly in studies related to strategic management, focus is more on hybrid hierarchical analysis. Again different tools can be combined with hierarchical analysis. According to European Journal of Operational Research, among 66 published articles from 1997 to 2006, 5 articles, or 8% of them have hierarchical analysis in combination with SWOTThis method, that is using hierarchical analysis in SWOT, called ***A`WOT***, was referred in next studies [20-23].

Creating swot matrix

Following examination and assessment of internal and external factors, required information to codify strategies were specified and managers starts comparing those information and four various types of strategy through SWOT matrix. However, in this matrix, after comparing pairs of opportunities with weaknesses, threats with strengths, and opportunities with strengths and examining pairs comparison results some of applicable strategies were selected. It should be noticed that many strategies can be drawn from above mentioned pair comparisons, but in the table below only applicable strategies are provided:

Table 1

Examining strengths and weaknesses and opportunities and threats

Perspective: 100% Scale Up	Strengths							weaknesses						
Internal factors / **External factors**	**S1- access to bank and credit resources**	**S2- technical, technological and empirical knowledge of managers**	**S3- communication with commercial partners outside of country organization**	**S4- presence of entrepreneurship and innovative spirit in**	**S5- product diversity**	**S6- valid brand**	**S7- nation-wide factory distribution**	**W1- presence of loss making irremovable products**	**W2- lack of capital**	**W3- liquidity and receivables collection problems from wholesalers**	**W4- disproportion of equipments with new technologies compared to external competitors**	**W5- lack of linkage between different parts of company**	**W6- high costs of transportation**	**W7- weakness regarding to costumers and market research**
O1- market of Persian Gulf and Oman Sea areas	1						1							
O2- central Asia	1													
O3- willingness of foreign companies for shared product		1							1					
O4- market of Arab countries	1						1							
O5- new-seeking young generation					1									
O6- people`s interest in fast food						1								
O7- expansion of food supply from outside														
O8- ability to attract key retired personnel of foreign countries														
T1- increase in raw material price	1							1						
T2- internal new competitors entrance						1								1
T3- opening borders to foreign goods					1									
T4- variable rate of exchange														
T5- high cost of equipment purchase	1							1			1			
T8- lack of proper management consultants		1												
T9- targeted subsidies							1						1	
T10- economical sanctions											1			

Table 2

Possible strategies drawn by investigating strengths and weaknesses and opportunities and threats

No	Strategy Resource	Strategy type	Strategy title with more explanations
1	O6S6	Maxi max	Production without factory (production by others with brand and packaging
2	O1S1	Maxi max	Sponsoring projects in order to increase production and market share
3	O2S1	Maxi max	Financing good export to central Asia countries
4	O4S1	Maxi max	Improving export to Arab countries via proper financing
5	O3S3	Maxi max	Developing joint venture to produce shared products
6	O5S5	Maxi max	Improving products and increasing diversity in response to different tastes
7	O1S7	Maxi max	Direct sales of products and reducing cost of transportation
8	O4S7	Maxi max	Production in neighbor countries and direct presence in region markets
9	T2S6	Maxi Min	Enhancing brand to eliminate competitors
10	T7S4	Maxi Min	Improving R&D unit
11	T3S5	Maxi Min	Improving and developing new products to prevent risk of import goods
12	T1S1/T5S1	Maxi Min	Obtaining required liquidity to improve projects of cost reduction
13	T6S2	Maxi Min	Knowledge management and documenting internal processes
14	T9S7	Maxi Min	Compensating high costs of transportation from geographical expansion of market presence
15	O3W2/O3W5/O3W8	Mini Max	Using knowledge and capital of foreign counterparts in order to cover weakness in technical knowledge, maintenance system, internal processes, etc
16	O8W12	Mini Max	Supplying required expert force through attracting foreign retired
17	O3W2	Mini Max	Attracting foreign investors
18	T1W1	Mini Min	Implementing projects of cost reduction from identifying loss making goods
19	T5W4	Mini Min	Program of equipment replacement based on priority
20	T2W7	Mini Min	Improving market research unit to identify market and competitors
21	T9W6	Mini Min	Planning new models of company`s transportation
22	T8W4	Mini Min	Finding new resources to import equipments

In below table, beside being applicable, those strategies are selected that are consistent to company`s situation.

Table 3

Applicable and consistent strategies with company`s situation

No	Strategy Resource	Strategy type	Strategy title with more explanations
1	O6S6	Maxi max	Production without factory (production by others with brand and packaging
2	O3S3	Maxi max	Developing joint venture to produce shared products
3	O5S5	Maxi max	Improving products and increasing diversity in response to different tastes
4	T2S6	Maxi Min	Enhancing brand to eliminate competitors
5	T3S5	Maxi Min	Improving and developing new products to prevent risk of import goods
6	O3W2	Mini Max	Using knowledge and capital of foreign counterparts in order to cover weakness in technical knowledge, maintenance system, internal processes, etc
7	T2W7	Mini Min	Improving market research unit to identify market and competitors

As already said, hierarchical analysis was used previously as a method of multi-measure decision making in combination with SWOT, which is called A`WOT. Using A`WOT makes it possible to examine and evaluate strategies regarding their priorities. Despite effectiveness of hierarchical analysis to remove some of defects of SWOT, regarding not considering internal dependencies in this method using network analysis (ANP) and combining internal dependencies may show better results will be obtained. When using hierarchical analysis it is assumed that there are no internal dependencies between strengths and weaknesses, as well as opportunities and threats. But it is clear that a company that has proper facilities (strength) can better use opportunities ahead and in the case of inaccessibility to proper resources these opportunities are lost or are available to other competitors of the company. As it is clear that there is a relation between strengths and weaknesses and it which can be examined using network analysis method. There are similar relations between strengths and threats and other factors which can be inserted in ranking by network analysis method. In the below Figure figure, relations and internal dependencies among SWOT factors are presented:

Figure 1
Relations and internal dependencies between SWOT factors

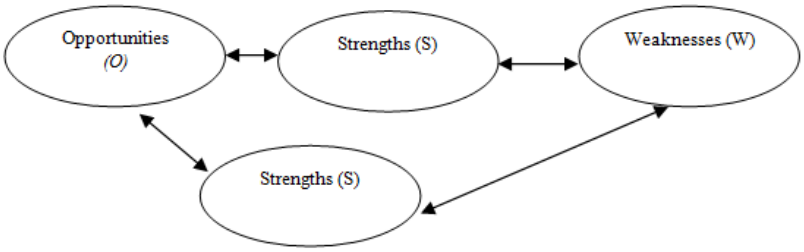
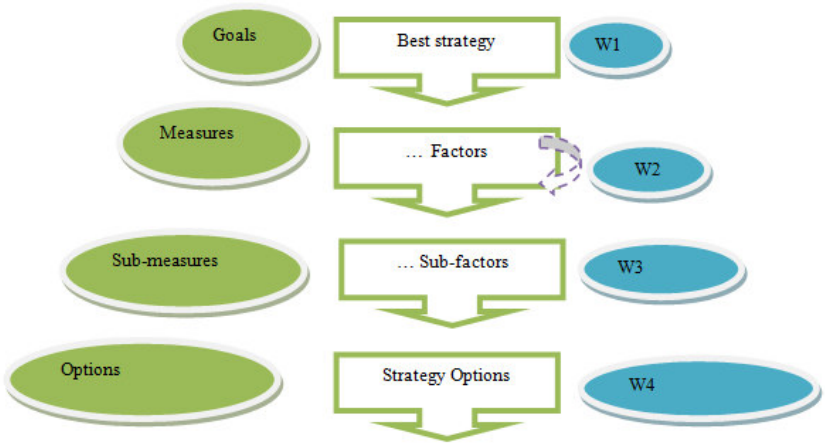


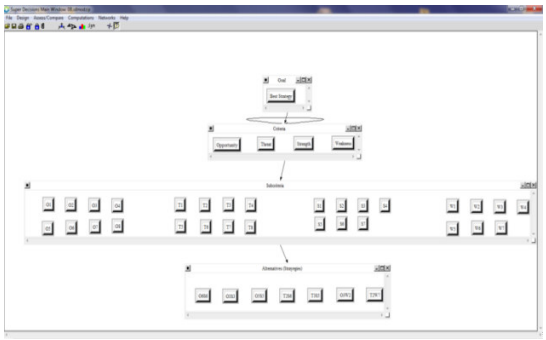
Figure 2
Hierarchical algorithm for SWOT model



Analytic network process

After examining weaknesses and strengths and considering opportunities and threats, as well as applicable consistent strategies with them, now we are were moved turning to investigating investigate the best of these strategies using network analysis method. In the below Figure figure, the relation between each of these strategies based on weaknesses and strengths and opportunities and threats with all their interdependence in used software for network analysis method are presented.

Figure 3
Internal and external relations between factors and measures



General graphic model of evaluating best strategies with ideal, normal and raw numbers are presented in the figure 4.

Figure 4
General graphic model and associated numbers of each strategy

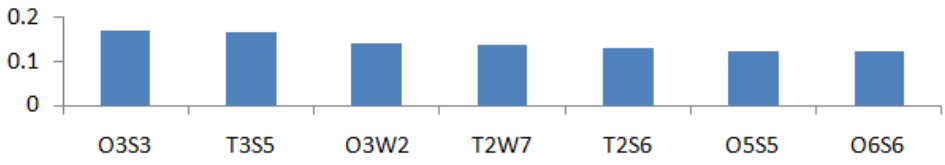
Name	Graphic	Ideals	Normals	Raw
O3S3		1.000000	0.170034	0.052824
O3W2		0.837321	0.142373	0.044230
O5S5		0.730470	0.124204	0.038586
O6S6		0.726636	0.123553	0.038383
T2S6		0.780923	0.132783	0.041251
T2W7		0.814302	0.138459	0.043014
T3S5		0.991537	0.168595	0.052376

Ultimately, final order of these strategies regarding defined situations are presented in the below table 4 and figure 5.

Table 4
Final order of selected strategies

No	Strategy resource	Strategy type	Strategy title with more explanations	Final weigh
1	O3S3	Maxi max	Developing joint venture to produce shared products	0.1700
2	T3S5	Maxi Min	Improving and developing new products to prevent risk of import goods	0.1685
3	O3W2	Mini Max	Using knowledge and capital of foreign counterparts in order to cover weakness in technical knowledge, maintenance system, internal processes, etc	0.1423
4	T2W7	Mini Min	Improving market research unit to identify market and competitors	0.2005
5	T2S6	Maxi Min	Enhancing brand to eliminate competitors	0.1327
6	O5S5	Maxi max	Improving products and increasing diversity in response to different tastes	0.1242
7	O6S6	Maxi max	Production without factory (production by others with brand and packaging	0.1235

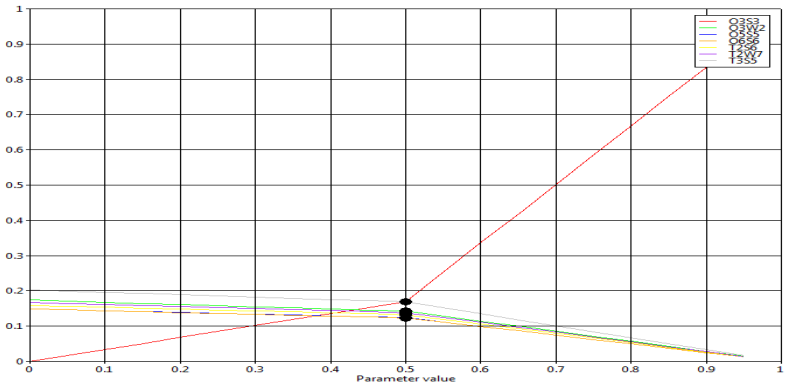
Figure 5
Diagram of final order of selected strategies



Sensitivity analysis

In order to study all these cases comprehensively, ranking changes in each of the factors must be compared with change in the importance degree of measures. In doing so, sensitivity analysis was used. For this purpose, by altering any of the parameters, its effect was visible on general ranking of strategies or ranking based on that certain measure or parameter. In the below diagram sensitivity analysis is presented in a form of plot for changes resulted from change in importance of "establishing joint adventure to produce shared products" (which was the best selected strategy in the previous step).

Figure 6
Plot diagram of sensitivity analysis



In other point of view, sensitivity analysis can be presented based on change in parameters in a bar graph. In two below Figures, change in ranking these strategies based on change in opportunities from 0 to 1 is depicted.

Figure 7
ranking Ranking graph with sensitivity analysis of opportunities in 0 degree

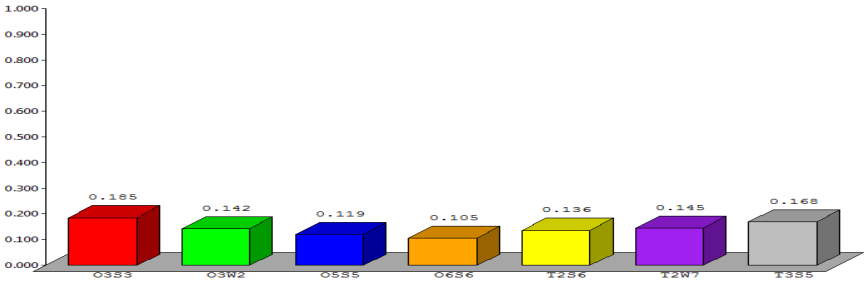
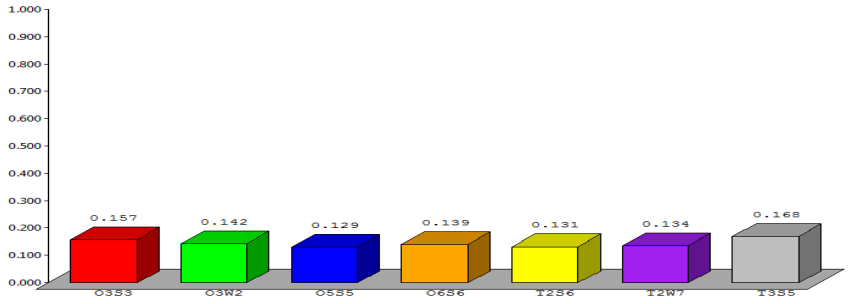


Figure 8
Ranking graph with sensitivity analysis of opportunities in 1 degree



CONCLUSION

Thus, from above study it can be concluded that using ANP along with SWOT in strategy formulation was found to show benefits.

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DEVELOPMENT OF A CONCEPTUAL MODEL OF PROJECT MANAGEMENT INFORMATION SYSTEMS FOR INVESTIGATING ITS EFFECTIVE FACTORS IMPACTING THE SUCCESS OF PROJECT USING STRUCTURAL EQUATION MODEL

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ABSTRACT

In this study, we had investigate the project management information systems as a means of ensuring the success of projects., So far less attention to its share in the success of the project. To identify each of the factors influencing project success in project management information systems we have created a model of PMIS to identify the impact of these factors on project success. We indicated the impact degree of each variable on each other and also on the success of project by using partial least squares method.

Keywords: Project Management, Project Management Information Systems (PMIS), Project Success, Structural Equations

INTRODUCTION

As long as information systems in organizations are under development. Project management information systems prove their position as an effective tool for achieving project success. Many of characteristics of these systems are still unknown. Using PMIS to manage projects is not enough, but it is essential as it plays an important role in the success of the companies. Since human activities affect the results of information systems. So measuring the success of information systems and its impact on the success of the projects is a complex task. Project Management Institute found that, project management information systems are tools and techniques that are used to distribute all the information in projects [1]. Turner [2] showed that Project management information systems create a Database that managers need for good coordination of people activities in projects with using the internet and configure management which is an essential element of concurrent engineering. PMIS also should be able to review the situation that people are involved in projects. In IT industries, Kanaracus and Gartner [3] estimated that 75% of IT projects management have succeeded under the support of PMIS; while, 75% of projects would fail without such a support. Since the success of project is a combination of project management success and project product success. Project management has three dimensions: 1) Doing the project at the acceptable time, 2) Observe the budget and 3) Meet the quality specifications of the project. Product success is: 1) Meet the strategies and needs of project owners,and 2) Meet the needs of users and those involved in the project [4]. Louis Raymond and Francois Bergeron [5] in their study checked the PMIS quality and PMIS information quality (as a dimension of PMIS quality) effects on project management and project success. They used the concept of the study of Delone and Mclean [6] and a

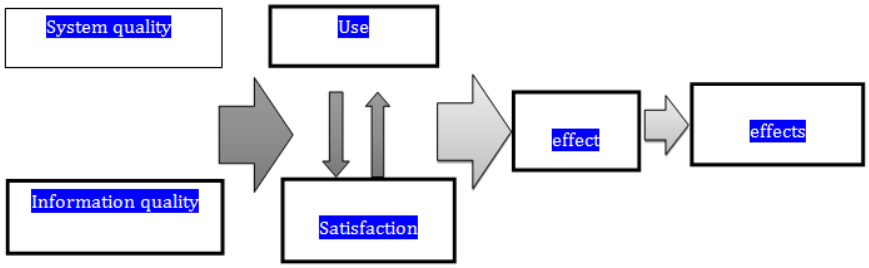
model that proposed, where they considered project success as an organizational effect. In this study, we check checked the effects of PMIS quality on intention to use PMIS and customer satisfaction and we also checked the impacts of intention to use and customer satisfaction on net benefit of using PMIS. Project management and project success showed as an organizational and individual effects. We also used Delone and Mclean [7] model to create a PMIS model.

Research background

Technology acceptance model was presented by Davis [8]. This model was introduced as a technology acceptance model in which the effects of perceived efficacy and perceived ease of use an information system on the system acceptance were investigated. The above model deals with the efficacy of IS technology. Davis [8] claims that if the structure of IS technology is not suitable; not using it will impose less cost than using it by the users and organizations. After reviewing more than 180 articles concerning assessment of factors of investment on IT published between 1970 and 1980, Delone and McLean [7] presented a successful model of information systems composed of 6 factors related to the success of information systems such as: system quality, information quality, customers' satisfaction, system utilization, individual and organizational effects (Figure 1).

Figure 1

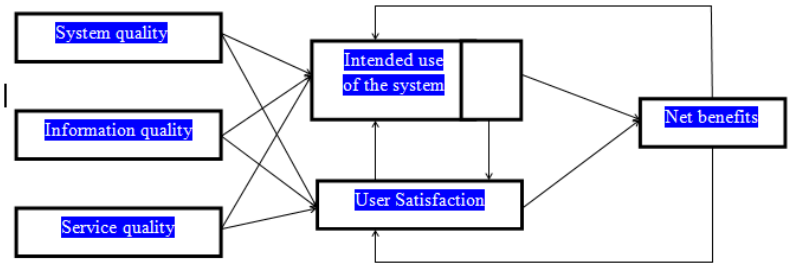
Delone & McLean Successful Model of Information systems



Although the model inclusively combines dependent variables used by IS researchers, several critiques may be posed to it: firstly, information systems used in Delone and Mc. Lean model offers many comparisons suitable in experiment; secondly, since user's satisfaction is indicator of unique effects of IS in an organizational environment investigating the course of the cause of satisfaction of customers for unique features is useless; finally and more importantly, the model does not express the relationship between satisfaction and individual and organizational effects in a transparent and perfect manner [8]. Seddon, & Yen [9], tested his model in the form of a modified version of Delone and McLean model with 3 following variables: 1- utilization was replaced by utility; 2- a new variable (importance of system) was added to help the explanation of changes in users' perception concerning utility and satisfaction; 3- causality was simultaneously replaced between utilization and user's satisfaction by a one- way causality. But in some cases such as Uday R. Kulkarni, Sury Ravindran, and Ronald Freeze [10] where knowledge management was included in Delone and McLean model. Successful IS model was presented by Leyland F. Pitt, Richard T. Watson, and C Bruce [11]. Pitt et al., [12] added the quality of services to Delone and McLean model and then its validity was tested. The factors mentioned in service quality have been developed in IT department systems. But Delone and McLean model claimed that their model is confusing and so they combined some parts of the model and it led to the development of a framework' moreover as that of Seddon et al. [9] presented a successful model of IS in which the effect of society as a perfect utility was added to information system; but Leyland F. Pitt et al. [11] model was different from Delone and McLean model in which service quality and 2- a work group were added to the theory of probability for dealing with the organization and external environment. After ten years of presenting their first model, Delone and McLean[6] presented an updated model with a view to the critiques and current situation in which service quality was added to IT as a concept by using internet. They increased the number of success

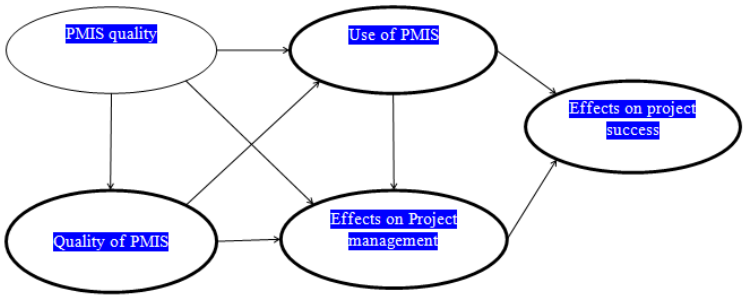
factors in information systems to 6, in which they included the service quality, mutual dependence analysis and the relationship among these 6 factors [8]. Besides, this model considers that successful information systems cover other aspects together with organizational and individual aspects, because working group information systems affect the industries and even the societies. Therefore, this new updated model replaced individual and organizational variables by perfect utility variable. In the modification the utilization variable was modified to the intent of information system utilization variable which is more related to the user's satisfaction and that the variables of intent of system utilization and user's satisfaction are mutually related (Figure 2) [12].

Figure 2
Successful Model of Delon & MCLean [12]



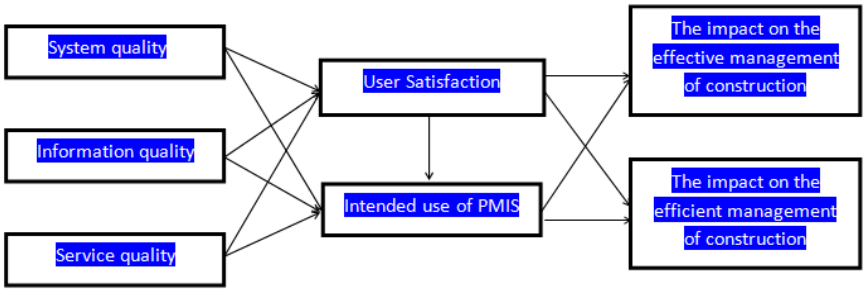
Guy G Gable, Darshana Sedera, [13] in their study concerning measurement of information systems' success in companies developed a model that follows Delone and McLean primary model. In this model, the aspects of information quality and system quality and also individual and organizational effects of using system impact each other and in general, they impact the satisfaction of working with the system and the success is generally related to the user's satisfaction of the system (as an aspect of success). New measures were added in order to reflect the framework of contemporary information systems and organizational features. Hence, considering further measures for investigating the structure of organizational effect in a more comprehensive way was conducted. Chesney [14] in his model investigated the intent of utilization of system by the user, while he investigated some part of Delone and McLean model in which the element of conceived utilization had higher direct effect on the intent of utilization than enjoyment during working with the system. Moreover, perceived ease in using the system has not a direct impact on the intent of utilization, but it is indirectly effective. Guy G. Gable, Darshana Sedera, and Taizan Chan [13] revised their model and presented a conceptual model of information system success in order to measure the effects of information systems in which organizational and individual effects were considered as current effects and system quality. The information quality were considered as the future effects of information systems. In addition to this, organizational systems impact IT features and IT features are influenced by its performance. Finally, the whole model impacts user's satisfaction of working with the system; in this model the IT performance part is added to the model. Louis Raymond and Francois Bergeron [5] presented a PMIS model or achieving success for the project and given that previous models just relied on the success of project's product this model supported the success of project. But in this model the management of project and the influence of a successful PMIS on the time, cost and limit of project are not referred inclusively that is a weakness in the model (Figure 3).

Figure 3
PMIS model of Raymond



Information systems are effective in supporting the decisions. Marjolein C.J. Caniëls, Ralph J.J.M [24]. in their model called the effects of project management information systems in decision making on multi- project systems investigated the effect of PMIS on the quality of decision. In this model, firstly the effects of two factors, namely multiplicity of projects and high quantity of information on the quality of PMIS information was investigated, with the increase of two above factors. The quality of PMIS information increases and then it was indicated that the quality of information in PMIS largely impacts the satisfaction experienced of using the system and user's satisfaction impacts his utilization of PMIS. The factor of system utilization and PMIS information quality impacts the quality of decisions making. Seul-Ki Lee and Jung-Ho Yu [8] developed a PMIS model for the success of organizations participating in construction projects (Figure 4). This model just supports the success of project management and project management success is divided to two parts: success of effective and efficient management in the project.

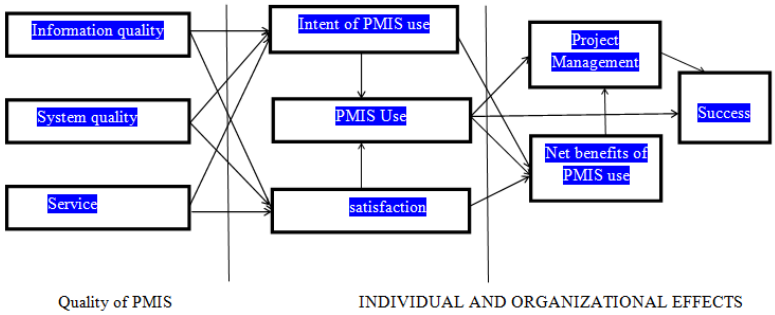
Figure 4
PMIS model in Construction projects [8]



What is understood from previous studies is that many of experimental studies support the left part of Delone and McLean model which is system quality, information quality and services quality. The nature and role of PMIS in the management system is a function of achieving project goals and execution of project strategies. On the other hand, these are not all parts investigated in a project; i.e. in order to achieve project success, the project product must be successful too. Project success includes the success of project management and the success of project product. Even if the success of project product is not determined by the success of project management the results of the success of both are integrally related [4]. Delone and Mclean also explained the organization impacts of this system. In this study, the result of whole effects on the project management and net profits of using PMIS on the success of project are investigated. Therefore, the aim was to improving our understanding of the effects of PMIS quality on the success of project based on a revised result of Delone and Mclean model The user's satisfaction has individual effects and these effects lead to organizational results. Organizational relations are under improvement at last using PMIS effect on

project success. The model developed based on the Delone and McLean model is shown in Figure 5.

Figure 5
the model developed in this study based on the Delon and McLean (2003)



Terminology of model
PMIS quality dimensions in present paper, generally selected based on the questions related to the system quality, information quality and services quality that we used [8-15].

System quality
System quality mentioned in main articles of Delone and McLean main means the ease of utilization of software and system. System quality includes the quality of information system that covers the software and data components and in technical terms it investigates used software [8].

Information quality
System quality gains meaning in relation to the ultimate customer, hence model measurement is difficult [16]. The aspect of information quality is considered as the suitable features of information systems output.

Services quality
It means the support the users receive from the system [16]. This aspect of quality may occur by a company located outside the organization or by technical supports inside the organization. Information quality means the quality of supports that the user of information system receives from information systems department and IT personnel [15].

User satisfaction and intent of using PMIS
Many studies relating to customer satisfaction concern that a concept of quality is presented by a superior authority and this issue is the only factor impacting the quality. The factor of user satisfaction and the intent of using PMIS explain that the improvement of quality product may increase customer satisfaction and may lead to the repetition of purchase and face to face promotion. Therefore, the costs of replacement are adjusted and the performance of company is enhanced [8]. PMIS quality impacts customers' satisfaction and customer's intent of using the system. Yet, when PMIS is used the flow of information is facilitated. Hence, customer's satisfaction serves as an assumption for the success of project. Customer satisfaction is a factor that mediates in improved levels of services of system performance felt by users and successful information systems. Blake & Margrethe [17] Indicated that customer satisfaction is a degree of meeting information needs of users. This article is about the intent of using PMIS as the efforts and attitudes for extension of PMIS utilization. The intent of utilization means repeated utilization and suggesting it to others in order to use previous experience- based information.

Net benefits of PMIS use
The aspect of success of net benefits indicates that to what extent the project stakeholders have achieved their benefits. This aspect is consisted of 2 aspects: individual effects and organizational effects of using PMIS in the primary model of Delone and Mclean. Selecting what must be measured depends on the system being under assessment, the aim of study and the level of analysis. In addition, user's utilization and satisfaction correlates to the net benefits. Separate investigation of net benefits is also highly important, because many of organizations are seeking to achieve ROI capital return from available information system. Many of has been conducted by

the researchers showed relation between organizational impacts and individual impact in Net benefits of PMIS use [15].

PMIS use

The aspect of use indicates the amount of work done by the user with the system. Previous articles investigated log in time, used functions and or frequency of usage to measure usage degree [15]. In TAM article published by Davis [7], perceived ease and utility were considered instead of usage and intention to use and real use that had been investigated in the first paper of Delone and Mclean. Intention to use is an attitude and use is a behavior [12].

Effects on project management

A successful information system must yield achievements that impact project management. Project manager must implement a balance between mentioned factors: this is achieved if in required time, project manager has access to information sources of project and save costs and time by applying them in order to achieve suitable quality for project. Louis Raymond and Francois Bergeron [5] showed that PMIS quality and information quality effect on project management and let him to perform professionally.

Project success

The ultimate goal of the project is project success. We have to consider the time, cost and quality of the project and also meet the needs of the people involved in the project to complete this stage, because the goal is project success, so that it can be considered as an organizational impact of the PMIS. Also project success is related to manager's decisions those can be True and accurate [18]. We can say the other researcher found and check relations between project management and project success, in this article also we used a hypothesis that is a relation between project management and project success.

Proposed model and research hypotheses

For the effects of PMIS on the success of project relied on successful IS model, a model is presented in Figure 6 that includes 106 questions and 9 main titles (system quality, information quality, services quality, customer satisfaction, intent of PMIS use, PMIS use, net benefits of PMIS use, effect of project management and project success).Using partial least squares method, the effects of each element in the model was investigated. At first, since we are looking for developing a model and using structural equations method for confirming it in this paper. , The primary model is developed based on the hypotheses presented in Table 1 and Figure 6.

Figure 6

The initial model was developed to evaluate the PMIS

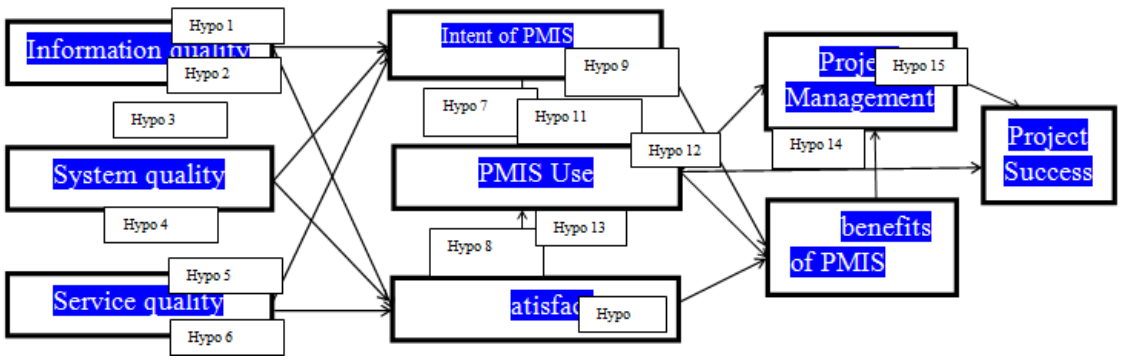


Table 1
Under investigation hypotheses in PMIS model

Hypotheses	Definitions
Hypothesis 1	Information quality is positively and significantly related to the intent of PMIS use. Based on the Delone and Mclean [8] models as well as in Seul-Ki Lee and Jung-Ho Yu [8] article have shown a significant relationship.
Hypothesis 2	Information quality is positively and significantly related to the customer satisfaction. That in ([8; 9; 6]) articles, this relationship considered to reflect user information needs when they use information system.
Hypothesis 3	System quality is positively and significantly related to the intent of PMIS use. Delone and Mclean [6] showed that system quality influence people to use system or not
Hypothesis 4	System quality is positively and significantly related to the customer satisfaction. ([6]; [9]) showed the relationship between user satisfaction and system quality
Hypothesis 5	Service quality is positively and significantly related to the intent of PMIS use. [6] showed service quality improvement will increase intention to use
Hypothesis 6	Services quality is positively and significantly related to the customer satisfaction. [(6; 18;8)] showed the relationship between service quality and customer satisfaction
Hypothesis 7	Intent of PMIS use is positively and significantly related to the PMIS use. Delone and Mclean [6] showed that PMIS use and intention to use PMIS are separated and have effects on each other.
Hypothesis 8	Customer satisfaction (user) is positively and significantly related to PMIS use. That in [(6; 19)] researches, this relationship considered.
Hypothesis 9	Intent of PMIS use is positively and significantly related to the net benefits of PMIS use. in [6] article This relationship is established
Hypothesis 10	Customer (user) satisfaction is positively and significantly related to the net benefits of PMIS use. in [6] article Also This relationship is established
Hypothesis 11	PMIS use is positively and significantly related to the project management. In [9] this relationship is considered with two components: effective management and efficient management, in Louis Raymond and Francois Bergeron [5] article authors considered project manager will perform professionally when uses PMIS
Hypothesis 12	PMIS use is positively and significantly related to the project success, many researchers showed PMIS has organizational impacts, also project success is an organizational goal furthermore we consider this relationship, Louis Raymond and Francois Bergeron [5] articles showed this relationship
Hypothesis 13	PMIS use is positively and significantly related to the net benefits of PMIS used in Delone and Mclean [6] article This relationship is considered
Hypothesis 14	Net benefits of PMIS use is positively and significantly related to the project management, in Delone and Mclean [6] article net benefits are impacts on people are involved with organization, project manager and his duty are related to organization, so we consider this relationship
Hypothesis 15	Project management is positively and significantly related to the project success, in Louis Raymond and Francois Bergeron [5] article This relationship is considered

Research methodology

Present research is an applied one in terms of the aim in which least squares methods is used and it is of survey type in terms of time. In this study, the secondary data were collected through library method including study of books, documents and materials of internet and this data were used for compiling theoretical fundamentals. For primary data and testing the model questionnaire tool were used. In order to determine the validity of questionnaire, the components of questionnaire were investigated by three experts whose experience mean in the field of PMIS was 6 years, to determine reliability of questionnaire we used SPSS software and Cronbach's alpha coefficient and the figure obtained was 0.96. Statistical population of this research included the personnel of quality control unit of Auto parts supplier companies, numbered 65 individuals. In order to determine required sample, we used formula (1) in Figure 9 in which 0.1 estimated errors was considered. Hence the number of sample was selected as 39 individuals that for further assurance, 41 questionnaires were distributed among organizations as the base of analysis.

Demographic findings of research

It was found that in the sample there were 22% female and 78% male. 8% of respondents hold diploma degree, 12% with associate degree, 68% with B.A degree and 12% with M.A. degree and above. Moreover, occupational records of individuals indicated that 26% had less than 5 years

of working experience, 15% had 5-10 years of experience, 49% had 10-15 years of experience and 10% had more than 15 years of experience. Also, concerning their experience in working with PMIS, 34% had less than 5 years of experience, 39% had 5-10 years of experience, 24% had 10-15 years of experience and 3% without any response.

Model fitness and measurement tools

Same as the researches in which structural equations method have been used, it is necessary that the validity and reliability of hidden variables are investigated in order to test structural equations. ; for For this purpose, reliability predictive values, internal consistency reliability for hidden variables, convergence validity and discriminant validity are investigated [23]. It must be noted that the values presented in following to confirm the model are obtained after eliminating some of questions and paths developed in model which may not be validated in these processes.

Reliability of questionnaire

In order to determine the reliability of questionnaire by using SPSS software, Cronbach's alpha coefficient of questionnaire was calculated, the value of which was equal to 0.96. Also, for all hidden variables of this value Smart PLS software were used. As it is evident in Figure 8, the obtained values are higher than 0.7. The value of Cronbach alpha is higher than 0.7 that indicates high reliability of questionnaire [20]. It can be seen that the lowest obtained value for Cronbach alpha equals 0.737. So, we can say that all values could be accepted concerning questionnaire reliability.

Table 2
Results of analysis on provided models

	Cronbach Alpha	Indicator of accepted questions in prediction reliability test	Internal consistency reliability	R Square	1-SSE/SSO	SSE	SSO	AVE
Use of PMIS	0.891	j1 – j2 – j3 – j5 – k1 – k2	0.917	0.192	0.478	128.401	246.000	0.648
intent of PMIS use	0.754	g2 – g5 – g6	0.859	0.410	0.325	83.054	123.000	0.670
net benefits of PMIS use	0.955	b1 – b2 – b3 – b4 – b5 – b7 – b8 – b10 – e1 – e3 – e4 – e5 – e6 – e9 – e11 – e12 – e14	0.96	0.301	0.514	338.571	697.000	0.583
Project management	0.922	m4 – m5 – m6 – m7 – m8 – m9 – m10	0.937	0.362	0.561	125.985	287.000	0.681
Project success	0.847	n1 – n2 – n3	0.906	0.508	0.531	57.628	123.000	0.763
User Satisfaction	0.800	a2 – a3 – a5– a6	0.869	0.610	0.354	105.965	164.000	0.624
Quality of Information	0.858	c8 – c9 – c14	0.913		0.543	56.261	123.000	0.777
Quality of Service	0.737	d3 – d4 – d5	0.849		0.279	88.682	123.000	0.652
Quality of System	0.869	f6 - f7 – f9 - f10 - f11 - f12	0.902		0.432	139.748	246.000	0.606

Investigating predictive reliability

In order to investigate predictive reliability in the model of structural equations in Smart PLS software, we used the results obtained from external loads table. For this purpose, for accepting each of indices impacting the variables, the square of each external factor for finding predictive reliability value for applied researched the value of 0.7 or higher are preferred and for exploratory researches the value of 0.4 or higher [21] . The values obtained in predictive reliability investigation are higher than 0.7 and this means predictive validity acceptance. Since in performed analyses for investigating predictive elements reliability, some of questions could not increase the obtained value from expected value (0.7). So only the indicators presented in Figure 8 as the indicators of accepted questions could be included in the model. From among 106 questions of

questionnaire, 52 questions received predictive reliability values above 0.7.

Investigating the possibility of internal consistency reliability

In order to investigate the internal consistency reliability for hidden variables, the results of composite reliability values in applied researches must be higher than 0.7 and this value for exploratory researches must be a value higher than 0.6 (Richard R Bagozzi, 1988). Since the aim of this study applied one and we need the values higher than 0.7. For investigating internal consistency reliability value, we can use formula (2) in Figure 9. The reliability may be measured from any value of y in a single factor of model using formula (3) in Figure 9. The value of reliability for the structure n is obtained from formula (4) in Figure 9. As it is obvious from the values presented in Figure 8, internal consistency reliability of components may be confirmed for each of variables in the model. In this figure the smallest value is equal to 0.849 that is higher than 0.7.

Table 3
The formulas used in the study

Item	Formulas	Defining Symbols
1	$n = \frac{NZ_{\frac{\alpha}{2}}^2 P(1-P)}{E^2(N-1) + Z_{\frac{\alpha}{2}}^2 P(1-P)}$	65=N96.1=$Z_{\frac{\alpha}{2}}$0.1=E$P = \frac{1}{2}\ 1-P = \frac{1}{2}$
2	$\rho(yT) = \frac{var(T)}{var(T) + var(\varepsilon)}$	ρ (yT):Reliability Measurement singles T :Actual value measurement :εThe standard error of measurement
3	$\rho_y = \frac{\lambda_y^2}{\lambda_y^2 + var(\varepsilon_y)}$	λ:The value of each variable load
4	$\rho_y = \frac{(\sum_{i=1}^{p} \lambda_{yi})^2}{(\sum_{i=1}^{p} \lambda_{yi})^2 + \sum_{i=1}^{p} var(\varepsilon_y)}$	
5	$AVE \quad \frac{\sum_{i=1}^{p} \lambda_{yi}^2}{\sum_{i=1}^{p} \lambda_{yi}^2 + \sum_{i=1}^{p} \varepsilon_i}$	

Investigating the quality of measurement tools

In order to investigate the quality of measurement tools refer to Figure 8. The values imply the sum squares of observation for SSO latent variables block, sum squares of predictive errors for each block of SSE latent variable and the ratio of 1-SSO/SSE of commonality validity index. If the 1-SSE/SSO latent variables commonality validity check index is positive, the measurement model has suitable quality [20] . Based in the results, the quality of model was confirmed. Up to this stage, the validity of questionnaire, validity of measurement tool and the quality of measurement tools were confirmed.

Convergent validity

In order to verify convergent validity of model, the average amount of variance extracted (AVE) from the model must be investigated against the results of model execution. These values must always show a number higher than 0.5 , in order to verify the model's convergent validity (Richard R Bagozzi, 1988). In order to investigate the average amount of variance (AVE) we used formula (5) in Figure 9. As it is obvious from Figure 8 these values are higher than 0.5. For example, we can say that the least value obtained relates to the net benefits of using PMIS that is equal to 0.583 and this confirms convergent validity of model.

Discriminant validity

In order to investigate discriminant validity, the second root of average amount of variance of model execution must be higher than the correlation between latent variables. It should be noted that the values of second root of average variance are placed on the diameter of correlation matrix and these values must be higher than their co- line and co-column elements, so that discriminant validity of structure may be confirmed. In table 4, discriminant validity of model is shown.

Table 4

Comparison the square root extracted of the average variance and correlation between variables

	Use of PMIS	intent of PMIS use	net benefits of PMIS use	Project management	Project success	User satisfaction	Quality of information	Quality of Service	Quality of system
Use of PMIS	0.805								
intent of PMIS use	0.438	0.818							
net benefits of PMIS use	0.403	0.385	0.764						
Project management	0.514	0.195	0.493	0.826					
Project success	0.418	0.159	0.239	0.712	0.873				
User satisfaction	0.389	0.392	0.500	0.251	0.185	0.790			
Quality of information	0.328	0.552	0.476	0.324	0.401	0.514	0.882		
Quality of Service	0.271	0.427	0.472	0.347	0.370	0.730	0.650	0.807	
Quality of system	0.352	0.491	0.672	0.381	0.169	0.573	0.336	0.445	0.779

Investigating and testing the structural model

Before investigating and testing the structural equations model, we again consider the model in figure 6. In order to investigate the model, the values of t- test statistics are used, which means that in this test, if the sample size is higher than 120 samples that was considered higher than 200 in model simulation, the following conditions should be met:

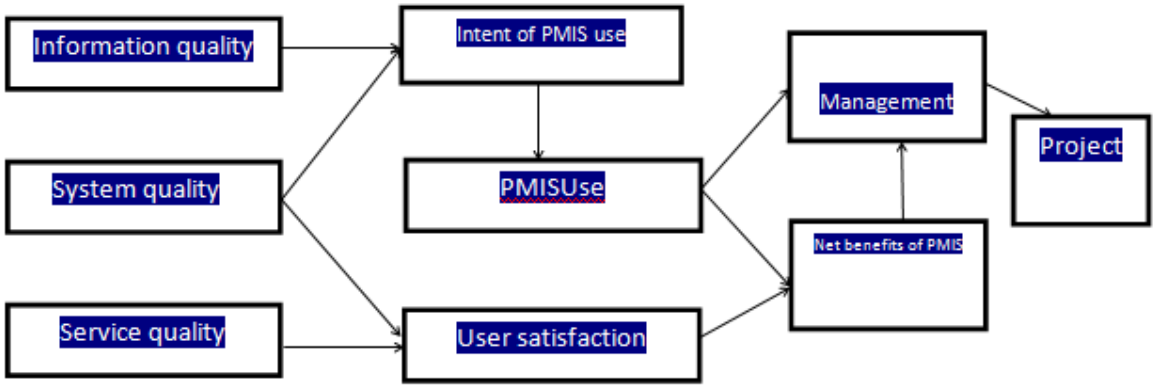
1. If t-test statistics are higher than 1,96 and significance level (p _value) must be less than 0.05;
2. If the values are higher than 2,58, significance level (p-value) must be lower than or equal to 0.01 [22]. After primary investigation, some of hypotheses could not be accepted in this test, so we must achieve conditions in which model hypotheses could be accepted based on acceptance level of t-test statistics by eliminating the hypotheses iteratively in the tests. After several eliminations run on the hypotheses and re-conduction of test, the result which is better than others were obtained (Figure 10). In figure 10 the coefficients of the path all meet acceptance conditions such that at the least value in which using PMIS over net benefits of PMIS use was obtained. The value of t equals to 2.003 with 0.046 significance level that meets acceptance conditions. Also, the results of final accepted hypotheses indicated in Figure 7 in which the hypotheses colored in red. In Table 6 the final model after elimination of some hypotheses is indicated.

Table 5

the results of t-test statistics for investigating the model

Net benefits of PMIS use → PMIS use	T Statistics (|O/STERR|)	P values
Project management → PMIS use	2.003	0.046
PMIS use → intent of PMIS use	3.402	0.001
Project management → net benefits of PMIS use	3.875	0.000
Project success → project management	3.043	0.002
Net benefits of PMIS use → customers' satisfaction	10.457	0.000
Intent of PMIS use → information quality	2.057	0.040
Customers' satisfaction → services quality	3.179	0.002
Intent of PMIS use → system quality	7.474	0.000
Customers' satisfaction → system quality	2.497	0.013
Net benefits of PMIS use → PMIS use	3.278	0.001

Figure 10
The final accepted model



The amount of explained variance

After developing a model, we can investigate the amount of explained variance. For this purpose, we investigated the value of determination coefficient or R square (R^2). The results of investigating R square value are indicated in Figure 8:

1. As it is evident, the value of explained variance for project success and or final hidden variable equals 50.8% that implies project management hidden variable explains 50.8% of variance in project success variable.
2. The value of explained variance for project management hidden variable equals 36.2% that implies two variables, namely net benefits of PMIS use and PMIS use explain 36.2% of variance in project management.
3. The value of explained variance in the hidden variable of net benefits of PMIS use equals 30.1% that implies the two variables, namely PMIS use and system user's satisfaction explain 30.1% of variance in net benefits of PMIS use.
4. The value of explained variance in hidden variable of PMIS use equals 19.2% implying that the variable of intent of PMIS use explains 19.2% of variance in PMIS use.
5. The value of explained variance in user's satisfaction variable equals 61% implying that independent variables of services quality and system quality explain 61% of variance in user's satisfaction.
6. The value of explained variance in hidden variable of intent of PMIS use equals 41% implying that independent variable of system quality and information quality explain 41% of variance in the intent of PMIS use.

At last, it must be noted that in this stage, some values of explained variance of R square that are less than 10% are eliminated [23]. But here all values are higher than 10%.

Implications for project management

Since this research proposed a PMIS model to consider impacts of model factors on project success and also Table 6 showed that one of factors that made in this model is impact on project management, also this factor considered by using following questions in questionnaire:

When project managers use PMIS:

1. Can they perform the project by observance of budget and estimation of specifications while at the same time they manage their project?
2. Can they allocate resources efficiently?
3. Can they plan and monitor project, better?

We can say that an information system in an organization can have impacts on project managers. Also project success is a goal for project manager and people involved in project. Therefore, project managers can use the model in this article to investigate, which one of the factors that involve in PMIS model can have impacts on project success. The extent of effectiveness coefficient of each factors in PMIS model on project success should be use to improve the structure of PMIS in their organization, and if they want to recognize the factors that have more impacts on project success they can use these amounts.

Table 6
Effects of any of the factors of model in project success in PMIS model

Model factors	The extent of effectiveness coefficient
Information quality	0.063
System quality	0.80
Service quality	0.058
intent of PMIS use	0.143
PMIS use	0.328
Customer satisfaction	0.098
Net benefits of PMIS use	0.244
Project management	0.712

CONCLUSION

As investigated in literature review, it was expected that the effect of PMIS quality on the elements of customer satisfaction and the intent of PMIS use are confirmed based on the left part of Delone & Mc. Lean model. Since the effect of net benefits of PMIS use and project management have been added to the hypotheses, the results obtained from the research could be the only cause for rejecting or accepting the hypotheses. The results indicated that the relationship between net benefits of PMIS use and project management could not be accepted with a high level of certainty but the results indicated the high effect of PMIS use and net benefits of PMIS use on project management and hence the high effect of project management on project success that is organizational impacts of PMIS. Based on the results obtained from the model and since case study of this research were Auto parts supplier companies and given that the effect of sanctions on automobile companies have face the employees with new products and or the products that had not been in production cycle and returned for production at any time, the necessity of presence of a strong information system that includes information regarding the materials and products that are applicable in the system is strongly felt. In this system it is found that a PMIS has a direct effect on the success of project, cooperation in improvement, budget control and meeting project timetables and also performing technical specification. By investigating the developed model, we can conclude that this research presents a mechanism for achieving a successful model of PMIS by defining the factors impacting project success and measuring the items of factors and analyzing these factors. The developers of information systems may apply the developed model for making a successful model and or guidelines in order to develop current models for enhancement of PMIS performance. Moreover, for PMIS user, information systems may be used as a standard for evaluation of the goal in PMIS and successful management of project. Our studies may produce some insights concerning related studies. Since investigating successful PMIS models as a new initiative, this research is based on an information system in a certain country. Therefore, the researches must be restricted to Iran or certain countries. We suggest that if the organizations are seeking to improve their information systems, they can act based on the model presented in this study.

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IMPACT OF CLIMATE CONDITIONS ON THE PLACE AND ROLE OF RELIGION IN ANCIENT IRAN STRATIFICATION SYSTEM

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ABSTRACT

Understanding the mechanisms and dynamics of historic relationship can better explain the human relations and treatment. Ancient Iran was one of the Iran temporal - historical periods, which had its own social system and human relations. Based on various documents we can trace the effects of climatic conditions and nature in construction of this system and relations. According to the documents, one of the most important classes in the upper layers of ancient Iran stratification pyramid were clergymen and priests who assigned a lot of advantages and features of the labor division system to themselves. In this study, using citation and studying the documents and literature in the field of social - economic life of ancient Iran, the effects of climatic condition on the role and place of religion in the hierarchical system were examined. The results showed that pastoral and agricultural economy as subsistence economy of ancient Iran was in close relationship with nature and the natural environment and climate. Therefore, the goddesses who people worship were somehow connected with the natural environment of the social construction. Clergymen or priests, or Magi as religious leaders and custodians of the goddesses and organizers of religious ceremonies, were always as one of occupants of upper parts of the stratification pyramid in these communities and consequently, they have benefited from the advantages and facilities unequally.

Keywords: Ancient Iran, Climatic Conditions, Priests, Stratification System, Social Construction.

INTRODUCTION

Iranian plateau was the cradle of one of ancient human civilization that affected by its geographic and climatic location, has imposed specific social - economic life on its residents. Located in the path of communication for different ethnic groups and its specific strategic location, this land has always been expecting a variety of changes, both the positive and negative. In the history, it has progressed to its developmental life and has created life patterns, norms and beliefs, tools, organizations and various institutions.Reviews and studies of ancient Iran history shows that one of the institutions that has always had a fundamental role in public - economic life of the inhabitants of the land is the institution of religion. Why and how this institution has always had a significant contribution as a major focus in human life in general, and especially in Iranians' life is not very precisely genealogized. It has been only studied from a specific point of view and in accordance with the cognitive principles of any scientific and cognitive discipline rather than a combined and comprehensive view. For example, those involved in education and theology considered that it is due to man's divine nature and explain it with the metaphysical - intuitive character, ethics scholars consider it is due to thinking and choice and its necessity to make the life morale with a belief in an afterlife in light of the teachings of religion that

over time, has resulted in the evolution of ethics and the evolution of religion. Some anthropologists like Frazer (1854 1941), in his evolutionary theory, considers the move from magic to religion and then to science. Feuerbach believes that man has a dichotomy in his existence, that is one side of him is higher and the other side is earthly. That is, there are both aspects like anger, and lust in human existence, as well as honor, dignity and great virtues, but usually the man forgets his sublime aspect and subjected to his inferior side and avoids his superior aspect such as honor and virtue. Thus, when he thinks of those superior traits, he considers them beyond himself which is the origin of religion genesis in human existence. [1]Stratification system that reflects the social relations and communications among different groups in the social hierarchy of society was studied and examined from the perspective of different scientists. Seifollahi (2014), in the definition of social stratification system said that "stratification means the structured formation of the layered classes of the population based on the economic situation and their life style and consequences of such a social layering is the formation of social groups. The formation of social groups from the economic situation and lifestyle and its sustainability in human societies leads to the emergence of social class. Social class is considered as one of the important social group, which is formed within the context of social relations, in the process of social division of labor." [2]On the stratification system of ancient Iran, various historical resources of ancient Iran shows that religious authorities and organizers of the religious ceremonies, with their intergroup hierarchy system, have been always placed on top of the social stratification system. As a result of it, they had benefited from special benefits and privileges of the society and were very influential in social changes and developments. In this paper, by limiting the scope of stratification system of Iran history to ancient times, it was aimed to examine the mechanisms and dynamism of effective factors that caused the central importance of religion in this area, as well as the influence of religion in layering pyramid and social hierarchy system of stratification of this period of Iran history.

Problem statement

Stratification system is one of the pillars of the establishment of communities' social structure, durability, driving dynamics, as well as a source of changes and transformations. Stratification system have both the positive and negative functions in society, such as durability, stability and order of society and the emergence of social inequities and emergence of dissatisfaction arising from it and the social movements and revolutions.Two states can be imagined for society stratification system and agreement:In the first case, if the mechanisms and dynamism of the formation of the social stratification system, according to be influenced by other social factors, such as sovereignty dialectical relationship, power and wealth, can create justifications and ideologies to maintain the hierarchy in favor of some people as the ruling class at the top of this pyramid. They use to get overflow of a variety of social benefits, such as power, wealth and prestige and respect to them, if the minority benefit from it, consent and consensus, whether inner or by discourse consent and from fear and repression and no denial and skepticism is done from the lower levels of society. This system was not only problem making, but also contributes to the stability of society and minimizes the internal conflict and stress.In the latter case, if the lower strata of society don't accept the unequal ideologies and justification of the ruling class and consider it as a false claim, and the system also doesn't open the ways for mobility of competent and elite people of the bottom groups and in other words "circulation of elites", it causes covert and overt discontent of community members and the stratification system will be challenged and here, the anomic and pathological aspect of social stratification system will be highlighted. In the anomic and abnormal aspect of stratification system, community is divided into facing and hostile groups and will lead to all sorts of tensions, including riots, war and revolution that could threaten the society systematic structure and collapse it and cause loss of forces and resources. Now, many questions can be raised here, such as, Is the stratification system an eternal divine inequality law or the product of human social construction? Why there should be a stratification system? Why, despite the limitations of human life for eternal benefit of social benefits, upper classes are always trying to defend their position will all their lives and provide ideological justification for

it? Isn't it indicating the law of survival of the fittest or struggle for survival in animal world that the moralists always deny? What is the criterion for the benefit of man and a saturation point? But in this article, we were analyzed the ancient Iran stratification system and the layers in it and also analyze and interpret the factors affecting the significance of religion role and its effects in the social hierarchy and its layering.

Research objectives

Overall objective: To study the impact of climatic conditions on the place and role of religion in ancient Iran stratification system.

Detailed objectives:

Studying the climatic conditions of Iran.

Studying the socio - economic system and human social relations in ancient Iran.

Studying the stratification system and social hierarchies of ancient Iran.

Studying the effects of climatic condition on the role and place of religion in the social hierarchy of ancient Iran stratification system.

Research hypotheses and questions

A. *Hypotheses*:

Climatic conditions and geography of Iran have a significant impact on social - economic life and human relations of ancient Iran.

The effects of climatic condition and geography on social - economic life, always put religion at the center of attention of ancient Persians.

Religion had influential and undeniable impacts on the formation of social hierarchies in the Iran stratification system.

B. Research questions

Why and how socio - economic conditions and human relations of ancient Iran has been affected by climatic conditions?

How climatic conditions, by influencing human relations, has put religion in the spotlight of ancient Iranians?

How social - economic relations of ancient Iranians had constructed and reconstructed the stratification system?

What is the role of religion in stratification system in the ancient Iranians, and what are its effects on the distribution of society's benefits and facilities?

Research methods used in this study

Research methods in sociology are divided into five types: 1. empirical, 2. survey or social investigation, 3. citation, 4. field method, and 5. comparative or adaptive [3]

In this study, since the subject matter is social - historical phenomenon, documents and books, articles, scientific websites surfing and taking notes from them and elemental analysis and obtaining historical elements relevant to subject are all essential. The research hypotheses and questions, as well as analyze and interpret the content of the research subject should be describe.

Analysis and interpretation of results

Effects of climatic conditions on the place of religion in the ancient Iran stratification system

It seems that the earliest human communities are formed through three fundamental and main elements that over time, other elements are created and added to it with the development of communities. The result of such development was the emergence of "human society" and "social systems" in the world today. The elements are as follows in order of priority and importance in formation of the early communities:

1. geographical and climatic environment
2. Human or the human population
3. Economic or livelihood. [4]

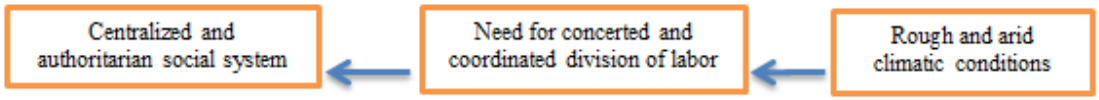
In this section, the climatic conditions and their impact on social - economic life and human relations were investigated and then summon of these two in the formation of religion and its central role in the next relations of stratification system and social hierarchy are contemplated.

A. The climatic conditions of Iran and theories associated with it:

Iran is one of the most unique countries in terms of climate. Temperature differences in winter between the hottest and coldest point arrives to over 50°C. The hottest point of ground in 2004 and 2005, was on a point in Loot Desert in Iran [5]. Iran is in the semi-arid and arid level in terms of precipitation. Precipitation is highly variable in Iran. In North, it reaches to more than 2113 mm (Rasht, 2004). In Desert area, rainfall is generally very low and about 15 mm. Precipitation in North West and West, the Southern range of Alborz and North East is somewhat remarkable which is about 500 mm. In the rest of areas, the rainfall is not more than 200 mm. Iran is grappling

with shortage of water and it is expected that Iran will be in a state of water stress in 2025. [6] .Temperature differences in different parts of Iran is high. While temperatures in winter in Shahrekord is -30° at night, people in Ahvaz experience summer weather (50°C). The weather is hot and humid in Northern coast in the summer and moderate in winter. North West and West regions have temperate summers and cold winters and Southern regions have extremely hot summers and mild winters.On the effect of climate on social - economic life, many scientists studied the effect of this variable on the social life and so the issue is well evident in climate-oriented views of people like Aristotle, Niccolo Machiavel, Ibn Khaldun, David Hume and Charles Louis Montesquieu. [7] .The impact of climate on human life, especially the Iranian plateau, includes the issues was studied by social thinkers such as Karl Marx and Friedrich Engels. In his studies, Marx recognized the differences between the political – social structure of Eastern societies and feudal Western societies. He knew the reason for this difference was appointed to climatic conditions. Therefore, for the first time in 1853, he wrote a letter to his friend and colleague Engels and explained the Asiatic mode of productionin response to Marx letter confirmed his discovery [8]. In a series of works, he analyzed the Asiatic mode of production and Asiatic ancient society and writes: "The climate, the land, the vast space, a desert which is extended from African Sahara through Saudi Arabia, Iran, India and Tatarstan, to the high plateau of Asia made the artificial irrigation system as the base for eastern agriculture with the help of canals and irrigation facilities, and the obvious need for thrifty use of water ... in the East inevitably requires intervention of government centralized power. This stems from the economic task i.e. specially task of organizing public affairs that Asiatic states had to execute stems from it." [9]. Concepts such as oriental despotism, Asiatic mode of production by different scientists showed the effects of dry and arid environment on human life and society system and the main reason for this nomination was the status of water in these areas. Water can be found in the East much less than the West, and accordingly the population has been expanded in these areas. The result of this trend is that population centers are centralized based on water, especially in Europe, which we witness the long distance of population centers, because the water was there. Another important point is that as water was scarce and found deep underground, drilling wells and aqueducts, etc., was needed. Since, farmers didn't afford the cost of this type of operations, they inevitably referred to the king or any other source of power and wealth and the process was underlying the dependence of people to these powers and its result was the creation of appropriate conditions for authoritarian regimes. Authoritarian rule which main base is the people need to water and its obvious characteristic is their vast territory due to vast lands and concentrated population which were easily ruled. [10].On the importance and influence of climatic conditions on social - economic life of human, Seifollahi (2009) in his book "Principles of Sociology" believes that " The geographical environment was the context of life. So, it is considered the first element in the formation of human communities. Evidences remained from early humans who lived during the quaternary, shows that the natural environment for primary people was not devoid of threat and risks." [11] He pointed out that of course human was not bounded always in relation to the natural environment, but according to the realities of life and the natural environment, he creates various social environment which indicates his ingenuity and creativity." [12].From all reviews of the Asiatic mode of production, the concept of oriental despotism and water-oriented society, we can clearly understand that in this part of the world, climatic and geographical conditions have created a special human relations and its inhabitants, as a result of these ecological conditions, invented various tools and equipment for enjoying the rough and tough nature, such as subterranean as an Iranian invention is a sample of the primary technology which creation is very difficult and requires solidarity and collective work under a centralized monitoring system. Following, the effects of climate on the division of labor and central and authoritarian social – economic system in the form of a causal model is displayed

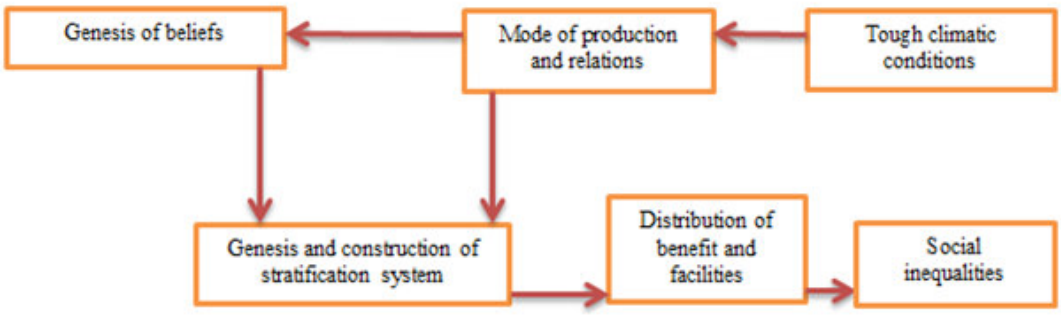
Figure 1
Causal model of climate impacts in creating authoritarian social system



B. Effects of climate on socio - economic life and human relations in ancient Iran:

We said that climatic conditions as one of the three important elements and three realities of thousands of major and minor elements form communities that affect many components of social - economic life. It was especially effective in the early stages of human life and the historical evolution. Also, some studies were referred that the dominance of climatic conditions in creation of a social system entitled "Asiatic mode of production or oriental despotism" in the evolutionary history of Eastern societies. The livelihoods and tools used in ancient Iran all show the influence of social - economic life from climatic element. In this method of the social life, fatalism and metaphysical look to affairs all were to create a kind of ontological security for people who struggle with the difficulties and hardships of the nature and in the dialectical relationship, they are the creator of one of the most ancient human civilizations. Pastoral and agricultural economy as subsistence economy of ancient Iran was in close relationship with nature, the natural environment and climate. Therefore, the goddesses who people worship were somehow connected with the natural environment of the social construction, goddess like goddess of Love (Mitra), goddess of rain or water (Anahita), goddess of storms (Vaio), Divine symbol of sun radiant (Oshbam), goddess of the twenty-seventh day of October (Aseman), the son of waters (apām napāt), sun gift, KKhorshiddad, Atiye Mehr (Mehrdad) [13]. All show the major and important role of nature elements' impacts on the lives of people of this territory. The significant role of theses goddess in the establishment of social order and consequently, is the significant structure in ancient Iran. Beliefs and values in the later stages of social - economic life became as organization, institution and structure. In the later stage cast a shadow over all aspects of life. That is why the clergymen or priests, or Magi as religious leaders and custodians of the goddess and organizers of religious ceremonies, always as an occupants of upper parts of the stratification pyramid of these communities and consequently, they benefited the advantages and facilities unequally. Following is the causal model of the climatic effects on the origin of ancient Iran religious beliefs:

Figure 2
Causal model of climate effects on the rise of religious beliefs and its impacts on ancient Iran stratification system



C. The place of religion in the stratification system

In previous discussions, it was said that the study of ancient Iran history shows the significance of religion as one of the factors constituting social system. Whether the climatic conditions and hardships and violence of natural environment

affected this trend and other factors is controvert. But certainly and without diminishing the importance of other factors and causes, according to the theory of oriental despotism or Asiatic mode of production can observe the role of environmental factors in this trend as well as the construction of the entire social system and stratification system. Security and the need for a bureaucratic government to plan for the use of scarce water and other agricultural inputs, is a concept that somewhat explains the reasons for centralized authoritarian and totalitarian regimes in this region and elements of religion and institutions as one of the factors creating consensus and solidarity as well as suppliers of ontological security and mental health issues. It has an important and fundamental role besides the political institutions and in connection with it and in turn was effective on the hierarchy of social system and its construction. In general, history and human culture never and in any period was not empty of religion in the strict sense and mythology and religious beliefs in general. The mythical idea and religion starts the cultural developments cohesion. In other words, the most important spiritual element of human social life in the beginning is thought and mythic worldview and then religion. The mythical idea and religion creates philosophical thought and philosophical thought and philosophical system eventually bring the scientific thought and scientific system from itself. The result of these large changes in material and spiritual life of mankind from the beginning until now has been always had the three pillars of religion, philosophy and science. [14]. If we look at it systematically, in general we see the role of none of the three pillars ineffective or notable than another, because each of these areas were in some way underlying the next developments. In ancient Iran, it is a little different, and this difference is in the fact that among the three pillars previously mentioned, among which religion plays the major role. This is religion which develops the injunction thought, and ultimately wisdom - not philosophy - and provides it for the Iranian culture. It is religion that changes many foundations and fundamental issues and extended the scientific thought which justifies its publication. Because in general and especially in ancient Iran and even Iran after the Islam, it is a conceptualization and standardization phenomenon, and something which is not conceptualization and standardization, will not bring a significant change. The centrality of religion in the Sassanid period of about four hundred years can clearly be seen. In this period, religion is the base for social interactions, legal judgments, both civil and criminal, fight against adversaries, all worthies and unworthies, and even scientific theories and so. [15]. Clergymen (priests) in different periods of ancient Iran history had a special status, and were considered one of the most influential social classes. Kings who were aware of the influence of this class among people, tried to establish a proper relationship with them to obtain the political legitimacy and by attracting their attention, they would provide a security coverage to their rule. Expansion of religion "and keeping the religion of truth and worship of Unique God and performing some good and useful events" [16] were considered the most important tasks of priest. While being responsible to perform all religious matters of society, they did some social activities, such as education, dream interpretation, treating patients and so, and in general, they were involved in all aspects of people's life. Education of princes and holding celebrations and religious festivals were also among other domains of activities of clergymen which gave a political look to the performance of this class. [17] On the role and task of clergymen and priests in the division of labor in ancient Iran, John B. NAS, in the history of religions, wrote: "Priests were in charge of the administration of religious life of Zoroastrian, that is the clergy class who inherited from their fathers and Magus ancestors were reserved and instructed the great leaders and most of them were educated and trained people. But the task to kindle the sacred fire in the temple is in charge of a particular community that are called priests. They must always carefully observe the religious practice and customs of cleansing and washing". [18] Evidence suggests that in Iranian ancient religions, clergymen had a lot of power and domination. They told people that the gods live like kings. They still live in aristocracy, so you should give ornaments and don't neglect. Thus, religious hypocrisy that ancient religions' clergymen were manifestations of it, looted people. Temples were supervised by clergymen and full of gold and jewelry, and all the wealth were in the hands of the representatives of gods, that is clergymen. Additionally, they had the reserves and stocks of corn and beans and a variety of commodities which were the gifts of poor for the gods, in their possession, and trade with the name of their gods. Temples were the trading platform and

trading for clergymen. [19] Based on the one of the available documents we can say that in ancient Iran; clergymen had such a role and power in the stratification pyramid that even they monitored the promotion of meritorious for small and partial stimulation of that era. Christensen Sen says overall it was not authorized going from a class to a higher class, but may actually be the exception, and it when one of the majority of subjects showed a special qualifications and art, in this case, based on the Letter of Tansar, it must be offered to the king and then the experience of the priests and harābiẓat (The attendants on a fire-temple) and the observations, as if they considered it worthy, entitled it to other than tribes. [20] In another document, it is said that, the priests were considered the most important social hierarchy in ancient Iran and even before the advent of Zoroaster (moghu), they were religious leaders of people. The word priest in Avesta is given as Moghu and over time, it changed into magupat and in Middle Persian (Pahlavi) to mogu, and it changed into Mobad (priest) in ancient Persian [21]. Although the priests were temple guards of the country and performed religious customs such as rites of purification and sacrifice, but their mandate the teacher, historian, physician and astronomer who were involved in the important decisions of the country. The highlighting influence and importance was to the extent that in the opinion of some scholars, studying the cultural status of ancient Iran is impossible unless considering the position of priests. [22] According to the role of the division of labor in the foundation of stratification system and using the benefits, clergymen and priests and mogu of ancient Iran were in charge of a variety of functions and duties and that it would provide more room for maneuvering to gain power and influence, and benefiting from social benefits to them and cause reproduction and stabilization of the existing hierarchy in favor of themselves. In some studies (Delpazir, 2010) the most important functions of the clergymen in ancient Iran division of labor were given as follows:

1. The implementation of the civilian and military tasks such as approval and adoption of the Kings, the coronation ceremony, messaging, justice, counseling, the court officer, participation in battle and supervision of Economic Affairs.
2. Holding ceremony that includes tasks such as temple rituals, marriage ceremonies and rituals of mourning.
3. Narrator and writer of the old stories.
4. Scientific authority, which included tasks such as education, medicine, foretelling, astronomy, architecture, debates and scientific sessions. [23] For the enjoyment of social benefits, for example, the role of their judgment, it can be said that one of the key roles in all societies both modern and traditional, is judgment and the holders of this role enjoyed more benefits. One reason for the importance of taking such roles is the ideological basis of these roles. , so So that the judgment always given to those who have spiritual and religious status. On the role of judgment of clergymen in ancient Iran, it can be explained that since Iranian society is a society which believes in religion, especially Zoroastrian religion had an important role in people's thoughts, and also because of the fact that the religion in a long period of the history of ancient Iran was in top of the power and judicial texts, religious literature of this religion, the major role of Zoroastrian clergymen in ancient Iran judiciary can be understood. In one of the documents, it is stated that "Courts of each area ran by a spiritual judge and generally took care if the provisions and acts of non-clergy leaders of the area are generally in favor of justice ... according to the Avesta book Seneca Zum Nosok, they made provisions for the judges who had studied jurisprudence for eleven, twelve, thirteen, fourteen and fifteen years, apparently the decisions and legal provisions of each of them was of various validity... Moreover, we can guess that many judicial officers who had special positions, they were priest or Herbad, as we know Herbads gave fatwa sometimes as judgment. "[24]. In this regard, it is given in another document that "judges are selected from among clergymen because only they had the judicial information" [25]. , Zarrinkub also writes that “In the Sassanid era "in what was related to the administration of justice, Herbads had the major role who were familiar with religious law and ordinary provisions." [26] The importance of judgment and social functions in the ancient Iran stratification system was so that the position of clergymen and authorizers of religious affairs made so prominent and influential that even sometimes, king himself some time as head of the stratification system were not safe of their judgments and their consequences. A clear example of such an event was the reign of Ghobad Sasanian. However, "if someone returns from religion and joins another religion, he was

immediately executed." [27] Although we don't have enough information about the rights and privileges of a judge in ancient Iran, but it can be assumed that according to the official judges, and the judges appointed by the king, they were among the nobles and noble families and the Zoroastrian clergymen who had many advantages, properties and income and a certain advantage may be at the disposal of this group in relation to the position of judge. Ehtesham (1976) writes about it: "In the Achaemenid era, justice had a distinguished place. Achaemenid Empire were assigned the justice and its implementation as one of the programs of their reign and the priority of state affairs, so that the judges at this time had many benefits and great privileges. "[28] In sum, based on the findings and the literature of social order, hierarchy and stratification of ancient Iran during the Sassanid era, it can be said that since the legal practices of each community reflects the lifestyle and the terms and conditions of the community, certainly the Iran law in the Sassanids era is also no exception, and because in the society of Sassanid era, clergymen were considered as the absolute power and were placed in the first class. Legal practices arising from the fact had a very strong mix with religion and the involvement of the Zoroastrian clergymen in all legal matters is clearly evident and it was because the Sassanid government was aligned with Zoroastrian clergymen from the early days. Companions of religion devoted their sacred aspects to religious government and also thanks to the support of the bureaucrats in all important aspects of Iranian lives, all state affairs were done by their consultation and prediction (the Magi). Magi had spiritual authority. Government made them ruling the people's lives and property and correct implementation of marriage and divorce, giving lawfulness title and possession truth and other rights was in their power. All of these rights resulted in their full influence. In the Sassanid period, the Achaemenid period, the king was at the head of the judiciary and according to requirements of Persian religion that knows the religion and moral united to law in its judicial sense. Arbitration and procedure in this period was done by clergymen and judiciary proceedings in the proper sense belonged to this class. [29] What is given in the testament of Ardashir Babakan, head of Sassanid empire to his son, Shapur (241-271 M), shows the importance of religion in ancient Iran stratification system more than ever: "My son! Religion and royalty are close to each other and they are interrelated; religion is the basis of king and king is the guardian of religion. Whatever has no base is destroyed, and what had no guard is destructed." [30] So the most important indicators that distinguish the political and religious history of period is that the, harmony of religion and government. The monarchy and the unity of the country was based on religion, and a deep bond was formed between religion and politics. What strengthening this link, in addition to the recognition of the Zoroastrian religion, was the relative correlation and religious and social objectives common to Clergymen and Kings that based on which the government was supportive of religion and state supported the religion. [31] On the place of religious clergymen in ancient Iran stratification system, it is given in some texts: the Great Darius was relied on the higher classes, the rich and the nobility and clergy and priests in the focus and unity of his country and for its organization. At that time, the clergy and priests in the community were considered politically and economically large force and to draw their assistance. Darius did many measures to preserve the foundations of the welfare of priests and reserved the income of temples from bankruptcy. For example, he rebuked one of the satraps of Asia Minor why he received charges from farmers attributable to Vulcan "Apollo" and commanded to plow his personal land. The priest "Audzagursant" certificate on the support of Darius of the property of a temple he ran is preserved in the available resources. Persian had a special place in the government and the country and did not pay taxes. [32] Based on the principle that power is corrupting, it can be said that always power and benefits from the occupation of the top levels of the stratification pyramid polluted the priests to all kinds of corruption and crime. ; Zarrinkoub in his review said: "At the end of the reign of Anushirwan, Iran had a precarious situation... clergy was in corruption. Corruption in the clergy condition was raised from the power of priests. [33] "Also, some studies (Alamdari, 2009) showed that in Sassanid era, "an improper situation happened in terms of religious situation. Religious system was integrated in the government. And Zoroastrian priests played a significant role in government policy making and suppression of dissents, especially religious opponents. So the religious system along with state was drawn to immorality." [34] Relying on

documents used in this study, it can be said that priests have a special place in the beliefs of the masses of people. Mobad Mobadan, except what was normal to educate about religious issues and spiritual guidance, was in charge of appointments and dismissals of the king and if a king didn't observe the spiritual teachings, he was considered unworthy and was dismissed by the priests. King election was for the highest representatives of clergy and army and teachers classes, and in the case of dispute among them, it was limited to priests. In the Letter of Tanser, some issues is provided in this regard. Accordingly, the influential and powerful strata were always placed besides kings in the upper places of pyramid and were enjoyed more benefits and inequality than low levels of stratification system.

CONCLUSION

What can be understood and explained from the literature and research is that the religion in ancient Iran was always as an influential component in the construction of social system, social hierarchy and stratification and its owners were always close to the top of the stratification pyramid and consequently unequally benefited from the social benefits and facilities and more than other segments of society and undoubtedly the impact of natural environment and hard climate of Iran plateau cannot be ignored in the social system and, this is while many of the world's great religions are always formed in tough and difficult nature areas such as the Middle East. Again climate and nature of an area affect the construction of social system, mode of production, instruments, norms and beliefs of the members and this has contributed to the construction of unequal human relations. Man in his life on Earth has always suffered from an emotional and spiritual vacuum and from various several, he wished to cure the distress of mind and religion is one of the early humans initiatives to fill the spiritual vacuum and the ontological security, as that it affects other human relations and labor division system of the ancient times in favor of those who have such abilities as ability to control the forces of evil, and providing the blessings and peace with nature, and this story is yet continued. What is noteworthy here is that the will of people and actors that with their interpretation and understanding, are acquainted to the reproduction of stratification system and hierarchy system in the life with obedience, the system they strongly deplore it, and always were pessimistic and unhappy with it.

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ZONING PLANT AND SOIL POLLUTION OF HEAVY METALS (NICKLE AND VANADIUM) AROUND ARDABIL PLAIN GAS STATIONS

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ABSTRACT

In this study, concentrations of heavy metals Vanadium and Nickle oil pollution index in 2013 at the petrol station in the plain of Ardabil was measured. Nickle and Vanadium concentration values zoning through designated points of geo-statistics (kriging) was used. Results showed that Nickle concentrations in soil around the gas station fuel pump Ali Ashrafi Station 2 and Station 2 Hakim Ghashlaghi Nickle had the highest concentration in the plant as well as 4 Hellabad station and station 10 Voraghol had the highest concentration. For Vanadium in soil gas station Moradlou Station 8 and 9 station Gas station Meshgin Sabalan and 7 Gilandeh plant station and station 3 Molaei gas station had the highest concentration. It can be concluded that a high concentration of Nickle Vanadium in soil and plant it in the stations and petrol stations due to more frequent and old motor vehicle exhaust system and fuel and gasoline to land loss and the influence of these stations are storage tanks. According to data obtained also show that the accumulation of heavy metals (Nickle and Vanadium) in the soil around the plant was a gas station for further study.

Keywords: Soil and plant, heavy metals, pollution, Ardabil gas stations

INTRODUCTION

Increased industrial activities associated with the production of pollutants such as heavy metals are developing a serious problem to the human beings and they are present [1] in a special blend of soil biosphere which is not only a repository of geo-chemical pollution, but also as a buffer controller elements and chemicals into the air, water and butter is butter-organisms [2] as one of the resources will be renewed organic and inorganic nutrient cycling plays an important role in environmental pollution through chemical contamination which is one of the major factors in the destruction of the biosphere. It is also the highest risk to the environment elements like beryllium, cadmium, copper, mercury, nickle, lead, selenium and vanadium. Physical degradation of the soil chemistry of rocks and organisms which form humus soil first so there is a mixture of minerals and organic addition to living organisms as well as air and water. The ingredients in the soil can be considered the most important part of life on Earth because of the growing plant and animal life [3]. The presence of heavy metals in the environment is very problematic because they are not biodegradable and so after entering into the living cell in human or animals it may led to serious toxicities [4]. The dynamics of these metals in the soil are low, usually below the soil layer is not transferred so more vulnerable to capture and transfer to plant used [5]. Heavy metals are also harmful pollutants for soil organisms. Ecosystem contamination by heavy metals is a serious threat to the environment because they accumulate in various parts of the food chain. It should be noted that the concentration of an element in soil may be higher than the toxicity due to absorption by the plant, but it appears it has been proven toxic [6]. Presence of natural plants heavy metals contaminated areas, as a results concentration of the heavy metals in the soil may vary from one area to other area because plants absorb the heavy metals. [7]. Heavy metals

pollution in agricultural soil may to irregularities in the structure of the soil and even damage to human health involved in plant growth through entry into the food chain [8]. Nickle and Vanadium such important elements as well as other environmental pollutants ingredients are oil. The average concentration of these elements in the crude oil from different countries varies In the event of oil pollution can be realized by having a concentration of Nickle and Vanadium to the source of contamination. For example, in the Persian Gulf War events of 6450 metric tons of Vanadium 1861 Nickle through wells are dry depot into the combustion zone in the Persian Gulf. Iranian Offshore Oil Company research studies related to the amount of heavy metals in crude oil production in oil fields Siri, Khark, Lavan, Bahrakan, carried out further that these two elements (Nickle, Vanadium) first and second the frequency allocated to why these metals are considered as an indicator of oil pollution [5]. In a study, it was found that 56 percent of heavy metals in the crude oil [9]. In another study it has been reported the effect of the plant in to prevent the heavy metal contamination in crude oil [10]. Unlike organic pollutants, heavy metals since the inevitable shift indicators are stable in soil and many of our needs through soil it is estimated the plant can accumulate and cause problems in the food chain or biological. That is why this research has been that the amount of heavy metals (Nickle, Vanadium) in 17 districts of soils and plant around petrol pumps Ardabil in 2013 were investigated.

METHODOLOGY

Situation of studied zone

Plain eastern side of the plateau Azerbaijan and Ardabil Ardabil Province is located in the center of the divisions. Meshgin north of the city and the southern city to city Kosar and from East to West to the mountain ridge and Sabalan Mountains Baghrodagh is limited. More elevation levels in the range of 2,000 to 3,000 meters above sea level. High on the slopes of Mount Sabalan increased to 3,000 to 4,000 meters. The lowest elevation in the central part of Ardebil plain and average height of 1350 meters. Baghrodagh the tea from rain, melting snow and spring in the Sabalan comes after a pass through the middle Sabalan in the village of Kara-Suu river Anzob down near the village of Sami, which comes from the western slopes of mountains efforts Ardabil is connected and after crossing the plains to the northwest and flows within the city limits Aslanduz the Aras River flows [11].

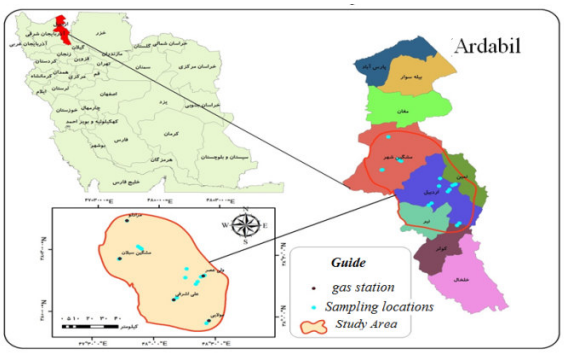


Figure 1

Location of the study area gas stations on the plains of Ardebil

In this experimental study, 17 gas stations in the desert region of Ardabil were selected using a GPS device in terms of its geographical position between the road and the surrounding villages have been measured. Soil samples from the designated seasons (November) were collected from a depth of 10-20 cm to 100 g using a metal shovel and plastic containers are free from any chemicals were dumped in the same way from any location where samples. The harvest of soil samples from the plant (shoot) were taken, and were placed in plastic bags for identification after it was sent for analysis by experts in the laboratory. The research in the fall of 2013 in order to Check Pollution soil and plant around petrol pumps Ardabil plain heavy metals (Nickle and Vanadium) was performed using a geographic information system. The position of the sampled point on standard virtual color

composite image was determined randomly. Then with the help of global positioning system receiver position samples were detected. Nickle and Vanadium 17 for both heavy metal soil samples and 17 plant samples were taken, a total of 68 samples were taken.

Table 1
Stations measure heavy metals Nickle and Vanadium (soil and plant) at a gas station in the Ardabil plaint

Zone	Stations	Longitude	Latitude
Ali Ashrafi gas station	**Stations** 1	38.12083	48.15083
Ghashlaghi Hakim	**Stations** 2	38.14	48.17583
Mollaei	**Stations** 3	37.95806	48.445
Hellabad	**Stations** 4	37.93611	48.42472
Vali Asr	**Stations** 5	38.32028	48.38528
Taze Kand Reza Abad	**Stations** 6	38.32417	48.39556
Gilandeh	**Stations** 7	38.31222	48.36694
Mradlou	**Stations** 8	38.75222	48.74083
Meshgin Sabalan	**Stations** 9	38.44333	47.69722
Voraghol	**Stations** 10	38.44	47.68944
Deh Biglu	**Stations** 11	38.54611	47.84083
Fakhr Abad	**Stations** 12	38.535	47.85861
Arjagh	**Stations** 13	38.52833	47.87194
Samian	**Stations** 14	38.375	48.24722
Sumerin	**Stations** 15	38.30389	48.23944
Zarbari	**Stations** 16	38.25222	48.32611
Agh Bolagh	**Stations** 17	38.27194	48.34167

To prepare the necessary parameters to be used in models to test the hypothesis, the spreadsheet application (Excel) is used. The information gathered in the pages of the work in the environment of the software was introduced and then the necessary calculations to obtain the variables were studied. After calculating all the necessary variables for use in models of this study, these variables were combined in a single business pages electronically to the software (Krijing) used in the final analysis.

RESULTS

In this study, samples of plant and soil surrounding the valley station of Ardabil, Meshgin Sabalan, Moradlou, Molaei and Ali Ashrafi were selected. That we tried almost all areas of Ardebil plain samples and samples were taken at each location where the GPS was struck. Ali Ashrafi areas of the stations 1 and 2, Molaei stations 3 and 4, Valiasr stations 5, 6, 7, 14, 15, 16 and 17, Moradlou station 8 and Meshgin Sabalan stations 9, 10, 11, 12 and 13 of the total of 17 samples were taken.

Results obtained from laboratory data

Table 2
Shows data obtained from the laboratory for soil samples

Stations	Zone	Longitude	Latitude	Vanadium (mg kg)	Nickle (milligrams per kilogram)
Station 1	gas station Ali Ashrafi	38.12083	48.15083	55.50	48
Station 2	Hakim Ghashlaghi	38.14	48.17583	95.59	44.57
Station 3	gas station Molaei	37.95806	48.445	59.39	37.24
Station 4	Hellabad	37.93611	48.42472	107.82	15.81
Station 5	gas station Valizasr	38.32028	48.38528	94.78	37.5
6 stations	Tazeh Kand Reza Abad	38.32417	48.39556	74.17	24.95
Station 7	Gilandeh	38.31222	48.36694	80.23	37.36
Station 8	gas station Moradlou	38.75222	48.74083	157.57	28.07
Station 9	gas station MeshginSabalan	38.44333	47.69722	146.34	22.91
Station 10	Voraghol	38.44	47.68944	47.32	16.59
Station 11	Dehbiglu	38.54611	47.84083	95.81	24.07
Station 12	Fakhrabad	38.535	47.85861	79.55	9.93
Station 13	Arjagh	38.52833	47.87194	73.86	23.81
Station 14	Samian	38.375	48.24722	74.73	22.62
Station 15	Sumerin	38.30389	48.23944	71.62	36.95
Station 16	Zarbari	38.25222	48.32611	65.48	38.85
Station 17	Aghbolagh	38.27194	48.34167	52.01	30.42

The results of this study are shown in Table 2. Results showed that the highest concentration in the soil surrounding the metal Nickle petrol stations, petrol pumps Ali Ashrafi (48 mg kg) and the lowest concentration at the pump Meshgin Sabalan (91.22 mg kg). The highest concentration in the soil surrounding the metal Nickle stations, station 2 Hakim Ghashlaghi (14.57 mg/ kg), and lowest concentrations at Station 12 Fakhrabad (9.93 mg kg). The results showed that the highest concentration of Vanadium metal in the soil around petrol stations, petrol stations Moradlou (157.57 mg kg) and the lowest concentration at the pump Ali Ashrafi (55.5 mg kg). The highest concentration of Vanadium metal in the soil around the station, station 4 Hellabad (107.82 mg kg) and the lowest concentration at station 10 Voraghol (47.32 mg kg).

Table 3
Shows data obtained from laboratory to plant samples

Stations	Zone	Longitude	Latitude	Vanadium (mg kg)	Nickle (milligrams per kilogram)
Station 1	gas station Ali Ashrafi	38.12083	48.15083	10.78	10.29
Station 2	Hakim Ghashlaghi	38.14	48.17583	24.7	26.56
Station 3	gas station Molaei	37.95806	48.445	38.19	24.34
Station 4	Hellabad	37.93611	48.42472	10.34	30.52
Station 5	gas station Valizasr	38.32028	48.38528	25.44	14.91
6 stations	Tazeh Kand Reza Abad	38.32417	48.39556	28.16	8.83
Station 7	Gilandeh	38.31222	48.36694	43.56	13.22
Station 8	gas station Moradlou	38.75222	48.74083	17.27	13.86
Station 9	gas station MeshginSabalan	38.44333	47.69722	16.27	9.81
Station 10	Voraghol	38.44	47.68944	15.83	25.34
Station 11	Dehbiglu	38.54611	47.84083	16.89	3.85
Station 12	Fakhrabad	38.535	47.85861	9.34	4.44
Station 13	Arjagh	38.52833	47.87194	15.28	15.56
Station 14	Samian	38.375	48.24722	19.8	14
Station 15	Sumerin	38.30389	48.23944	18.86	7.67
Station 16	Zarbari	38.25222	48.32611	19.4	10.16
Station 17	Aghbolagh	38.27194	48.34167	23.25	13.47

The results of this study are shown in Table 3. The results showed that the highest concentrations of the plant Nickle nearby gas station, gas station Molaei (24.34 mg kg) and the lowest concentration at the pump Meshgin Sabalan (9.81 mg kg). The highest concentration of metal Nickle between plants around the station, station 4 Hellabad (30.52 mg kg) and lowest in Station 11 Dehbiglou (3.85 mg kg). The results showed that the highest concentration of Vanadium metal between plants around petrol stations, petrol stations Molaei (38.19 mg kg) and the lowest concentration at the pump Ali Ashrafi (10.78 mg kg). The highest concentration in the plant Vanadium metal around the station, station 7 Gilandeh (43.56 mg kg) and the lowest concentration at station 12 Fakhrabad (9.34 mg kg).

Investigating statistical distribution

Kriging interpolation method was employed to normalize the data we need. The most appropriate statistical model interpolation error with respect to the total error that low rating criteria, the best and worst ratings above criteria. Vanadium in the most appropriate model for plant spherical model, exponential model, and spherical model plant for Nickle in the most appropriate model for Vanadium in soil linear and spherical models were selected for Nickle in the soil.

Table 4
To determine the best fitting model for heavy metal data Nickle and Vanadium for plant

Metals	Model fitting	RMSS	M	RMS	ASE	MS
Nickle	Spherical	1.07	-0.53	7.33	6.83	-0.07
Vanadium	Linear	1.15	-0.39	8.84	7.64	-0.04

Table 5
To determine the best fitting model for the data Nickle and Vanadium heavy metal to soil

Metals	Model fitting	RMSS	M	RMS	ASE	MS
Nickle	Spherical	1.08	0.04	8.95	8.22	0.008
Vanadium	Linear	1.18	-2.008	32.57	26.58	-0.13

Vanadium and nickle histograms obtained by kriging test

Understand data distribution to production level will be very important that the histogram display data may be possible. Enabled distribution histogram view data created in this window to specify the layers that the variable histogram can be seen and studied. The most important feature is distribution histogram charts in the center of symmetry and the same approximate mean and median, it can be achieved.

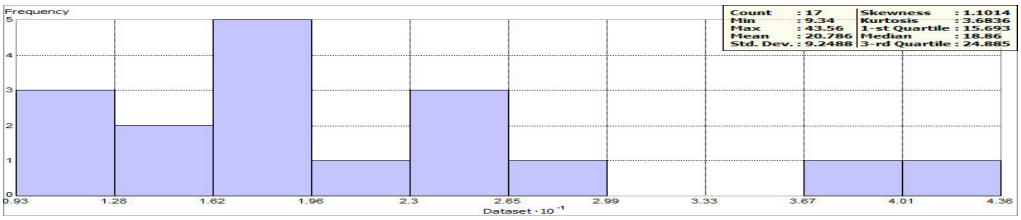


Figure 2

Shows the histogram distribution Vanadium concentration on plant

Vanadium histograms obtained in this study indicate that skewed to the left on the plant, and a bulge in the first, which represents the non-normality of the data.

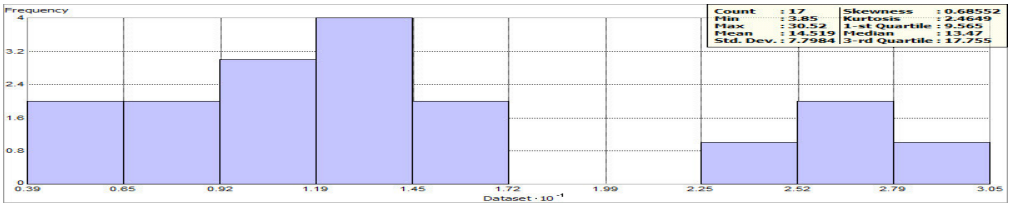


Figure 3

Histogram distribution Nickle concentrations on plant

Nickle histograms obtained in this study indicate that a bulge in the middle of the plant is not the expression of non-normal data.

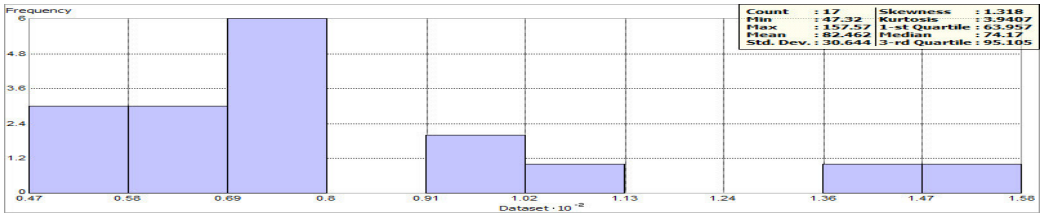


Figure 4

Histogram distribution Vanadium concentration of the soil

Vanadium histograms obtained in this study indicate that a bulge in the middle of the soil is not abnormal that represent the data.

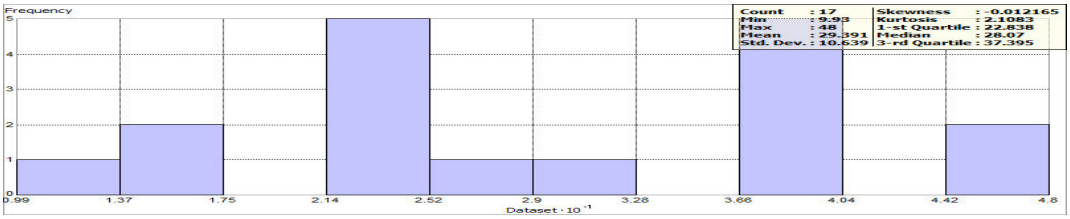
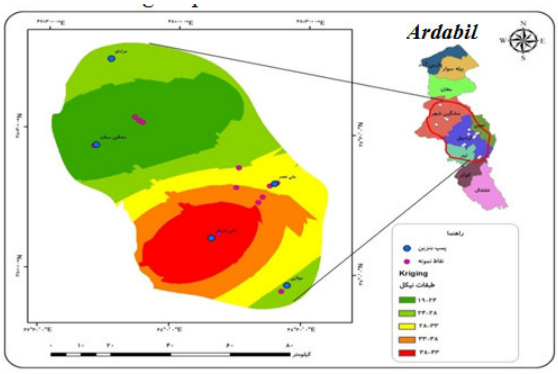


Figure 5
Histogram distribution Nickle concentration on soil

Histograms obtained in this study indicate that a bulge in the Nickle on soil that is not the expression of non-normal data.

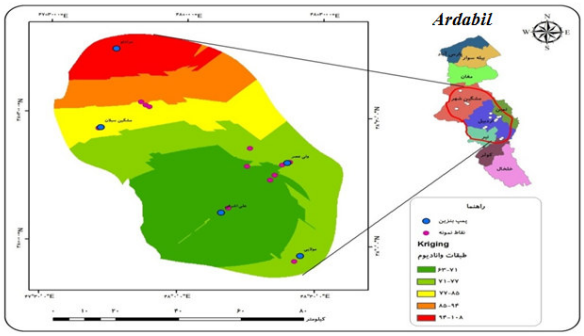
Output map geo-statistics

After fitting histograms of measured statistical estimate interpolation maps and mapping each and soil surrounding the plant heavy metals Nickle and Vanadium in Ardebil plain gasoline stations was based on the following map.



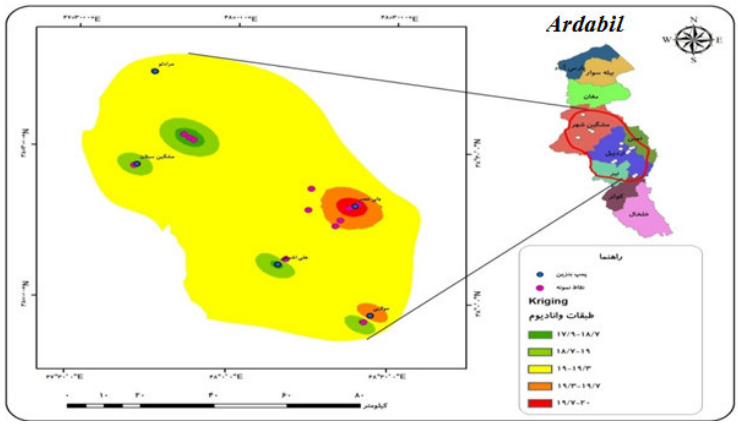
Map 1
Distribution of metal concentration in the soil around a gas station in the desert Nickle Ardabil estimate

Map 1 using kriging with spherical model fitting was obtained. Based on the above map metal concentrations in soil around the gas station in the desert Nickle Ardabil in the red at the gas station and station 2 Hakim Ghashlaghi Ali Ashrafi. The maximum value is highlighted in green field at the gas station Meshgin Sabalan, station 10 Voraghol, and station 11. Ten Bigelow, a 12 station downstream and Fakhrabad 13 Arjagh station with the lowest concentrations are Nickle. Nickle high concentration of stations and petrol stations Meshgin of the motor vehicle is traveling more.



Map 2
Distribution of Vanadium metal concentrations in soil gas station in the desert around Ardabil estimate

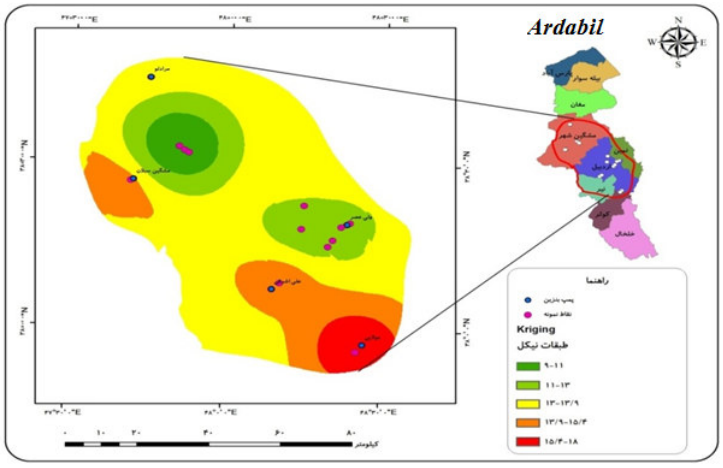
Map 2 was obtained using kriging with a linear fitting model . According to the map above Vanadium metal concentrations in soil gas station in the desert near Ardabil in the red at the gas station Moradlou reaches its maximum value and the green color at the gas station and station 2 Hakim Ghashlaghi Ali Ashrafi Vanadium has had the lowest. Moradlou gas station and station 2 Hakim Ghashlaghi Because of the difficulty in unloading and refueling system and the loss of influence in the field of petrol storage tanks because of the high Vanadium is a metal.



Map 3

Distribution of Vanadium metal concentration in the gas station in the desert plant Ardabil estimate

Map 3 was obtained by using kriging with fitting model. According to the map above Vanadium metal concentrations in plant Ardebil plain around gas stations in the red at the gas station Valiasr, station 6 Tazeh Kand Reza Abad, 7 Gilandeh station and 17 Agh Bolagh the greatest value will be highlighted in green field at the gas station 11 Dehbiglou Ali Ashrafi stations and 12 stations downstream Fakhrabad and 13 Arjagh lowest Vanadium's station, respectively. Vanadium high concentration of gas station gasoline pumps Valiasr Valiasr, station 6 Tazeh Kand Reza Abad, 7 Gilandeh station and 17 Agh Bolagh due to motor vehicle traffic is more.



Map 4

Nickle metal concentrations in plant distribution around the gas station in the desert Ardabil estimate

Map 4 was obtained using kriging with spherical model fitting. According to the map above Nickle metal concentrations in plant Ardebil plain around gas stations in the red at the gas station and station 4 Hellabad Molaei reaches its maximum value and the green full color 11 Dehbiglou station and Station 12 Fakhrabad downstream and 13 Arjagh lowest Nickle's station,

respectively. Nickle high concentration of the gas station Molaei Valiasr gas station and a new station Hellabad 4 due to motor vehicle traffic is more.

CONCLUSION

According to geo-statistics best fitting model for heavy metal in the soil surrounding Nickle gas station Ardabil plain spherical model for Vanadium metal linear model was the most appropriate model. The best fitting model for heavy metal in plant Nickle nearby gas station Ardabil plain spherical model for Vanadium metal exponential model was the most appropriate model. According to the results, the metal concentrations in soil around the gas station in the desert Nickle Ardabil at the gas station petrol station 2 Ali Ashrafi (2000) and Station 2 Hakim Ghashlaghi had the highest concentration. Nickle high concentration of the gas station and filling station for motor vehicles are traveling more. Vanadium metal concentrations in soil around the gas station in the desert gas station in Ardabil 8 stations Moradlou (2012) and 9 station Gas station Meshgin Sabalan (2001) had the highest. Old because of drainage system and fueling stations 9 and losses and came to the land of gasoline storage tanks, and a lack of fueling stations 8 correct, because of the high Vanadium metal is in these areas. Nickle metal concentrations in plant nearby gas station in the desert gas station Ardabil 4 Hellabad station and station 10 Voraghol had the highest concentration. Nickle high concentration at this station and gas station for unloading and refueling system is outdated. Vanadium metal concentrations in plant as well as nearby gas stations Ardebil plain 7 Gilandeh station and 3 station Gas station Molaei (2003) had the highest. Station 7 due to more frequent motor vehicle, and refueling and unloading station 3, because the old system, because of the high Vanadium metal is in these areas.

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15-LEVEL CASCADE MULTILEVEL INVERTER USING A SINGLE DC SOURCE

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ABSTRACT

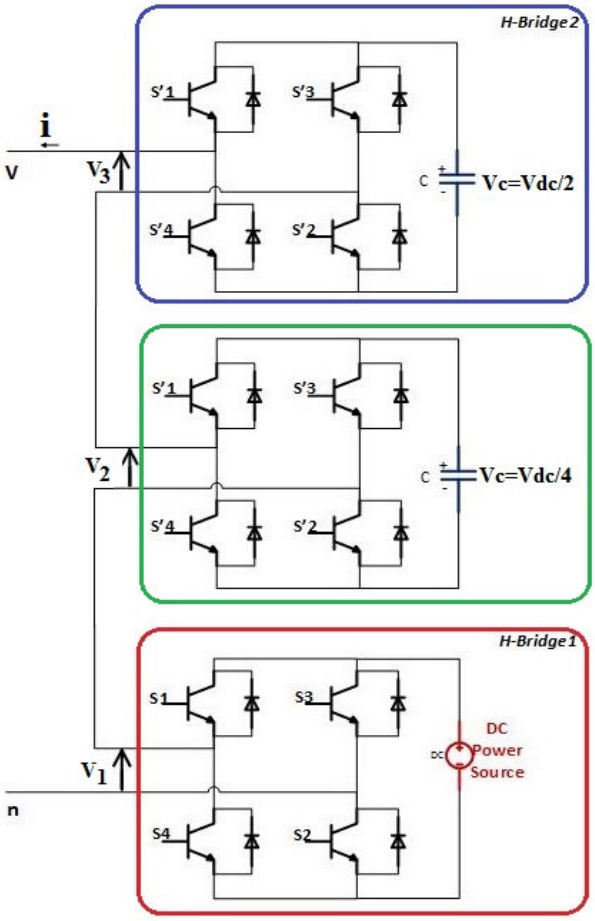
In this paper, a 15-level cascade multilevel inverter using a single Dc source was considered. Switching angles were obtained using a smart technique to remove the selected harmonics. Furthermore, it leads to the simple design of the inverter output filters. The equations have been presented in several sections and simulations performed by PSCAD/EMTDC software.

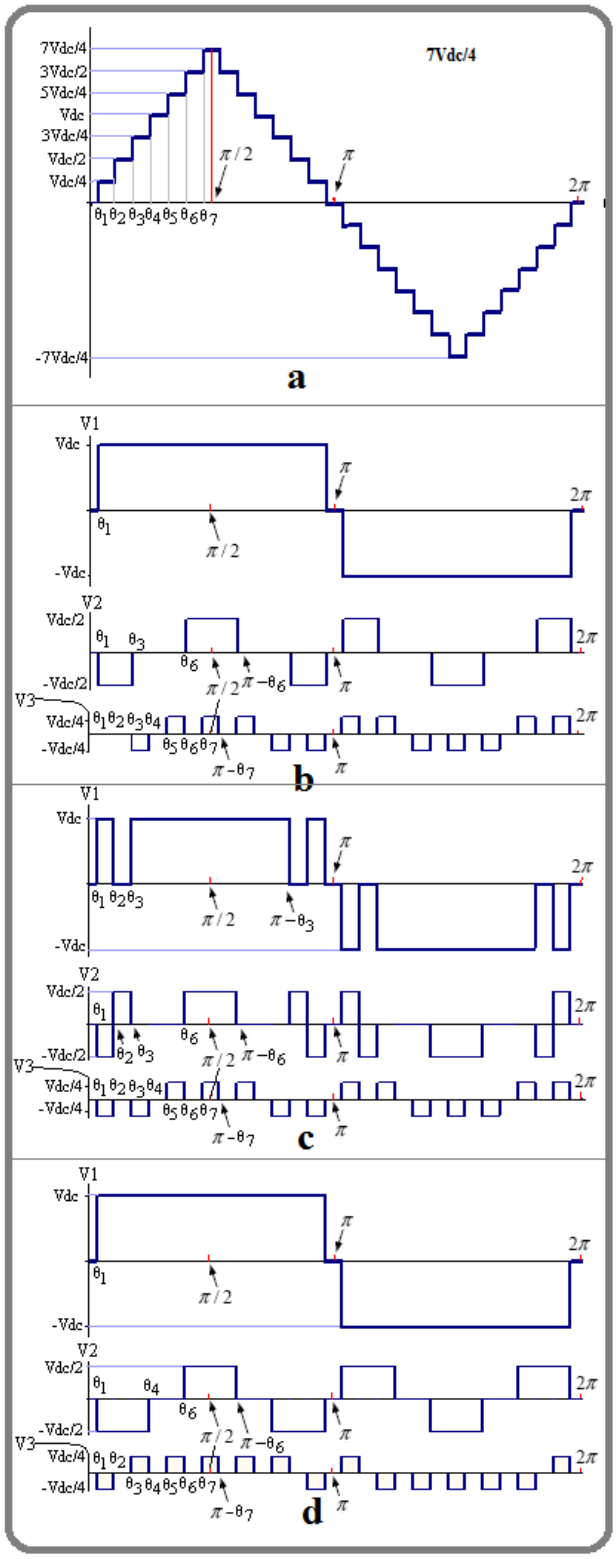
Keywords: *Multilevel inverter, Harmonic, Switching, THD*

INTRODUCTION

There are many applications for multilevel inverters, such as Flexible AC Transmission Systems (FACTS), High Voltage Direct Current (HVDC) transmission, electrical drives and Dispersed Generation (DG) systems. In some applications the converter connects one DC source to the network and some other applications; they can connect separate DC sources to the network [1]. Multilevel inverters of voltage source have a unique structure that allows them to be used with minimal harmonic without high-voltage transformers. Waveform of desired voltage is generated through a combination of several levels of DC-voltage. For this reason, the multilevel inverters can be generating high powers. The number of the output waveform levels is increased by increasing the number of levels of multilevel inverter which leads to the generation of a waveform with less distortion harmonic and the distortion tends to zero as the number of levels increases. There are three important types of multilevel inverters which are used in industrial applications; capacitor clamped multilevel inverter, diode clamped multilevel inverter and cascaded multilevel inverter. In recent years, the multilevel inverters have been studied by a few researchers [2-7]. Among multilevel inverters, the cascade multilevel inverter despite having many advantages, such as less THD, reduction of ratio dv/dt, reduction of voltage pressure on switches etc. Due to the separate DC source, they cannot be connected back to back and this problem was solved by a novel structure [3]. Another point about multilevel inverter is the change of switching modulation which leads to changes in THD value and also undesirable output waveform in some cases. In this paper, a cascade multilevel inverter is presented with only a DC source without transformer by method of selected harmonics elimination. Switching angles have been obtained by an intelligence method for minimum value of THD while in each case a capacitor has been used instead of the DC source. The obtained results confirm that change DC link voltage leads to stabilizing output THD in minimum value and design output filters of inverters in the simplest mode by selecting proper switching angles(with PSO method) to eliminate selected harmonics for minimum value of THD in output voltage.

Figure 1
Structure of cascade 15-level inverter by a DC source





Bridges in -of each H $_3$and V $_2$V , $_1$Voltages of output V .(a)level inverter -15waveform of output The .2 Fig c and d ,b) ($_3$V+$_2$V+$_1$V=V)different cases to generate same voltage in inverter output

VI. STRUCTURE OF 15-LEVEL CASCADE MULTILEVEL INVERTER WITH SINGLE DC SOURCE[1]

The structure of 15-level inverter, which composed of three HBridges, has been illustrated in Fig.1. Table 1 presents production of these waveforms by the structure of Fig.1.

TABLE I
OUTPUT VOLTAGES OF 15-LEVEL INVERTER

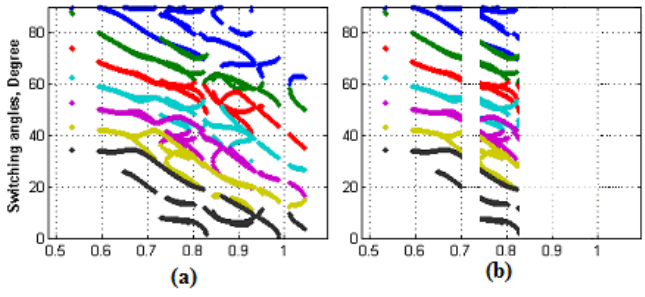
θ	$_1$V	$_2$V	$_3$V	$_3$V+$_2$V+$_1$V=V
$_1$θ≥θ≥0	0	0	0	0
$_2$θ≥θ≥$_1$θ	$_{dc}$V	2/$_{dc}$V-	4/$_{dc}$V-	4/$_{dc}$V
$_3$θ≥θ≥$_2$θ	$_{dc}$V	2/$_{dc}$V-	0	2/$_{dc}$V
$_3$θ≥θ≥$_2$θ	0	2/$_{dc}$V	0	2/$_{dc}$V
$_4$θ≥θ≥$_3$θ	$_{dc}$V	0	4/$_{dc}$V-	4/$_{dc}$V3
$_4$θ≥θ≥$_3$θ	$_{dc}$V	2/$_{dc}$V-	4/$_{dc}$V	4/$_{dc}$V3
$_5$θ≥θ≥$_4$θ	$_{dc}$V	0	0	$_{dc}$V
$_6$θ≥θ≥$_5$θ	$_{dc}$V	0	4/$_{dc}$V	4/$_{dc}$V5
$_7$θ≥θ≥$_6$θ	$_{dc}$V	2/$_{dc}$V	0	2/$_{dc}$V3
2/π≥θ≥$_7$θ	$_{dc}$V	2/$_{dc}$V	4/$_{dc}$V	4/$_{dc}$V7

Fig. 2-b shows generation of waveform of Fig.2-a for θ2≤ θ≤θ3 and θ3≤ θ≤θ4, Fig. 2-c shows generation of waveform of Fig. 2-a for θ2≤ θ≤ θ3 and Fig. 2-d shows generation of waveform of Fig. 2-a for θ3≤ θ≤ θ4. In fact, the output voltage level Vdc/2 can be generated by the two mentioned and alsow a slow the output voltage level Vdc/4 can generated by the two mentioned cases which selected to stabilize DC capacitor voltage. Times of charge and discharge of capacitor has been listed in Table 2. Times of charge and discharge of capacitor has been listed in Table 2.

TABLE II.
Control of voltage level of capacitor c_1 in 7-level inverter

System state	$_1$V	$_2$V	$_3$V	$_3$V+$_2$V+$_1$V=V
0<i , 2/$_{dc}$V>$_{1c}$v	$_{dc}$V	2/$_{dc}$V-	0	2/$_{dc}$V
0>i , 2/$_{dc}$V>$_{1c}$v	0	2/$_{dc}$V	0	2/$_{dc}$V
0<i , 2/$_{dc}$V<$_{1c}$v	0	2/$_{dc}$V	0	2/$_{dc}$V
0>i , 2/$_{dc}$V<$_{1c}$v	$_{dc}$V	2/$_{dc}$V-	0	2/$_{dc}$V
0<i , 2/$_{dc}$V>$_{2c}$v	$_{dc}$V	0	4/$_{dc}$V-	4/$_{dc}$V3
0>i , 2/$_{dc}$V>$_{2c}$v	$_{dc}$V	2/$_{dc}$V-	4/$_{dc}$V	4/$_{dc}$V3
0<i , 2/$_{dc}$V<$_{2c}$v	$_{dc}$V	2/$_{dc}$V-	4/$_{dc}$V	4/$_{dc}$V3
0>i , 2/$_{dc}$V<$_{2c}$v	$_{dc}$V	0	4/$_{dc}$V-	4/$_{dc}$V3

Figure 3
Limitations of switching angles for 15-level in modulation interval(a)



he range of switching angles for 15-level inverter in the modulation interval subjects to constrain 3(b).

VII. CALCULATION OF SWITCHING ANGLES FOR 15-LEVEL MULTILEVEL INVERTER .

The Fourier expansion of 15-level inverter output waveform (Fig.8-a) for θ1, θ2, θ3, … , θ7 switching angles by assuming a constant output voltage in 15-level inverter of structure of Fig.7 is as follows:

The mathematical relations of the case are:

$$\frac{2}{\pi}\cdot\frac{V_{dc}}{2}\left(\cos(\theta_1)+\cos(\theta_2)+.....+\cos(\theta_7)\right)=V_1$$
$$\left(\cos(5\theta_1)+\cos(5\theta_2)+.....+\cos(5\theta_7)\right)=0$$
$$\left(\cos(7\theta_1)+\cos(7\theta_2)+.....+\cos(7\theta_7)\right)=0$$
M
$$\left(\cos(19\theta_1)+\cos(19\theta_2)+.....+\cos(19\theta_7)\right)=0$$

The equations are seven unknown nonlinear equations for unknown θ1, θ2, θ3, … and θ7. Various techniques have been suggested to solve the equations. In this paper, the switching angles has obtained using the intelligent method. Switching angle by this method has been depicted in Fig.3-a.

VIII. SELECTING OPTIMAL SWITCHING ANGLE FOR 7-LEVEL MULTILEVEL INVERTER

By considering the obtained switching angles, there are no restrictions for balance between charge and discharge of capacitors C1 and C2 because the interval of capacitors charge is slightly longer than interval of capacitor discharge. The restrictions of the intervals lead to restriction of the obtained switching angles. The switching interval is expressed as follow by considering Figs.2:

$$2\left(\theta_3-\theta_1\right)\geq\left[2\left(\theta_6-\theta_5\right)+\left[\left(\pi-\theta_7\right)-\theta_7\right]\right]$$
$$2\left[\left(\theta_2-\theta_1\right)+\left(\theta_4-\theta_3\right)\right]\geq\left[2\left(\theta_6-\theta_5\right)+\left[\left(\pi-\theta_1\right)-\theta_7\right]\right]$$

Based on Fig.8 and Table 3, there is only one case to select desired voltages V1 , V2 and V3 to generate waveform of Fig.2-a in intervals of θ5 to (π-θ5) which by considering positive current in the first half-cycle C1 and C2 discharged. while there are two cases of switching for output voltages of V1 and V2 in interval of θ2 to θ3 an interval of π-θ2 to π-θ3 that by change of this cases, capacitor C1 is charged or discharged. Also there are two cases of switching for output voltages of V2 and V3 in interval of θ3 to θ4 an interval of π-θ3 to π-θ4 that by change of this cases, capacitor C2 is charged or discharged. The obtained switching angles are restricted by applying the mentioned restriction (constrain or Eq. 3). Fig.3-b shows the obtained switching angles for 15-level inverter subjects to constrain 3. Among the obtained switching angles in Fig. 3-b, the angles θ1, θ2 , θ3 , … and θ7 are selected for the minimum value of THD of output voltage.

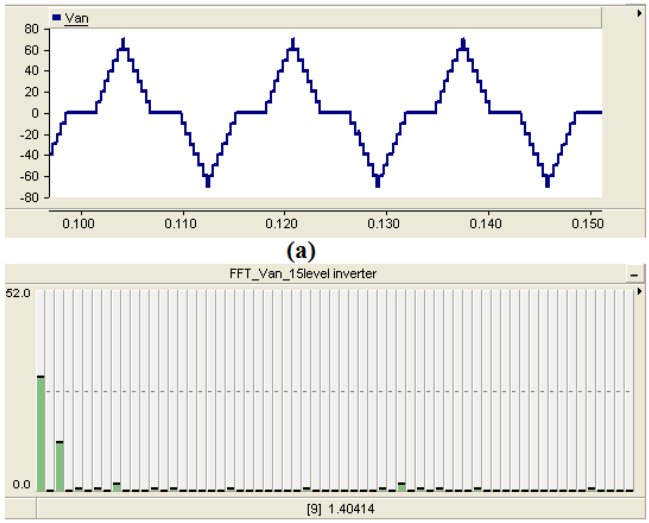
IX. SIMULATION RESULTS OF CASCADE MULTILEVEL INVERTER BY A DC SOURCE

Due to the mentioned description, the switching angles θ1, θ2 , θ3 , … and θ7 for a cascade 15-level inverter using an intelligent method and applying constrain or Eq. 3 for the minimum value of THD are following:

θ_1=38.321,
θ_2=42.3,
θ_3=51.5,
θ_4=59.172,
θ_5=69.21,
θ_6=79.72 and
θ_7=88.17

Waveforms of the phase voltage A and harmonic spectrum of cascade 15-level inverter have been illustrated in Fig.4.

Figure 4
Waveforms of output voltage (a) and harmonic spectrum of phase A of cascade 15-level inverter by a DC source (b)



Also, Waveforms of the output line voltage and harmonic spectrum of cascade 15-level inverter by a DC source have been presented in Fig.5. With respect to fig.6, amount of THD is 5.01% that by increasing the level of inverter lead to standard value(less than 4%).

Figure 5
The waveform of output voltage (a) and harmonic spectrum of cascade 15-level inverter by a DC source (b)

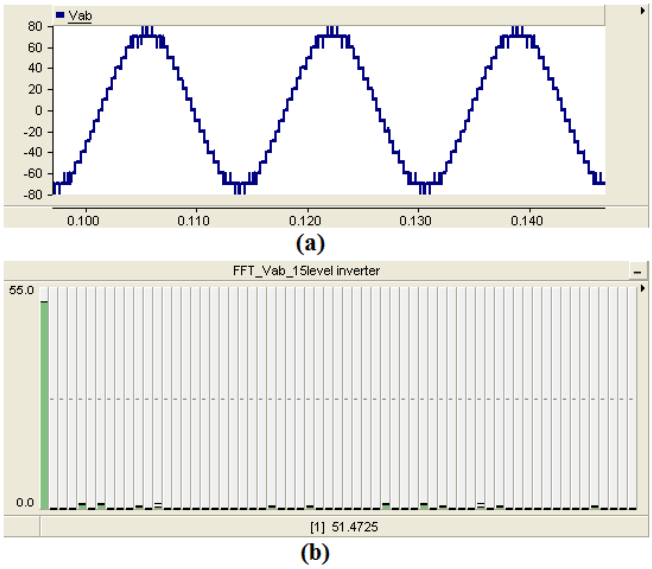
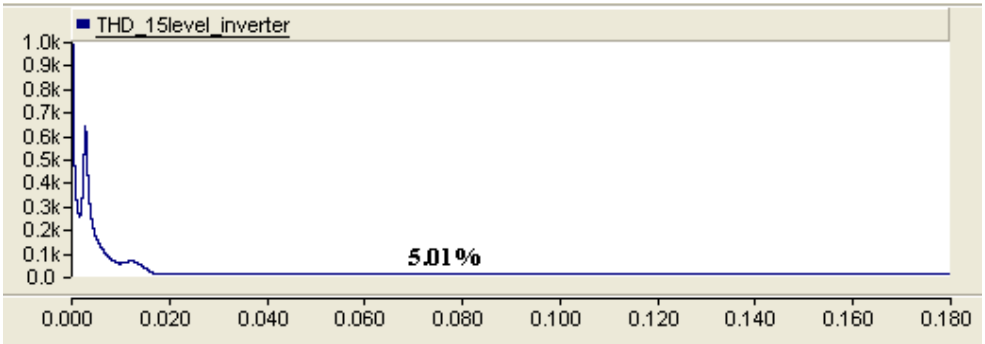


Figure 6
Output line voltage THD of cascade 15-level inverter by a DC source



CONCLUSION

This study is an initial step, which needs to be improved by future researches. Thus, authors can consider other variables to expand this study. In the current paper, a 15-level cascade multilevel inverter using a single Dc source was considered. Switching angles were obtained using a smart technique to remove the selected harmonics. Moreover, it leads to the simple design of the inverter output filters. The equations have been presented in several sections and simulations performed by PSCAD/EMTDC software.

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THE OIL AND PROTEIN CONTENT OF ISFAHAHN'S SAFFLOWER SEED IN DIFFERENT PERIODS OF IRRIGATION, LEVELS OF HUMIC ACID AND SUPERABSORBENT

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ABSTRACT

In this experiment, the main factor was three levels of irrigation (7 days, 11 days and 15 days), the sub factor was 2 levels of humic acid (zero, 300 and 600 kg per hectare) and sub-sub-factor was superabsorbent either using superabsorbent or not using it. Seed oil content, protein content, oil-cake protein and percentage of loss (of the kernel to the shell) were measured. Analysis of variance showed that the main effects and bilateral and trilateral interaction of test factors, namely irrigation * humic acid * superabsorbent, on safflower seeds oil content and protein were significant. The best combination to improve safflower seeds oil content (25.8%) was observed at the 7 days was associated with the consumption of 300kg per hectare humic acid and using superabsorbent. The best combination for improving the protein content (at 30/24%) was observed at the 15 days was associated with the consumption of 300kg per hectare humic acid and using super-absorbent. The highest percentage of zero safflower oil-cake protein belongs to the second level fertilizer, namely 300 kg per hectare humic acid under 15-days irrigation and the use of super-absorbent. The highest percentage of seed loss was observed at 15-days irrigation without humic acid and superabsorbent. While irrigating with a minimum interval of 7 days, taking humic acid 300 or 600 kg per hectare and the use of superabsorbent led to the lowest percentage of loss.

Keywords: *Oil and Protein, Safflower, Irrigation, humic acid, superabsorbent*

INTRODUCTION

Soil and water are two major natural sources for agriculture and business development in any country [1]. In Iran, about ten percent of needed oil is produced within the country and the rest is imported in the form of raw or ready. Thus, a large share of the currency used to import food into the country is related to the vegetable oil, seed and oil plant oil-cake used for animal consumption Hence, the need for long-term planning aimed at achieving self-sufficiency in the production of edible oils is undeniable. Inadequate access to water in arid and semi-arid regions, led to the raise of increase water use efficiency as a central pillar of sustainable agriculture in these areas. The water stress reduced quantitative and qualitative characteristics of plants on one hand, and, on the other hand due to the high price of water buying water for farmers has become a major problem [2]. Thus, in recent years efforts have been made to increase the efficiency of water use, in this way, increased irrigation interval and use of superabsorbent as two basic strategies for saving and efficient use of water have been considered [3]. It has been demonstrated in numerous studies that use of superabsorbent polymers in agriculture can reduce drought stress and mortality of plants and increase crop production [4-5]. A study of Hasanvandi et al [6] showed that safflower seed oil content among different cultivars under irrigated

conditions and different levels of superabsorbent polymers in two years averaged 24 to 32 percent and the protein content was between 14 and 20 percent depending on the interactions factors. Ashrafi et al [7] concluded that water stress along with decreased unfilled seed percentage can reduce seed oil and the increased protein content could be due to the effect of water stress on decreasing seed filling and increasing shell to kernel ration. Also, the problem may be due to seed weight loss caused by water stress. Unbalanced use of fertilizers has caused organic fertilizers have special importance in increasing production and maintaining fertility of the soil. In this regard researchers have focused on the application of humic substances. Qadimov et al [8] discussed about humic substances as natural technological products with miraculous biological effects on crops and concluded that a scientific and practical application of this technology in the world, especially for the developing countries. Humic acid facilitates the uptake of large and small elements increases protein synthesis and improves the quality of the product. Tests conducted by numerous researchers has shown that different levels of humic acid act as supplement and providing water and enough food, lead to improve product quality and quantity characteristics. In one experiment, it has been reported that the 14 days circuit irrigation with all levels of superabsorbent and with either using humic acid or not was better than 7-days Irrigation. Moreover, the application of humic acid exacerbated the effects of all superabsorbent levels and irrigating circuits [9]. Studies have shown that poor nutrition in safflower increases the percentage of unfilled seed; although the possibility of increasing the ratio of kernel to the shell (lower percentage of unfilled seed) is provided with improved plant nutrition [10].

MATERIALS AND METHODS

This experiment was conducted in crop year 1392 in the research field of Islamic Azad University of Ardebil, located at Km 5 North West Ardebil (region Hasan Baroogh). The location is 1350 m higher than sea level and its latitude and longitude are 48 degrees and 20 minutes east longitude and 38 degrees 15 minutes north latitude respectively. 9/310 mm average annual rainfall has been reported. The region's soil is clay loam with 2.8 – 8.7 pH.

Table 1
The experimental soil physicochemical analysis

Soil texture%			Soluble potash	Phosphorus	Total	Organic	Acidity	Electrical conductivity
Sand	Silt	Clay	mg/kg	mg/kg	nitrogen%	carbon%		ds/m
43	52	5	326.5	58.3	0.12	1.08	8.24	1.59

The experiment was designed in a split-split plot, a randomized complete block form with three replications, where the main factor was three levels of irrigation [7 (control), 11 and 15 days] and the sub-factor was humic acid (compound fertilizer on food containing humic acids, 25%, 15% nitrogen, 10% phosphorous and 15% potassium) in three levels (0, 300 and 600 kg per hectare) and the sub-sub-factor was colophony of two levels: use and not to use it. Each experimental unit was in 5 rows of 3 m length, with 50 cm row spacing and plant spacing was 5 cm. The amount of fertilizer for each plot was zero, 5/286 and 573 grams respectively, and the superabsorbent colophony consumption was 42 grams for each plot. The seeding rate of 28 grams per plot were considered. After planting the first stage of the irrigation carried out and the next irrigation based on experimental treatments had done every 7, 11 and 15 days. Humic acid and superabsorbent colophony fertilizer treatments were carried out based on planting project in different levels. After the completion of vegetative and reproductive growth, the samples were harvested (randomly 10 plants per plot), seeds were taken, and after defining the ratio of kernel to the shell, the oil content by using soxhlet were determined and then, Kjeldahl apparatus was used to determine protein oilcake (in oilseeds and edible oils reference lab). For determining the oil content, first 3 grams of milled sample weighted in filter paper. The filter paper was closed and placed in the thimble and the soxhlet was run using n-hexan as a solvent. After the the soxhlet extraction the solvent was removed

by distillation. The dried sample weight was taken by using the below mentioned formula.

To calculate the sample

Primary soxhelt beaker weight (V1) subtracted from secondary soxhelt beaker weight (V2) and divided by sample gram, then multiplied by 100% oil. (V2-V1) / (m gram sample) * 100 = the samples oil content % It should be noted that the soxhelt was at a temperature of 60-50°C. Determining the percentage of oilcake protein, 1 gram of sample with 8 grams of protein catalysts poured on filter paper and weighed. Protein catalysts consisted of: Sodium sulphate, copper sulfate and selenium dioxide. Then, filter paper was closed and placed into the protein flask (Kjeldahl flask) and 30 ml of concentrated sulfuric acid was added. After that, the flask was placed on heater and attached to a trap (water trap) – filled by 30% soda (30% sod: 30 grams soda with 70 ml water) – and left until the color of material turns into turquoise blue. After cooling it was titrated with the 50% soda until it become black. Then, the steam from titrated flask containing 50 ml 2% boric acid and methyl red indicator was collected. Resulted steam causes boric acid and methyl red to turn pale yellow. When the material inside the flask reached to 150 ml. then the flask containing 150 ml ammonia was titrated with Hcl 1.0 till it gain red colour. Amount of protein = (N * V * 14 * 100 * 6.25) / (1000 * m) m = sample in gram; N = normality of Hcl which is 1.0; and V = consumed Hcl volume. The protein content was determined using the formula given below: (percentage of oil – 1) * % of oilcake protein = % protein To determining the percentage of unfilled seed (kernel to the shell ratio) 5 grams of grain weighed, then proceeded to separate the kernel from the shell. Then kernel would be weighed and through the proportionality, the percentage would be determined (if in 5 grams it is equal to 2.2, then in 100 grams it would be 44%).

Statistical Analysis

After collecting, data were analyzed using SPSS software based on split-split plot design (split plots) in a randomized complete block design with three replications. Tukey method was used to compare mean and Excel software was used to draw diagrams.

RESULTS

SEED OIL PERCENTAGE

Based on analysis of variance data of safflower seed oil content it was found that the pilot's operating, namely irrigation with 1% probability level, humic acid at the level of five percent, and superabsorbent with 1% probability level had a significant impact on the property. Also, among mutual effects, the mutual effect of irrigating × humic acid with 1% probability level, both irrigating × Superabsorbent and humic acid × Superabsorbent with 5% probability level, showed to have statistically significant effect on qualitative traits of safflower seed oil content. Three way interaction factors, i.e. irrigating × Superabsorbent × Humic acid, is at 1% probability level (Table 2).

Table 2

Analysis of the seed oil percentage variance under test operating factors irrigating, humic acid and superabsorbent

S.O.V	Df	Mean of Square			
		Oil%	protein	oilcake	Unfilled seed
Rep	2	0.0007	3.018	2.694	1.802
Irrigating (a)	2	15.602*	65.604**	1.635ns	66.185**
error	4	0.788	4.417	3.213	12.336
Humic acid (b)	2	1.081*	12.267**	4.167*	22.882**
a × b	4	4.858**	11.550**	3.316ns	2.871ns
Error	12	0.258	0.317	0.679	3.917
Superabsorbent (c)	1	112.378**	67.335**	27.878**	31.74**
a × c	2	1.145*	37.644**	33.889**	3.611ns
b × c	2	1.129*	5.071	2.459ns	0.447ns
a × b × c	4	9.143**	57.199**	1.429ns	2.836ns
Error	18	3.407	1.795	1.233	3.475
C.V%		1.99	6.97	4.33	5.13

The comparison between trilateral interactions of irrigation × humic acid × SAP showed that among derived treatments, the best treatment combinations to improve safflower seed oil percentage is 7-days irrigation along with consumption of 300 kg per hectare of humic acid and the use of super absorbent, so the highest seed oil content (8.25 percent) was observed in this combination. Whereas, the treatment combination with irrigation 15 days with no use of humic acid and superabsorbent triggered the lowest seed oil (2.19 percent). It was found that with 7 days irrigation the percentage of oil in all compounds was higher than 20 percent, while watering in the 11 and 15 days, especially without using humic acid and superabsorbent, it reduced to less than 20% (Table 3). In the experiment it was observed that longer irrigation intervals, or water stress conditions, lead to a reduction in safflower seed oil. A significant reduction in safflower seed oil content as a result of different irrigation regimes, especially with the lack of water during the seed filling stage has been reported by several researchers[11-13]. Bouchereau et al [14] argued the reduction of oil content in water shortages due to disruption of metabolic processes of seed and to assimilate transfer. It was found that the use of superabsorbent colophony improves safflower seed oil content. Also, under the non-application of humic acid condition, the use of superabsorbent has a better effect on safflower seed oil content, and it could be a viable alternative to the humic acid. Hasanvandi et al [6] reported that the super absorbent polymer used in supplemental irrigation at flowering stage caused significant difference in the percentage of safflower seed oil. However, in the condition of no irrigation, use of superabsorbent didn't lead to significant changes in safflower seed oil content. Humic acid consumption to an average increased safflower seed oil content and higher level of that led to reduced oil content. Increasing oil content due to the consumption of humic acid shows the importance of this organic matter in the canola quality, although likely at higher levels of humic consumption the product quality will be reduced due to the higher quantity. This is due to the benefits of humic acid, such as chelating property of nutrients (sodium, potassium, magnesium, zinc, calcium, iron, copper, etc.) [15], preventing enzymes activity such as carboxypeptidase phosphatase, increase root enzyme activity and improving ATPase, improving nutrient uptake and ease of absorption of the main elements of macro and micronutrients (micro), and increasing hormone-like activities. Laboratory research has shown that humic acid and superabsorbent can also be supplements and thus providing water [5] and enough food to the plant, they can lead to significant product quality characteristics changes.

Table 3
A comparison of the tripartite effects average of test agents on oil content of safflower seed

Experimental factors			Traits average			
Irrigation (days)	Humic acid	superabsorbent	Seed oil content		Protein content	
7	zero	use	23.23	c	12.36	g
		No use	20.8	fg	21.5	bc
	300	use	25.76	a	15.87	ef
		No use	22.27	de	16.26	ef
	600	use	24.8	b	21.53	bc
		No use	20.33	ghi	15.23	f
11	zero	use	21.83	de	22.87	ab
		No use	19.30	j	14.86	f
	300	use	23.33	c	22.43	ab
		No use	19.73	hij	21.56	bc
	600	use	23.33	c	22.47	ab
		No use	21.56	ef	20.8	bc
15	zero	use	22.43	cde	21.43	bc
		No use	19.23	j	16.73	ef
	300	use	21.90	de	24.3	a
		No use	20.57	gh	18.16	de
	600	use	22.76	cd	20	cd
		No use	19.6	ij	18.03	de

Common letters in each column means no significant differences in the level of 5% is based on Tukey test.

Protein content

Analysis of data variance showed that the experimental factors effects, ie irrigation with 1% probability level, humic acid with 1% probability level, and superabsorbent with 1% probability level, on seed traits is significant. Also, statistically significant effects of irrigation × humic acid and irrigation ×superabsorbent, both at probability level of 1% on protein content was observed. Three-way interaction factors effects, i.e. irrigation interval × humic acid × SAP, on protein content at probability level of 1% is was significant (Table 2). The comparison of trilateral interaction average effects, irrigation × humic acid × SAP, showed that among compounds derived treatments, the best treatment combination to improve the protein content of seeds of safflower is 15 days watering along with 300 kg of humic acid per hectare and the use of super absorbent. Whereas treatment combination with irrigation 7 days in the absence of humic acid consumption and no use of superabsorbent leads to minimum protein content led (36.12 percent). It was found that in treatment composition related to irrigation 7 days with different levels of humic acid and superabsorbent, protein content is lower than 1 and 15 days of periodic irrigating in some treatment combinations (Table 3). In this experiment, under normal conditions, safflower seeds protein content was low, but higher irrigation intervals led to higher contents, while the opposite observed in the case of safflower seed oil content. In a study reported by Hasanvandi et al [6], it was observed that an increase in seed oil was accompanied by a reduction in protein, so that treatments with the highest and lowest oil yield, respectively, had the lowest and the highest protein content. Liu et al [16] reported that at the time of stress, to perform osmotic adjustment in plant, tension specific proteins were produced (higher protein content). Mirshekari et al [17] stated that maximum protein content of safflower were in treatments to stop irrigation at heading and flowering, respectively. Hasanvandi et al [6] concluded that drought stress reduced seed filling period and hence accumulation of protein occurs earlier than oil accumulation. As well as improved safflower seeds protein was observed using superabsorbent, which shows the positive impact of this material on the quality of safflower seeds. This effect was more evident in the case of longer irrigation intervals. Superabsorbent polymers can absorb large amounts of water and keep it in their structures and gradually as needed in drought conditions make it available to the plant [5-18]. In this experiment, although the use of humic acid increased safflower protein content compared to the control treatment, but decreased protein content in higher humic acid. It was found that the use or non-use of humic acid with 7-days irrigation has low impact on seed protein, but the moderate consumption of humic especially in the case of average 11-day irrigation leads to a high percentage of protein. The role of humic acid in soil-borne diseases control and health of soil improvement and nutrient uptake increase by plants, the availability of mineral elements, improving product quality and so on is well-known now [19]. Humic acid facilitates large and small elements, increases protein synthesis and improves the quality of the product. In general, the best combination of treatments to improve the protein content of seeds of safflower was 15 days irrigating along with 300 kg of humic acid per hectare and the use of superabsorbent.

Oil cake protein

According to the analysis of variance, among experimental factors, the effect of irrigation on the protein content of oilcake of safflower is not statistically significant but the fertilizer humic acid and superabsorbent material, at level five and one percent have significant effects on this trait. Among interaction of factors, only bilateral interaction of irrigation × superabsorbent has significant impact on oilcake protein. A comparison of the average effects of the main factors in the different levels of humic acid showed that the highest percentage of safflower oilcake protein belongs to the second level of fertilizer consumption with 300 kg per hectare of humic acid (95.25 percent), although statistically it has no significant difference with the highest level of humic acid fertilizer. Avoiding the use of humic acid (control), also shows the lowest oilcake protein (25.7 percent) (Table 4). It was found that the use of superabsorbent colophony compared with non-use of it, improves protein content of oilcake, as most (34.26 percent) and lowest (90.24%) protein content of oilcake obtained from the use and non-use of superabsorbent, respectively (Table 5).

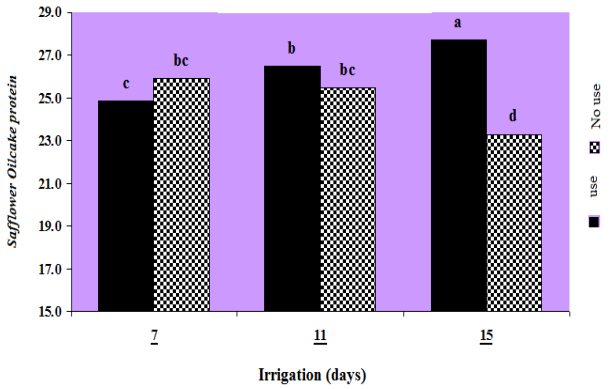
Table4
Comparison of the average effect of the main experimental factors on oilcake protein content

average	superabsorbent (colophony)	average	Humic levels (kg per hectare)	average	Irrigation (days)	Experimental factors
26.34a	use	25.07b	zero	25.39a	7	Safflower Oilcake protein
24.90b	No use	25.95a	300	25.96a	11	
-	-	25.84a	600	25.50a	15	
35.6b	No use	37.67a	zero	34.42b	7	The percentage of unfilled safflower
37.13a	No use	35.78b	300	36.43ab	11	
-	-	35.66b	600	38.25a	15	

Common letters in each column means no significant differences in the level of 5% is based on Tukey test.

A comparison of the average of interacting factors, irrigation × superabsorbent, showed that operating under irrigation with an interval of 15 days and it was found that the use of superabsorbent is the best combination of treatments to improve the protein content of the Oilcake safflower, as this combination treatment led to the highest percentage of Oilcake protein (24.9 percent). Not using in the same irrigation also showed the lowest percentage (23.1 percent) (Figure 1).

Figure 1
Comparison of irrigating × superabsorbent average effect on Oilcake Safflower protein content



The use of humic acid was compared with no use of it, led to increased protein content, although with higher amounts of fertilizer slight decrease in the amount of this trait was observable. Also, using superabsorbent caused significantly higher oilcake protein. It seems that the use of humic can have a positive effect on Oilcake protein, as plant's oilcake are to be used for livestock and poultry [20] attention to proper nutrition of oil seeds is necessary.

Unfilled seed percentage (kernel to shell ratio)

According to the analysis of data variance, among the factors, the effect of irrigation, humic acid and superabsorbent at the probability level of 1% on unfilled seed percentage is significant. However among interacting effects of factors none of the effects of bilateral or trilateral interactions did show statistically significant effect on this trait (Table 2). A comparison of the average effects of the main factors indicated that, 15 days irrigation has the most effect on seed density (25.38%), while 7 days irrigation leads to the lowest percentage of unfilled seed (Table 4). he The use of superabsorbent colophony compared to not using it significantly reduced the safflower unfilled seed percentage as most (13.37 percent) and lowest (60.35%) in the percentage of unfilled seed respectively belongs to

non-use and the use of superabsorbent (Table 4). It was found that creating condition of water shortage with 15 days irrigation, increases the percentage of unfilled safflower seeds, while the opposite percentage occurs under normal condition. The amount of unfilled seed percentage with the use of humic acid fertilizer decreased in comparison with control, causing the kernel to shell ratio increase. The use of superabsorbent colophony also has positive effects on the kernel to shell ratio. In experiment carried out by Ashrafi et al [7] they noted that increasing the protein content could be the result of water shortage. It has been reported by the researchers that water shortages during flowering and pollination, due to its effects on reproductive organs increases the number of unfilled seeds in a sunflower plant. Unfilled seed percentage is a trait that depends on genetic factors and environmental factors such as fertile land, irrigating in a timely manner, the air temperatureat the time of pollination, relative humidity, wind and insect population. However, researchers have noted the positive and significant impact of the use of organic fertilizers on reducing unfilled seed percentage in the oilseed crop.

CONCLUSION

Safflower seed oil content could significantly be affected by experimental factors – irrigation, humic acid and superabsorbent. It can be concluded that the possibility of improved seed oil content could be provided with low irrigation, modest amount of humic acid use, with colophony superabsorbent consumption. It seems that safflower protein content reaches its maximum, when the amount of oil is the opposite because in this test the conditions of water scarcity led to highest value of this trait, although the use of moderate amount of humic acid and the superabsorbent had positive effect on the percentage of safflower seed protein.

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THE THEORY OF ACTUAL AUTHORITY IN UNIDROIT PRINCIPLES AND IRAN'S LAW

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ABSTRACT

A person can act as an agent on behalf of another only when he or she has been legally given the right and authority to do so. Authority delegation from one to an agent has different cases and one of which is actual authority. Among the main issues dealt with in this research are how such authority is realized, the fundamentals, forms and effects of this authority in the legal system of the principles of International Commercial Contracts as an important international document which is in a position to unify the private laws of the member countries with Iranian civil Law, which is an integration of Islamic Law and French Law. Such a study can elucidate the commonalities and differences of the two systems and can introduce the common rules to the legal community as strength and the differences as a legal gap or vacuum and will suggest the main strategies to the domestic legislator in order to coordinate it with the international document.

Keywords: *Agency, Actual Authority, Principles of International Commercial Contracts, Iran's Law*

INTRODUCTION

With the development of trade and commercial exchanges, especially in the field of international commerce, the need to accelerate doing such affairs was felt more than before. The specialization of affairs added to its urgency also. Such issues were followed by special challenges and problems so that individuals have not been able to overcome these consequences by themselves. It was here that the agency institution was found important and valuable, and businessmen and businesses found their way of overcoming and coping with the problems in their tendency to delegate or grant authority to others in the form of agency institution. One of the most important types of authorization is granting actual authority. The fundamentals and conditions of which is different in different legal systems. However, the internal relationship between the principal and agent is granting proxy or authority to the agent, in the sense that the principal regards what the agent does in ratification of a contract with a third party as his or her own action and gives the agent the authority to do so on his or her behalf. Therefore, an agent is a middlemen whose actions go to the principal and whose commitments are imposed on the principal, and the profits and interests gained by his actions go to the principal as well [1]. The authority assigned by a principal to an agent to do the legal acts is referred to as actual authority, which is in contrast with apparent authority. This authority can be explicit or implicit. An authority can be called actual only when it has entered the agency contract and there has arisen a relation between the principal's consent and the agent's acceptance of the authority [2]. Therefore, actual authority is indeed the internal relationship of the agency theory that has found the legal nature before the application of agency between a principal and an agent. This article investigates this type of authority in an international document called UNIDROIT Principles, which has mainly been derived from Common Law on the one hand and

Iran's Law as a national law related with Islamic rules and standards on the other.

1). The position of UNIDROIT Principles

UNIDROIT Principles have explicitly accepted agency as granting actual authority to an agent. Delegation of actual authority can be explicit or implicit according to the rules of UNIDROIT Principles. According to Act 1 of Article 2-2-2 of UNIDROIT Principles, granting authority from a principal to an agent may occur explicitly or implicitly. When this is done, the agent will have the authority to use the authority that he has been granted and delegated by the principal with regard to the conditions and circumstances [3] . Apart from this, the agent will also have the authority to do all the actions related to the subject that he or she has been delegated the authority by the principal to perform. This type of authority may be granted explicitly or implicitly. Concerning the explicit authority, it is the case that applying agency also includes all cases that are needed for doing the subject, although not explicitly mentioned.

1-1). The exceptional cases of the principles' lack of influence by English Law

In English Law, a rule similar to UNIDROIT Principles cannot include implicit actual authority. In this country's law, the agent's authority is limited to explicit authorization, which is possible in three cases: First, selecting an agent has been done under a certain condition or for doing a certain task or function. , These conditions or circumstances indicate his or her certain authority or method in granting agency and this implicit authority is verifiable if the agent does the affairs or acts according to them. In English Law, the explicit authority is not analyzed out of a certain condition or method; rather the framework of the agent's authority is explicitly determined and the agent has implicit authority within that limit [4] . Second, in some cases, an agent's implicit authority can be extended to all cases of the subject, in which case the legal agent will be ableto do all business deals and actions related to a certain profession according to the business customs [5] . Third, in cases similar to Act 2, an agent will have the authority and freedom of action generally and for the future. This authority is interpreted based on the general principles and rules in such a way that the implicit authority is placed within the scope of explicit authority [6]. Therefore, unlike UNIDROIT Principles and Principles of European Contract Law, the framework of agency which is based on implicit authority is actually based on explicit authority that has been delegated to the agent and this implicit authority cannot be inferred based on the necessities of the conditions and circumstances of applying agency. Therefore, according to English Law, an agent can rely on implicit authority when such authority can be explained and justified based on explicit authority. For example, a person has the authority to sell a property to another. This agent has the right to sign the deed of sale. Article 40 of English Property Law adopted in 1925 also shows this point. In addition, it is also assumed that, based on Article 2 of that law, this agent has the right to write down the contract and sell the property to another. Thus, if this agent is the agent of a property agency, the agency which has had the authority to find customers for the principal will be able to do the various actions within the scope of the explicit authority granted to it, without the need for the cases to be explicitly mentioned. The property agency will be authorized to negotiate with the third party regarding the property's buy and sell, although if he has not been given the authority to receive the price. The agency can also sign the business documents associated with that property, although he has not been given the litigation right [3] . Stating this problem and comparing the position of the principles with English Law, it is observed that there is a fundamental difference in that the principles which shows a wide scope to implicit authority. Now, a question that arises here is on what basis this international document has such a deep understanding of implicit authority. It is a rule that implicit authority that can be inferred from explicit words is valid only when the principal has given the explicit authority to the agent, rather than when the agent has been given some implicit authority outside this limit and based on the conditions and circumstances [8] , because in this case, the issue of applying agency becomes too wide. Thus, it seems that such a wide implication from the regulations of the principles is not proper and legal. As a result, determining the limits of the agent's authorized actions whether in explicit or implicit authority depends on the proper interpretation and a reasonable understanding of the scope of actual authority granted by the principal to the agent. In other words, based on the nature of the specified authority, to what extent will an agent be implicitly authorized to do an action? In fact, the criterion that determines implicit authority

is nothing but explicit authority. This understanding and analysis of English Law has made all aspects of implicit authority merely a reflection of an actual interpretation or understanding of the granted authority. It seems that UNIDROIT Principles has used the commonly accepted criteria for determining implicit authority.

1-2). The Principle of Freedom of Contract

Referring to the internal contract between a principal and an agent with the criterion of considering the inner intention of the parties and accepting the Principle of Freedom of Contract as a rule superior to other regulations, this principle has considered such a wide scope for applying agency. According to Article 101 of UNIDROIT Principles under the title the Principle of Freedom of Contract, the parties are free to conclude a contract and determine its content. Furthermore, Article 105 of UNIDROIT Principles under the title Excluding or Reforming by the Parties says that the parties can exclude the application of the principles or avoid the effects of each one of their regulations or change the effects. Therefore, according to these two articles, UNIDROIT Principles explicitly accept the principle of freedom of contract, which is the base and foundation of acceptance of the inward will, and thanks to this, the agent will be able to perform all actions that are needed for agency based on the conditions and circumstances [9] . The Principles of European Contract Law, which is the closest international document to UNIDROIT Principles has a similar position in Article 102-1 under the title "The Principle of Freedom of Contract", saying that the two parties are free in concluding contracts and determining their contents by considering the principle of good faith and fair dealing and the mandatory rules created by these principles and they can exclude the applicability of each one of the regulations or violate them or change their effects, except for the cases otherwise predicted by these principles [10] .

1-3). Business customs and practices

Besides acceptance of inner will and the principle of freedom of contract as a foundation for the development of implicit authority in UNIDROIT Principles, there is a series of rules and principles that arise from the contractual relations between the parties such as commercial customs and practices. According to Article 9-1 of Principles under the title Commercial Customs and Practices, the parties are required to observe any commercial customs that they have agreed upon and any commercial practices that they have established between themselves. The parties are also required to observe commercial customs accepted in international trade and they should regularly observe the particular trade between them, unless in cases where the application of such customs is uncommon and unacceptable. Principle 9 of United Nation's Convention on International Trade Law about the contracts of international sale of goods Vienna 1980 has a position similar to UNIDROIT Principles [11] . International commercial customs refer to that type of accepted principles and rules that are forcible in the international world of business. If the commercial place of the parties of a contract is in different countries, the customary rules and practices should be accepted in the both countries [12] . Commercial practices also refer to a state formed in accordance with the past performance of the parties to a contract in a certain transaction or in a commercial field or career between the parties, with the difference that the parties should have agreement on the commercial customs between themselves according to Act 1 of Article 9-1 of UNIDROIT Principles. However, in case of commercial practices, there is no need for agreement between the parties, although a long established practice between the parties can be regarded as an instance of agreed practices. As a result, the main difference between commercial customs and commercial practices in international trade is the creation of commercial practices is based on the parties' contractual history, but commercial customs includes a series of accepted principles and rules that are not specific to a certain transaction between the parties [13] . The principles of European Contract Law also has a similar position to UNIDROIT Principles. Some believe that the application of these two general rules which are accepted by the principles of European Contract Law, UNIDROIT Principles and United Nation Convention of Contracts have the same efficiency in determining the content and scope of implicit authority as does the English Law [15] . This opinion is held by groups who believe that determining implicit authority in UNIDROIT Principles is redundant and unnecessary. However, the opposite view is that these two rules involve the complete development of implicit authority without their being limited to the rules of international trade or the basic conditions of the principles of contracts [16] .

2) Iran's Law

2-1) Types of Actual Authentication

Basically, actual authority is granted explicitly. Although the type of authority has not been explicitly mentioned in Iran's Law. There is a commonly-accepted rule saying that mutual consent can be explicit or implicit. In other words, the agent's acceptance or the principal's consent can be implicit. It may even be possible in some cases that there is no principal's consent, but the effects of the agent's interventions may imply the principal's consent [17]. We will deal with this subject in details in discussion of apparent authority and unauthorized actions.

2-1-1). Explicit authority

Explicit authority refers to that type of authority that a principal grants to an agent via a contract of agency. Besides, the principal can authorize the agent orally to apply agency. Authorization can also occur based on the verdicts of the board of directors of companies, institutes and banks [18] . For instance, all the powers of attorney written in bureaus of official documents are instances of explicit authorization, or the authority that is delegated by the companies or institutes' board of directors to the executive manager based on the statute is an instance of explicit authorization. For example, Act C. under Article 36 of the Statute of Iran's National Oil Company ratified in 1977 says: the "The reception and payment of funds and opening monetary or foreign accounts in domestic and foreign banks in the above cases will be possible if signed by the chairman of the board of directors or by the executive manager and one member of the board of directors". The chairman of the board of directors and the executive manager can select and introduce one or more members of the board of directors for this purpose. The chairman of the board of directors and the executive manager and the selected member can assign their right of signature to the company's staff with their own responsibility [19] . Assigning the signature right to another is an instance of explicit authorization.

2-1-2). Implicit authority

An agent's consent to authorization as well as authorization can be implicit. According to Article 273 of Egyptian Civil Law, acceptance of an agent can be implicit". When agency is related to the agent's task or the agent introduces himself or herself for such a task, the acceptance of the agent is implicit here, provided that the agent's agency is not rejected in the contract's meeting [20]. This type of implicit consent to authorization has contractual instances as well, such as the affairs that the house servants or maids do for the house owners, or the shopping that a housewife does for her husband's house, and also when one of the partners of a Mosha (collective ownership) property handles the property without the other partners' objecting to this [21-22] . These interpretations show that consent to authorization can be implicit, whereas consent to agency is explicit in cases other than these cases. Implicit authority is when the principal's intention for granting authority to the agent can be inferred from the principal's behavior from other conditions and circumstances [23] . According to Article 671 of Iran's Civil Law, "agency in any affairs requires agency in its requirements and premises, unless it has been explicitly asserted otherwise". According to this article, as explicit authority cannot completely cover all aspects and sides of agency and some peripherals are indeed ignored or there is no need to mention them, the agent is authorized to act based on that granted authority. Such actions that are needed for achievement of the considered goals can be done by the agent based on rules such as "consent in a thing is consent in its requirements" in order to be able to achieve the goal considered by the principal. In analysis of implicit authority, it should be mentioned that when an agent concludes a contract based on the authority granted to him or her. It may in some cases involve doing things which the principal has not already explicitly delegated to him or her. These actions are accounted for by the agency theory, because the application of agency will basically be impossible without considering those cases. Therefore, the agency theory is a criterion for determining the limits of the agent's implicit authority. In Butwick vs. Grant in 1924, the court said that there is no explicit article or rule according to which an agent who is authorized to sell goods also has authority to receive funds. In this case, the principal had determined an agent to sell several items of clothing. The purchaser also paid the price to the agent, but the agent did not deliver the fund to the principal. The principal also made a petition against the purchaser for reception of the price. The court of King's Bench said that the petition can be sued, because according to the existing evidence, the agent has had no authority to receive the price of the goods [25] The judge's reasoning was based on the verdict that Judge Lush had previously issued in the case of Drakeford vs. Piercy, in which the judge had said: "It is unacceptable and nonsense to think that an agent's

having authority for sale necessarily involves his or her having ability to receive the price of the transaction as well". It is quite obvious that the judges in these cases have considered one's lack of agency and dominance over the other [26]. According to Article 34 of Civil Procedure Law 2000, attorney may be the result of official or non-official documents. Therefore, persons can write the agency documents in official or non-official form. Therefore, basically, agency is not influenced by the consent or authority's being official or normal. Authorization can be in written form including official and normal forms, as it can be in spoken form as well. In all of these forms, agency application will have its effect and can create legal relations between the parties. This is a general rule over which there is no doubt and controversy. However, the question that arises here is whether the agency document can be in normal form when it must be in official form by law.

2-2-2). Documents that are effective in proving contracts

According to Articles 46 and 47 of the Documents and Property Registry Law, it is mandatory to register the following documents:

1. All contracts and transactions regarding the properties or their interests which have previously been registered in property bureau.
2. All legal transactions that have previously been registered in property bureau.
3. In places where the Documents and Property Registry Bureau exists and the Ministry of Justice determines, all of the contracts and transactions concerning immovable properties which have not been registered in Property Bureau, and also peace pact's, testaments and applications.

It is important that the contents of this type of contracts must be registered in a certain form in Official Documents Offices. Therefore, using a normal document, one cannot register these transactions in the court, as indicated by Article 48 of this law. In other words, the contract is correct without observing Articles 46 and 47, but it is not proved with a normal document [27] . Thus, in cases where the formalities have the only effect of proving documents, there seems to be no need to write down the agency document officially. The only effect of writing the agency document officially is the document's proving power. According to Article 1930 of Civil Law, a petition that is contrary to the contents of official documents cannot be proved by witnesses' testimony. If the agency document is an official document, any claim contrary to the contents of that document cannot be proved by witnesses' testimony, whereas it can if the document is a normal agency document. Consequently, in cases where how to write the document is not one of the conditions of concluding contracts, there is no doubt and controversy about the applicability of agency. However, if the law has predicted some conditions about how to write the will, lack of observing the formalities will make the will inaccurate so that the heirs can make a petition before the court to prove or reject its accuracy. The agency document is no exception to this rule. However, the main issue is where formality is an essential component of the contract.

2-2-3) Documents that are effective in concluding contracts

In some contracts, the official writing of a contract seems not to be the condition of forcibility and effect of that contract, and violation of it will make the contract ineffective. This type of contracts is referred to as formal contracts [28] . Although formal contracts do not exist in Iran, the issuance of promissory notes, cheques and bills is possible by observing some formalities, without which the document will become invalid [29] . Some instances of this include the insurance contract, transfer of the partner's share of some commercial companies, the establishment of joint-stock companies and transfer of their stock. In the above cases, formalities is a necessary condition for the contracts' accuracy. It seems that the nature and conditions of these contracts is such that formalities is one of the necessary conditions of them. In other words, these contracts' formality is inherent rather than acquisitive [30] . If the agency document lacks those conditions, it will not affect the contracts. How the agency document is does not affect the contracts. The application of agency cannot be said to be a preface for realization of the contracts, because basically there is no relation between agency and those contracts. How can we prove the accuracy and formation of such contracts when they are done by an agent [31] ? It is not conceivable for a contract to need some formalities in one state and not to need than in another state, unless the legislator has predicted a condition for one type of contract. Therefore, one cannot rely to the judicial

rule saying that the preface of an obligation is obligatory.

2-2-4) The condition of writing a document in registered properties

According to Article 22 of the Registry Law, as soon as a property is registered in Property Office, the government will regard as the owner the one who has been registered as the owner or the one to whom the property has been transferred and his name has been registered as the owner of the property, or one who has inherited the property from its official owner. There are two main perspectives among lawyers and even in judgmental procedure regarding this article. Some believe in observing and maintaining public order and preventing disorder and believe that sales should be along with the formalities of documents [32] . Another group resort to the principle of consent in sale contract, rejecting the writing of official documents as the pre-condition for accuracy of contracts and for the transfer of ownership, but regard it as one of the ways to prove the realization of sales. We do not seek in this paper to prove these theories. If we believe in the second theory, there will remain no doubt that the transfer of property can even be done via a usual or non-formal document. However, the issue is more complicated with the acceptance of the first theory, as the contract should be registered formally, otherwise the property would not be transferred. Now, how can we accept such transfer via a normal or non-official document? Does such an agency have the authority for such a transfer? To answer this question, it should be said that this condition is completely different from a normal document to an official one. For example, if a contract is based on a normal document but the transfer is based on an official document, the priority is with the official document if there is a contradiction between the content of the official document and that of the normal document [34] , because the two documents have the same subject about ownership transfer. However, in the agency issue, the subject of agency application document is "authorization" and the subject of official document is "registered transfer". Therefore, such a contradiction cannot basically be realized so that one can accept this reasoning based on it. On the other hand, the condition of writing the official document considered by the legislator has merely been provided for transfer of the registered property and due to the lack of legal texts about the agents' having power of agency, we cannot regard the agency contract as an official contract. If an agent concludes such a contract with a normal document of agency, the document will have its legal effects and the juristic rules cannot be applied in these cases, because these rules are applicable when there is a relation between the premise and conclusion. These relations are: complete cause, contingency, cause, lack of barrier and resurrection. However, there will not definitely be such a relation between agency application and transfer of the registered property or any other contract. Therefore, in transfer of such properties via agency, the agency document does not have to be official, and being normal and creates no problem for the transfer. However, application of agency will have its effects, i.e. creation of a legal relation between the parties. That it has been mentioned in some registered circulars and judicial decisions [35-36] that if the agency document is an official document, the agent should also be dismissed officially cannot be extended to other cases, because there is no condition of subject unity here. Although bureaus and organizations refuse the normal documents of agency and such a state is not conceivable in practice, if such a state comes into being, we should accept the effects of applying agency. For instance, if a person introduces himself or herself to a bureau of official documents as the owner of a property and the bureau does not do the authentication process correctly and does the transfer, and the real owner validates it later, the agency theory is in effect here. This means that the unauthorized person is regarded as the agent. It is observed that the unauthorized person has no agency document, but this creates no problem for the application of agency on his or her behalf. Thus, such a state does not seem unlikely.

CONCLUSION

This comparative study shows that agency relation in international documents and the civil law of countries is based on actual authority with certain conditions and effects in each legal system. In the two legal systems of Iran and the principles of international contracts of business, creation of the agency relation based on actual authority has explicitly been accepted. This type of authorization can be either explicit or implicit in the two legal systems, but the conditions and standards of realization and acceptance of implicit authority are different in the two systems under study.

In UNIDROIT Principles, the general rule is that based on the conditions and circumstances, an agent has all the authority needed for doing agency, although the authority has not been explicitly mentioned in the agency contract. The reason for this is the absolute acceptance of the principle of individual freedom and focus on the general customs and practices of business. However, the implicit authority in Iran's law is not so wide; rather the actual authority of implicit type in this country's law is justified based on rules such as "the premise of an obligation is obligatory", and "consent in a thing is consent in the requirements of that thing", which cannot go beyond the limits of explicit authority. In UNIDROIT Principles, due to the absolute acceptance of the principle of consent in contracts, the form of granting actual authority is not relevant in agency. In these principles, authority can be granted orally or in writing can even be authenticated in cases from the principal's behavior, because it does not refer to special procedures. However, in Iran's Law, although the principle of consent in contracts has been accepted by the legislator, this principle is not absolute and has been given some exceptions. In order to maintain public order and observe the rights of the third party, the legislator has considered some conditions besides the acceptance of the parties, which affects the form of granting authority, although based on the principles of will and consent in contracts it can be said that the necessity of observing the procedures and formalities in the external relation of agency has no influence on the internal relation of agency or authorization, and this legal relation is indeed supported by the above principle and can be realized in any form with the agent's authority and consent.

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REDESIGNING ORGANIZATIONAL STRUCTURE BY CONTINUOUS IMPROVEMENT OF EFFICIENCY APPROACH (CASE STUDY: A SUPPLIER COMPANY OF DENTAL EQUIPMENT)

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ABSTRACT

One of the most important needs of every organization is having the potentiality of response to competitive situations, increasingly environmental change, and improving the efficiency of the organization in all levels. By having a descriptive-analytical methodology and a practical approach, the present research studies the relationship between organizational structure of Dorsun Teb Pars Company and the efficiency of the organization. , and it It provides an appropriate structure in order to overcome the shortcomings. To achieve this goal, three hypotheses have been made. The independent variables of hypotheses include three aspects of organizational structure, i.e. complexity, formality, and centralization, and the dependent variable is efficiency. The study of the relationship between variables was done in the level of personnel and the results showed that improving the efficiency of organization requires the restructuring in a flexible and dynamic way and according to the organizational mission.

Keywords: *Organizational Structure, Efficiency, Complexity, Formality, Centralization*

INTRODUCTION

Manager is a real person, and management is all activities done by the manager to navigate his or her complex. So, manager, management, and the complex are three main and interconnected items. The complex, whatever the size and activity, is considered as an organization. Organization is a targeted social institution with clear programs which does specific activities due to have an informed structure and defined boundaries [1]. Stable efficiency, change, innovation, and quality are among general goals which the manager like to have in an organization. The most important needs of every organization is having the potentiality of response to competitive situations, increasingly environmental change, and improving the efficiency of the organization in all levels. Efficiency improvement creates enormous synergistic force which supports the programs of growth, development, and creating opportunities of organizational promotion. Peter Drucker has defined "efficiency" and "effectiveness" as follows: "Efficiency means doing activities in a good and appropriate way, and effectiveness means doing good and appropriate activities" [2]. Achieving efficiency in an organization requires an approach of change. Findings and experiences in theoretical sciences make organizations to adapt with changes happening and move forward accordingly. On the other word, the main principle in the organization is having flexibility with the aim of preventing undesirable changes, and facing with conditions, happenings, and implementation of programs which the situations of time and place motivate. Change and movement are obvious principles which do not need any reason, since you a person cannot find anything in nature which is immune to change and

stable [3]. General appearance of change includes explaining the desirable situation, identifying present situation, determining general direction of strategies, determining the appropriate situation, and the manner of transition of organization from existing situation to the desired situation. One of the issues of change in management is changing the structure of organization, i.e. organizational structure of the framework of governing relations on jobs, systems, people and groups which try to reach the goal [4]. By organizational structure, operation and activities inside organization are managed and responsibilities and authority limit are determined. The structure of organization is manifestation of strategic thought. Since the strategies of organization explain the structure of that organization. , There must be always a balance between the strategies of organization and its structure, and on the other hand, the efficiency of organization is one of the effective factors in organizational structure. Dorsun Teb Pars Company is one of the biggest importer companies of dental equipment. It is an exclusive representative of Dentium Company, was founded in Iran in 2004 by a group of professors and faculty members of dentistry department with the aim of fulfilling the needs of country in the section of dentistry services. By having 160 personnel and active agencies throughout the country, this company provides the main part of internal need to material and equipment in the health services area in dentistry. The variety of health services activities in dentistry and also widespread changes of science and technologies in dentistry and consequently in health services have provided various opportunities to develop the activities of Dorsun Teb Pars Company. By identifying these opportunities, the quality of resources and effectiveness of activities, and finally, continuous improvement of efficiency of the company are leveled up. Regarding the necessity of restructuring of organization in a reaction to changes of circumstances, the aim of the research is studying the relationship between the aspects of organizational structure with organization efficiency, and providing an appropriate structure in order to eliminate shortcomings, coordinate between different departments of organization, and finally, improve the efficiency. In this research, structural and content variable, goals, and mission of organization was studied.

2.Organizational structure

The structure of organization is a way by which organizational activities are divided, organized, and coordinated [2]. Moreover, by this structure, the process of delegation of authority, responsibility of monitoring regulations, and standards are specified for activities and their administrators [5]. In other definition, organizational structure includes a model of interactions between sections and components of an organization. Organizations consciously create some sections and units as parasystems in the main system, and they also make some specific communication and interchange model between these parasystems. The distinction between sections and their models of communication is called the structure of the organization [6]. A relatively simple and tangible concept of structure is summarized as an organizational diagram and it is a representation of the reality of organizational structure. The aspects of the structure of organization are classified into two structural and content groups. Organizational aspects introduce internal characteristics of an organization, and organizations can be compared by them. Content aspects show the position of organization and influence the organizational aspects.

2.1. Organizational aspects

These aspects indicate internal characteristics of an organization, and a basis can be extracted of them by which the type of organization is determined and the organizations are compared. Three components used to create organizational structure include complexity, formality, and centralization that are incorporated and the result is organizational structure [1]. Each of them is explained here:

- Complexity: It is a degree of people specialization based on occupational specialty in organization, and the number of places in which the activity is done there It also include the number of occupations, and the number of hierarchies that do the tasks.
- Formality: It means the rate of which the organizational occupations are standardized, or in other words, an extent to which an organization depends on regulations and procedures to direct personnel's behavior.
- Centralization: It is about the rate of flexibility in decision-making and evaluating of activities in a centralized form [7] and the degree of concentration of decisions in one point of

organization [8]. Concentration is related to the distribution of authority in organization, and it determines who has the authority of deciding.

2.2. Content aspects

Content aspects are introducer of the whole organization and they show the organization or environment in which the structural aspects exist. These aspects, not only affect the structural aspects (complexity, formality, and centralization) but also get affected, too. The important content aspects of organizational structure are:

- Size: Size is the magnitude of an organization that is determined by the number of personnel.
- Strategy: Strategy can be defined as the process of determining long-term fundamental objectives, determining methodology, and allocating required sources to achieve these objectives [1]. Strategy means activities that organization designs for responding to or predicting the changes of external environment [9].
- Environment: Environment is factors inside or outside of the organization that influence on the effectiveness of everyday operations and the performance of organization, and the organization have a little or no control over them.
- Technology: It is knowledge, machineries, procedures, and raw material that change data to outputs [10].
- Culture: People working in organizations form the organizational environment. The environment defines the kind, manner of selection and implementation of strategies, regulations, and methods in an organization, and so, it is indirectly an important and effective force in the formation of the culture of organization [11].

3. Efficiency

Efficiency can be defined in many ways. Efficiency is doing things right [12], or the amount of resources which is consumed to produce a product and it can be calculated based on the ratio of consumption to product. Efficiency means understanding how to do an activity and how to do it well; and this happens when for each unit of input, more valuable outputs are produced [13]. It is is a ratio that compares some functional aspects of an activity with the costs spent for doing that activity [14]. Efficiency shows the product of the system of organization; a product whose consumption resources are human resources, capital, and other financial resources which are used to produce output. Some definitions are somehow general, and they have not introduced a measurable criterion practically; but what is definite is that managers can evaluate the efficiency of organization and staffs only when they can be sure about the rate and accuracy of obtaining the objectives. Some researchers have investigated different aspects of the structure of organization and the quality of the proceeds of organization within the last years. However, a few researchers have studied the effect of the role of the aspects of the organization structure on the organization efficiency. The research of Hadi Zade Moghaddam et al. (2010) can be mentioned in this regard. By studying the relationship of learning organization and complexity theory regarding quantum views, they found out that complexity is an indispensable quality of an organization, and the increase of complexity in the organization leads to managers' change of thought and the mental model and improvement of learning capacity in the organization, and propels it to a desirable change and efficiency. Different organizations experience different levels of changes and pressures, therefore, they use different combinations of methods and tools to face with them. While studying the role of internal factors in explaining a model for changing the present organizations to active organizations, Jafar Nejad and Zarei (2010) have found out that the necessity of decreasing formality in the organization, i.e. delegating more authorities to staffs, and providing an opportunity to find and apply better methods, and upgrading the level of interactions inside organization, is a requirement for organizational agility. So, decreasing centralization and formality in the structure helps the agility and efficiency of the organization.

4. Organizing and restructuring the organization

Organization includes general division of duties, determining responsibilities, authorities, and relationships [15]. Organizing is a three-stage process including designing and classifying activities in organizational positions and making connections between positions to obtain a shared goal. Redesigning the organization means a set of managerial activities that are done to make change in technologies, processes, and organizational structure. The aim of such implementation is organizational effectiveness, problem solving, and the ability of adaptation to a changing environment.

Lately, a growing tendency for different activities that may affect the process of organizational redesigning is appeared. These tendencies have been shown in metaphors like layer scavenging, reengineering, and redesigning. Managers and the members of organization try to detect the environmental and organizational factors that are effective in redesigning activities. Now, the question is that how can the Dorsun Teb Pars Company, as one of the biggest importers of dental equipment and the exclusive importer of Dentium in Iran, have a dynamic interaction with other social systems? Dynamic interaction means that this company, with regard to the environmental changes, could change so that no disorders happen in the function and efficiency of the organization. This change requires a deep understanding of the operation and governing atmosphere of the organization. This research aims to answer following questions: If the organizational structure plays role in improving the efficiency of the organization? If the present organizational structure of Dorsun Teb Pars Company has led to any improvements? And finally, what are the factors of an appropriate organizational structure for Dorsun Teb Pars Company which cause efficiency improvement in this organization?

5. Research hypotheses

Three hypotheses are studied in this research:

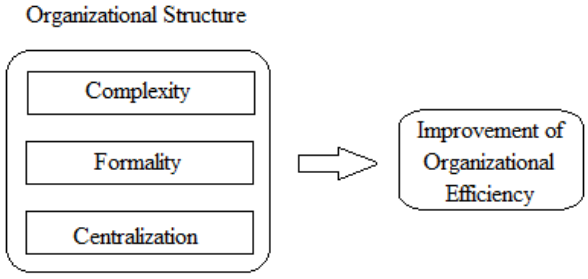
First hypothesis: There is a significant relationship between the complexity of the present organizational structure in Dorsun Teb Pars Company and improvement of organizational efficiency.

Second hypothesis: There is a significant relationship between the formality of the present organizational structure in Dorsun Teb Pars Company and improvement of organizational efficiency.

Third hypothesis: There is a significant relationship between the centralization of the present organizational structure in Dorsun Teb Pars Company and improvement of organizational efficiency.

Regarding the classification of the aspects of organizational structure, following conceptual model (Figure 1) is used to study the effect of organizational structure on the improvement of organizational efficiency in this research.

Figure 1
Conceptual model of the research



6. Methodology

This research is methodologically descriptive-analytical type, and in terms of objective, it is practical. Moreover, since it studies the present situation of the organization by questionnaire and without any manipulations, it is a library research and survey regarding data gathering. The statistical population of the research is all people working in Dorsun Teb Pars Company formally and contractually. have positions in the levels of staffs, experts, middle managers, and general managers. Those who who are working as part-time or far from the company were not included in this study. With respect to the statistics of human resources in the organization while gathering the data, statistical population estimated as 110 people. Sampling in statistical population was done in four levels of general managers, middle managers, experts, and staffs by using Cochran's formula (relation 1) which is a common method in determining the sample size. So, N is the size of statistical population and n is the size of required sample. To obtain the maximum size of sample, p and q were determined 0.5; the margin error of estimation d is 0.05 and Z^2 calculated 1.96 for the confidence interval 0.95.

$$(1) \quad n = \frac{N.p.q.Z^2}{N.d^2+p.q.Z^2}$$

The results of the estimation of the statistical sample size are in table 1:

Table 1
Statistical sample size

Level	Statistical population size	Statistical sample size
General managers	5	4
Middle managers	12	11
Experts	18	16
Staffs	75	54
Total	110	85

First documents of the organization were studied to gather the data and understand the present situation and organization efficiency of the organization. Then, three kinds of questionnaire were used. To measure independent variables of the research, Standard Questionnaires Measuring Organizational Structure Robins, which includes 24 questions about three aspects of organizational structure were used [9]. Job Performance Questionnaire Paterson, which includes 15 questions, and Evaluating Performance Questionnaire Paterson, which includes 10 standard questions about staffs' personal evaluation of their performance and efficiency in the organization were also used for evaluating the efficiency of organizational structure. The reliability of the questionnaire is confirmed because they have been used several times. To evaluate the validity of questionnaire a pre-test including 30 cases were used. The value of Cronbach's alpha was 0.8 for the completed questionnaires, which shows that the questionnaires have a good validity. The central index average was used for descriptive analysis of the data, and Spearman Rank Correlation was used to test hypotheses and the study of the relationships between the variables. Since the data were ranked, this test was used. Spearman Rank correlation is between +1 and -1.

7. Data analysis

The participants' statistical information, which is was gathered via questionnaires, shows that about 60 percent of participants were men and 40 percent of them were women. Most of them had master degree, and 2 to 7 years of experience in the company, and they were 30 to 40 years old. Complexity average (questions 1 to 7), formality (8 to 14), and concentration (14 to 24) were measured in the levels of general managers, middle managers, experts, and staffs for the Standard Questionnaire Measuring Organizational Structure Robbins.Table 2 shows the information related to the participants' answers to questions 1 to 7. As it is seen, staffs and experts believe more in complexity in organization than general managers and middle managers.

Table 2
Complexity average between four levels of general managers, middle managers, experts, and staffs

Complexity	1	2	3	4	5	6	7	Total
General managers	2.83	2.5	4	2.2	4.16	3.83	1.6	21.12
Middle managers	2.5	4.8	3.9	2.1	4.6	2.3	3.7	23.9
Experts	4.16	4.6	4	4.5	4	3.54	4	28.8
Staffs	4.2	4.8	4.2	4	4	4.2	4.8	30.2
Average	3.42	4.18	4.03	3.2	4.19	3.47	3.53	26

Table 3 shows the information related to the participants' answers to questions 8 to 14. As it is seen, staffs and experts believe more in formality organization than general managers and middle managers.

Table 3
Formality average between four levels of general managers, middle managers, experts, and staffs

Formality	8	9	10	11	12	13	14	Total
General managers	1.6	1.6	2.5	3.3	2.2	3.83	3	18.03
Middle managers	3.6	4	1.8	2.5	3.33	4	1.8	21.03
Experts	4	4.2	3.5	4	4.2	4	4.2	28.1
Staffs	3.83	4.8	4.2	4.4	4.5	4	4.8	30.53
Average	3.26	3.65	3	3.55	3.56	3.96	3.45	24.42

Table 4 shows the information related to the participants' answers to questions 15 to 24. As it is seen, staffs and experts believe more in centralization and lack of authority in organization than general managers and middle managers.

Table 4
Centralization average between four levels of general managers, middle managers, experts, and staffs

Centralization	15	16	17	18	19	20	21	22	23	24	Total
General managers	1.2	1.5	2	2.2	1.5	1.88	2.5	2.2	1.2	1.5	17.68
Middle managers	2.3	2.2	1.5	2.8	1.8	3.33	3	2.5	2.2	1.8	23.43
Experts	4	3.33	3.6	3.83	1.9	2.5	4	4.2	3.83	4.2	35.4
Staffs	4.4	3.83	4	4.2	4.8	4	4.2	4.8	3.83	3.23	41.4
Average	2.97	2.7	2.77	3.25	2.5	2.92	3.42	3.42	2.76	2.7	29,47

To determine the complexity of the organizational structure of Dorsun Teb Pars Company, the total averages of questions 1 to 7 of questionnaire Robin were used which were 26 scores out of 35 total scores, and it shows 74.3% complexity. The total averages of the questions eight to fourteen associated with formality was 24.4 scores out of 35 total scores, which shows 69.7% of formality in the structure of organization. Moreover, for centralization, the total average of 10 last questions, 29 scores were obtained out of 50 total scores, which shows 59 % of centralization in the organization. Due to the alignment of questions in the Job Performance Questionnaire Paterson and Evaluating Performance Questionnaire Paterson, all questions were gathered in a questionnaire including 25 questions to determine the efficiency. First, the value of "always" which shows numerical value of 5 and is the highest limit of each choice was multiplied by 25 questions of the questionnaire, and it was found that the highest score to be obtained is 125. The results of the questionnaire showed 78 was an average score of efficiency and the staffs' performance efficiency was 62%. Therefore, efficiency is in a middle level in this company. Spearman Rank Correlation test was done between the variables to test the hypotheses, and the study of the relationship between the aspect of the structure of organization and efficiency. The results are shown in table 5.

Table 5
Results of the testing hypotheses

Hypotheie	Spearman Rank Correlation	Result
First	0.558	Positive and significant relationship between the compllexity of organizational structure and organization efficiency
Second	0.719	Positive and significant relationship between the formality of organizational structure and organization efficiency
Third	-0.689	Positive and significant relationship between the centralization of organizational structure and organization efficiency

As it is seen in the table of testing hypotheses:
1. There is a positive and significant relationship between complexity and efficiency of organization structure. Although the complexity is in the middle level and above, efficiency is not in a desirable level, especially in the horizontal hierarchy of organization; efficiency is obtained slowly due to less number of occupations and variety of responsibilities. The analysis of questionnaires indicates that the large number of responsibilities and lack of specialized job in lower level of organizational hierarchy lead to disharmony and increase of the hours of doing specialized activities, and the whole process decrease the dynamicity of the organization.
2. There is a positive and significant relationship between formality and efficiency of the organization structure. Formality is the organization relies on regulations, rules, policies, and procedures to guide its staffs' manner. When formality is high, there are particular descriptions of tasks, many rules and regulations, and clear guidelines about activity in organization so that staffs act completely accordingly. Unlike the middle and above level of centralization in the regarded company, the analysis of questionnaire shows that emphasis on rules and regulations, responsibility variations, and lack of people's complete familiarity with descriptions of duties and occupations have led to lack of compatibility of organization operation with organizational mission and finally to efficiency drop.
3. There is a positive and significant relationship between the centralization of organization structure and efficiency. Too much centralization in structure leads to an efficiency drop. Centralization refers to the distribution of authority and it determines who has the right to decide. Based on the results of the questionnaires, high centralization, particularly in comparison to horizontal hierarchy of the organization, leads to a decrease in individual's experience and lack of growth of commitment and responsibility among staffs. Centralization has an inverse relationship with delegating authority. When there is more delegation of authority, there will be lack of centralization, and by having more flexibility in decision-making, its implementation and supervising will transfer to lower levels of organization. In such a situation, staffs' ability, commitment, and responsibility will increase and the organization efficiency will improve.

CONCLUSION

Efficiency is a comprehensive and wide concept that includes all economic, political, social, and cultural sections. Managerial experience of developed countries shows that the most important factor in economic progress of organizations in those countries are programming, organizing, coordination, and a systematic movement towards increasing the organization efficiency. The final achievement of increasing the organizational efficiency is the amplification of competition in internal and external markets, development of market, income augmentation, and a flourished economy. Regarding the importance of efficiency and its improvement in the organization, this research has been done with the aim of studying the relationship of organization structure and efficiency in Dorsun Teb Pars Company. The result of first hypothesis shows that there is a positive and significant relationship between complexity of organizational structure and efficiency. Based on the results of Hadizadeh Moghadam et al.'s research (2010), the increase of complexity in organization will bring about a change in managers' thought and mental model and will lead the organization toward a desirable change and efficiency. This confirms the result of the present research. Additionally, the result of the second hypothesis indicates that there is a positive and significant relationship between formality of the organization structure and efficiency. This finding is not consistent with the findings of Jafar Nejad and Zarei's research (1995) in studying the role of internal factors of organization in explaining a model to convert the present organizations to the dynamic organizations, and reducing formality to increase dynamicity and efficiency. The result of the third hypothesis shows that there is a negative and significant relationship between centrality of the organization structure and efficiency. This is consistent with the findings of Jafarnejad and Zarei's research (1995) of reducing centrality to increase dynamicity and efficiency of organization. Regarding the results of the research and middle level of efficiency in Dorsun Teb Pars Company, efficiency improvement of the organization requires restructuring in a flexible and dynamic manner and in accordance to the organizational mission in order to

eliminate the present defects. These solutions are proposed to redesigning the present structure:

1. By employing experts in lower level of organizational hierarchy, specialized activities would be coordinated and speeded up.
2. The organization chart is a visible symbol of all activities and processes of the organization, so, it is important to give all staffs the plan of organizational structure in order to have complete awareness of organizational level, organizational hierarchy, position of people in a unit, and the area of managers' control.
3. Descriptions of duties of all sections and occupations would be provided for all staffs to avoid ambiguities.
4. Authorities and responsibilities would be given to staffs according to their expertise so that the present centralization increases and staffs' ability, commitment, and responsibility increase.
5. Staffs' ideas and views would be asked to eliminate the defects and optimizes the activities of organization.

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INVESTIGATION ABOUT PHYSICAL PROPERTIES OF FERROUS NANOPARTICLES PRODUCED BY CHEMICAL METHOD

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ABSTRACT

Ferrous nanoparticles were prepared by evaporation of aqueous solution (PH 2.7) at 250℃. The crystallography study of nanoparticles were studied by X-ray diffraction method. SEM and Energy dispersive X-ray spectroscopy (EDAX) were also analysed and all the results obtained were in good agreement with each other.

Keywords: ***Ferrous, XRD, SEM, EDAX, nanoparticles***

INTRODUCTION

Iron sulfide (FeS_2) thin films have attracted sustained research due to the natural abundance of iron sulfide and its environmental compatibility as well as the potential applications of FeS_2 thin films in photovoltaic, optoelectronic and photochemical systems among others [1-2]. Sulphurization tertiary iron cannot be applied by organisms freely, except at very low pH values. Still, iron usually occurs in this form. To the best of our knowledge the chemical, physical and toxicological properties of iron sulfide have not been thoroughly investigated. Iron compounds have varying toxicity. Some iron compounds are suspected carcinogens. In general, ferrous compounds are more toxic than ferric compounds. Acute exposure to excessive levels of ferrous compounds can cause liver and kidney toxicity, altered respiratory rates and cause convulsions .Sulfides have variable toxicity. Sulfides of the heavy metals are generally insoluble and hence have little toxic action except through liberation of hydrogen sulfide. Inhalation of dust or powder may cause irritation to the respiratory system and possibly acute iron poisoning. Large amounts of iron may cause iron pneumoconiosis. Ingestion of iron orally may cause irritation to the gastrointestinal tract It may cause irritation to the skin and eye.Various techniques have been used to prepare FeS_2 thin layers. These include flash evaporation [3], metalorganic chemical vapor deposition [4], sputtering [5], chemical vapor transport[6], electrode position [7] and molecular beam deposition [8]. The aim of this work was to synthesis and investigation structure and crystalline properties by XRD, SEM and EDAX of ferrous nanoparticles

MATERIALS AND METHODS

Experimental details

Ferrous (Fe_xS_y) Nano particles prepared by CBD technique were grown from solution containing sodium thiosulfate and Iron Chloride ($FeCl_3$) as sources of S^{2-} and Fe^{3+} respectively. The resulting solution was diluted to 100mL with water distillated. Deposition parameters were: [Iron chloride] = $2x10^{-3}$M; [NH_3] = $2x10^{-1}$ M; [sodium thiosulfate] = 4.10^{-2} M. During the deposition the bath temperature was kept at 80 and the solution pH at 2.7 constant value. After 90 minutes deposition time, aqueous solution was transferred to a special oven and evaporated at 250℃ for about one hour.Crystal and phase structure of the deposited ferric nanoparticles were identified using an X-Ray X'pert MPD diffractometer (CuK_α radiation,λ=0.15406nm)with step size of 0.03 and

count time of 1s per steps. Nanoparticles and element analysis were investigated by SEM (S-3400, Hitachi, Japan).

RESULTS AND DISCUSSION

Figure 1 shows the X-ray diffraction pattern of ferrous nanoparticles, produce at 90 minutes chemical deposition time, by CBD method. As it can be seen structure is polycrystalline. Different peaks depend to different ferrous components grow on layer. Reaction between iron and sulfur tends to different crystal structures, symmetries and chemical formulas, FeS, FeS2, $Fe_{1-x}S_{(x=0-0.2)}$, Fe_3S_4 [5]. Noisy XRD pattern relates to amorphous glass substrate.

Figure 1

XRD pattern of Ferrous Nano particles deposited at 90 minutes, by CBD method.

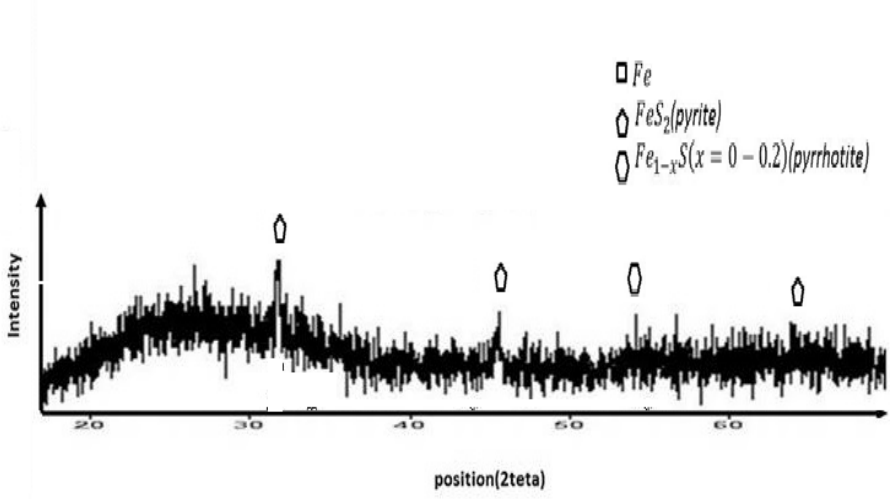
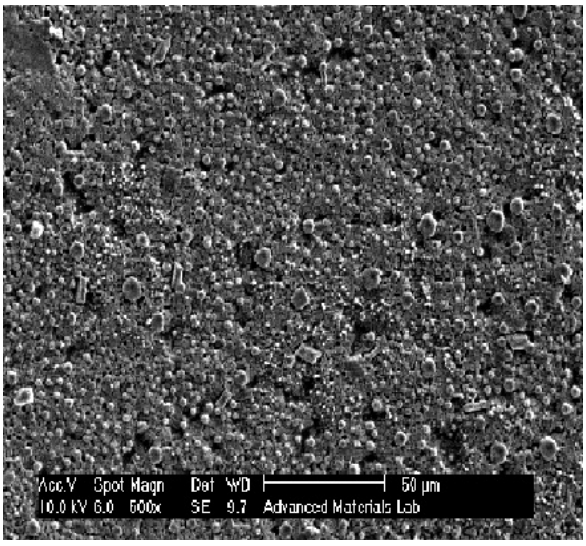


Figure 2 shows the SEM image of produce ferrous nanoparticles in this work. As it can be seen, there is a major fraction of pyrite (FeS_2) and pyrrhotite ($Fe_{1-x}S_{(x=0-0.2)}$) grains and clusters of iron sulphide.

Figure 2

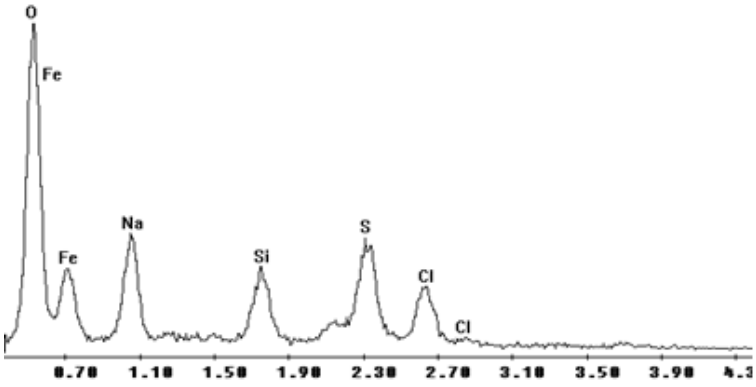
The SEM image of Ferrous nanoparticles deposited at 90 minutes, by CBD method.



We depict two element analysis of produce nanoparticles as EDAX analysis in figure 3. Result approves the configuration of ferrous nanoparticles .Presence of impurities such as Cl, Na etc were observed because of using chemical deposition method is inevitable.

Figure 3

The EDAX graph ofFerrous Nano particles deposited at 90 minutes, by CBD method.



CONCLUSION

The most crystalline peaks depended to Ferrous nanoparticles were shown FeS_2 dominant preferred structure that was in agreement with XRD results. SEM result showed fractalmackenwithe structures with pentagonal symmetries. EDAX analysis approved configuration of ferrous nanoparticles. Thus, all the results obtained were in good agreement with each other.

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EFFICIENCY OF DATE PALM SAWDUST AS A LOW COST AND AVAILABLE ADSORBENT FOR THE REMOVAL OF HEAVY METALS

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ABSTRACT

Cadmium is widely known as one of the most dangerous substances that cause long term effects on human health and the environment. In this research, the capacity of Date Palm sawdust in aqueous solution containing Cadmium ions was studied. The important parameters such as pH, the amount of adsorbent, initial Cadmium concentration and contact time were investigated. In order to evaluate the adsorption capacity of Date Palm sawdust, the experimental data were fitted to the Langmuir and Freundlich isotherms models. According to the results, the maximum efficiency of cadmium adsorption was 99.62% which was obtained in pH of 7 and contact time of 30 minutes and 10 g/L of adsorbent. Langmuir isotherm showed the highest consistency. The analysis of kinetic indicated that cadmium adsorption is consistent with the second-degree kinetic adsorption model (R2=1). According to the high efficiency of cadmium removal by the sawdust of Date Palm, this method can be used as an efficient and cheap way for the removal of cadmium. The results showed that Date Palm sawdust is a good and new low- cost Adsorbent for removing Cadmium ions from aqueous solution without any chemical or physical pre-treatment.

Keywords:*Cadmium, Sawdust, Date Palm, Kinetic and Adsorption*

INTRODUCTION

In 1969, water pollution was defined as the increase of any material including chemical, physical or biological type that changes quality and plays a crucial role in its particular application [1]. Cadmium is one of the hazardous metals for human and environment [2]. The most important application of cadmium includes its usage as a coating to protect iron and steel against corrosion [3]. These metals can be dangerous and poisonous even at low concentration [4]. Cadmium poisoning has very adverse impacts on health [5]. According to potable water standard offered by World Health Organization and the American Water Works Association; the permissible quantity of cadmium in drinking water is 0.005 mg/L [6]. Now, many companies have been developed and produce chemical products for removing heavy metals from sewage systems. Furthermore, some of these products have been used in order to remove heavy metals from water resources and groundwater [7]. According to some sources, wastewaters from old mines and areas where solid waste is buried are the biggest cause of heavy metal pollution [8]. Now, there are many methods for reduction of pollution from water and soil including filtration, coagulation, oxidation and ion exchange methods [9], but most of these methods are often tedious, high-cost and low efficient. Today, the trend is finding simple and cheap methods, which have the same efficiency for sewage treatment, particularly in the developing countries that are unable to use high-cost methods. Among these methods, the technology of adsorbents based on the process of ion exchange, physical and chemical adsorption has increasing application in

the recent years. Sawdust is a cheap by-product, which is produced widely in the woodcutting industries and has adsorption and ion exchange characteristics. Studies show that there is a feasible application of Sawdust for adsorption of various metal ions. Among the previous conducted research, Raji and Anirudhan used a mixture of sawdust and poly acrylic amid to remove chromium (VI) from aqueous solutions. They achieved an absorption percentage of 91% for solutions with the initial concentration of 100 mg/L, temperature of 30°C, and pH=3. Adsorption capacity was measured using the Freundlich model, with chromium (VI) adsorption following the first order equation [10]. Sima et al., used tree sawdust to remove thallium (I) from aqueous solutions. This process followed the Langmuir, Freundlich, and Temkin isotherms, with thallium absorption standing at 98% for an eight-minute contact time [11]. Gupta and Babu also used sawdust to remove chromium from aqueous solutions. Their results had an excellent correspondence with the Langmuir isotherm, and chromium adsorption followed the second order equation. This absorbent had a capacity of 41.5 mg/g and showed good results with respect to removing chromium in the spectrum of pH: 6-9 [12]. Finally, Srinivasa et al., used modified sawdust to remove nickel and copper from industrial wastewater. Optimal pH was 5 for copper and 4 for nickel respectively and optimal contact time was 150 minutes for copper and 180 minutes for nickel respectively [13]. Sawdust is considered a biological adsorbent for removing and measuring heavy metals today. This capability of sawdust depends on its combination and structure [14]. The aim of this research is achieving an efficient and cheap method for removing heavy metal of cadmium from the wastewater of various industries. For the same reason, it is intended to measure its removal capability and analyze the sawdust of Date Palm which is a native tree of Khuzestan province for removing cadmium from synthetic wastewater are examined.

MATERIALS AND METHODS

2.1 The preparation of adsorbent

After collection of sawdust adsorbent of Date Palm, the particles were homogenized by mesh 35, and then it was washed with distilled water to remove dust and other pollution, then was dried in oven at 30OC 30°C.

2.2 The preparation of synthetic solutions

Cadmium nitrate was used to make synthetic solution. For this purpose, at first the cadmium solution with concentration of 25 mg/L was prepared. Then the other concentrations were prepared by diluting the main solution. All the applied chemicals were from Merck Company. The experimental stages were conducted at 20°C and the remained concentration of the metal was determined by atomic absorption spectrophotometer. All the experiments were replicated three times and the mean of data and the results were determined.

2.3 The effect of pH on the efficiency of cadmium removal

For determination of optimum pH, it was selected in range of 3 to 10. After adjustment of pH using Hydrochloric acid and 0.1N NaOH solution, considering other fixed parameters, 0.5 g of sawdust was added to 50 ml of the cadmium sample with concentration of 10 mg/L. After 30 minutes, the concentration of remained cadmium was determined.

2.4 The effect of adsorbent quantity on the efficiency of cadmium removal

In this step, in order to determine the optimum quantity of adsorbent with consideration of other fixed parameters, 0.15, 0.3 and 0.5 g of sawdust were added to the 50 ml solutions with the initial cadmium concentration of 10 mg/L and with the optimum obtained pH quantity from the previous stage. After 30 minutes of contact time, the concentration of the remained cadmium in the solution was determined.

2.5 The effect of contact time on the quantity of cadmium adsorption

After the preparation of 50 ml solutions with the initial cadmium concentration of 10 mg/L, the optimum quantities of sawdust were added and the pH of the solution was adjusted and the samples were brought out from the mixer at intervals between 15 to 120 minutes and were analyzed.

2.6 The effect of initial concentration of cadmium on efficiency of cadmium removal

In order to examine the effect of initial concentration of cadmium on the adsorption quantity 50 ml solutions were prepared with the initial concentrations of 5, 10, 15, 20, 25 mg/L and were analyzed after adjustment of pH and addition of optimum quantity of sawdust.

2.7 The morphological study of sawdust

The scanning electron microscope (SEM) photomicrograph of adsorbent using particle size analyzer revealed the considerable variation in particle size. In this stage, SEM was used in order to identify the morphology and it showed how cadmium is adsorbed on the Date Palm sawdust.

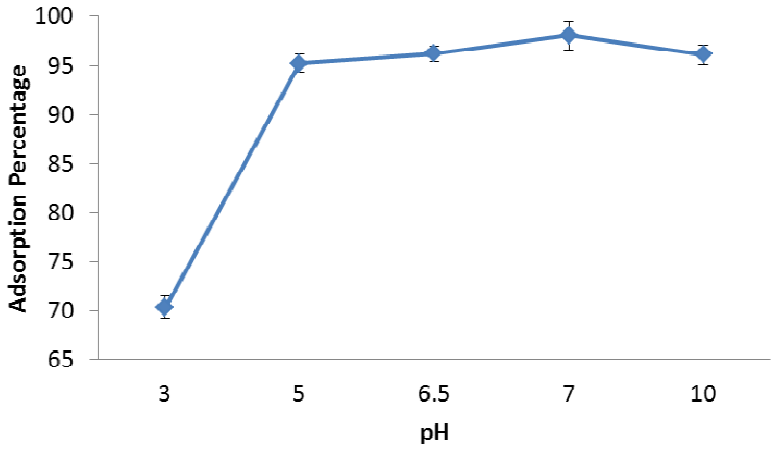
RESULTS AND DISCUSSION

3.1 The examination of pH effect on cadmium removal

Fig. 1 shows the results of effect of various pH on the adsorption percentage. Based on the obtained results, with the increase of pH up to 7, the removal efficiency was increased and then slightly decreased. According to the conducted studies, in acidic pH, the concentration of H^+ ion is high in the solution which compete with cadmium Thus, cadmium adsorption is decreased at low pH .In higher pH, concentration of OH^- ion is high and cadmium deposits are being observed and thus the adsorption rate decreased.

Figure 1

Effect of various pH on the adsorption percentage of cadmium (Adsorbent quantity =10 g/L, Contact time=30 min, Initial concentration of cadmium=10 mg/L)

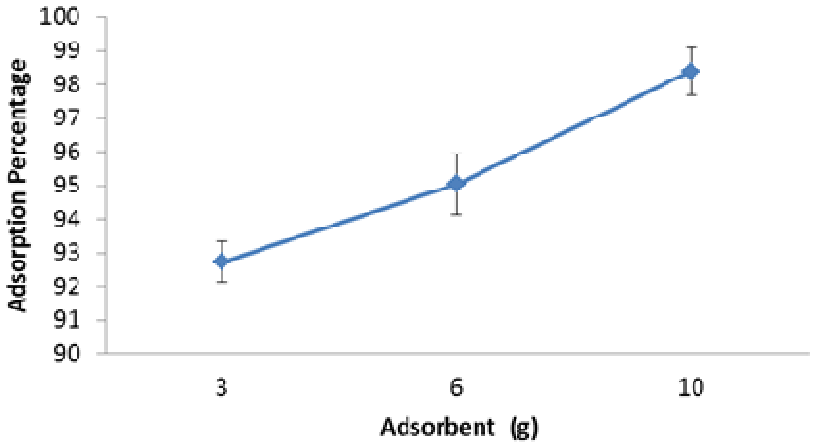


3.2 The examination of the effect of adsorbent quantity on the adsorption rate of cadmium

The results of the effect of adsorbent quantity on the adsorption of cadmium are presented in Fig. 2. The results showed that the removal percentage of cadmium by sawdust of Date Palm was increases with the increase of adsorbent quantity, because with the increase of adsorbent quantity, the quantity of contact surface of adsorbent with cadmium increases, therefore the efficiency of adsorption increases.

Figure 2

Effect of different adsorbent quantity on adsorption percentage of cadmium (pH=7, Contact time=30 min, Initial concentration of cadmium=10 mg/L)

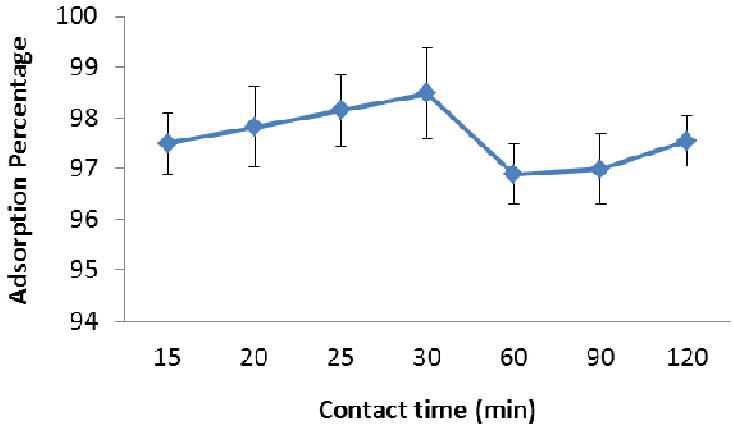


3.3 The effect of contact time on the adsorption rate of cadmium

The results of different contact time on the adsorption rate of cadmium are shown in Fig. 3. According to the results, removal efficiency increases with the increase of contact time and after 30 minutes, its reaches to maximum removal , but with the increase of time, at 60 minutes, adsorption rate decreases and with more passing time, adsorption rate again increases, that the cause of this issue is the reversibility of adsorption process that at first with passing time, adsorption reaction would be started and with more passing time, the reverse reaction would occur. Finally, after passing certain time, this cycle increases and the decrease of concentration would be fixed, that this behavior does not signify the cease of forward and backward reactions, but these reactions are still current and with equal velocities, thereby maintaining the concentration, that in this case, the reaction has reached dynamic equilibrium (not static).

Figure 3

Effect of different contact times on the adsorption percentage of cadmium (pH=7, Adsorbent quantity =10 g/L, Initial concentration of cadmium=10 mg/L)



3.4 The effect of initial concentration of cadmium on the removal percentage and adsorption capacity of cadmium

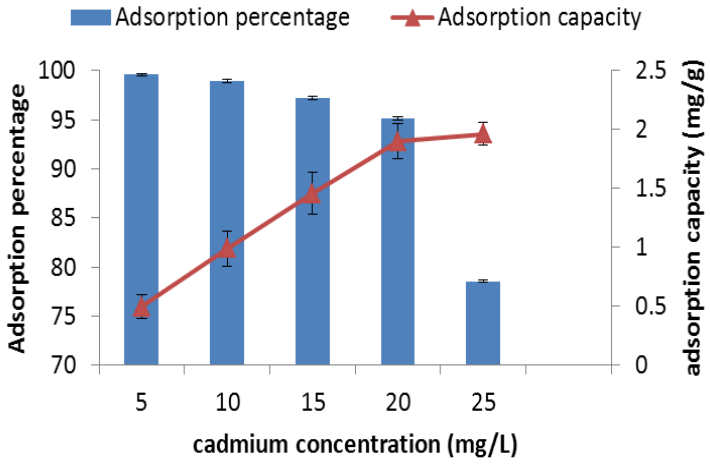
The quantity of adsorbed substance (adsorption capacity) is defined as follows:

$$q_e = (C_o - C_e) \times \frac{V}{W} \quad (1)$$

Where C_0 is the initial concentration of adsorbed substance (mg/L), C_e is the concentration of the adsorbed substance after adsorption (mg/L), V is the volume of the solution (L) and W is the weight of adsorbent substance (g).The results of examination of the initial concentration effect of cadmium on adsorption are shown in Fig. 4. The results showed that with the increase of initial concentration of cadmium. It was observed that the quantity of adsorbed substance (adsorption capacity) increases, but the adsorption percentage decreases, in a way that with the increase of initial concentration of cadmium from 5 to 25 mg/L, adsorption capacity increases from 0.498 to 1.964 mg/g, but removal percentage decreases from 99.62% to 78.57%. This issue can be concluded from having more free bands of adsorbent and bands of ion exchange in low concentrations of cadmium. Furthermore, in batch adsorption systems, the input concentration of cadmium in the solution plays a crucial role as the motivative force for overcoming the resistance from the mass transfer between liquid and solid phases. Therefore, with the increase of cadmium concentration in the solution, the adsorption capacity of cadmium increases. It is important to note that with the increase of concentration from 20 to 25 mg/L, the adsorbed substance (q_e) increases slightly that shows the saturation of sawdust.

Figure 4

Effect of the quantity of different initial concentration on the capacity and percentage of cadmium (pH=7, Adsorbent quantity =10 g/L, Contact time=30 min)



3.5 isotherms studies of cadmium adsorption by Date Palm sawdust

Analytical information was obtained from isotherms in order to develop equation which is necessary for designing. Furthermore, adsorption isotherm can be used to describe how the reaction of adsorbing substance with adsorbent is as well as optimizing the quantity of adsorbent application [15].

3.5.1 Langmuir isotherm

The linear form of Langmuir equation is as follows

$$\frac{1}{q_e} = \frac{1}{q_m} + \frac{1}{q_m \times K_l \times C_e} \quad (2)$$

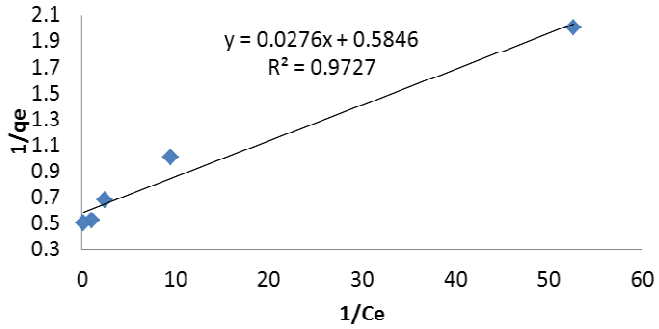
Where q_e is the amount of adsorbed substance (mg/g), q_m and K_l are Langmuir parameters that are related to the maximum adsorption capacity and the correlation energy of adsorption respectively. The quantities of q_m and k_l can be determined by drawing the changes of $1/q_e$ based on $1/C_e$[16,17]. The main characteristic of Langmuir equation is a dimensionless constant which is called equilibrium parameter that is defined as follows [18]:

$$R_L = \frac{1}{1 + K_l \times C_o} \quad (3)$$

R_L indicates type of isotherm. $0<R_L<1$ for optimum adsorption, $R_L>1$ for non-optimum adsorption, $R_L=1$ for linear adsorption and RL=0 for irreversible adsorption [19]. The results of Langmuir isotherm analyzing are shown in Fig. 5 and Table 1, according to the obtained results of R_L=.0018 and correlation coefficient of R^2=0.9727, achieved data is conformed with Langmuir isotherm.

Figure 5

Langmuir isotherm model for cadmium adsorption



qm	K_l	R_L
1.710	21.181	0.0018

3.5.2 Freundlich isotherm

The linear form of Freundlich equation is as follows [20;21]

$$\text{Log } q_e = \text{Log } K_F + \frac{1}{n}\text{Log } C_e \quad (4)$$

Where K_F is adsorption capacity (mg/g), 1/n is the intensity of adsorption, $C_e$is the equilibrium concentration (mg/L) and q_e is the adsorbed substance (mg/g). From the linear diagram $\log(q_e)$ against $\log(C_e)$, K_F and 1/n are determined that 1/n indicates type of adsorption process, if 1/n=0 it

shows irreversible process, 0 < 1/n < 1 shows optimum adsorption state and if 1/n >1 indicates non-optimum adsorption [22]. The results of Freundlich isotherm analyzing are shown in Fig. 6 and Table 2 that according to 1/n, the adsorption process is optimum, but due to the smaller quantity of R^2 compared with Langmuir isotherm, it shows perfect match of adsorption process with Langmuir isotherm.

Figurer 6
Freundlich isotherm model for cadmium adsorption

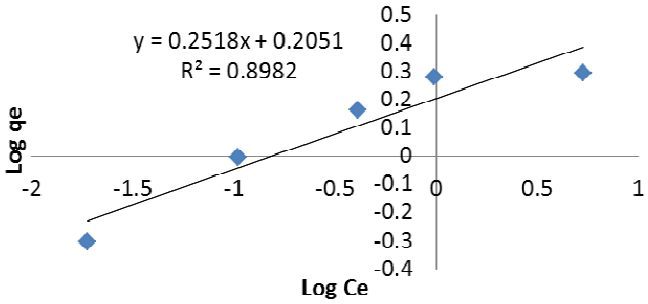


Table 2
Results of Freundlich isotherm calculations

K_F	1/n
1.603	0.251

3.6 kinetic studies of cadmium adsorption by Date Palm sawdust

One of the most important factors for adsorption process is prediction of adsorption rate. The adsorption kinetic depends on the physical and chemical properties of adsorbent that affects adsorption mechanism.

3.6.1 The kinetic model of the first-degree adsorption

The first-degree adsorption kinetic can be described as follows [23-25]

$$\text{Log}\ (q_e - q_t) = \text{Log}\ q_e - \frac{K_1}{2/0303}t \qquad (5)$$

In this equation, $q_e$is the adsorption capacity of sawdust in equilibrium condition (mg/g), q_t is the quantity of adsorbed cadmium in time (mg/g) and k_1 is a constant of first-degree equilibrium velocity (1/min). The first-degree kinetic model is obtained by linear drawing of $\log(q_e-q_t)$ on the basis of t, that k_1 and q_e are drawn from slope and intercept and correlation coefficient R^2 also can be obtained from the diagram. The results of the first-degree adsorption kinetic are shown in Table 3 and Fig. 7. According to the parameters and diagram, it can be concluded that the data does not follow the first-degree adsorption kinetic model because in spite of optimum R^2, quantities of q_e from the experiment are not equal with calculated $q_e$from the diagram.

3.6.2 The kinetic model of the second-degree adsorption

The second-degree adsorption kinetic model is also one of the most common models for analyzing the kinetic of adsorption reactions, which are as follows [26;27]:

$$\frac{t}{q_t} = \left[\frac{1}{q_e}\right]t + \left[\frac{1}{K_2 \times q_e^2}\right] \quad (6)$$

In a way that, q_e is the adsorption capacity of sawdust in equilibrium condition (mg/g), q_t is the adsorbed cadmium quantity in time (mg/g) and k_2 is a constant of second-degree equilibrium velocity (g/mg/min). the second-degree kinetic model is obtained by linear drawing of t/q_t on the basis of t that q_e and k_2 are drawn from slope and intercept and correlation coefficient R^2 also can be obtained from the diagram. The results of the second-degree adsorption kinetic are shown in Table 4 and Fig. 8. According to the parameters and diagram, it can be concluded that the data follow the second-degree adsorption kinetic model because the quantity of R^2 is optimum and obtained q_e quantities from the experiment are equal with calculated $q_e$from the diagram.

K_1	qe (calculated)	qe (experiment)	R^2
0.0968	0.0539	0.9848	0.9777

Figure 7
First-degree adsorption kinetic mode

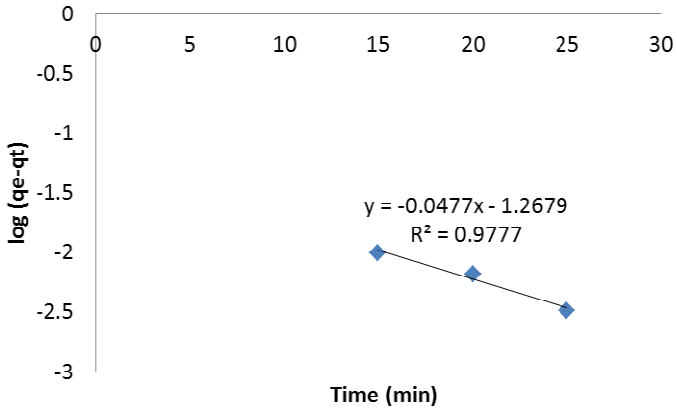
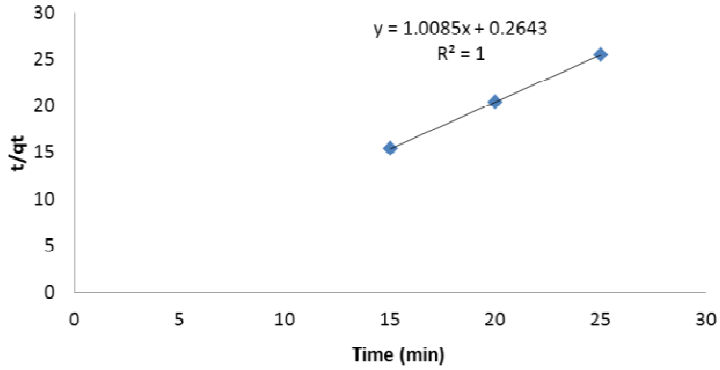


Table 4
kinetic results of the second-degree adsorption

K_2	qe (calculated)	qe (experiment)	R^2
3.8481	0.9915	0.9848	1

Figure 8
Second-degree adsorption kinetic model



3.7 Morphological study of Date Palm sawdust

Figs. 9 and 10 shows the images from the surface of sawdust by scanning electron microscope (SEM). Fig. 9 shows the images before the adsorption of sawdust in different magnifications,that show porous structure. Fig. 10 show the images after the adsorption of sawdust in different magnifications that metals have filled pores and the adsorption process is conducted.

Figure 9
SEM images before adsorption of metal by Date Palm sawdust with 16X and 1KX magnifications

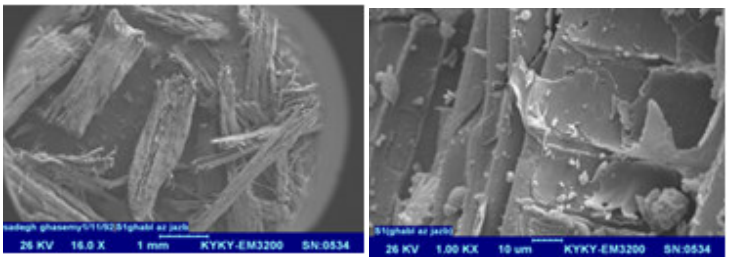
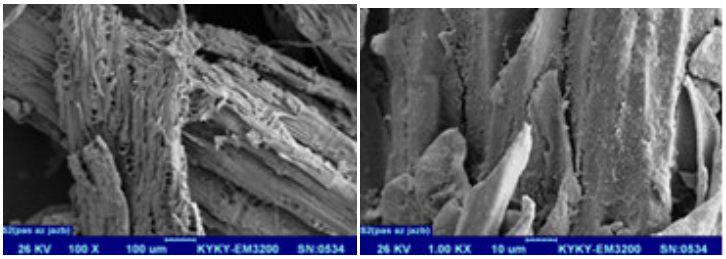


Figure 10
SEM images after adsorption of metal by Date Palm sawdust with 100X and 1KX magnifications



CONCLUSION

The results of this study indicated that the highest adsorption efficiency is 99.62% that was conducted in optimum conditions of pH =7, adsorbent quantity of 10 g/L, 30 minutes of contact time and the initial cadmium concentration of 5 mg/L. According to the considerable removal percentage of Date Palm sawdust in removing of cadmium, this method can

be considered as an effective method in heavy metals removing. Ion exchange and/or formation of hydrogen bonds could be among the principles of mechanisms for separating metal ions [28].

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DETERMINING FACTORS OF CD4 CELL COUNT IN HIV PATIENTS: IN A HISTORICAL COHORT STUDY

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ABSTRACT

This study was aim to investigate the factors affecting HIV progression to AIDS so as to identify the most important factors associated with accelerating conversion of infection to disease. This historical cohort study was conducted on the individuals infected with HIV in Fars province, south of Iran during 2006 to 2013. The study data were obtained using the information documented in the patients' records. For statistical analysis, first t- test, f-test, and Pearson's correlation coefficient were used as univariate analysis and then, log linear or Poisson regression were applied as multivariate analysis. The study findings indicated that variables, such as female gender, unemployment, addiction, joint injection, joint blade use, HIV infection via injection or sex, longer durations, and older ages , could play the role of risk factors for HIV progress. On the other hand, some variables, including insurance coverage, receiving TB prophylaxis, receiving HAART, and higher baseline CD4 cell count, could act as protective factors and decelerate the trend of disease progress. Many factors affect CD4 cell count in HIV patients. Some of these factors, such as gender, are irreversible, but some others, such as addiction, are preventable. As a result, special attention should be paid to these factors to slow down the process of HIV conversion to AIDS.

Keywords: ***Poisson regression, HIV, AIDS, CD4 cell, Progression, Cohort study***

INTRODUCTION

Human Immunodeficiency Virus (HIV) destroys specific cells of the body that defend the body against diseases. Once the virus has weakened the immune system so that the system can no longer restrain a person from diseases, the patient enters a stage of the disease which is called Acquired Immunodeficiency Syndrome (AIDS) [1-2].According to the statistics reported by World Health Organization (WHO) in 2013, 35 million individuals were living with HIV worldwide. Among these patients, 31.8 million were adult, 16 million were female, and 3.2 million were children (<15 years). With the beginning of HIV epidemic, nearly 75 million individuals around the world were infected with HIV. From 2001, new cases of HIV infection have declined by 33% [3-5] . Based on 2012 statistics, out of the 27041 individuals living with HIV in Iran, 89.3% were male and 10.7% were female. Besides, nearly 45.9% of the HIV infected patients were in the 25-34 - year - old age group [6].Generally, HIV can be transmitted through unprotected sexual intercourse (including anal and oral), blood transfusion, and contaminated needles

as well as from mother to child during pregnancy, childbirth, and breastfeeding [7-8]. The disease caused by HIV has three main stages. In the first stage (acute infection), a person may experience a brief influenza-like illness. The disease is usually followed by a long period without any symptoms called the incubation period. Finally, when the patient enters the third stage or AIDS, the CD4+ cell count reaches less than 200 cells per microliter [9].According to the previous studies, some factors are involved in conversion of HIV infection to AIDS disease. The infection enters the phase of disease more quickly in patients infected with HIV in older ages and they also have lower survival rates [10]. Variation in co-receptors of HIV, especially diversity in C-C chemokine receptor type 5 (CCR5) receptors, which plays an important role in increased susceptibility and disease progression [11]. Human Leukocyte Antigen (HLA) differences are also involved in creation of susceptibility and disease progression. Thus, B35 and Cw4 alleles are associated with increased susceptibility and disease progression, while HLA B27 and B57 cause resistance against disease progression [12]. It has been reported that behavioral and psychological factors, such as unprotected anal intercourse, smoking, poor nutrition, and depression accelerate conversion of the infection to the disease, but these findings were not confirmed in all studies [13]. The factors associated with HIV subtype, play an important role in the disease process, as well. In a study on the Ugandan individuals infected with HIV, the conversion of the infection to disease the infection was much faster in those patients infected with subtype D compared to those with subtype A [14]. Co-infection with hepatitis C has also been reported to be involved in accelerating the infection progression, but the mechanism is not fully understood yet [15].Global AIDS epidemic is a universal emergency and forms one of the biggest challenges in humans' individual and social life because it undermines social and economic development throughout the world and influences all levels of social, familial, and individual activities. Moreover, AIDS has an impact on the economy of involved countries; thus, the Gross Domestic Product (GDP) of these countries is decreased by lack of human sources [16]. Although the global statistics of the disease have decreased, especially in developed countries [3-4] the number of HIV cases is increasing in Iran every year [17]. Since the trend of HIV progression and its related factors may somewhat vary from population to population, this study was aim to investigate the factors affecting HIV infection progression to AIDS so as to identify the most important factors associated with acceleration of infection to disease conversion. In this way, through appropriate educational and interventional measures, the progression process can be delayed and the patient's life expectancy can be increased.

MATERIALS AND METHODS

2.1 Setting

This historical cohort study was conducted on the individuals infected with HIV in Fars province, south of Iran during 2006-2013. The study data were collected using the information documented in the patients' records. These records had been archived by Behavioral Disease Consulting Center of Shiraz University of Medical Sciences, Shiraz, Iran.

2.2. Study Variables

The information in the patients' records consisted of two types of variables: the dependent variable; i.e., CD4 cell count measured periodically, and other variables such as including sex, education level, marital status, occupation, insurance status, addiction status, HIV transmission way, joint injection, imprisonment history, unsafe sex history, joint blade usage, tattooing, result of Purified Protein Derivative (PPD), Chest X-Ray (CXR), Acid-Fast Bacilli (AFB), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and Venereal Disease Research Laboratory (VDRL) tests, prophylaxis for Tuberculosis (TB), treatment for TB, Highly Active Antiretroviral Therapy(HAART), HIV level at diagnosis, baseline CD4 cell count, age, and duration of HIV infection.

2.3. Study Population

In this study, the samples were selected through census method. Thus, all the HIV-infected individuals identified during the aforementioned years (N=1565) were recruited into the study. HIV infection was confirmed by two ELISA positive test results and a Western blot test result. These tests were performed for the patients voluntarily or, and in some cases, because of requirements, such as marriage or employment. After confirmation of HIV infection through these tests, the patients were

introduced from the laboratory to the health center located at their place of residence so that Behavioral Disease Consulting Center could cover the patients and perform the necessary periodical testing and follow-up. In this study, 1052 out of the 1565 HIV positive patients with three CD4 measurements in their records were selected for statistical analysis.

2.4. Data Analysis

The desired outcome was CD4 count value were measured at baseline, after six months, and one year later.The relationship between the above-mentioned factors and CD4 cell count was evaluated, as well. At first, the mean of total CD4 cell count was computed in each patient using three CD4 cell count measurements. Then, t-test, one-way ANOVA (f-test), and Pearson's correlation coefficient, as univariate analysis, were used to determine the factors with significant effects on CD4 cell count. In univariate analysis, the factors with $P<0.2$ were considered as significant and were entered into multivariate analysis. Afterwards, Poisson regression analysis was used as multivariate modeling to recognize the factors' true effects on CD4 cell count. In multivariate modeling, the factors with $P<0.05$ were considered as significant and were reported in the table. Chi-squared goodness-of-fit test was also utilized to assess the fitness of Poisson model. In order to check the over dispersion of the data and model's goodness of fit, we evaluated the deviance (1034) which involves Chi-square distribution with degrees of freedom (1026). Based on the results, the chi-square test goodness-of-fit was not statistically significant (0.42). Thus, we concluded that our data were not over dispersed and the model fitted reasonably well. After that, the Omnibus test, a test of the model as a whole, was evaluated. In this test, all the estimated coefficients are equal to zero. Considering the P-value (0.001), we concluded that the model was statistically significant [18]. All the analyses were performed using the SPSS statistical software, version 21.

RESULTS

3.1. Descriptive Findings

Descriptive statistics of the patients according to the categorical variables have been presented as number (N) and percentage (%) in column 3 of Table 1. Besides, mean and standard deviation (std.deviation) of the patients in terms of continues variables have been displayed in column 2 of Table 2.

3.2. Univariate Analysis

The findings of student t-test and one-way ANOVA (f) showed that sex, occupation, TB prophylaxis, HAART treatment, HC, HIV level, addiction, transmission way, joint injection, imprisonment history, and mother's HIV status were significantly associated with CD4 cell count (Table 1).

In addition, the results of Pearson's correlation coefficient indicated that CD4 cell count was negatively associated with the patient's age and HIV duration, but positively correlated to baseline CD4 cell count (Table 2).

3.3. Multivariate Analysis

Poisson regression analysis outputs indicated that female gender, unemployment, past or current addiction, having joint injection, positive imprisonment history, joint blade usage, HIV infection via injection or sex, longer HIV durations , and age were negatively associated with CD4 cell count. Interpretation of the gender coefficient indicated that CD4 cell count in the female patients was 15.2% [(1 – 0.848) * 100= 15.2] lower compared to the male ones. In contrast, insurance coverage, receiving TB prophylaxis, receiving HAART, and higher baseline CD4 cell count were positively associated with risk of CD4 cell count. This implies that CD4 cell count was higher in the patients with such characteristics (Table 3).

DISCUSSION

The findings of the present study indicated that some variables could play the role of risk factors for progression of their disease and accelerate the conversion of HIV infection to AIDS disease. These variables included female gender, unemployment, addiction, joint injection, joint blade usage, HIV infection via injection or sex, longer duration of infection, and older age. On the other hand, some variables, such as insurance coverage, receiving TB prophylaxis, receiving HAART, and higher baseline CD4 cell count, could act as protective factors in HIV patients and decelerate the trend of disease progress.According to the findings of our study, female gender may be a risk factor for CD4 cell decrease and progression of HIV to AIDS. Similarly, Hongboand et al. conducted a cohort

study in China and showed that a larger number of women compared to men entered AIDS after 1 year (23% vs. 17%) and 3 years (45% vs. 35%) [19]. Moreover, other studies showed that the mean of HIV-RNA varied between men and women for given CD4 count strata and was higher in women compared to men [20-21]. The dominant idea is that gender itself does not affect HIV progression, morbidity, or mortality, but some differences can be attributed to the effect of confounders, such as poverty and poor access to medical care. Moreover, gender via other factors, such as genetic, hormonal, and psychological variables which makes differences between men and women. Such studies indicated that host genetic factors. For example chemokine receptors CXCR4 and CCR5 and their natural ligands, and immune response play important roles in progression of HIV to AIDS [11-12]. Many studies have also identified a role for HLA genotype for HIV outcomes [22-23]. Rapid progression to AIDS has been associated with HLA alleles A24, B35, B37, B56, B58S, and A1-B8-DR3 [24]. In contrast, alleles B57, B27, B14, and C8 have been associated with long-term non-progression [25].According to the findings of the current study, unemployment was a risk factor for progression of HIV to AIDS. Patients who have a job have better nutrition compared to jobless ones. They also use health services more that can improve their health. Studies have demonstrated that micronutrient supplements may be of benefit in some patients with HIV infection [26-28]. A randomized trial on 1078 pregnant women in Tanzania also showed that the women who received a multivitamin supplement (vitamins B, C, and E) had delayed progression of HIV compared to those receiving the placebo [26].The results of our study revealed that addiction, joint injection, and HIV infection through injection were positive factors for accelerating the disease progression. Some studies demonstrated that the patients who acquired their HIV infection through drug injection had higher death rates compared to those acquiring their infection via sex [29-30]. Moreover, the results of a study conducted on more than 22,000 patients from Europe and North America indicated that AIDS event rates decreased more rapidly in Men who have sex with Men (MSM) in comparison to injection drug users [30]. Besides, the findings of a prospective, longitudinal study conducted on a cohort of 222 HIV-infected drug users in Camillus House, Miami showed that crack-cocaine users were 2.14 times [95% confidence interval (CI): 1.08 to 4.25, P= 0.029] more likely to present a decline of CD4 to ≤200 cells/mL, independent of antiretroviral use [31]. Injection drug use could have an effect on HIV disease progression because drugs, such as opioids, may increase HIV replication in vitro [32-33]. Furthermore, drug use may negatively affect medication adherence and use of medical care [34]. Intoxicating effects of many drugs can change individuals' judgment and inhibition and cause them to take part in capricious and insecure behaviors which eventually worsen the patients' conditions.The findings of the present study displayed that older ages affected development of AIDS symptoms. Several studies have also shown that the higher the HIV patients' age, the more quickly their infection will be converted to AIDS disease [35-37]. In one study, for example, the median time from serocon version to AIDS without therapy was 15 years for 16-24-year-old patients, but 6 years for those who were 35 years old or above [38]. Similarly, another study indicated that in the absence of HAART, faster overall progression to AIDS occurred with increasing age, especially after the age of 40 years. Also, the speed of disease progression was higher among younger children, especially newborn HIV-positive patients. On the other hand, the slowest rate of progression was seen in teenage patients. This might be justified by the fact that with increasing age, CD4 cell replacement power is decreased because fewer and naïve CD4 cells are generated by the thymus gland. An alternative explanation is that with increasing age, there are lower levels of chemokines to intervene with HIV's ability to infect CD4 T-cells [35-39].The current study results indicated that receiving TB prophylaxis and HAART and higher baseline CD4 cell count could slacken the speed of HIV conversion to AIDS. In the same line, Pepe and his colleagues conducted a study on HIV patients and reported that the incidence of TB and HIV progress were lower in isoniazid recipients than in the patients who received B6 vitamin alone (2.2 vs. 7.5 per 100 person-years) [40]. In addition, in the study implemented by Peter et al. for determining the effect of different types of treatment on prevention of HIV, Kaplan-Meier estimates of progression rates to AIDS at 18 months were 13.6% (monotherapy), 4.7% (RTI combination therapy), and 3.9% (HAART) [41]. Coinfection with other pathogens

may influence the rate of HIV progression [42]. For instance, coinfection with TB accelerates HIV-associated immunodeficiency and increases the levels of viremia. Therefore, it is evident that TB prophylaxis could delay HIV progression to AIDS. In the study accomplished by Emily Koech et al., on 22 832 patients within the age range of 10–24 years, 69.5% aged 20–24 years and 82% were female. Their study results implied that the risk of AIDS-related diseases was associated with CD4 cell count. Besides, the hazard ratio of death was 1 in the patients with CD4 <350, but 1.7 (1.2 – 2.3) and 1.8 (1.5 - 2.4) in those with CD4=100-200 and <100, respectively [43]. CD4 cell is a body defensive tool against dangers and diseases; thus, it is logical that its count is associated with progression of HIV to AIDS.

Limitations

Since many factors affect HIV progression and many of these factors have partial associations with each other (e.g. genetic factors have correlations with gender, sensitivity, or progression of HIV), if we do not have any information about such variables (similar to this study), they might induce confounding effects. As a result, confounding could aggravate, mitigate, or mask the observed correlations because we could not adjust its effect. Another limitation of the current study was making use of recorded data. Since these data were collected for patients' follow-up and surveillance, they might not be of high quality. Finally, if the patients referred to the clinics in early stage of the disease, their morbidity was diagnosed in the first step. However, some patients may go to lab at advanced stages of the disease. If so, using HIV duration or baseline CD4 count might not give correct or appropriate results.

CONCLUSION

Many factors affect CD4 cell count in HIV patients. Some of these factors, such as gender and genetic factors are irreversible; however, some others, including addiction and joint injection, are preventable. This implies that in order to slow down the speed of HIV conversion to AIDS disease; we must pay special attention to these factors and change the patient's conditions accordingly.

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Table 1

T-student and F test results for determining factors effect on CD4 cell count

Variables		N (%)	Mean	Std.Deviation	T/F test	p-value
Gender	Female	230 (22)	231.90	114.29	3.74-	0.00
	Male	822 (78)	266.10	146.88		
Education level	Illiterate	81 (8)	262.40	140.92	2.04	0.08
	Elementary school	329 (31)	237.20	120.20		
	Middle school	396 (38)	245.84	124.64		
	High school	208 (20)	224.68	116.25		
	Academic education	38 (4)	218.07	114.66		
Marital Status	Divorced	152 (14)	224.21	108.92	1.18	0.31
	Married	502 (48)	243.38	122.61		
	Single	382 (36)	238.66	123.71		
	Temporarily marriage	16 (2)	265.17	210.24		
Insurance	Yes	103 (10)	258.73	120.25	1.69	0.09
	No	949 (90)	237.11	123.05		
Occupation	Unemployed	462 (44)	229.48	112.056	2.28-	0.02
	Employed	590 (56)	246.85	130.338		
CXR test	Normal	322 (31)	239.42	118.55	0.52	0.60
	Abnormal	730 (69)	234.83	125.53		
AFB test	Positive	263 (25)	236.47	122.22	0.85-	0.39
	Negative	789 (75)	245.38	115.27		
TB prophylaxis	Yes	768 (73)	244.15	115.30	2.14	0.03
	No	284 (27)	225.89	140.74		
TB treatment	Yes	986 (94)	240.94	122.07	1.75	0.08
	No	66 (6)	213.55	132.82		
HAART treatment	Yes	611 (58)	266.43	112.99	8.74	0.00
	No	441 (42)	201.54	112.48		
VDRL test	Positive	48 (5)	235.55	111.16	0.21-	0.83
	Negative	1004 (95)	239.40	123.47		
HCV test	Positive	362 (34)	230.34	108.55	3.88-	0.00
	Negative	690 (66)	262.90	146.35		
HBs test	Positive	222 (21)	228.62	112.83	1.22-	0.22
	Negative	830 (79)	242.55	123.73		
HIV level	Asymptomatic	776 (74)	254.01	119.00	6.67	0.00
	Clinical stage	276 (26)	197.66	124.32		
Addiction type	None	200 (19)	224.75	117.92	9.46	0.00
	Quitted	623 (59)	231.69	111.34		
	Using	229 (22)	269.58	147.93		
Transmission way	Injection	701 (66)	229.39	107.61	22.44	0.00
	Sex	312 (30)	249.13	137.55		
	Transfusion	39 (4)	372.83	193.54		
Joint injection	Yes	266 (25)	230.96	108.74	3.79-	0.00
	No	786 (75)	265.28	146.15		
Imprisonment history	Yes	723 (69)	229.07	109.04	4.00-	0.00
	No	329 (31)	261.53	146.60		
Unsafe sex	Yes	642 (61)	236.32	119.85	096.-	0.33
	No	410 (39)	243.78	127.51		
Tattooing	Yes	262 (25)	231.50	111.08	1.17-	0.24
	No	790 (75)	241.78	126.52		
Joint blade use	Yes	248 (24)	230.28	112.99	1.31-	0.19
	No	804 (76)	241.98	125.72		
Knife injury	Yes	105 (10)	242.9	102.66	0.32	0.74
	No	947 (90)	238.82	124.97		

Table 2

Pearson correlation results for determining factors effect on CD4 cell count

Variables	(Deviation.Std)Mean	Correlation Coefficient	p-value
Patient age	(42.90) 35.28	**0.226-	0.000
cell count 4First time CD	(192.98) 342.13	**0.861	0.000
PPD test	(5.95) 8.98	0.016	0.615
HIV duration time	(1.88) 5.54	**0.39-	0.000

*****. Correlation is significant at the 0.01 level (2-tailed)***

Table 3

The Poisson regression analysis results for determining factors effect on CD4 cell count

Variables		B	p-value	Exp(B)	95% CI Exp(B)	
					Lower	Upper
Gender	Female	165.-	000.	848.	815.	883.
	Male	[a]0	.	1	.	.
Yes	**Insurance**	054.	002.	1.056	1.020	1.093
No		[a]0	.	1	.	.
Occupation	Unemployed	037.-	000.	0.963	0.943	0.984
Employed		[a]0	.	1	.	.
Yes	**TB prophylaxis**	026.	017.	1.026	1.005	1.048
No		[a]0	.	1	.	.
Yes	**HAART**	035.	001.	1.035	1.015	1.056
No		[a]0	.	1	.	.
Addictiontype	None	055.-	023.	0.946	0.897	0.997
Quitted		121.-	000.	0.886	0.859	0.914
Using		[a]0	.	1	.	.
Injection	**Transmission way**	187.-	000.	0.829	0.807	0.849
Sex		069.-	071.	0.933	0.923	0.973
Transfusion		[a]0	.	1	.	.
Yes	**Joint injection**	212.-	000.	809.	776.	844.
No		[a]0	.	1	.	.
Yes	**Prison history**	033.-	040.	0.967	0.936	0.999
No		[a]0	.	1	.	.
Yes	**Joint blade use**	024.-	051.	0.976	0.952	1.000
No		[a]0	.	1	.	.
HIV duration time		024.-	000.	0.976	0.970	0.981
Patient age		004.-	000.	0.996	0.994	0.997
cell count 4time CD First		0.222	000.	1.248	1.226	1.268

a. Set to zero because this parameter is redundant

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EVALUATION OF THE EFFECT OF K-W-D-L PROBLEM-SOLVING MODEL ON SELF-EFFICACY, ANXIETY AND MATH FUNCTION

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ABSTRACT

The aim of the research was to evaluate the effect of K-W-D-L problem-solving model on self-efficacy, anxiety and math function of students. The statistical population of this research was junior high school students in Tehran. ,Three high schools were selected from Tehran's area based on cluster sampling method, according to the existing facilities, and same major classes of each school were randomly selected among the selected schools. The sample size was 145 people. This research has been done on both test and control groups and also evaluated before and after model implementation. To evaluate the math self-efficacy and anxiety, MATHEMATICS SELF-EFFICACY AND ANXIETY QUESTIONNAIRE, was used. To assess the math function of students, the first and second semester grades of the students were considered in the experiment. After data analysis, it was found that the KWDL problem-solving model leads to improve the math function and self-efficacy.

Keywords: *Model, problem-solving, K-W-D-L, math self-efficacy, math anxiety*

INTRODUCTION

Today, problem-solving is one of the most important concerns of the developed countries in the field of education. According to the results of international tests, Japan is one of the leading countries in education of mathematics. In Japan during 1947 to 1951 and due to the growing education, the emphasis of lesson studies is on daily life experiences and in the same period, problem-solving was become as a part of the curriculum of the primary schools. In 1951, problem-solving was proposed as the goal of teaching mathematics in schools. However, it was the only period that problem-solving was indicated as the main objective of the curriculum of this country. Of course, problem-solving was basically related to addition, subtraction, multiplication, division and promotion [1]. After 1958, the aim of teaching mathematics was to reinforce the mathematical thinking. In the course studies of 1958, the aims of mathematics education were considered as follow: (Students should understand the concepts, principles, values, quantities and the geometric shapes. They must have advanced mathematics thinking and also be able to solve their problems using mathematics.) Mathematical problem-solving is a very important factor in the review of math education [2].There are different strategies and approaches to teach (problem-solving) in the classroom and this teaching was not limited to a specific formula. One of those methods was (work in small groups) based on Vygotsky (the theory of social interaction). Vygotsky's ideas are strong justification on the importance of the role of small groups in growth and development of learners. Vygotsky claimed that collaboration helps students to achieve to the approximate range of growth [3]. Small groups creates a natural environment for students that

through it people can interact and discuss with each other and understand the mathematical relationship better. One of the organizing pattern of small groups in the classroom and monitoring their actions is K-W-D-L model which has been developed by the University of Mississippi. This model consists of four stages and each group declares results of their work in four stages after the problem presentation by teacher. These four steps are:

1. What I know?
2. What I want to find out?
3. What I did?
4. What I learned?

Bandura (1997) noted that students with high self-efficacy have more desire and motivation for learning and show more insist to solve the challenge in challengeable situation [4]. Bandura introduces four main sources for self-efficacy:

1. Mastery experiences
2. Vicarious experiences
3. Social persuasion
4. Physiological states

Many students' beliefs about their capabilities are returned to their old experiences. For example, students who were successful in their previous mathematical tests for several times, most believe that they can be successful at the next tests also. The second source involves the students with this problem to evaluate their similar social models and how those models are deal with the similar tasks. Although this case is not effective like the past experiences, but however the students feel more self-confidence if find that the similar students with their situation are successful in mathematics. Social stimulations were returned to encourage whether positive or negative from the friends, teachers and parents. Physiological states of the students returned to the student body such as fatigue, pain and nausea [4].Anxiety is in all people in a moderate rate as a part of every human's life and it is considered as an adopted answer in this range. So, it can be said that: with no anxiety, all of us were asleep on back of our desks. Lack of problems may face us with many problems and dangers. Low level of anxiety is essential for the survival of human and can be considered as normal [5]. In some cases, anxiety creates productivity and creativity in the person, provides the ability to visualize the situation and dominate them or causes to raise his or her to seriously face with an important responsibility such as preparing for an exam or accepting a social responsibility. But as its disease form, it is considered as defeat, lack of compromise and a wide frustration which deprives the person from a much of its facilities [6]. Math anxiety was introduced as a new term to describe the difficulty attitude of students regarding mathematics by Dreger & Aiken in 1957 for the first time. Perry has defined the math anxiety as lack of the individual's ability to cope with the situations which are concerned with numbers and in general terms with mathematics. Generally anxiety and particularly math anxiety can increase the rate of distractions and attack of irrelevant thoughts to the mind and cause distortion of individuals' perceptions of phenomena and math issues by creation of disruption in mental structures and processing of information [7]. The students who suffer from math anxiety, do not have anxiety in other subjects necessarily. Math anxiety have many negative effects. Students who have a high math anxiety usually have a negative attitude and feeling for mathematics. When the students reach to academic mathematics, their attitudes about mathematics become stable and the students with math anxiety do not like to participate in math classes or the jobs which are involved with mathematics. Maybe the highest effect of math anxiety is decrease in mathematical achievements [8].The research progress in problem-solving from 1980 to 1995 has been reported. By collecting data from the books and different scientific journals and lesson groups, he concluded that many studies have been conducted after 1980. These researches increased significantly since 1985 and then remained stable. Pointed out that during this period, investigation about mathematical problem-solving is one of the most important issues of university researches and school teachers. It seems that in the recent ten years, the number of studies with the word of (problem-solving) in their titles has been declining. However, there were studies which have not brought (problem-solving) clearly in their research titles, but basically have addressed this issue. For example, some studies in the field of social interactions in learning of mathematical or the process of math modeling and also some studies about the learning process of math content were done. This issue can be interpreted that new problem-solving studies expand the previous ones and everybody evaluates one aspect of it based on their interest [9]. Although mathematics always had been emphasized in the schools but the ability of the students to mastering it is also always questionable.

Due to the importance of the above mentioned, this study was conducted aim to evaluate the effect of K-W-D-L problem-solving model on math self-efficacy, math anxiety and students' understanding of problem-solving. In this research, the K-W-D-L problem-solving model is an independent variable. Math self-efficacy, math anxiety and students' understanding of their problem-solving behavior are the dependent variables. The investigated theories in this research are as below:

1. The K-W-D-L problem-solving model causes an increase in math self-efficacy.
2. The K-W-D-L problem-solving model causes a decrease in math anxiety.
3. The K-W-D-L problem-solving model causes an increase in math function.

MATERIALS AND METHODS

The statistical population were the high school juniors in Tehran and they were selected according to the existing facilities and using the like-cluster sampling method from three high schools. Two classes from each school were selected, one of them as the test group and another one as the control group. The sample size was 145 people.MATHEMATICS SELF-EFFICACY AND ANXIETY QUESTIONNARE (MSEAQ) was used to assess the mathematics self-efficacy and math anxiety. The applied tools of our study are standard and their validity and reliability have been approved before. Also in this research, its validity was evaluated again and Cronbach's alpha was 78%. Due to the high and reverse relevance of mathematics self-efficacy and math anxiety, founder of this questionnaire has measured both the components in a questionnaire. This questionnaire has 29 components, among that 13 components assess mathematics self-efficacy and another 16 components assess math anxiety. This questionnaire is based on Likert scale that give the scores of 1 to 5 to the answers [8]. We referred to the selected classes and share the general purpose of this research with students. Students were asked to answer the questions of the questionnaire accurately and honestly. The mentioned questionnaire was performed in each two classes at the first semester of study, after that in the second semester one class was considered as the test group and the other one as the control group. Problem-solving model of K-W-D-L was performed in the test group. In this way, students were divided into three or four-individual groups. The method of this model was explained for the classroom teachers. Problem-solving model of K-W-D-L was performed in the classrooms of the test group. Then, the questionnaire was given to the students again at the end of the second semester and the result was evaluated. The mathematical function of the students in the first and second semesters was assessed according to the final grades. Then, data were analyzed using SPSS software.

RESULTS

In order to detect the use of parametric and nonparametric tests, we evaluate the normality of data. As it is seen in table 1 and due to the obtained – P which all are higher than 0.05, we concluded that all data follow a normal distribution. So, we use parametric tests to evaluate the hypothesis of the research.

Table 1

Evaluation the normality of pre-test and post-test data in test and control groups

Students' math anxiety in test group	Students' math anxiety in control group	Math self-efficacy in test group	Math self-efficacy in control group	Students' math function in test group	Students' math function in control group	Total numbers of subjects 68	
49	44.05	34.40	38.30	15.80	16.25	Mean	Normality of pre-test data
9.03	7.52	7.24	7.73	2.66	2.67	SD	
0.2	0.2	0.2	0.2	0.2	0.17	Pre-test P	
44.10	49.65	38.05	38.05	16.7	15.2	Mean	Normality of post-test data
7.50	8.77	7.86	7.86	1.80	2.30	SD	
0191	0.2	0.2	0.2	0.2	0.2	Post-test P	

In table 2, the difference in students' math function in both control and test groups were evaluated using t-test. In pre-test function in both test and control groups and according to the obtained P-value (0.05<0.858), the assumption of equality of variances can be accepted. Then, in equality test of the averages and according to the obtained P-value (0.05<0.597), the assumption of equality of averages will be accepted again in both control and pre-test test. In pre-test function of both test and control groups and according to the obtained P-value (0.05<0.429), the assumption of equality of variances will be accepted. In equality test of averages and according to the obtained P-value (0.05>0.028), the assumption of equality of the averages will be rejected. According to the table 3, it is concluded that the average of math function in test group is higher than the control group. Due to the analysis, it is concluded that the implementation of problem-solving KWDL model causes an increase in students' math function. As it is observed in table 3, the average of the test group have received better average compared to the first semester (before implementation of the model). It is while the scores average of the students in the control group were not only has not remained stable, but also it has decreased. This issue can be analyzed that the volume of courses in the second semester has been more than the first semester.

Table 2
Result of t-test in order to evaluate the difference in students' math function in both test and control groups

			Levene test for equality of variances		t-test for equality of the averages		
			F statistic	P-value	T statistic	Degrees of freedom	P-value
Pre-test function	math	In case of equality of variances	0.032	0.858	0.533	38	0.597
		In case of lack of equality of variances			0.533	38	0.597
Post-test function	math	In case of equality of variances	0.638	0.429	-2.28	38	0.028
		In case of lack of equality of variances			-2.28	35.95	0.028

Table 3
Evaluation the average of math function in test and control groups

	code	Mean
Pre-test function	Test group	15.80
	Control group	16.25
Post-test function	Test group	16.7
	Control group	15.20

To evaluate the math self-efficacy in both test and control groups, t-test is used. According to table 4 in each two groups before and after the implementation of KWDL model based on the obtained P-value which is more than 0.05, the assumption of equality of variances was accepted. As it has been observed in averages evaluation, because P-values are more than 0.05, the assumption of equality of math self-efficacy in both groups before and after implementation of the model was accepted. Using this analysis, it is concluded that math self-efficacy in both test and control groups before and after implementation of the model has no difference which shows that this component is the same in each of both groups.

Table 4
Result of t-test in order to evaluation the difference in students' math self-efficacy in both test and control groups

		Levene test for equality of variances		t-test for equality of the averages		
		F statistic	P-value	T statistic	Degrees of freedom	P-value
Pre-test math self-efficacy	In case of equality of variances	0145	0.705	1.64	38	0.108
	In case of lack of equality of variances			1.64	37.83	0.108
Post-test math self-efficacy	In case of equality of variances	1.305	0.36	0	38	1
	In case of lack of equality of variances			0	36.99	1

In table 5, paired tests were used to evaluate self-efficacy of control and test groups before and after implementation of the model. As it has been observed, in the test group and due to the obtained P-value (0.05>0.0), the assumption of equality of averages before and after implementation of the model is rejected and due to value of the averages, it can be concluded that math self-efficacy of these four groups has increased while the results of control group indicated that math self-efficacy value was stable during the year. These results show that the problem-solving KWDL model increases students' self-efficacy.

Table 5
Paired tests in order to evaluate math self-efficacy in both test and control groups

P-value	Mean	
0.609	38.30	Pre-test self-efficacy of the control group
	38.05	Post-test self-efficacy of the control group
0	34.40	Pre-test self-efficacy of the test group
	38.05	Post-test self-efficacy of the test group

Finally in table 6, the difference in students' math anxiety is evaluated, as it can be seen in the table, before the implementation of problem-solving of KWDL model and based on equality of variances and after that, the obtained P-value which is more than 0.05, the assumption of equality of averages was accepted. After implementation of KWDL problem-solving model and according to the below table and the obtained P-value, the equality of variances is accepted, but in continue and according to the obtained P-value (0.05>0.038), the assumption of equality of the averages is not accepted. In continue and according to the table 7, it can be concluded that the average of math anxiety in the test group was less than control group that indicates the positive effect of KWDL problem-solving model on this component, so that KWDL problem-solving model causes a decrease in students' math anxiety.

Table 6
Result of t-test in order to evaluate the difference in students' math anxiety in both test and control groups

		Levene test for equality of variances		t-test for equality of the averages		
		F statistic	P-value	T statistic	Degrees of freedom	P-value
Pre-test math anxiety	In case of equality of variances	0.419	0.521	-1.88	38	0.068
	In case of lack of equality of variances			-1.88	37.79	0.068
Post-test math anxiety	In case of equality of variances	0.12	0.731	2.15	38	0.038
	In case of lack of equality of variances			2.15	37.10	0.038

Table 7
Evaluation the average of math anxiety in test and control groups

	code	Mean
Pre-test function	Test group	49
	Control group	44.05
Post-test function	Test group	44.1
	Control group	49.65

DISCUSSION

K-W-D-L problem-solving method including small groups, in addition to learning the skills to the members of the group, can prepare them to enter into different social groups and help to increase the motivation of disinterested students to lessons. In this method, students learn from each other and explain what they solve in the group, so thinking in the group grows. Small group working in problem-solving of mathematics seems a useful and cost-effective solution. If by this way the person's belief in the evaluated components can be change then it can be a useful step toward changing the students' mathematical point of view and therefore their better mathematical activities. According to the obtained results in this research and since the implementation of this model causes an increase in math function and math self-efficacy and in other words causes a decrease in math anxiety, it is a very effective way in education, especially in mathematics which is the problem of many students. According to the above mentioned, lack of cost for this model, it is convenient and applicable in all classrooms, makes this model as one of the essentials of math classes. The results of Wales' research show that the students with higher self-efficacy skills, do better that the other students in performance field. Also to avoid the parrot-like learning and step towards meaningful learning, the ability to create and solve problems is an important arena [10]. It is recommended to the teachers and parents to note the students' understanding from their abilities, because this perception may predict motivations and next academic choices of students. According to Phalet et al, the people with higher self-efficacy, imagine higher goals and wishes for themselves, so try more to achieve their goals [11]. According to many research results that show math anxiety is one of the important and effective factors on the performance and math learning, K-W-D-L problem-solving model is one of the strategies to reduce math anxiety.

CONCLUSION

After data analysis, it was found that the KWDL problem-solving model leads to improve the math function and self-efficacy.

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NANO STRUCTURES OF PRODUCED FERRIC NANOPARTICLES BY CHEMICAL METHOD

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ABSTRACT

Ferric nanoparticles were produced by using aqueous solution containing Iron chloride and H_2O mixture was heated for 90 minutes. Aqueous solution temperature for synthesis was adjusted to 80 º C and the pH was adjusted at 2.5. Ferric Nanoparticles achieved from evaporated aqueous solution at 250 ºC temperature was subjected for X-ray diffraction (XRD), scanning electron microscopy (SEM), and Energy dispersive X-ray spectroscopy (EDAX) analysis and all the results were in good agreement with each other.

Keywords: *Nanoparticle, Ferric, XRD, SEM, EDAX*

INTRODUCTION

Nanocrystalline transition metal oxide thin films are fascinating materials because of their electrical and magnetic properties which have great importance in the field of micro-electronics and nano-electronics, mainly for the development of optoelectronic devices. Iron oxide (α-Fe_2O_3) is a thermodynamically stable oxide of hexagonal close packed crystal structure with indirect and direct band gap energies around 1.9 and 2.7 eV, respectively [1]. In recent years, much attention of scientific community has been focused on iron oxides due to their potential applications such as magnetic devices [2] and gas sensor [3]. Iron oxide Nanoparticles, have been approved by both the US Food and Drug Administration (FDA) and the European Medicines Agency for IV medical use. Iron may cause conjunctivitis, choroiditis, retinitis and it may remains in the tissues. Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in development of a benign pneumoconiosis, called siderosis. Fe_xO_y(x=1-3 and y= 0-4) Nanoparticles can produce by several methods, such as chemical vapor deposition(CVD) [4], MOCVD [5], reactive ion beam sputtering [6] and laser-assisted CVD [7], results in excellent quality thin layers, they lack flexibility and cost effectiveness.

The aim of this work is to produce Fe_xO_y(x=1-3 and y= 0-4) Nano particles nanoparticles and investigate about their Nano structure and crystalline properties by XRD, SEM and EDAX analysis.

MATERIALS AND METHODS

Experimental details

Nanoparticles prepared by CBD were grown from solution containing Iron Chloride ($FeCl_3$) as sources of Fe^{3+} respectively, NH_3 was used as complex agent of the Fe^{3+}. The resulting solution was diluted to 9.50 mL with water distillated. Deposition parameters were: [$FeCl_3$]=50mM;[NH_3]=500mM . Ferric nanoparticles were produced by using aqueous solution containing Iron chloride and thioacetamide mixture was heated for 90 minutes. Aqueous solution temperature for synthesis was adjusted to 80ºC and the pH was adjusted at 2.5. Ferric Nanoparticles achieved from evaporated aqueous solution at 250ºC temperature for 1 hr. Crystal and phase structure of deposited ferric nanoparticles were identified using an X-Ray X'pert MPD diffractometer (CuK_α radiation,λ=0.15406nm) with step size of 0.03 and count time of 1s per steps.

Nano-structure and element analysis were investigated by SEM (S-3400, Hitachi, Japan).

RESULTS AND DISCUSSION

Figure 1 shows the X-ray diffraction pattern of Ferric nanoparticles, produce at 90 minutes chemical deposition by CBD method. It was was observed that the nano-structure is polycrystalline and fit well with rhombohedral crystal structure [8]. Growing of the grains results to crystalline peaks. There are at least four allotropic forms of iron, γ, ε , β and α which are converted from one form to another due to change in temperature and pressure grain size,. In this work, the most peaks was belong to α-Fe2O3. Noisy XRD pattern relates to amorphous glass substrate.

Figure 1
XRD pattern of Ferric nanoparticles deposited at 90 minutes, by CBD method.

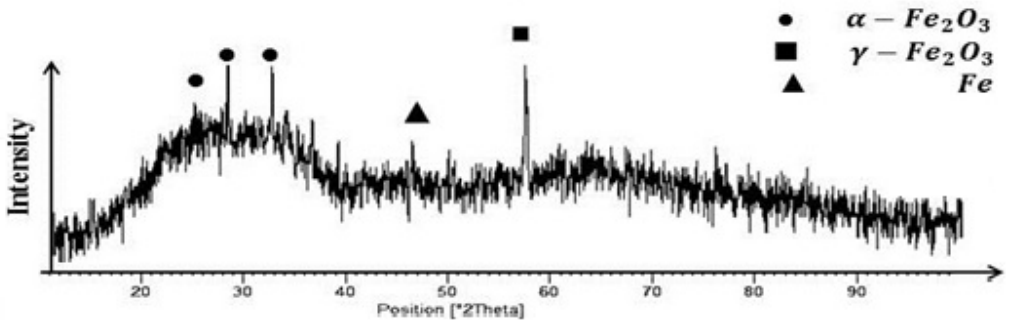
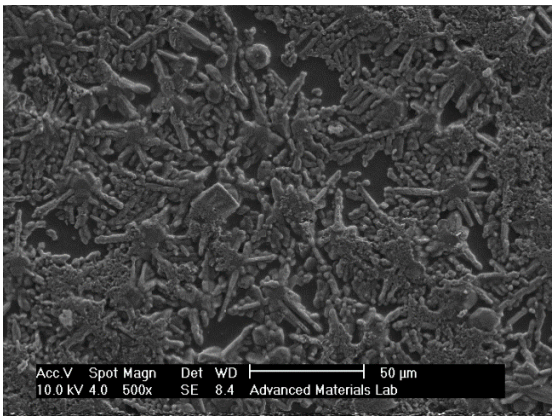


Figure 2 shows the SEM image of produce ferric nanoparticles in this work. As it can be seen, the nanoparticles are grown in different fractal shapes as broccoli and its stalks, ferns and bones along with voids between them.

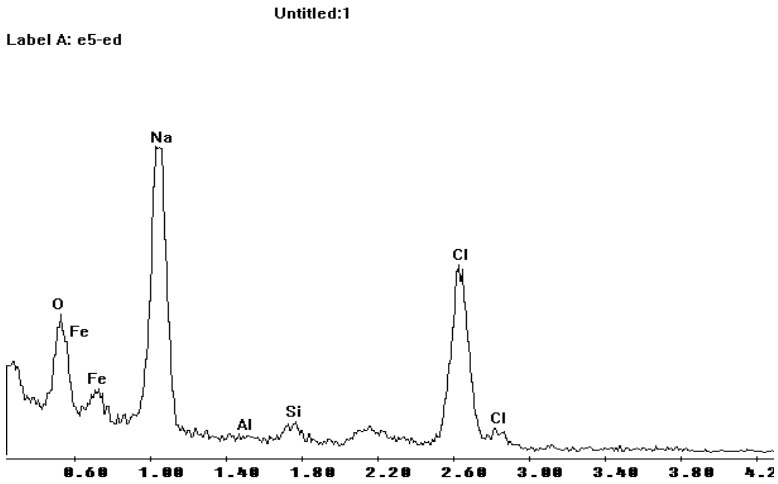
Figure 2
The SEM image of Ferric Nanoparticles deposited at 90 minutes, by CBD method.



The EDAX analysis is shown in the figure 3. Result approves the configuration of ferric nanoparticles. Presence of impurities such as Cl, Na etc was observed which are because of using chemical deposition method.

Figure 3

The EDAX graph of Ferric nanoparticles deposited at 90 minutes, by CBD method.



CONCLUSION

From the above results it can be concluded that the α-Fe_2O_3shown the most crystalline peaks that was in agreement with XRD result. Moreover, SEM image showed fractal structures as ferns, broccoli (and its stalks) and bon like shapes grown on layer. EDAX analysis Result approved configuration of ferric nanoparticles.

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