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RESEARCH ARTICLE

Investigating the Relationship between Agency Cost and Top Executives' Overconfidence Regarding Cash Flow Sensitivity to Invest in Tehran Stock Exchange

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ABSTRACT

One of the main assumptions of agency theory is that company executives (employers) and stockholders (employees) have conflicts in their interests and executives do not necessarily make decision for the benefit of stockholders. Regarding this hypothesis, executivesare trying to maximize their benefits by using their agency effectiveness. The goal of the present research is to study the relationship between agency cost and top executives'over-confidence regarding cash flow sensitivity to invest in Tehran Stock Exchange. The statistical society includes all firms enlisted in Tehran Stock Exchange between the years 2007 and 2011. By using a specific screening method, 83 firms were investigated. The research method was correlation type and the research variables were tested using statistical techniques. Test findings showed that there is positive and negative significant relationship between agency problem measurement indexes such as free cash flows and assets' flow rate and investment-cash flow sensitivity, respectively. However, there was not any significant relationship between operating costs ratio and sales with investment-cash flow sensitivity. Finally there was a positive and significant relationship between top executives' over-confidence of and investment-cash flow sensitivity.

Key words: free cash flow; investment-cash flow sensitivity; top executives' over-confidence; asset turnover; Tehran Stock Exchange; Iran

INTRODUCTION

One of the most important factors in improving a company's performance is its executives' behavior and decision-making ability. Executives are responsible for providing independent monitoring of corporate performance and are accountable to shareholders and stakeholders. The popular belief is that more optimistic and confident executives, they will supervisethe company's performance more effectively (Hermalin & visbek, 2010).In practice, however, the capital market cannot be fully effective. On the other hand, executives who are not the owners of the company or have different interests from the main owners (the agency issue) manage the companies. In such cases, investors do not trust the company executives (Arbsallehy & Ashraf, 1390).

Furthermore, one of the main assumptions of agency theory is that executives (employers) and shareholders (employees) have conflict of interest, and executives do not necessarily decide in favor of the shareholders.One of the indicators of measuring the agency cost is the free cash flow and some executivesmay investitin projects with negative net present value in order to secure their personal interests in the short term. In addition,the ratio of the total asset turnover and the whole operating costs to sales is another parameter of measuring the agency cost (Hassas Yeganeh, 1388).On the other hand, the executives' over-confidence is one of the key subjects in the theories of behavioral finance, which has its root in psychological issues with the belief that people in general are over-confident.

Research has indicated that there is a significant correlation between the cost of agency and executives' over-confidence so that those with higher confidence exercise their influence and thereby increase or decrease the amount of investment. This could eventually lead to inefficiency in investment and investment-cash flow sensitivity (Landier & Thesmar, 2010). This study, therefore, is an attempt to address this concern, as it discussing the need for conducting such research and elaborating on the research hypotheses as well as its scope.In particular, this study aims to investigate the relationship between the agency cost and top executives ' over-confidence with investment-cash flow sensitivity in Tehran Stock Exchange.

LITERATURE REVIEW

Cash resources are important and vital to any economic unit. Striking balance between the available cash resources and cash needs is one of the most important factors in the economic health of the business units and the key to sustainability of their activities. Cash flows are pivotal to financing decisions,the patterns of securities valuation, capital project evaluation methods, etc. (Haghighi & Ghorbani, 1389).Because of the large number of owners and shareholders in today's large companies, the direct control on the company performance by shareholders is not possible (Kabirzadeh, 1389). For this reason, ownersdelegate the company management to executives. This, therefore,leads to the separation of ownership from management (control); an organization problem called the 'agency problem' (Hassas Yeganeh, 1388).

According to Jensen and Meckling (1976), agency problem stems fromexecutives' motivation to achieve personal self-interests.From this perspective, they proposed the principles of agency theory. One of the main assumptions of agency theory is that executives 'employers' and shareholders 'employees' haveconflict of interests and executives do not necessarily decide in favor of shareholders. Another assumption of agency theory is that the approval of employers is costly for employees. Agency costs result from the efforts of shareholders to monitor executives. On the other hand, executives tend to prove that they are trying to increase shareholders' wealth (Ibid).

According to Jensen (1986), one of the indicators of measuring agency cost isthe level of free cash flow, which some executives may invest it in projects with negative net present value in order to secure their personal interests in the short term. Costs of free cash flow are those involved in projects with negative net present value of the investment

(Mehrani & Bagheri, 1388). Also, according to Ang et al. (2009), the ratio of the total asset turnover and the whole operating costs to sales is another parameter of measuring the agency cost. On the other hand, the executives' over-confidence is one of the key subjects in the theories of behavioral finance, which has its root in psychological issues with the belief that people in general are over-confident. Through further research, Landier and Thesmar (2010) developed this the psychological background of behavioral finance and identified executives as a special group who are more confidentthan ordinary people.

According to Weinstein (1980), the executives' over-confidence can affect the firm investors' decisions, which is critical insecuring the firm's financing (Huanget et al., 2010).Heaton (2008) proposed a model of executives' over-confidence showing that the over-confidence of executives can have a positive and significant impact on investment cash flow sensitivity.Moreover, this impact is more on the companies that have high financing costs.According to Lin et al. (2010), empirical studies have found that individual characteristics of executives, specifically behaviors resulting from over-confidence lead to deviations in the investment decisions of the firms so that over-confident executivesincreased the investment-cash flow sensitivity; something that is more evident in firms with financing constraints (Malmendier & Tate, 2013).

In general, there are two prevailing theories in the cash resources:trade-off theory and hierarchical theory. Based on the first theory, companies determine the adequate levels of cash according to the balance between benefits and costs of holding cash resources. Three mainmotives to maintain cash resourcescan be named as transactions motive, precautionary motive, and promissory note motive (Wang, 2010).However, as the result of asymmetric information and signaling problems associated with external financing the second theory does not follow the hierarchy theory of financing approach. In this theory, the internal resources are preferred to external sources. If more funds are needed and NPV is positive, the debt will be cleared and cash assets will be accumulated (Jani et al., 2009).

In general, cash flow sensitivity in accounting research can be divided into two categories:

1. Cash flow sensitivity of investment that refers to the percentage of change in the company's capital expenditure against changes in cash flow (Kashanipour & Naginejad, 1388).

2. Cash flow sensitivity of cash resources that refers to the percentage of change in the levels of maintaining cash resources against changes in cash flow (Dichu et al., 2012). In this study, In order to study,however, cash flow sensitivity refers to the first case (cash flow sensitivity of investment).

The agency cost and executives' over-confidence lead to the devaluation of the company and eventually to the decreased dividend payments to shareholders (Deshmuk, 2009).Research has shown that there is a significant correlation between the cost of agency and executives' over-confidence so that more confident executives exercise their influence and thereby increase or decrease the amount of investment (Huang et al., 2010).Given the importance of agency cost and executives' over-confidence for the company and also investment-cash flow sensitivity in decisions made for the company investment plans, this study aims to investigate the relationship between the agency cost and top executives' over-confidence with investment-cash flow sensitivity in Tehran Stock Exchange.

Hypotheses of the study

Aligned with the research questions, the following hypotheses were formulated:
There is a significant relationship between the agency cost and investment-cash flow sensitivity.
There is a significant relationship between the free cash flow and investment-cash flow sensitivity.
There is a significant relationship between the ratio of asset turnover and investment-cash flow sensitivity.
There is a significant relationship between operating costs ratio and sales with investment-cash flow sensitivity.

There is a significant relationship between the executives' high confidence andinvestment-cash flow sensitivity.

Methodology

Considering the used correlation method and its applied goals, the present study falls within the remit ofaccounting research. In addition, given that the historical data will be used to test hypotheses, this study could be classified as a quasi-experimental research.Epistemologically, then, this study is also an experimental using inductive reasoning, field notesandpost hoc historical data (i.e., using the data from the past). The following sections present the analysis of different variables.

Variables and their analysis

This study investigates the relationship between agency cost (free cash flow, asset turnover and operating costs ratios) and top executives' over-confidence with investment-cash flow sensitivity. Additionally, the firm size and the ownership structure variables are considered as controlling variables. The general model used in this study will be based on the model proposed by Huang et al. (2010).

Dependent variable

The dependent variable in this study is investment-cash flow sensitivitythat is measured using the model proposed by Arsalan et al. (2006). It is worth noting that Arabsalehi and Ashrafi (1390) used this model in their study before.

$$INV\ i,t = \beta 0 + \beta 1\ CFLOWi,t + \beta 2\ Qi,t + \varepsilon it$$

INV i,t = represents the firm investment of i in year t, which is measured based on the ratio of capital expenditures to net fixed assets in the beginning of the period.

CFLOWi,t= reflects the cash flow of firm i in year t, which is measured based on the ratio of cash flow from operating activities to the fixed net assets in the beginning of the period.

Qi,t = represents the growth opportunities of firm i in year t, which is measured based on the value of total debt plus market value of equity divided by value of total assets.

i represents the firm (the place) and t represents the year (the time). In order to measure the cash flow sensitivityin this model first regression model (3.1) for each year of firmis run and then CFLOWi, which is extracted from regression andinvestment-cash flow sensitivity, is calculated.

Independent variables

The independent variables in this study are agency cost and top executives' over-confidence. However, according to the studies conducted by Len and Poulsen (1989) and Ang et al. (2000) three indices of free cash flow, the ratio of asset turnover and the total operating costs to sales ratio are used to measure the agency cost.This study alsofollows the same procedure and uses the models previously tested byStayesh et al. (1390):

Free cash flow

$$FCF_{i,t} = (INC_{i,t} - TAX_{i,t} - INTEP_{i,t} - PSDIV_{i,t} - CSDIV_{i,t})$$

FCFi, t = free cash flow of firm i in year t
INCi, t = operating profit before depreciation of firm i in year t
TAXi, t = total taxes paid by firm i in year t
INTEPi, t = costs paid by firm i in year t
CSDIVi, t = dividends paid ordinary shareholders of firm i in year t

Asset turnover ratio

Asset turnover ratio = ((total sales) / (total assets))

$$\text{Asset turnover ratio} = \left(\frac{\text{total sales}}{\text{total assets}}\right)$$

Total sales to total assets ratio of a company indicates the effectiveness of the company's investment decisions, the productivity as well as the use of corporate assets by executives for more sales, which is used as a reverse criterion (the lower the higher the cost of agency) to show the cost of agency (Setayesh, 1390).

The ratio of operating costs to sales

$$\text{Operating costs to sales Ratio} = \left(\frac{\text{operating costs}}{\text{total sales}}\right)$$

The ratio of operating costs to sales ratio measures the wayoperating costs are controlled by executives. This criterionis used as a direct measure (the greater this measure, the higher the agency cost) to measurethe agency cost (Ibid).

Over-confidence of top executives

According to a study carried out by Huang et al (2010), executives' over-confidence isexcessive optimism exercised by executives because executives are so optimistic about their performance that leads to their over-confidence.In order to measure the executives' over-confidence in this study, the difference between the expected profits and real benefits over expected profits is calculated.

$$\text{Top executives' over} - \text{confidence} = \left(\frac{\text{real benefits} - \text{expected profits}}{\text{expected profits}}\right)$$

Controllable variables

Based on the model proposed by Huang et al. (2010) as well as the study conducted by Kashanipour et al. (1389), the following variables are considered as controllable variables.

Ownership structure

Ownership structure can also affect investment-cash flow sensitivity. Efficient monitoring of major shareholders can reduce of executives'too much power and information asymmetry, as well asinvestment-cash flow sensitivity (Kashanipour et al., 1389). Consistent with other studies, this study usespercentage of block ownership of shares to

measure ownership structure. The owners of share blocks are individuals who own at least 5% block of a company's shares. It can be noted that in this study the data for block shareholder is included in the statistical model.

The firm size

Thefirm size may affect investment-cash flow sensitivity. In general, large companies face with fewer problems in attracting investment and eventually face with less investment-cash flow sensitivity because in large companies creditors incur less monitoring and agency costs (Ibid). In this study, the size of a company is calculated using ln assets.

Size = ln Assets

Data analysis

The following table presents the results of the descriptive statistics for the study variables:

This table shows that after normality test, the significance level of the KS test statistic Z for the dependent variable increased above 05.0 or the normal distribution of the data. Therefore, the hypothesis H0 suggesting the normal distribution of the data is accepted, which indicates that the dependent variable is normally distributed after the process of data normalization.

The results presented in Table 4 indicate that all variables stand at a significant level of above 95 percent confidence level.

To test the hypotheses of the study the following model is used. In order to identify whether using data panel will be effective for estimation, the F-Limer test is used. The null hypothesis of this test is as follows:

$$CFR_{i,t} = \beta_0 + \beta_1 EO_{,t} + \beta_2 FCF_{,t} + \beta_3 SA_{,t} + \beta_4 OCS_{,t} + \beta_5 OS_{i,t} + \beta_6 SIZE_{,t} + \varepsilon_{it}$$

The results of these tests are presented in Table 5.

Interpretation:the results of the F-Limer test show that since the level of significance of the test is over 0.05 (0.963), it is then necessary to use other approaches. In order to determine the variance anisotropy, the White test was used. The null hypothesis of this test is as follows: The results of this test are shown in Table 6.

Interpretation: Since the significant level of White test is less than 05/0 (0.000), this suggests that the model is a variance anisotropy. Thus, after removing the variance anisotropy the Breusch–Godfrey-Bertolo test is used. In addition, the Breusch–Godfrey-Bertolo test is used to clarify the problem of serial correlation. The null hypothesis of this test is as follows: The results of this test are shown in Table 7.

Interpretation: since the significant level of The Breusch–Godfrey-Bertolo test is more than 0.05 (0.431), the model does not have the problem of serial correlation.

In order to check if the model was significant, the results confirmed the overall significance of the model, given that the significance level of the F-statistics is smaller than 0.05 (0.000) with 95%confidence level. The coefficient of determination of the adjusted model suggests that 10.1% of the variation in investment-cash flow sensitivity of firms is explained by the variables in the model.Additionally, the results from the assumptions of the classical regression

Jariku test indicate that the residuals obtained from the model estimation enjoya normal distribution at 95% of confidence level so that the significance level of the test is greater than 0.05(135/0).Also, considering that the statistic value of Watson's model is between 5.1 and 5.2 (540/1), it could be said that in this model, there remains no problem of autocorrelation of the residuals.

Furthermore, since the significance level of executives' over-confidence, free cash flow, corporate ownership structure and asset turnover ratio is below 05/0, the correlation coefficients indicate that there is a positive correlation between executives' over-confidence, free cash flow, corporate ownership structure, asset turnover ratio and investment-cash flow sensitivity and there is a negative correlation between asset turnover ratio and investment-cash flow sensitivity.Eventually, the test of multicollinearity among the variables of the study indicated that the value of VIF (variance inflation factor) for all variables was smaller than 5, suggesting there exists no severe multicollinearity problem between variables.

DISCUSSION AND CONCLUSION

As the purpose of this study was to examine the relationship between agency cost and executives' over-confidence withinvestment-cash flow sensitivityin Tehran Stock Exchange, in addition to the aforementioned theoreticalframework, the findings show that there is apositive and significant relationship between free cash flow and investment-cash flow sensitivity. This is because when free cash flow rises it leads to an increase in agency cost asexecutives use free cash flow to enhance their influence and maximizetheir interests.Thus, the index of agency cost leads to increasinginvestment-cash flow sensitivity. In other words, itincreases the risk of investment-cash flow sensitivity into the economic unit.

The findings from the second hypothesis suggest that the asset turnover ratio has anegative and significant correlation with investment-cash flow sensitivity. This might suggest that when theratio of asset turnover coming from the total sales is higher than that of coming from the total assets, the efficacy of investment decisions of the firm, the productivity approach, and the use of corporate assets by executivesrises as well.Therefore, this measure as an inverse measure indicates that the lower its value, the higher the agency cost.In this test, the aforementioned measure has a negative relationship withinvestment-cash flowsensitivity because an increase in asset turnover ratioleads to a rise in productivity and a decline in agency cost. Thus,this risk index decreases the flow of investment-cash flow to the economic unit.

The findings of the third hypothesis suggest that there is no significant relationship between the ratio of operating costs and investment-cash flow sensitivity. This may be due to the lack of importance of this criterion to enter or exit investment-cash flow.The findings of the last assumption suggest that there is a positive and significant relationship between executives' over-confidence and investment-cash flow sensitivity. This suggests that when top executiveshave a high confidence, the gap between expected revenue and actual revenue is greater and accordingly executives are likely to benefit and reach their expected revenue. This leads to an increase in agency cost and,as the result, this index risk increases investment-cash flow into economic unit.

According to the findings of the first assumption, investors are recommended to take into account valuable variables such as asset turnover while parsing and analyzing to buy shares of companies because it represents the productivity of economic unit. What's more, according to the findings resulting from the second hypothesis it is recommended that investors pay attention to the positive relationship between investment-cash flow sensitivity and top executives' over-confidence.Considering the fact that the executives' goal is to gain the trust of the company owners, the findings resulting from the second hypothesis indicate that they should take into account that an increase in free cash flow and top executives' over-confidence leads to increased investment-cash flow sensitivity. Therefore, they should take initiatives to reduce these indexes.

Given the positive relationship between free cash flow and top executives' over-confidence and the negative relationship between asset turnover and investment-cash flow sensitivity, the findings of the first and second hypotheses imply that the Stock Exchange shouldadopt regulations to that companies enjoy less confidence at management level and have a higher asset turnover because these precautions strengthen the real value of these companies, transparency of information, and understanding of their functions.

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Table1. Descriptive statistics for variables

Variables	Obs.	M	Median	Min	Max	SD	Skewness	Kurtosis
Investment-cash flow sensitivity (CFR)	415	0.1979	0.314	2.968	-2.594	0.8947	-0.1108	3.0271
Free Cash Flow (FCF)	415	0.0599	0.0629	0.3523	-0.3607	0.0911	-0.0437	4.3568
Asset Turnover (SA)	415	0.7813	0.75	2.62	0.02	0.396	1.3315	6.5168
Ratio of operating costs of sales (OCS)	415	0.0653	0.0572	0.3768	0.0129	0.0385	2.8578	18.0154
Executives' overconfidence (EO)	415	0.0545	0.0264	4.4334	-6.4346	0.8420	-0.4293	15.0154
ownership structure (OS)	415	0.7216	0.76	1	0.000	0.1904	-1.4934	5.7689
Firm size (SIZE)	415	0.512713	13.438	18.395	9.881	1.3128	0.5573	3.8881

Table2. The results of the study, the normal distribution of the dependent variable

Variable	Test results (Normal distribution)				
	Mean	SD	Positive	Negative	K-Z
Investment-cash flow sensitivity (CFR)	0.197	0.894	0.064	-0.060	1.312
Significant level	0.064				

Table3. Pearson correlation coefficients between variables

Correlation coefficients	CFR	FCF	SA	OCS	EO	OS	SIZE
Investment-cash flow sensitivity (CFR)	1						
Free Cash Flow (FCF)	0.149	1					
	0.002						
Asset Turnover (SA)	-0.098	0.208	1				
	0.045	0.000					

Ratio of operating costs of sales (OCS)	-0.042	-0.252	-0.248	1			
	0.387	0.000	0.000				
Executives' overconfidence (EO)	0.177	-0.162	-0.058	0.036	1		
	0.000	0.000	0.234	0.457			
Ownership structure (OS)	0.161	0.218	0.180	-0.089	0.020	1	
	0.001	0.000	0.000	0.067	0.672		
Firm size (SIZE)	0.007	-0.233	-0.249	-0.119	0.101	0.045	1
	0.879	0.000	0.000	0.015	0.039	0.350	

Table4. Unit root test using Augmented Dickey Fuller test

Variables	Error	t	*p*
Investment-cash flow sensitivity (CFR)	0	-14.740	0.000
Free Cash Flow (FCF)	0	-14.005	0.000
Asset Turnover (SA)	0	-7.995	0.000
Ratio of operating costs of sales (OCS)	0	-9.838	0.000
Executives' overconfidence (EO)	0	-17.768	0.000
ownership structure (OS)	0	-8.249	0.000
Firm size (SIZE)	0	-7.073	0.000

Table5. Results of the F-Limer test

Test type	Test statistic	F	*p*
F	0.148	(4.404)	0.963

Table6. White test results

Test type	Test statistic	*p*
W	2.592	0.000

Table7. The Breusch–Godfrey-Bertolo test results

Test type	Test statistic	*p*
BG	2.154	0.431

Table8. Results of the research model

Variables	t	*p*	*r*	VIF
Fixed amount (C)	0.314	0.753	0.168	-
Executives' overconfidence (EO)	3.3	0.001	0.208	1.035
Free Cash Flow (FCF)	3.051	0.002	1.647	1.242
Asset Turnover (SA)	-2.966	0.003	-0.371	1.206
Ratio of operating costs of sales (OCS)	-0.503	0.614	-0.887	1.187
ownership structure (OS)	2.741	0.006	0.694	1.096
Firm size (SIZE)	-0.017	0.607	-0.017	1.203
F		7.665 (0.000)	Watson statistic	1.540
Coefficient		(0.101)	Jariku	4.004 (0.135)
$CFR_{i,t} = 0.168 + 0.208EO_{,t} + 1.647FCF_{,t} - 0.371SA_{,t} - 0.877OCS_{,t} + 0.694\ OS_{i,t} \quad -0.017SIZE_{,t} + \varepsilon_{it}$				

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RESEARCH ARTICLE

Differences of Intercultural in the Resiliency Structural

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ABSTRACT

Resiliency is the human ability to adapt and overcome the dangers and difficulties. The resiliency of people is affected by different factors. This descriptive study was conducted to compare the intercultural scale of resiliency. The study population includes all high school students in Tehran and 260 students were selected by multistage cluster sampling method. Assessment tools include questionnaires of resiliency (Conner - Davidson, 2003) that after the completion of data by the students were analyzed through factor analysis. According to the findings, resiliency has appropriate reliability and validity and includes five targets of purpose, self-control, problem-solving ability, belief, and optimism. Comparison of the results with the results of the factor analysis of the questionnaire in other countries (Spain, India and Korea) showed that the number of components and structural questions related to each component of resiliency is different in different countries, as well as purpose and self-control abilityhave the most important in the resiliency scale of Iranian culture. So the cross-cultural differences must be considered in the evaluation of the resiliency.

Key words: factor analysis, intercultural, reliability, resiliency, validity.

INTRODUCTION

In recent decades, positive psychology approach has been the interest to psychologists according to the talents and capabilities of people. The ultimate goal of this approach is the identification of the structures and the ways in which human well-being and happiness are looking for. Resiliency is one of the structures of interest in this approach that is more and more compatible with the needs and threats to human life. Garmezy&Mastendefined resiliency as "a

process, capability, or the outcome of successful adaptation despite threatening conditions". Resilience is not only passive resistance against threatening injuries or conditions, but it is an active and constructive participant their environment. Resilience ability balances a person's psychological-spiritual life in the precarious situation (Conner, Davidson, 2003). Kamperbelieves (1999) resilience or return to balance is the base for reaching to a higher level (under threatening situation) and should lead to consistent success in life. Positive relationship with mental health resiliency reflects its importance .The research of Rahimianbogar and Asgharnezhad. (2008) and Samani, Jokar, and Sahragard (2007) have confirmed the relationship between mental health and resiliency. The findings of Bitisika, Sharply and Peter (2010) showed that resiliency is significant negative predictor of anxiety.

Resilience people have four main features that contribute to their mental health: 1) social competence (e.g, understanding, flexibility, empathy and compassion, communication skills and sense of humor); 2) problem solving (such as planning, Critical and creative thinking); 3) self-orientation (identity, self-orientation, self-awareness and mastery of tasks) and 4) purpose and optimism for the future (target, optimism and spirituality) (Garmezy&Masten1990). But the capacity of resiliency of individuals depends on factors such as personality factors, cognitive factors, family factors, biological factors, and sociological factors (Garmezy, 1991), so the resiliency of people is not the same and can be increased by the education, therefore, sometimes it is necessary to measure individual resiliency.

Given the importance of resiliency assessment, thequestionnaires are provided in the different fields, including: children and adolescents, family education. Darin Kordich Hall investigated 38 measures of resiliency (2010) and divided it based on the age. Resiliency scale of Connor - Davidson is placed in the questionnaire of teens and adults. Given the importance of treating anxiety, depression and stress,Connor and Davidson (2003) developed a scale to assess flexibility. Resiliency factor analysis by Connor - Davidson yielded five factors: The first factor (questions 10, 11, 12, 16, 17, 23, 24, 25) represents the concept of individual skills, high standards, and tenacity.The second factor (questions 6, 7, 14, 15, 18, 19, 20) is related to trust the instincts of the individual, tolerance of the negative factor and the power ofstress effects, the third factor is related to the positive acceptance of change, and security relations (questions 1,2,4,5,8), fourth factor is related to the control (questions 13,21,22) and fifth factor (questions 3 and 9) shows the effect of religion.

Analysis of the Conner Davidson questionnaire of resiliency in Spain (Carlos et. al., 2013) was also performed and the 3 elements (resistance, resourceful and optimistic) were extracted. Questions in the first factor (questions4,12, 14, 15, 16, 17, 18, 23, 24) representing the tenacity that represents people who do not easily frustrated when faced with unfavorable conditions and have a strong belief and courage. The second factor consists of seven items (1, 2, 5, 11, 13, 22, and 25). Factor 3 includes seven questions (questions 6, 7, 8, 10, 19, 20 and 21) that indicate a person's optimism. In another study that was performed on 17 -27-year-old technology student in India (Kamlesh and xenon, 2010),4 factors were extracted from the resiliency scale. First, resistance, including questions 19-4-16-7-11-18-17- second factor, optimism including 12-14-20-8-6-10-15, third factor, Skill 3-9-2 -5-1-13 and the fourth goal, questions were 21-22-23-24-25. In Korea also in the performed factor analysis, 5 factors of tenacity (4-14-23-17-15-16-18-19), standing (11-21-24-22-25-10-12-5), optimism (6-7-8-9), social protection (2-13) and spirituality (3-20) were achieved, respectively.

In general, the resiliency is known as a construct with a multi-dimensional nature of variables, such as temperament and personality, with special skills, such as problem solving skills (Campel- Sylis, Cohan and Stein, 2006). Various factors including family, cultural and social factors are effective on resiliency. In addition,resiliency plays an important role in a person's mental health. The goal of this study is to compare the intercultural structures of the resiliency and in this context the following hypothesis is considered:

Resiliency components are not the same in different cultures structures.

RESEARCH METHODS

Statistic population and sampling

This study is descriptive and the population consisted of all high school students in Tehran. Random cluster sampling was used for sampling. Connor and Davidson questionnaire distributed among three hundred students and were completed. 260 questionnaires (130 girls and 130 boys) had fulfilled the conditions of the analysis.

Measuring instruments

To measure the resiliency,Resiliency scale of Connor and Davidson (CD-RISC) was used. Resiliency scale of Connor and Davidson (2003) has 25 items with five options (never, rarely, sometimes, often and always), which is scored based on a Likert scale while the maximum score is hundred and the least one is zero. Connor and Davidson have reported internal consistency, test-retest reliability and convergent and divergent validity of this scale. Mohammadiet al. (2006) translated this questioner to Persian to examine the resiliency factors in people at risk of substance abuse. The total Cronbach's alpha was obtained 0.89.

Analysis Methods

Questionnaireswere answered in the fall of 2013 by students in the Self-report manner. Data were analyzed through factor analysis using statistical package for social sciences version 16 (spss).

RESEARCH FINDINGS

Resiliency descriptive index scores showed that a minimum score is 18 while a maximum score is 94.Skewness value (-0.19) and elongation (-0.20) of scores showed that the data distribution had the normal trends. The correlation of each question was compared to individual questions andCronbach's alpha coefficient was obtained 0.88.

To determine the analysis capabilities,Conner- Davidson test, KMO test and Bartlett test was performed and obtained coefficient was acceptable and a high level (KMO = 0.88) and Bartlett's test was significant at the level of P <0.0001 (Chi-Square = 1767.66). Then to determine the main component, the factor analysis, and orthogonal rotation of the factor were used. The results showed that there is 5 strong factors with a value more than 1 in this scale that together explain 49.36 % total variance of resiliency scale. Each of the fivevariablesexplains14.98, 13.10, 8.5, 0.07 and 5.79 of the variance, respectively.

After eleven times converge varimax rotation, 5 factors of resiliency scale and their question were obtained accordance their matrix. The first and the second factors have 8 questions while 3, 4 and 5, each includes 3 questions (Table 2). Factors Cronbach's alpha coefficient components were obtained 0.81, 0.76, 0.6, 0.55 and 0.36 showed that all components are properly validated. at this stage, the factors according to the questions perceptions are named as follows: purpose (questions 22 , 24,25,21, 17, 5,11,12) self-control and problem-solving ability (questions 19.18, 13,14, 1,4,6,7), toughness (questions 23, 10.16), belief (questions 2,3,9), and optimism (questions 8,15,20) and their results were compared the results of the factor analysis of other countries and the results are shown in Table 1.

CONCLUSION

The validity examination of the resiliency scale in the present study showed that the Cronbach's alpha coefficient of total questions is 0.88 and the questions have a good internal consistency. The coefficient of reliability of components 1 and 2, each with 8 questions are 0.81 and 0.76, respectively whileCronbach's alpha coefficient of components 3, 4 and 5, each with 3 questions were obtained 0.6, 0.55 and 0.36, respectively and by factor analysis, 5 components were found that are named as follows: purpose (questions 22 , 24,25,21, 17, 5,11,12) self-control and problem-solving ability (questions 19.18, 13,14, 1,4,6,7) and toughness (questions 23, 10.16) and belief (questions 2,3,9), and optimism (questions 8,15,20).

Factor analysis of the resiliency questionnaire in 2003 by Connor - Davidson brought five factors. The first factor (8 questions) represents the capabilities of the individual, high standards, and tenacity, the second factor (7 questions) is related to trust the instincts of the individual, tolerance factor and negative effects of stress, the third factor (5 questions) related to the adoption of positive changes, and safe relationships, the fourth factor related to control (4 questions) and fifth factor (2 questions) reflects the influence of religion. In analysis of the Connor - Davidson questionnaire used in Spain 3 factors of the resistance (9 items), resourceful (7 questions) and optimism (7 items) was extracted.In India 4 factors was extractedfrom the resiliency scale.The first factor is the resistance (7 items), the second factor is optimism (7 questions), the third factor isskill (6 questions) and the fourth factor is the goal (5 questions).In Korea, factor analysis resulted in 5 factors of tenacity (8 questions), stand (8 questions), optimism (4 items), social protection (2 questions) and spirituality (3 items) were obtained, respectively. In this study, five factors of purpose (8 questions) self-control and problem-solving ability (8 questions), tenacity (3 items), belief (3 items), and optimism (3 items) were identified.

The first factor questions, purpose (11-12-17-24-25), third factor i.e. tenacity (10, 16, 23) are placed in the first component present in the analysis by Connor - Davidson (high standards, and tenacity). With regarding the questions in Iran culture, it could be said that person’s ability and confidence of the person have influence on his purpose and resiliency .On the other hand, given the fact that two factors were identified in the analysis separately, it can be said that tenacity to be considered separately in the resiliency scale .But in Iranian culture, purpose is the first factor of resiliency while tenacity and resistance is the fourth factor and having an appropriate target for resiliency in the Iranian culture is more important than tenacity and resistance .This difference can be explained so that people toughness in India, Korea might be their characteristics or due to a specific culture in these countries people are training for more endurance.In addition, differences in social - economic structure in these countries with Iran could also explain the findings. Questions of purpose component in this study are very similar to India but in India this component is the last factor, then the target value may vary between cultures.

Questions of second factor represent a person's ability to control and consistency in decision making in stressful situations that can cause resiliency in person. Common questions (6, 7, 14, 18, and 19) with the second factor of Conner - Davidson analysis show the importance of negative factors tolerance for the problem solving but questions 1, 4, 13this factor in the Iranian culture shows the importance of adaptability and problem-oriented coping style in the resiliency. In Spain, the (second) factor has caused that people with sufficient resources and imagination have resiliency enough to handle adverse conditions while ability to withstand harsh conditions is placed in third ranking in India.Optimism in this country is considered as the second factor of Resiliency.Optimism importance in people resiliency in Korea and Spain is more than Iran. Moreover, the questions of these components are different in Iranian culture. Optimism is the positive attitude to the world and optimistic person with such an attitude is trying to see the world better.Theless impact of optimism in Iran may be due to changes in the sanctions against Iran.

The religion factor and similar questions with Connor – Davidson analysis shows the importance of resiliency in Iranian culture, while inSpanish culture only three factors has been specified. Question 3 (Sometimes God can help)

and Question 9 (I believe that there is discretionary in any event) was removed from the Spanish questionnaire due to their low credit.It seems that theyless rely on external control.

The lack of religion factor in the culture of India and its existence in Korea may therefore imply that religious beliefs of Iranians are more similar to Koreans.But the optimism questions of 8-15-20 and questions of 21 -22-24-25 in the purpose factorin India suggests that the people of the two countries are proud of their achievements, have purpose in their life and try to reach that and will not be disappointed In the face of hardship.

In the overall, the results of this study suggest thatresiliency questionnaire of Connor - Davidson has good reliability and validity in Iranian studentsand can be used to assess the resiliency of Iranian students. Also the factor analysis of five components has been named that purpose, problem solving, tenacity, religion, and optimism.

In Spain, India, and Korea, the resistance factor has the most important role in people's resiliency ratewhile optimism had little role in Iranian culture. The purpose, problem-solving ability and control ability have important role inresiliency of Iranian students. Purpose factor in the culture of Spain and Korea is not considered as the component of Resiliency and this factor has the least important in India. Question 3 and 9 did not have required validity and religion factor have been removed in Spain while this questions are placed in skillful factor in Indian questionnaires. In Iran and Korea, Religion is considered as a separate component of resiliency.

Although cultural differences can explain difference in factor numbers and their questions in the present study compared to the research in other countries, but other factors such as age of population, family and cultural status, religious beliefs, etc. can also be effective in answersof each factor.

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Table 1: Components and questions of resiliency scale in different countries

Question	Name of the component	Component number	Title
24-12-11-25-10-23-17-16	Individual ability and tenacity	5	Conner-Davidson
20-18-15-6-7-19-14-1	Tolerance of negative factors		
1-4-5-2-8	Positive acceptance of changes		
22-13-21	Control		
3-9	Religion		
24-23-18-17-16-15-14-4-12	Resistance	3	Spain
1-2-5-11-13-22-25	Resourceful		
6-7-8-10-19-20-21	Optimism		
19-4-16-7-11-17-18	Resistance	4	India
12-14-20-8-6-10-15	Optimism		
3-9-2-5-1-13	Resource		
21-22-23-24-25	Target		
4-14-23-17-15-16-18-19	Resistance	5	Korea
11-21-24-22-25-10-12-5	Hardiness		
6-7-8-9	Optimism		
2-13	Social Protection		
3-20	Spirituality		
21-25-24-22-17-12-11-5	Purposefulness	5	Iran
18-19-14-13-7-6-4-1	Control and problem-solving abilities		
23-16-10	Hardiness		
9-3-2	Belief		
20-15-8	Optimism		

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RESEARCH ARTICLE

A Survey of the Reaction of Shareholders to Implementation of Corporate Governance Mechanisms (The Investigation of the Companies Listed on TSE)

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ABSTRACT

The corporate governance mechanisms are indirect tools of shareholders to reduce information asymmetry, these shareholders attempt to change the behavior of the managers as their agents and reduce agency costs. Thus, it is expected that by improving corporate governance, investors and shareholders have good view to the company and implementation of corporate governance mechanisms is encountered with positive reaction of investors. To evaluate the relationship between mechanisms of corporate governance and stock return (a criterion for the reaction of shareholders), the data of 155 companies listed on TSE during 2008-2012 were used. The pooled data and estimated generalized least squares (EGLS) were also applied. The result of investigations showed that there was no significant relationship between features of board and reaction of investors (stock return) and investors had negative reaction to blockholder ownership.

Key words: Corporate governance, corporate governance mechanisms, Stock return, TSE

INTRODUCTION

The authors of the first agency theory (Spence and Zeckhauser, 1971) attempted to introduce basic model of agency theory. Agency theory starts with the assumption that people act along their personal benefits and this shows that under common conditions, goals, benefits and risks of two parties (owner and agent) are not similar. This theory states that when the manager has not 100 percent of company share, the hidden contradiction between shareholder and manager is unavoidable. This creates various agency problems as benefits contradiction between the manager and shareholder, ethical risks, lack of assurance and risk partnership (Namazi, 2005), information asymmetry between the manager and shareholder and taking unsuitable decisions (Jensen and Meckling, 1976). One of the solutions of agency problem is establishing good methods of corporate governance. Shleifer and Vishny (1997) defined corporate governance as a way by which financial providers of company are sure of receiving return on their investment. Gillan and Starks (1998) defined corporate governance as a system of rules and factors controlling company operation. Schwert (1981) and Binder (1985) evaluated the reaction of market to corporate governance mechanisms and stated that unsuitable corporate governance had serious reaction. Based on the review of literature, this study evaluates the reaction of investors to implementation of corporate governance mechanisms.

Corporate governance mechanisms are indirect tools of shareholders, the shareholders who try to change the behavior of the managers as their agents and reduce agency costs (Deshmukh, 2005; Kanagaretnam et al., 2007; Rutherford and Buchholtz, 2007; Chen et al., 2007). The behavior of managers is changed by two methods via reduction of information asymmetry (1) Direct reduction of information asymmetry by incentives, 2) Indirect reduction of information asymmetry by supervision. Namely, rewards are achieved only when the managers reveal the effort dedicated as information asymmetry regarding their operation is reduced. In addition, it is possible that corporate governance mechanisms indirectly via improving supervisory systems and separation of CFO duty from chief of board or increasing independent members in board reduce information asymmetry. These measures inhibit collusion, and make it more difficult for managers to hide their perquisite consumption and shirking behavior, while opening a window through which the shareholders control managers' behavior (Elbadry et al., 2010). It is expected that by improving corporate governance, investors and shareholders have better view to company and implementation of corporate governance mechanisms is with the positive reaction of investors. This question is raised in the present study whether corporate governance is effective on investors' behavior and is this effect significant statistically?

REVIEW OF LITERATURE

Theoretical literature

The start of corporate governance via stock ownership has considerable effect on control method of companies. Jensen & Meckling (1976) raised the basics of agency theory and defined manager as the agent and shareholder as principal. In their analysis, shareholder is before manager. One of the main assumptions of agency theory is that agent and principal have benefits contradiction. Thus, ownership separation form management leads to an organization problem as agency problem. The main problem of

agency is benefits contradiction between shareholder and manager. It means that the shareholder tries to achieve the highest stage of investment value and manager tries to increase hos wealth. Thus, it is possible that the managers doesn't act in accordance to shareholder benefits. Embezzlement of manager and removing the benefits of shareholder from company are extreme examples of benefits contradiction. This agency problem shows the necessity of management control of companies by shareholders. Today, the term corporate governance is an interesting issue in business world. Corporate governance is the foundation of relations of company with beneficiary groups. Generally, corporate governance is control system of company; this system defines the relationship between company and its beneficiaries. Corporate governance at micro level is achieved company goals and at macro level, optimal allocation of resources of society. Corporate governance is a set of internal and external company control mechanisms as establishing suitable balance between equity on one hand and power of board on the other hand. These mechanisms provide good assurance for shareholders and providers of financial resources and other stockholders to keep their benefits (Hematfar et al., 2012). Shleifer&Vishny (1997) defined corporate governance as a way the financial providers of company can be assure of receiving return to their investment. Gillan& Starks (1998) defined corporate governance as a system of rules and factors controlling the company operation. Levitt (1999) defines corporate governance as: The link between company management, managers and its financial reporting system. The OECD organization defines corporate governance as: A set of relations between management, board, shareholders and other beneficiaries of company. Corporate governance provides the structure by which company goals are formulated and the tools to achieve these goals and supervision on performance of managers are revealed. Good corporate governance should create good motivations for board and management to follow the goals for the benefit of company and its shareholders and efficient supervision should be facilitated. The presence of an efficient corporate governance system in company and entire economy helps to provide a degree of trust as necessary for good performance of an open economy. In terms of TSE industry, corporate governance is a method to manage activities of company by board and top manager. This method can be effective on act of board in the following items:

Formulation of company goals

Doing daily business

Performing responsiveness responsibility to shareholders and considering the benefits of other stockholders

Making the activities and corporate behaviors consistent with this public expectation that stock markets act as in accordance with law and rules.

Supporting the benefits of investors (Regulation of corporate governance system, 2007).

Corporate governance mechanisms affect the information disclosed by company for its shareholders and full non-disclosure of information and disclosure of less important information can be reduced (Kanagaretnam et al., 2007).

From international aspects, corporate governance is a set of mechanisms for the personal benefit of managers of company in decision making to maximize the company value for the owners (Denis & McConnell, 2003).

Suitable governance provides timely reporting and disclosure by companies. The aim of corporate governance is assurance of flack of opportunistic behavior as occurred via reduction of agency problems and potential asymmetrical information between agent (manager) and various stockholders (shareholders, creditors, etc.). Reduction of these problems increase the inclination of shareholders to trading in these markets and increasing stock liquidity in market (Gerald, et al. , 20060.

Quantity and quality and timeliness of disclosed information from corporate governors is one of the most important decision making tools from the investors. If the information is presented to public via corporate governors, the information tis analyzed by traders, investors and analysts and they decide stock trading of companies. The behavior of investors with this information and their decision, supply and demand or market depth and bid –ask are formed. In other words, corporate governance system is organized and via improving qualitative level of information and transparency plays important role in directing decisions of investors and actors of capital market and create capital markets with high liquidity and depth (Kashanipour et al., 2010). Figure 1 is presented by Hermanson&Rittenberg (2003) regarding involving components in corporate governance. There are four principles for a good corporate governance as:

- Transparency
- Accountability
- Responsibility
- Fairness (Aras &Crowther, 2008)
- Empirical literature

Regarding the reaction of shareholders to implementation of corporate governance mechanisms, various studies have been conducted in Iran and abroad.

Yermack (1996) in a study "Higher market valuation of companies with a small board of directors" attempted to find the relationship between separation of responsibility of board chief with executive manager and created value for shareholders. The findings of the study showed that when CFO and board chief are two independent people, the company creates much wealth.

Ginglinger and Saddour (2007) applied the data of French companies and showed that the effect of quality of enterprise governance system was explained based on holding cash flow by company via financial limitations and agency problem. Based on the views of these theorists, the companies as controlled by family suffer much financial limitation compared to other companies.

Tasia and Gu (2007) in a study "The Relationship between Institutional Ownership and Casino Firm Performance" evaluated the relationship between institutional ownership and financial performance of companies. Institutional ownership in this study was the percent of held stock by state companies. They

showed that institutional investors could help the other investors to reduce agency issues of separation of management and ownership.

Francis et al., (2013) in a study "Corporate governance and investment-cash flow sensitivity" evaluated the effect of corporate governance on financial limitation. They conducted this study by the data of 14 countries and found that better corporate governance reduced dependency of companies on internal cash flows and reduced financial limitations.

Bhutta and Ali Shah (2014) in a study "Investors' Reaction to the Implementation of Corporate Governance Mechanisms" applied the data of 125 non-financial companies supported in Karachi stock market during 2005-2010. The results showed that there was no significant relationship between corporate governance and reaction of investors. This showed inefficiency of Pakistan capital market.

Namazi and Kermani (2008) in a study "the effect of ownership structure on performance of companies listed on TSE" evaluated the role of major ownership in improvement of companies' performance. They applied the data of 66 companies during 2003-2007. The results of their study showed that there was a significant relationship between ownership structure of companies and their performance.

Ahmadpour et al., (2010) evaluated the impact of corporate governance and audit quality on funding cost via borrowing. They evaluated the data regression and informed regarding the reducing effect of major institutional shareholders in composition of shareholders and their efficient supervision on debt cost of stock companies.

Khodadadi and Taker (2012) in a study "the effect of corporate governance structure on financial performance and value of companies listed on TSE" evaluated the effect of corporate governance features on financial performance and value of stock companies. The results of their studies showed that ownership concentration and state ownership had positive and significant relationship with performance and value of companies. The variable of major institutional investors had positive relation with company value and negative relationship with company performance. The CFO duality had negative and significant relationship with company value and had no significant relationship with the performance of companies.

BaradarnHassanzade et al., (2012) in a study "evaluation of the relationship between some of corporate governance mechanisms and value created for shareholders and economic value added" evaluated the relationship between some of mechanisms of corporate governance with created value for shareholders and economic value added. The results of study show that of eight mechanisms of corporate governance in the study, four mechanisms (influence and ownership of government, ownership of institutional shareholders, capital structure and free float share) were associated with created value for shareholders. Also, of eight mechanisms of corporate governance in this study, three mechanisms (influence and ownership of government, ownership of institutional shareholders and free float stock) were associated with economic value added.

METHODOLOGY

The identification of reaction of investors to implementation of corporate governance mechanisms led into the high awareness of managers, investors and activists of capital market to take correct and economical decisions and led into optimal allocation of resources and economic growth. This study evaluates the reaction of investors to implementation of corporate governance mechanisms in the companies listed on TSE. The results of the study can be applied in decisions of managers, investors and activists of capital market. It is applied design in terms of purpose. In terms of inference regarding study hypotheses, it is descriptive-correlation design as it discovers the relationship between study variables and regression techniques and correlation and it is also deductive. The results of study are in proving theories as via testing the data, the conclusion is made. For data collection, library method and documentary studies are used. To achieve the data for processing study hypotheses, the data of RahavardNovin software and financial statements of companies listed on TSE and formal site of TSE are used.

The study population is the companies listed on TSE during 2008-2012. The selection of companies listed on TSE as study population is as the most available data regarding Iranian companies are in this institution. The sample is selected by systematic elimination method. The sample is based on all existing companies in study population meeting the following criteria:

Their fiscal year leads to 12/29 in each year to put the data beside each other and be applied in the form of panel or combined (Based on the results of assumption tests)

There is no change in fiscal period to compare the results of financial performance.

The required data for study variables are available during 2008-2012 to do the computations completely.

There is no trading pause more than 6 months. The pause in trading leads to inability in estimation of market value and this inability leads to lack of providing required variables of study.

Considering the mentioned conditions leads to the selection of 112 companies as study sample of this study. Each company during 2008-2012 had 5 extracted financial data in financial statements and other relevant information resources.

Study variables and models

To test the hypothesis of study, the following model is used:

$$IRi,t = \beta 0 + \beta 1\ BSi,t-1 + \beta 2\ BIi,t-1 + \beta 3\ OSi,t-1 + \varepsilon i,t$$

Where,
IR=Reaction of investors as measured with stock return. To compute stock return, the ratio of stock price at the end of year to stock price at the beginning of year (Pn/P0) is used.

BS= Board size and is equal to the number of board members

BI=Board independence as equal to the ratio of non-executive board members to total board members

OS= Ownership structure as equal to the percent of owned share of blockholders and

εi,t=Disturbance term or residual of model

STUDY FINDINGS

Inferential statistics in this study are the basis of analysis in this study as Pearson and Spearman correlation tests and multi-variate regression are used to detect the relationship of dependent and independent variables with control of the effect of other variables. In addition, to be sure of reliance of results, regression tests are used. Before reporting the multi-variate regression test, the results of correlation tests of study variables are presented. After re-statement of study hypotheses, correlation test and regression tests are used.

The study hypotheses are as

Main hypothesis The mechanisms of corporate governance have significant effect on reaction of investors.

First subhypothesis The board size has significant effect on investors' reaction.

Second subhypothesis Board autonomy has significant effect on reaction of investors.

Third subhypothesis The ownership structure has significant effect on reaction of investors.

Correlation test of variables

At first, we investigate the Pearson and Spearman correlation of study variables. The results of Pearson and Spearman correlation test of independent and dependent variables are shown in Tables 1, 2.

As shown in Table 1, in Pearson correlation, there is no significant relationship between stock return and mechanisms of corporate governance. As normality of variables is rejected, to perform regression based on central limit, the data are assumed as normal. Spearman correlation test is used as applied for non-normal data. The comparison of the results of two correlation tests shows that non-normality of data of present study is not important as there are not many differences in the results of two groups of correlations (The relationship between stock return and corporate governance criteria in both methods is rejected).
The high number of observations eliminated this problem.

The results of Spearman correlation test are shown in Table 2. In Spearman correlation, there is no significant relationship between stock return and corporate governance mechanisms.

Regression test

In each regression model, specific assumptions should be established and in case of violation in each of them, good features of estimations of regression factors or hypothesis test, the problem is created. Some of the hypotheses are tested in the following.

Normality test of regression disturbance terms

Jark –Brak is used to evaluate the normality of regression disturbance terms. Based on this test as significance level of variables is less than 0.05, distribution of regression disturbance terms is not normal. If sample size is big enough, deviation of normality is not important. Based on central limit, we can say even with the absence of normality, the test statistics follow suitable distributions as Asymptotic. Thus, lack of justification of this hypothesis is ignored (Abade, 2013).

Auto-correlation of study variables

To investigate autocorrelation of study variables, Durbin-Watson test is used and the mentioned statistics is 1.963 and this show non-autocorrelation of study varaibles.

Variance Heteroscedasticity

In this study, to evaluate variance Heteroscedasticity in pooled data, White test is used.

This method considers at the same time the autocorrelation and variance Heteroscedasticity effects and it has adverse effects on conclusion of estimations. According to White test, variance homogeneity is not rejected (significance level above 0.05) and there is no Heteroscedasticity (P=0.413, F=1.03).

The evaluation of reliability of variables

Before data analysis, reliability of variables should be evaluated. The reliability of study variables means as the mean and variance of variables are fixed over time and covariance of variables was fixed. Thus, using these variables in model doesn't create spurious regression. To do this, Levin , Li and Chow tests, impesaran and shin test and dickey fuller test are used. To do this analysis, impesaran and shin test is used and in all cases, significance level is less than 5% and all of study variables are stationary in the period.

Study hypotheses test

At first, to determine the pooled data and homogeneity or non-homogeneity, Chow and F-Limer statistics are applied. The statistical hypotheses of this test are as followings:

H0: Pooled data
H0 : Pooled data
H1: Panel data

H0 is based on lack of individual effects not observed and H1 is based on individual non-observed effects. If H0 is supported, it means that the model has not non-observed individual effects. Thus, it is estimated by pooled regression model. If H1 is supported, it means that non-observed individual effects are seen.

If the results of test are based on using data as panel data, to estimate the study model, one of fixed effects models or random effects model is used. To select one of these two models, Hausman test is used.

H_0=Random Effect
H_1=Fixed Effect

Null hypothesis of Hausman is based on suitability of random effects to estimate regression models of panel data.

As shown in Chapter 3, to test the study hypotheses, the following model is used:

$$IRi,t = \beta 0 + \beta 1\ BSi,t\text{-}1 + \beta 2\ BIi,t\text{-}1 + \beta 3\ OSi,t\text{-}1 + \varepsilon i,t$$

Where,

IR=Reaction of investors measured with stock return. To compute stock return, the ratio of stock price at the end of year to stock price at the beginning of year (Pn/P0) is used.

BS= board size as the number of board members
BI= Independence of board as equal to the ratio of non-executive board members to total board members.
OS=Ownership structure as equal to the percent of owned stock of blockholders.

To estimate the mentioned model, to determine pooled data and homogeneity or non-homogeneity of them, Chow and F-Limer tests are used. The results of this test are shown in Table 3.

As shown in Table 4, Chow test result shows that the probability for F statistics is higher than 5%. To test this hypothesis, the data are used as pooled. The result of mentioned model test is presented by pooled data and EGLS method in Table 4.

Based on the results of Table 4, t statistics of ownership structure (percent of owned share of blockholders) is bigger than -1.965 (-2.778) and its significance level is less than 0.05, there is an inverse and significant relationship between ownership structure (percent of owned share of blockholders) and stock return. It is worth to mention that autoregressivevariable besides improving Durbin-Watson statistics fills control variables and the model can be validated.

As shown, Durbin-Watson statistics is 1.963 ranging 1.5, 2.5. Significance level of F statistics is 0.041 as lower than 0.05 and it shows significance of model.

The important point in Table 4 is coefficient of determination. Although this value is low (3%), due to lack of using control variables, this value is dedicated to independent variables. The coefficient of determination shows that about 3% of changes of stock return are explained by mechanisms of corporate governance. Thus, third sub-hypothesis of study is supported.

DISCUSSION AND CONCLUSION

This study evaluates the reaction of shareholders to implementation of corporate governance mechanisms among the companies listed on TSE. The studies hypotheses are based on collected data of 155 companies listed on TSE during 2008-2012 and are tested by combinational regression analysis. The study includes a main hypothesis and three sub-hypotheses and subhypotheses are designed to evaluate the main hypothesis. The results of significance test of coefficients are based on fitted regression equations. Briefly, there was a significant and inverse relationship between ownership structure and stock return of company. Indeed, investors show negative reaction to ownership structure and percent of owned stock of blockholders. In justification of inverse effect of major ownership on reaction of investors can be referred toLins et al., (2005). According to Lins et al., (2005), if external investors expect that controller shareholders own the company resources without any limitation, external funding cost is high and this issue is based on reliance of company on internal cash flow. The investment sensitivity to cash flow is increased and financial limitation is created. Thus, the high presence of major owners can lead to pessimism of investors. According to Rahimian and Janfada (2014) by increasing the number of blockholders, external investors feel that the major shareholder doesn't remain any space to keep the resources for other shareholders. Investors don't show significant reaction to board features.

The findings of study show that investors have negative reaction to major ownership or its increase. In other words, major ownership has inverse effect on stock return. Thus, the most important recommendations of present study are based on this issue:

It is recommended to managers and decision makers of companies listed on TSE to consider this issue in case of major changes in ownership.

In addition, it is recommended to investors in TSE to consider ownership features of company and probable reaction of investors.

Other results of study are the lack of market reaction to board features and its changes.It is recommended to the companies listed on TSE to consider lack of serious attention of market to board features, internal organizational dimensions of board members selection and don't concern market reactions.

It is recommended to the investors in TSE to consider composition and its features based on importance of the role of board in taking strategic decisions of company.

In addition, it is recommended to TSE and other capital market authorities to develop information about the importance of board and its features and increase the attention of investors to this issue.

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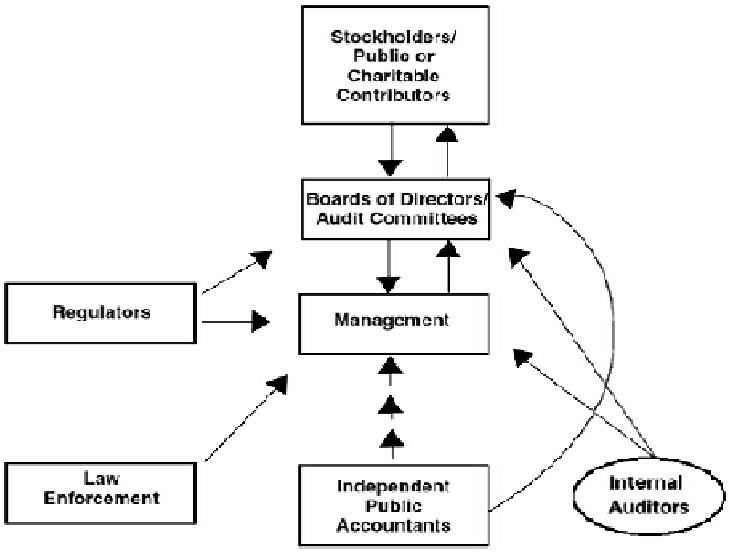

Figure 1. Parties involved in organizational governance

Table 1- Pearson correlation

Ownership structure	Board independence	Board size	Stock return	Variable
0.022- 0.603	0.052- 0.215	0.023 0.58	1	Stock return
*0.088 0.031	**0.199- 0.000	1		Board size
0.065- 0.106	1			Board independence

Table 2-Spearman correlation

Ownership structure	Board independence	Board size	Stock return	Variable
0.016- 0.704	0.029- 0.49	0.006 0.858	1	Stock return
*0.089 0.029	**0.236- 0.000	1		Board size
**0.117- 0.004	1			Board independence

Table 3-The results of Chow test to determine homogeneity or non-homogeneity of sections

Chow test result	Prob F	F	H0
H0 is not rejected	0.631	0.953	Cross section and time effects are not significant

Table 4. The results of estimation of model coefficients

Significant level	T statistics	Standard error	Coefficients	Variable
0.000	10.496	0.115	1.211	Constant
0.812	0.237	0.017	0.004	Board size
0.641	0.465-	0.035	0.016-	Board independence
0.005	2.778-	0.0007	0.002-	Ownership structure
0.123	1.544-	0.032	0.05-	First auto-regressive variable
0.025	Coefficient of determination		2.516	F statistics
0.015	Adjusted coefficient of determination			
1.963	Durbin-Watson		0.041	F statistics probability

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REVIEW ARTICLE

Qualitative Improvement of Historical Buildings with Cultural, Recreational Approach

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ABSTRACT

Culture and social relations play important role in formation of urban life, repairing such spaces increases the growth and cultural promotion of society. With historical and ancient works, Iran has great history and its protection depends upon considering these memorials. This study reviews the improvement of historical buildings registering the identity of people in the region and finally establishing recreational cultural complex, shortage of cultural space based on young population of Iran can have catastrophic results as the youth are the most dynamic and active part of society. Thus, the planning basis of cultural, recreational complex besides its important social role has great effects on urban texture and it is used as a tool for development in region and entire city.

Key words: Improvement, Historical buildings, Cultural approach, Recreational, Repair

INTRODUCTION

Today, to prove their cultural identity, any country talks about its cultural heritage as its identity and is recognized by respecting the cultural elements. Indeed, the history of any nation is an organized set of events occurred in specific time and place and forming the identity of society. Iran with many historical and ancient works from various eras has great history in the mind of all people and its protection depends upon considering these memorials.

Thus, their protection is the duty of one by one of people, institutions and present organizations in the society. As it was said, repair of a historical building is a requirement for religious society with cultural people being proud of their old historical and valuable heritage of their country. The culture and considering cultural values are basic issues in society. Also, the development of domestic culture and fighting with west culture and cultural issue namely the young general can be considered specifically. Here, the development of cultural space as the places in which cultural works are performed is one of the important issues. Considering its establishment namely in the places with much people, can help us to achieve goals. Thus, the aim of designing these sets is achieving cultural development and cultural promotion of society with emphasis on domestic culture and using leisure time of people for their growth.

Protection

Protection of human being of himself to natural factors, protection of living spaces, living environment, protection of civil environment and villages and protection of documents, evidences and tools are observed in the life of people. Various layers of information of past can be considered as scientific and historical capitals for people with accuracy and researchers view. To use these capitals, it is necessary to protect the original documents and they continue their life as live creatures. The next step is appropriate application of these documents and heritage and protection of historical information and experiences, the basis of growth of human being, it means that the protection of works is interrelated with human stability. Generally, any measurement to make the historical work stable or safety of the work to the changes is called protection and according to Filden is the action to avoid the damage and increasing its life. The major goal of protection is protecting the originality, integrity and consistency of the work. Protection requires exact and comprehensive planning as including research, repair, introduction and renovation. Research is for achieving exact information of work, place, environment and social, cultural, belief and economic factors of works creators and detecting its originalities, social, human, religious, typology, materials and methods of impact(Moradi, M.,Moheb, A., Mohammad Hossein, A. 2008).

Repair

Repair is a vital activity and its necessity is felt in the entire life of human being. In other words, repair is a living necessity and is not performance necessity. Based on the evidences of past, repair is one of the development tools and one of the vital activities of human being indicating his tendency to order and continuity and prevention of irregular changes and repair accepts the changes as equal force in nature but it also considers regular changes. In other words, repair is returning order to environment and avoiding irregular changes and avoiding the breakage of general and natural frames. Indeed, any intervention with the aim of increasing efficiency to a product of human activity is called repair. Repair is one of the subsets of protection covering the technical and executive sector of protection and is fulfilled by new concepts and facilities. When a study is conducted regarding a work, the society is aware of its protection necessity and repair is also provided. In Islamic culture, based on historical experiences as its documents are remained in the works and based on the remaining of existing documents in buildings and historical cities, we can say major part of the applied methods is based on the growth based on definite goal. In the remaining evidences, there is an organization relation between environment, human being, nature and instinct and divine nature of human and as the major consideration is given to the internal nature of human being in creating remaining works, the past methods based on the religious beliefs and Islamic teachings are based on continuity of these evidences (Falamaki, M. 2008).

Border and protective regulations of valuable cultural-historical buildings

Any work based on the time and place of construction has some vital accesses and joints and besides its establishment in natural, urban and rural texture has close relation with its natural environment and can communicate well. This historical-natural co-existence has full coordination with marginal additional aspects of

buildings and isbased on the history, culture and beliefs and the applied technology is also consistent with natural geography of place. Today, changing life style, application of materials and formation of various design methods (besides damaging the geographical unity) created a separation in historical chain of urban and rural textures. These changes and interventions are rapid and their speed is not controlled normal natural life of urban and rural textures and nature are invaded and also damaged the achievements of experiences of some centuries of artistic, cultural and economic life of nations. Indeed, change is inherent component of all affairs but change control is unavoidable necessity of present time. As we observed, various historical changes can separate buildings from natural, rural and urban texture. Whether this disconnection is occurred or the building continues its life, prediction of the border and specific protective regulations is necessary to protect these buildings against the probable damages. Due to the variety of existing buildings with different conditions we can draw a general review of common lines for protection of building as border regulations. These regulations are investigated based on the type of effect as: The building continuing its life inside the urban textures as mosques, religious places, markets, caravansary, Abanbar, holy shrines and etc. In all these similar items, historical, image studies, archeology, competitive, similarity, physical perception of building from artistic-historical aspects are necessary besides considering the modern needs as urban utilities and etc. (Falamaki, M. 2007).

Architectural renovation

We encounter two contradictory architectural views following two equal goals. One is meeting the demands of an old building based on relying on culture and second is responding the already mentioned needs from routine and mechanical applied-physical view. Before indicating the technical issue of the building, a historical building includes thinking methods and environmental behaviors indicating the life of people in their era. Repair is performed via maintenance and returning the original form of building, repetition of each section or each worn out construction element of building as its initial form. This intervention method in the buildings based on the building nature is via fixation of the building physical form and fixed nature of building features over time and guarantee the continuous presence of the past culture of residential centers for all generations in contact with the building. We should say, the innovations in old architecture can be used based on different architecture thought in a new set: A new set accepting the learning of new generations of past and also including new findings, manifestation of new culture via its combination with past culture works can be performed. Today, dumping an old building and also interference with its condition to be improved to meet the present time needs are two contradictory methods to cope up with a historical building. First way with all its continuities with nature is unable to take positive and constructive decision and second method by accepting that we should be positive and constructive- endangers protection principle as respecting the past experiences and cultures (Falamaki, M. 2007).

Common methods of repair or architectural renovation

When we accept extensive definition and comprehensive thought basics for repair, in architecture, we achieve a long history and clear experiences in different countries: The mosques that are destroyed and renovated following the changes in administrative and political condition of cities or the change of governments: The temples that total or part of them are destroyed to accept new application: The churches that following new victories in countries and thoughts accepted relatively important changes to achieve more magnificence: The residential townships and units that are changed by various reasons: the ancient palaces and places that are destroyed with national aggressiveness and they were renovated by next generations can be in this group. In normal theories, the repair of buildings is created with them and in the early stages, is not a serious or complex problem but over time with the change of initial conditions of building and the changes of using building, architectural renovation is raised by new forms. This important goal is a complex issue based on historical quantity or building age and in consistency with the qualities of changes and it is the task of architects and experts of renovation of old historical buildings. Wear out of building materials is raised for various reasons (local changes in building frame, being influenced by periodical phenomena and unpredicted climatic and natural phenomena in land and in building neighboring sectors or those inside soil) can

be raised as technical issues for buildings repair experts. Due to correlation with other fields, the design for re-integration removes architecture renovation from its physical field(Dijozef, 1997).

From architecture to repairing a building

The design for repair of historical buildings is performed in two general stages: Recognition and design. Research and design works should be based on advanced architecture historiography methods and based on scientific methods considering critical theories and cultural evaluations based on place. The need of repair expert of historical building to exact information about local culture and literature during building foundation or when it based its vitality and productivity of citizens and hidden architecture changes in building (it is a part of culture and literature component) and this need is not met by architecture and urban planners historians, nor by anthropologists and literature researchers or archaeologists , thus by making a critical-analytic issue created by repair expert of historical building with his co-workers, creation qualities based on net attitudes, power of conception and methodological mastery (based on personal experiences of research group members) to show the framework of topic by scientific method (Falamaki, M. 2008).

The methods of investigation of damaged and worn-out buildings for their repairing

After taking decision to repair a historical-civil building, not considering whether the decision is based on which artistic-cultural, social, civil or economic-urban needs, as the building is presented to the repair expert for study and research, no intervention is made in its existing condition. The building for repair is like a patient visited by a doctor before curing for examination. Thus, except the cases the risk of destruction of a part of building is raised (this issue is observed in limited sectors of its physical form), intervention in its condition can bring unavoidable damages. During the professional work of architects during the design of a new building, recognition of geophysics, geographical, climatic, city construction and tectonic features and considering public applied needs, aesthetic , economic, ecological-biological, sociological and cultural anthropologic and demographic aspects can be taken into attention. The repair architect is invited to research in two distinct historical and continuous spaces. First, what is dominant on the building and another one is to his era. It can be said repair architect cannotbe indifferent to the time after his generation and only respond to the needs of his era and it can be said any decision making regarding specific item during repair plan is reflected on other issues in building body and restrict the building in the set of spaces created by it by its own form. The first step here is recognizing the existing conditions by considering the historical dimension of the phenomena as observed directly by signs or by some evidences are relevant to architecture spaces. After correct regulation of information and data of problem, in various summary and after their evaluation, we can be constructive theorists for architecture repair design and formulate the executive works(Falamaki, M. 2007).

Artistic-architecture and technical-building issues about architectural vitalization

The most important issue regarding architectural repair is started when by raising repair technical issues, we should decide definitely and for a long period of future life of building and apply the decision. During the repair of a valuable building, a specific dialogue can be between the repair architect and specialists group and the last word is said by the architect: The one committed to innovation and thought to achieve an ideal executive plan. As there are values inside the building being repaired and in its extensive environment and they are different stable life and finding a good method is very difficult. The values of any type not have equal effect, life or equal culture and taste and they have specific mechanism. Like the architects creating new space, repairing architect can put the existing values reflected in internal and external environment of his work in a new form, put some of them as bright and others in shade(Falamaki, M. 2007).

Formation of repair plan ranging from applied volumes to building materials

In recent years, the researchers and architecture critics emphasized on the fact to formulate comprehensive definition for architecture. They attempt to give definite role, position and weight to all the components of constructed space. The most important theory stated in this regard justifies architecture as the content or frame and container: Reflection of applications and internal spatial relations of building on exterior shell and relative conditionality of formation of this building or restricting wall of building from space or open spaces, can create architecture foundation. Based on the mentioned items, we can hardly review a building or an architectural complex fully. The development of such theory is one of the latest efforts of rationalistic thought in architecture and indicates the vivid importance of technical issues in architecture design. As architecture repair issue in the last analysis applies one of its serious decisions on building physical structure, we can emphasize on the hierarchy between spatial system of buildings (foundation chart and hierarchy of the distinct users of building) with construction materials and framing applied in guarantee of their stability (indicating the thought of designer architect and current construction traditions of building construction time) can be necessary. Determining the type of construction materials considering the volumes maintenance, tolerating different forces, resistance against corrosion, the recognition to the meeting of "chromatic needs" and decorative formations during building construction can be done by architect. Such decision making has considerable freedom in building creation (being affected by economic conditions, technological facilities, local building traditions and show the cultural personality of architect following common aesthetic methods". The combination of close and open space as everywhere discussing about enriched architecture set, can find its original roots in traditional life of residents. Traditional lives due to conditional nature of climatic-geographical aspects as using sun during day namely in hot and cold seasons indicate specific procedures in which internal and external space combination can be observed. This combination method of internal and external space (or close, semi-close and open space) with cultural values of environment indicate specific concepts completing architecture definition(Falamaki, M. 2007).

The position of technology in architecture repair

The architecture repair is like knowledge regarding only current applied relations in valuable and historical buildings and by specific method, this issue is responded as we cannot consider specific technological load for it. This hypothesis cannot be raised for two reasons: first even simple applications in the buildings, in encountering of human being with various spaces of physical-applied can show definite shape and face indices with specific color, texture and building compositions affecting human behavior, as the color and quality of flooring and the material and decoration of walls, door of kitchen and hall and living room are not equal in the houses. Second, the applied changes in the houses or bathrooms or shops, are based on specific applied structure and as established in a wide range of one-two rooms, as the changes occurred in the performance of intercity caravansary and are based on the change of type and goods, the establishing of commercial relations and its type and are relevant with the mutual recognition of buyer and seller. Any repair issue in historical buildings with structural damage or being worn-out and primary constructional materials cannot resist against compressive and tensile forces (bending or torsion) in building and they can ask for changing the use in various spaces of houses and bathrooms and shops and the change of use of buildings can show the changes of technical-structural relations in an old building. Briefly, we can say we cannotdistinguish between physical issues (as showing the structural problems of buildings) and applied issues occurred over time (and mostly have some reflections of fatigue of construction based on the morale of residents and employed in old buildings) and we can draw separating line and the false assumption that is raised as architecture is a mixture of applied and form data, can state a structure and cannot present the full form. From this point, building technology generating architecture repair technology can be used to review in architecture creation basics and along the experiences as achieved in architecture creation part and in expert part of architecture repair and they ask for statement of problem in a new form(Falamaki, M. 2007).

The durability of traditional architecture

It seems that Iranian architecture with the features introduced by "Pirnia" is close to these definitions as principles as sociability, avoiding vanity, self-sufficiency as key words of durability of a work. According to Pirnia, no shape language of traditional architecture is described and four principles of reasoning and general as executed in all sustainable architecture even by its modern form. It seems as although Pirnia was tradition-based and gave importance to traditional issues, it believed in durability but his principles don't protect historical architecture and can follow a reasoning permanence. For example, his sociability was different form post-modern sociability and was not equal with fashion and audience-based. Pirnia didn't raise any principle regarding the creativity and individual innovation as modernist believe in it but in their attitude besides observing each of reasoning principles, any creativity can be created. These principles are based on reasoning logic in nature as divine creation and the work formed by these principles should respect God, nature, human being and human wisdom (Noghrekar, A. 2009).

Culture

One of the relatively comprehensive definitions of culture is presented by E.B.Taylor in 1871. These English anthropologist believe that culture is a complex set of sciences, knowledge, arts, thoughts, beliefs, rules and traditions and namely the learning and habits as obtained by a person as a member of society. According to Samar, American sociologist, culture is a set of traditions and social institutions. According to Moein dictionary, it means magnificence and thinking about value and excellence and it includes going forward as time and place concept. Culture means dignity, understanding, intelligence, achieving deputy on education. Culture has special functions and it is called human ethics.

Culture creates educational system and it is transferred from one generation to another, it has accumulated and is transferred from one place to another, selects in accepting things and it has complex nature. It also has some functions such as sociability of people, education, false and true values, social supervision, norms, tradition, beliefs and family life system. Indeed, one of the most important public needs of society is improving public culture and dynamics in this path. The establishmentof the places in which these goals are fulfilled are necessary issues. Based on the importance of insignificance of leisure time and improving public culture, the buildings built in this regard are based on the current need of society and social and state theorists should get together and plan to respond the new cultural needs of required spaces. Cultural buildings are those in which cultural activities are performed and these activities include scientific, educational, belief, political, artistic and sport. The buildings in which these affairs are performed are schools, culture houses, culture institutions, cultural complex, clubs and youth clubs and etc. and cultural complexes play important role and dominant activity is cultural in them (Ashuri, D. 2010).

Leisure

Different definitions are presented of leisure time and people and scientists define this term by various methods. According to some people, leisure is the free time remained after work, the work done after working and creating money. Some people consider leisure time restricted and believe that the time remained after working and commuting and meeting the physical demands as sleeping, feeding, bathing and etc. is called leisure time. Others consider social obligations as religious and family obligations (keeping the children and etc.) are deducted of leisure time. The third interpretation is correct as leisure time is the result of free selection and it requires being released of various duties. We can say that leisure time is specific time of a person. In Iran and in the past, leisure time was collective and in this leisure time, social goals were overcoming individual inclinations and by a view of the past, we can say leisure time is used by various methods with full consistency with urban construction and architectural spaces of that period. Leisure had different nature in various historical periods and geographical situations and its variety form was consistent with the social, economic and cultural conditions of people life, it had direct impact on

human and in the present time, by entrance of industry and technology namely mass media increasing cultural relation of societies, the term leisure is changed generally and its form is similar among the communities and it follows unified goal but the difference and variety in leisure functions can be observed in historical civilizations and communities but due to its human nature, it has great similarities(PoursoltaniZarandi, H., Eibizade, A. 2010).

Leisure in contemporary era

Before industrial revolution (late 18th century), leisure time was not separated from working. On that time, people were working continuously and when the nature was no suitable, they gave up working. After industrial revolution, work time was defined, work duration was calculated as one of the production basics and leisure time was separated from work and the basis of leisure time based on its nature meaning refers to industrial revolution. The present generation prefer to have much leisure time and the current communities are faced with the risk that leisure time of people is much and it seems that it creates great risk for themselves and society due to the lack of ability to plan these times. Thus, leisure time is one of the most difficult issues that most nations in the world namely westerns are faced with it as sociologistsrecently mostly emphasize on leisure time and they study how to pass leisure time in various social communities, groups and different classes(Hirod, L. 2001).

The necessity and performance of leisure time

Leisure time is necessary to have healthy life and there the relevant functions include: Leisure time and avoiding social damages, modification of behavior and excellence of human personality. Using leisure time besides releasing energy can provide self-actualization and creativity to show the talents. Leisure time plays crucial role in evolution of individual and social personality and helps a person to approach the interest and the desires(Hirod, L. 2001).

CONCLUSION

The shortage of cultural space, based on young population of Iran can have adverse impacts as the youth are the most dynamic and active part of society. Thus, the planning of cultural , recreational complex beside its important role based on type has great impacts on urban texture and it is a tool for development in region and the entire city. The establishment and development of cultural space as the places in which cultural works are done are the most important issues. Considering the place of its establishing namely in the places with many gathering of people can help us to achieve these goals and the aim of designing these complexes is achieving cultural development and cultural improvement of society with emphasis on local culture and using leisure time of people for their growth. Thus, the following results are achieved: 1- For recreation, human being needs comfort of beauty and enjoying the surrounding environment, 2- Leisure is necessary for human actualization, 3- IT is human being ability to pass leisure time, 4- Leisure time is the bridge to society and entering the social arena, 5- Recreation is a factor to fulfill mental, spiritual, sensory and social issues, 6- The recreation shouldn't be only for fun and it should be a factor to provide mental, spiritual, physical and social health. 7- Cultural invasion by targeting the behavior of each nation is dangerous and it is based on losing faith, self-belief and it is full dominance, 8- Combination of cultural and recreational activities in the form of establishing cultural and recreational complexes in leisure time is useful in actualization and public growth of society, 9- The nation that is dependent upon another nation will be dependent also from military, political and economic aspects. 10- Establishing cultural places is one of the necessities of society, 11- Combination of cultural and recreational activities in the form of establishing cultural and recreational complexes as in leisure time are useful in actualization and general growth of society.

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REVIEW ARTICLE

Depenalization in the Islamic Penal Code (Act of April 8, 2014)

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ABSTRACT

Considering the issue of depenalization and implementing methods to achieve it has been one of the most important achievements of the Islamic Penal Code Act 2014. It has been carried out by inspiration from changes in criminal law in the past few decades. Along in addition to "parole" and "suspension of penalty," which existed in the Islamic Penal Code Act of 1370, substitute punishments for imprisonment or custodial penalties (Articles 64 to 87), postponement of the sentence (Articles 40 to 45), and the system of half-release [open prison] or half-release system (Articles 56 and 57) are innovations in the new law. It signifies the legislators' attention to depenalization and their efforts to find a successful and efficient criminal policy. In this regard, this article mulls over depenalization innovations in the new Islamic Penal Code.

Key words: custodial penalties, depenalization, free public services postponement of the sentence, half-release [open prison] system, supervised period.

INTRODUCTION

Predicting penalties for violators of laws has been used even in the earliest societies because it is impossible to imagine a society without the least minimum rules governing the behavior of individuals. Undoubtedly, punishment has always been executed in all societies, even primary ones, either as a social reaction against anti-social behavior or as a penalty for evil action by suppressive methods (Mazlooman (1972)). Some lawyers believe punishments had been based on defending instincts such as life, property, tribal rules, ethnic customs, and religious traditions; one can find the trace of such foundations more or less around the world in the present time(Noorbaha, (2007)).

For Plato, The fate of every sinner tolerating punishment (if justice imposed on him) will be either his own benefit by improving or others' edification by improving them as the result of fear of punishment (Plato (2001)). Kant argues that justice and ethics require the punishment of offenders; therefore, even if one disregards the benefits of punishment for society, he cannot avoid it due to violation of ethics and justice (Noorbaha (2007)). Bentham agrees that it is essential to challenge any action contrary to the public interest in order to provide the greatest happiness for most people. Hence, legislative system is bound to predict punishment in the laws as a means threaten criminals (Ardabili (2009)).

Discussions about penalties and punishments have been a common subject and every criminal law thinker has examined this subject. With broad political and social change in Western societies, this question has rised: To what extent are punishments effective in preventing crime and correcting offenders?

Some lawyers suggest new ideas in this regard. Italian jurist, Gramatica, believes that an offender is indeed an anti-social person that the system should employ for him social defence measures rather than punishment. Social defence means improving the person's condition that can be realized by measures considering his personality and individuality; the action aims to correct the anti-social person (Noorbaha (2007)). The ultimate goal of social defence is to enter the person in the social order, not to execute a punishment. Gramatica concludes that social defence requires cancelling criminal responsibility and replacing concept of 'anti-social behavior.'(Ancel (2013)).

Criminal law has been developed as far as punishment is not the first choice of thinkers in this field; but new doctrines emphasize on depenalization. Depenalization is a kind of criminal policy tool including reduction of penalty to remove it, or a suggestion for alternation between punishment and a non-criminal act for criminal behavior. Thus, the measures to limit or eliminate the penalties –such as transforming or replacement to a less severe penalty or substitution of non-custodial penalty for a custodial penalty- are included in the class of depenalization. Therefore, depenalization can include all forms of modification in order to mitigate or eliminate criminal penalties(Rayjian Asli (2002)). In addition, the concept of depenalization includes all forms of de-concentration of the penal system. In this context, changing description of a crime from 'felony' to 'misdemeanor' may be regarded as depenalization. This issue is true about non-custodial penalties when they can be replaced with other sanctions that have Are less adverse effects or less side effects (like fine, suspension of surveillance, courts' particular orders, etc.) (Mera (1998)). That is to say, depenalization is a form of incomplete decriminalization. In this situation, a social policy and intervention replaces punishment, but criminal title is maintained for action or omission(Najafi Abarand Abadi (2011)).

Some lawyers believe in the separation and classification of depenalization. According to this view, depenalization includes:

Legislative depenalization : Depenalization may be carried out through harmonizing penal enforcement by the legislator. The legislator may employ various methods to achieve this goal such as (a) changing in the three levels of crime; for instance from felony to misdemeanor or from misdemeanor to infraction; (b) determination of passing offenses in the Act; (c) predicting procedures such as deals, conversion or impunity; (d) prediction mechanism for amnesty as a means to reduce punishment.

Judicial depenalization : In legal systems with foundations like Office of the Prosecutor, relevant authorities such as investigator or prosecutor can use powers such as banning, suspension or suppression of a pursuit through provisions predicted by the legislature.

Executive depenalization: One can see the effects of policy depenalization in some countries with respect to the important role that police plays alongside the courts and tribunals. For example, in the class of countries that believes

in common law for family rules or inspired by doctrines of this school – especially England and Wales- police can prevent offenders to commit a crime through methods like 'caution' or 'warning.'(Rayjian Alsi (2002)).

This article concentrates on depenalization in the new Islamic Penal Code, Act of 2014 and examines its instances. Therefore, it disregards instances of depenalization in Act of 1370 like conditional release and suspension of penalty.

Paragraph 1 - Substitute punishments for imprisonment

Detaining criminals as society's official and conventional reaction has not very long history. In not so distant past of the West, the Orient, and Asia, deprivation of liberty and confinement of criminals was allocated to pre-trial stage to deliver the accused to the court to judge whether he is guilty or not; then, the punishment, which was mostly physical and inhumane punishment, were executed(Zeinali, 2005)). In fact, prison was used to temporary maintenance of those who awaiting trial or sentence of the court, or it may be used as a force for guilty to pay a fine(Ahmadi Movahed (2004)).

Ancient Persia enforced imprisonment rarely because of the abundance of the death penalty as well as non-recognition of prison as a place of punishment. However, sometimes imprisonment was used for correction(Noorbaha (2007). Some of the Achaemenid kings incarcerate traitors and rebels. In this case, Ardavan is an example who incarcerated by Ardeshir's order. Mani is a famous prisoner of the Sassanid era. 'Oblivion Castle' is a famous and the notorious prison of the period that was designed for political and senior prisoners that repeating their names was crime (Aboonia, (1989)).

There was also no prison in early Islam and it was formed later. The jail established by Hojaj ibn Yousef was one of the most horrifying prisons in this age. There is no known jail in Iran after Islam. Most prisoners were claimants of the throne, which were usually detained in the special strongholds. In this period, penalty was usually executed for revenge; the offender was given to the plaintiff to be punished. Public jail was not common and offenders were kept in the houses of judges for a short time.

In general, a glance at the history of criminal law reveals the major developments in the field of penalties, especially imprisonment. The first phase includes corporal punishmentssuch as death penalty, flogging or amputation; they were executed untill the early 19th century. In the second phase, due to the importance of individual freedom, deprivation of liberty was considered by legislators as criminal punishment. Later, because of numerous disadvantages presented for prison by criminologists, substitute penalties have been introduced(Maskani (2005)). Despite unfavorable conditions of prisons, the introduction of substitution of incarceration for severe corporal punishment was very hopeful. This hope diminishes gradually due to lack of attention to prison conditions, high incarceration rates, and professionalization of sentencing to prison. Thus, with the advent of 1789 French Revolution, prison reform movement, paying attention to the prisoners' conditions, and their rights were concentrated and its scope went beyond Europe, Latin America, and America, particularly the northern part of America(Najafi Abarand Abadi (2001).

Mark Ancel believes that policy of Western European countries have undergone three ascending stages:

In the first stage, which is the traditional framework, the prisoner is sent from a completely closed place to the outside. Experts have always suggested work in outdoor and away from the four walls of the prison.

Another system is 'penal week-end'in which the convict endures a punishment continuously from Friday night to Monday morning and follows his ordinary life in weekdays. Semi-freedom is similar to penal weekend system because the convict maintains his job at least outside prison in days and return to jail at nights and holidays.

Finally, there areis conditional releases that have been regarded as a concession for the prison authorities for long times. Social defence movement regards this institute as a method of social reconstruction that will introduce life to the convict in free environment. In this way, conditional release is a right for the convict with respect to legal provisions or regulations. It is important in some new rules where conditional release is necessarily the final step in the gradual regime, before the final release (Ancel (2009)).

However, imprisonment has always been a challenging point in debates. Advocates have expressed their approval for the following reasons:

1. Removal of incarceration may lead judges more to issue death penalty where there is still death penalty legal.

2. When one speaks of private intimidation and deterrence by prison, he indeed intends to disable the criminal during incarceration and it cannot be achieved with non-custodial punishments.

3. In the case of prison elimination, it is not clear how to treat with dangerous criminals and repeated crimes or how to keep society safe from such people(Zeinali (2005)).

Nevertheless, opponents have also expressed their opinions; the followings are the reasons for the ineffectiveness of the prison sentence:

1. Prison sentence does not necessarily decrease the crime rates or forestall a repeat of crime.

2. Prison may change the guilty's identity; long-term incarceration may cause mental and personality disorders.

3. In addition to the guilty, imprisonment influence badly on guilty's victed family, relatives, and friends; thus, in is contrary to personal aspect of punishments.

4. Construction and maintenance of prisons requires enormous costs. On the one hand, governments must bear such costs; on the other hand, a convicted person is away from economic and social activities that impose adverse effects on economic development. Therefore, incarceration increases problems rather than solving problems.

During recent decades, pathological studies of incarceration from the viewpoint of criminology has shown the destructive social, economic, and family effects imposed on a convict; this effects brings about irreparable damages to the body of the family and society. The principle of personal punishment requires the system to punish only the convict and the penalty should not extend to others. In incarceration of the household head, the headband of family life is disrupted and the innocent children of family will be exposed to dangerous deviations due to deprivation from family canon, parental love, and narrowness livelihoods(Javaheri, (2001)). Accordingly, anew penology is emerging with emphasis on limiting use of prison for dangerous criminals and deployment of social competences in correction of non-dangerous offenders(Ghasemi Moghadam (2008)).

In Iran, many attempts have recently been carried out to eliminate incarceration or introduce better administrative procedures; but they have been unsuccessful. Hence, there have been attempts to limit the use of imprisonment and diversify punishments within the framework of deimprisonment influenced by the recommendations of the United Nations and the successful experience of other countries (Haji Tabar (2008)). Some believes deimprisonment movement began in Iran from twenty years ago; it was first discussed in scientific circles; then it was prosecuted as a judicial movement (Babaee (2012)). Therefore, the legislators of Islamic Penal Code, Act of 2014 have attempted to

legislate in respect of non-custodial penalties. Chapter 9 of the second section (punishment sections) that includes Articles 64 to 87 explains this issue.

According to Article 64 of this law, "Substitute punishments for imprisonment include: supervised period, unpaid public service, fine, daily fine, and deprivation of social rights, which shall be given subject to forgiveness of the complainant and existence of mitigating factors and taking into account the type of the offense and the circumstances in which the crime was carried out and its consequences, and the convict's age, skills, conditions, character and records, and also conditions of the victim and other circumstances and conditions."

Supervised period

According to Article 83 of Islamic Penal Code, Act of 2014, "The supervised period is a period during which the convict shall be ordered, according to the judgment of the court and under supervision of the judge in charge of execution of judgments, to carry out one or more of the [same] orders provided [earlier] for supervised suspension as explained below:

(a) In the case of offenses which their punishment prescribed by law is maximum three months' imprisonment, up to six months

(b) In the case of offenses which their punishment prescribed by law is from ninety one days to six months' imprisonment as well as offenses that the type or amount of their ta'zir punishment is not specified in statutory laws, from six months to one year

(c) In the case of offenses which their punishment prescribed by law is from six months to one year's [imprisonment], from one to two years

(d) In the case of unintentional offenses which their punishment prescribed by law is more than one year's [imprisonment], from two to four years."

In supervised postponement, the convict is obliged to observe commands and measures imposed by the court during the postponement and he should implement them timely. Article 42 of Islamic Penal Code satates, "n supervised postponement the following measures shall be taken:

(a) On-time attendance at the time and place determined by the judicial authority or the supervisory social worker.

(b) Providing the required information and documents in order to facilitate the supervision of the social worker over the compliance of the convict with his/her obligations

(c) Declaring any change of job, residence, or relocation within fifteen days and providing the report to the social worker

(d) Application to the judicial authority for permission for travelling abroad

Note- The abovementioned measures can be accompanied by the court with some supportive measures such as referral of the offender to support organizations."

In addition, "In supervised postponement, the court, while considering the offense committed and characteristics of the offender and conditions of his/her life, can require the offender to carry out one or more of the following orders during the period of postponement, provided that this will not significantly and hugely disrupt his/her own, and his/her family's, life:

(a) Learning or holding a specific profession or job
(b) Residence or non-residence in a specific place
(c) Treatment of an illness or rehabilitation of an addiction
(d) Payment of nafaqa (allowance) to those required by law
(e) Refraining from operating all or some motor vehicles
(f) Refraining from professional activity relating to the offense committed or using the means of the offense
(g) Refraining from contacting and associating with accomplices and accessories to the offense or other people such as the victim of the offense at the discretion of the court
(h) Attending (a) special program(s) for training and learning basic skills for life or participating in training, ethical, religious, educational or sport classes." (Article 43 of Islamic Penal Code)

In United States as the main founder of supervised period, the period is introduced to correct criminals and help them to return to society. In this regard, supervised period means granting opportunities to offenders to be present in the community for showing their willingness to obey the law. In fact, supervisor, or supervisors, seeks to admonish, assist, and establish a friendly relationship with the offender. In this manner, the convict is led to a lawful life through stimulation of moral and religious sentiments(Ghasemi Moghadam (2008)). It seems Iranian legislators follow the same goal. In addition to the reduction of prisons' criminal population, rehabilitation and reforming criminals to return to society is the main goal of supervised period.

Unpaid Public Services

Unpaid public service is another noncustodial punishment. Unpaid public services are those determined by court for the convict; the convict should carry out them under the supervision of an agent for a specific time for a determined period without receiving remuneration to the benefit of society (Khaleqi (2008)). According to some experts, the implementation of this type of service is a mix of physical and psychological pressure because they limit freedom, establish discipline, and bring respect for others; they place offenders in a position employing his will, experience and competence as well (Ghajavand (2011)).

Public works is a method presented to courts and enabling judges to sentence criminals and force them to carry out constructive and unpaid services in the community to compensate the damage caused by his action. The purposes of this type of service can be as follows:

Subjugation to the coordination and adaptation of unpaid work;
Ensure that the work causes compensation for the damage to society and all damages caused by the offense would be corrected in a beneficial way;
Reduce the risk of recidivism;
Increase the likelihood of offenders' returning to the community(Mohammad Nezhad (2005)).
In some countries such as France, community service is used in practice for three types of offenders:
First accidental offenders: whose offence is relatively serious;
Serial offenders committing offences of low to medium severity;
Traffic offenders in the previous two categories (Picquart (1997)).

Article 84 of Islamic Penal Code, Act of 2014 stipulates, "Unpaid public services are those services that, with the consent of the convict, shall be given in the judgment as explained below and shall be executed under the supervision of the judge in charge of execution of judgments:

(a) Offenses mentioned in paragraph (a) of article 83, up to two hundred and seventy hours
(b) Offenses mentioned in paragraph (b) of article 83, from two hundred and seventy to five hundred and forty hours
(c) Offenses mentioned in paragraph (c) of article 83, from five hundred and forty to one thousand and eighty hours
(d) Offenses mentioned in paragraph (d) of article 83, from one thousand and eighty to two thousand and one hundred and sixty hours."

Criminal laws of different countries have specified different hourly rates for public services. Despite the different criteria in different countries, community service consists of 40 to 240 hours of unpaid work for a local authority in most penal systems. Some countries predicted working hours in excess of the maximum rate (240 hours). For example, the rate is 40 to 300 hours in England and 360 to 1500 hours in the Republic of Armenia. Therefore, it seems Islamic Penal Code is considered one of the heaviest penalties in the field of community service with predicting a minimum of 270 hours and a maximum of 2180 hours of community service.

Note 1 of Article 84 says, "Hours of providing public services shall not exceed four hours a day for employed people and eight hours a day for unemployed people. In any event, providing the services during the day time shall not disrupt the convict from earning a reasonable living."

However, public services are followed by economic interests and profits in addition to reducing the cost of keeping offenders in prison. Earnings from services performed by the sentenced person returns to the public. The more use of this penalties increase, the higher would be amount of profit returned to the public. In addition, the offenders' emotional, family, work and social ties will not be disturbed during this period. Some believe that the governments should not be encouraged to use these penalties merely for their profitability because correction of offenders is one of the main goals of this punishment since they fulfil this goal better. They should be supported in this regard(Mohavalati (2003)).

Fines

Fine plays a key role among all substitutions for imprisonment because it is regarded as the first punishment by thinkers and legislators when prison is ineffective. Non-corruption of financial penalties, simplicity in implementation, contributing to the state treasury, accelerating the chastisement of offenders, non-corruptive psychological influence, the ease of establishment of proportionality between penalties and fines, and lasting intimidation impact(Ardabili (2009)) are advantages of this type of punishment. Of course, it should be noted that the execution of this penalty relies more on the financial power of the sentenced person. Thus, the convict's poverty and his inability to afford fines may be an obstacle to the implementation of the punishment.

Over nearly the recent century, there have been some provisions in Iran for converting punishments into fines. For example, "The law for possibility of converting 'imprisonment due to infraction less than two months' to fine, Act of 1928," Article 11 of "General Penal Code," approved 1973, Article 22 of Islamic Penal Code adopted 1991, and Article 3 of "The law for receipt of government revenue and expenditure in certain cases," adopted in 1994. The new Islamic Penal Code, Act of 2014, has also predicted fine as a substitution for incarceration and determined them it in Article 86. According to this Article, "The amount of fine substitute to imprisonment is as follows:

(a) Offenses mentioned in paragraph (a) of article 83, up to nine million (9,000,000) Rials

(b) Offenses mentioned in paragraph (b) of article 83, from nine million (9,000,000) Rials to eighteen million (18,000,000) Rials
(c) Offenses mentioned in paragraph (c) of article 83, from eighteen million (18,000,000) Rials to thirty-six million (36,000,000) Rials
(d) Offenses mentioned in paragraph (d) of article 83, from thirty-six million (36,000,000) Rials to seventy-two million (72,000,000) Rials."

Daily Fine

In daily fine approach, fines are calculated not according to a defined amount, but according to "day" with respect to the convict's daily income. In other words, this approach uses the combination of two elements. With respect to the situation, circumstances, and severity of the offense, the judge determines the number of days that a sentenced person should compensate; then, the fine of every day is calculated according to the convict's financial situation and personal income. Thus, the amount of fine is obtained from the first element (number of days) multiple the second element (daily amount of fine).

Daily fine= number of sentenced days × daily amount of fine(Mohavalati (2003))

According to Article 85 of Islamic Penal Code, "aily fine is defined as one-eighth to one-quarter of the daily income of the convict which shall be given as explained below and shall be received under the supervision of [the judge in charge of] the execution of judgments:

(a) Offenses mentioned in paragraph (a) of article 83, up to one hundred and eighty days
(b) Offenses mentioned in paragraph (b) of article 83, from one hundred and eighty to three hundred and sixty days
(c) Offenses mentioned in paragraph (c) of article 83, from three hundred and sixty days to seven hundred and twenty days
(d) Offenses mentioned in paragraph (d) of article 83, from seven hundred and twenty days to one thousand and four hundred and forty days.

Note- The convict is obliged to pay the daily fines of each month within ten days after the end of the month."

The second paragraph - Postponement of Deliverance of Judgment

In line with Article 40 of Islamic Penal Code, "In ta'zir offenses of the sixth to eighth degree, after the accused is found guilty, the court, subject to the following conditions and considering his/her personal, family, and social conditions and backgrounds and the circumstances that resulted in commission of the offense, may postpone the deliverance of the judgment from six to two years:

(a) Existence of mitigating factors
(b) Foreseeable correction of the offender
(c) Compensation of, or taking appropriate measures to compensate, the loss
(d) Lack of effective criminal record."

According to the article, the definition of "postponement of deliverance of judgment" is non-issuance of criminal conviction for a defendant known guilty by the judge for more correspondence of official criminal response to the unique features of an offender in the case of existence of stipulated conditions in law to enforce this authority (Ghiasi (2012)) That is to say, this foundation paves the way to individualize punishments in the proceedings. In fact, the court has the authority not to hurry in determining the punishment for offenders by considering personal and social

conditions as well as status of the offender(Tavajohi (2013)) Therefore, 'postponement of deliverance of judgment' is an authority in line with criminal policy based on flexibility and further support for non-dangerous offenders. This leniency tool can correct the offender through proper use of the judge.

Postponement of deliverance of judgment, as said by Article 40 of Islamic Penal Code, requires the following conditions:

Perpetration to ta'zir offenses of the sixth to eighth degree The first condition for is perpetration to ta'zir offenses of the sixth to eighth degree. On the word of Article 19 of Islamic Penal Code, ta'zir offenses of the sixth to eighth degree are:

Sixth Degree

— Imprisonment from six months to two years
— Fine from twenty million (20,000,000) Rials to eighty million (80,000,000) Rials
— Flogging from thirty-one to seventy-four lashes and up to ninety-nine lashes in indecent crimes
— Deprivation from social rights from six months to five years
— Publication of the final judgment in the media
— Ban from one or more professional or social activity (activities) for legal persons for up to five years
— Ban from public invitation to increase the capital for legal persons for up to five years
— Ban from drawing some commercial bills by legal persons for up to five years

Seventh Degree

— Imprisonment from ninety-one days to six months
— Fine from ten million (10,000,000) Rials to twenty (20,000,000) million Rials
— Flogging from eleven to thirty lashes
— Deprivation from social rights up to six months

Eighth Degree

— Imprisonment up to three months
— Fine up to ten million (10,000,000) Rials
— Flogging up to ten lashes

In keeping with ta'zir offenses of the sixth to eighth degree, it is clear that the legislators have allowed the authority for 'postponement of deliverance of judgment' only for in connection with insignificant offenses be cause such offenders are not high potential criminals and society is not basically damaged by their crimes.

The Presence of mitigating factors: Article 38 of Islamic Penal Code determines mitigating factors. Mitigating factors are:

"(a) Forgiveness by complainant or private claimant
(b) Effective cooperation of the accused in recognition of accomplices and accessories to the offense and in finding the proceeds of the offense or discovering the properties and goods resulted from, or the means used in commission of, the offense
(c) Specific circumstances under the influence of which the accused has committed the offense; such as: inflammatory conduct or talk of the victim or honorable motive for committing the offense

(d) Statement of the accused prior to prosecution, or his/her effective confession during investigation and prosecution
(e) Regret, good reputation or specific condition of the accused such as his/her age or illness
(f) Efforts by the accused in order to reduce the effects of the offense and his/her measures to compensate the loss resulting from it
(g) When the loss imposed to the victim of the offense or the consequences of the offense are slight
(h) Slight contribution of accomplice or accessory to the offense in commission of the offense."

Foreseeable correction of the offender The court should decide whether postponement of issuing sentence can correct the offender or not. Indeed, the judge of court can discern whether he is reparable or not after obtaining the culprit guilty with respect to his individual, family, community and records. Then; he may postpone the judgement.

For some experts, the purpose of such correction is self-correction contrary to mandatory correction. The latter case imposes enormous social and individual costs on criminal justice system with the direct impact of perpetrator's punishment. However, a convict can be institutionalized correctly during the period of judgement postponement without any cost; the effect of such self-institutionalization is definitely more stable that the possible effect of mandatory correction(Ghiasi (2012)).

Compensation, or taking appropriate measures to compensate the loss

Nowadays, new approaches to criminal law emphasize mostly on providing compensation for losses from providing compensation for losses from delinquent. In this view, delinquent should find an opportunity to correct and compensate the damages of his offense. The theorists of "Restorative Justice" believe that delinquents should met the persons having been harmed by them; in this manner, the can see the damages they have imposed on others. They should explain about their behavior to victims and attempt to correct what they have destroyed (Allison Morris (2003)).

Any offender's attempt and action intended to compensate for losses and reduction of crime, either during or after the crime, and compensation for moral and material damage caused by the offense as well, can entitle the offender to some commutation because compensation is a sign of the convict's awareness and a penitent who seeks compensation deserves moderation commutation (Tavajohi (2013)) Considering this issue, Iranian lawmakers have predicted "compensation of, or taking appropriate measures to compensate, the loss" as a condition for 'postponement of deliverance of judgment.'

Lack of effective criminal record As said by Article 40 of Islamic Penal Code, "An effective conviction is a conviction that deprives the convict from social rights following the execution of the sentence in accordance with article 25 of this law." Actually, effective conviction is final criminal convictions on intentional charges depriving the convict from social rights (According to Article 26 of Islamic Penal Code) as consequential punishment. After the sentence was executed or subjected to lapse of time, the deprivation shall be for the following periods:

(a) Seven years from the date the execution of the main punishment is stopped, in the case of sentences of deprivation of life and life imprisonments
(b) Three years in the case of sentences of limb amputation, qisas of limb if the diya of the suffered injury exceeds half of the victim's diya, banishment, and imprisonment of the fourth degree
(c) Two years in the case of sentences of hadd flogging, qisas of limb if the diya of the suffered injury is half or less than half of the victim's diya, and imprisonment of the fifth degree.

Third paragraph - Regime of 'Half-release' [open prison]

Using the ideas of criminal lawyers and in the discourse of international criminology, the new Islamic Penal Code has recognized regime of 'half-release' [open prison] in support of the offender, his family and the community (Babaee (2012)).

In accordance with Article 56 of the Act, "The regime of half-release [open prison] is a method according to which the convict can pursue his/her professional and educational activities, training, treatment, and the like outside of prison while serving the imprisonment sentence. These activities shall be supervised by the Centers of Half-release which shall be established in the Organization of Prisons and Security and Correctional Measures."

With regard to the provisions of the foregoing, it seems that the convict can continue some personal activities outside the prison during incarceration. For instance, he can engage in training activities such as educational courses; or he can continue his treatment outside the jail if he is addicted. The foundation of half-release system, which is a new method, depends on the establishment of the Centers of Half-release under the supervision of the Organization of Prisons and Security and Correctional Measures. Thus, in addition to approval offenders' part-time release, half-release system emphasize on constant monitoring on offenders. In this regard, the legislators decide to punish the offender, prevent damages to his social relations, and take the advantages of offenders' presence in community.

Article 57 specifies how to issue the sentence of half-release system. By virtue of this article, "In ta'zir imprisonments of the fifth to seventh degree, subject to forgiveness of the complainant and pledging an appropriate guarantee and promising to pursue a vocational, professional, or educational activity or contributing in continuity of the family life, or treating an addiction or illness which are effective in the process of rehabilitation [of the convict] or compensation of the victim, the court of final judgment can put the convict, with his/her consent, under the regime of half-release. Additionally, the convict can request the order of half-release while serving his sentence, provided that s/he meets the legal requirements and the court is obliged to consider the request."

Considering article 19 of Islamic Penal Code, imprisonments of the fifth to seventh degree, which stated in Article 57, are imprisonment from two to five years (fifth degree), imprisonment from six months to two years (sixth degree), and imprisonment from ninety-one days to six months (seventh degree).

The legislators' attention to half-release system and its prediction in Islamic Penal Code have been proper strategy to reduce prisons' criminal population. Many disadvantages of prison were stopped with the operation of half-release system and offenders' correction was accelerated. Moreover, the administrative expenses using prisons was removed and the society takes the advantages of results and benefits of offenders' work and service(Babaee (2012)).

CONCLUSION

Undoubtedly, achieving a successful criminal policy requires an understanding of modern penal systems and the implementation of new criminological and penal findings in the form of relevant laws. In this regard, Iranian lawmakers have attempted to reconcile new Islamic Penal Code in line with developments in criminal law in the modern age to be a step towards the realization of criminal justice and removing shortcomings of the former Islamic Penal Code. New institutions predicted in the Islamic Penal Code, which are relied on depenalization, are rooted mostly in the principle of punishment individualization and they aim to reduce criminal population, correct offenders, and ensure the interests of society. With proper implementation of the new Islamic Penal Code, the reduction of criminal population would be expected and the adverse effects of imprisonment would be reduced to minimum. Hence, the new law offers a new promising perspective to Iran legal system.

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RESEARCH ARTICLE

Iranian Nurse's Knowledge and Experience about using Health Literacy Strategies in Clinical Practice

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ABSTRACT

Patient education and effective communication are core elements of the nursing profession. Knowledge of health literacy and using health literacy strategies are essential for patient care, education, and counseling. This study aimed to assess the nurse's knowledge and experience about using health literacy strategies in clinical practice and to examine the specific relationship between health literacy knowledge and experience. We conducted a cross-sectional observational study of 152 nurses who worked in an educational hospital. Participants were administered an instrument consist of two sections: Health Literacy Knowledge, Health literacy experience and also a demographic questionnaire.Among the four content areas of health literacy knowledge, consequences associated with low health literacy had the highest and health literacy screening had the lowest mean score. The most common HL strategies employed were reading written instructions aloud and speaking more slowly, presenting 2 or 3 concepts in each learning course and checking for difficulty of written materials, while Making follow up

telephone contact to check understanding and compliance and using "teach-back" were used the least often.A direct relationship between HL knowledge in "Standards for writing health materials" content area and HL experience and an inverse relationship between HL knowledge in "basic facts" and HL experience was found.Nurses in practice need additional support from nursing education, so we recommend developing a series of workshops that may enhance the nurses' learning of HL and, consequently, the effects on their patient care.

Key words: health literacy, knowledge, experience, nurses.

INTRODUCTION

Today's healthcare setting is rapidly changing and becoming increasingly complex. For patients who must navigate this complex system, make informed healthcare decisions, and care for acute or chronic health conditions at home, the complexity of healthcare terminology, devices, and instructions can be overwhelming(1). In addition to this complexity, if patients have poor health literacy, healthcare management for them becomes even more difficult; therefore, the need for patients to be 'health literate' in today's society is greater than ever before (1, 2).World Health Organization defined health literacy (HL) as "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways, which promote and maintain good health"(3). Adequate health literacy is a key component of health care and low HL can create significant barriers to effective care and treatment for any health condition (4). Poor HL has been associated with poor health outcomes such as poorer health knowledge, poorer medication adherence, poorer control of chronic illness, higher hospitalization rates and delayed diagnosis, and higher health-care costs (5-10).

Although low HL levels have been linked to worse patient health outcomes, many healthcare professionals are unaware of which of their patients have limited HL; and often they do not know how to intervene appropriately with these patients (11, 12). Healthcare professionals usually assume that the health educations and instructions given to patients are easily understood, but in reality, these instructions are mostly misunderstood and sometimes resulting in serious mistakes. A common reason for misunderstanding health instructions is the patient's low health literacy skills (13, 14), and the responsible nurses must learn and believe that telling is not teaching, and patients' understanding cannot simply occur (15). Healthcare system, along with healthcare providers has a responsibility to become more cognizant of the poor HL of their patients and implement initiatives to improve the effectiveness of patient-provider encounters and ultimately improve health outcomes (14, 16). Therefore, it is essential that care providers be aware of issues regarding health literacy and how these can be addressed (17). Nurses comprise the largest segment of healthcare professionals and Patient education, and effective communications are core elements of their profession (18, 19). They are considered as teachers of health information and are already in an optimal position to make a positive impact on health outcomes. Health literacy provides an excellent opportunity for nurses to empower patients by providing patient education that meets the specific needs of patients in a way that patients can comprehend. Nurses should be proficient in both identifying limited health literacy and applying appropriate interventions (20).Nurses can enhance patient understanding by using a few simple techniques such as slowing the pace of providing information, using plain language, using pictorial information, repeating information, asking the patient to repeat back information, and developing user friendly, shame-free environments (20, 21).

Although these strategies are effective and easy to use they are not routinely used in most clinical settings, a study by Macabasco-O'Connell and Fry-Bowers revealed that nurse practitioners had limited health literacy knowledge and understanding of the role health literacy plays on patient health outcomes. In their 59% of nurses had never had any formal education or training about health literacy, 72% were not aware if their health organization had a health literacy program in place, and 53% reported that health literacy was a low priority compared with other problems(22). Schlichting et al, found that although healthcare professionals who participated in the study were informed of the prevalence of low health literacy in patients, but many of them were not aware of the strategies to

communicate with patients who may have limited health literacy skills (23). In another study by Cafiero, 75% of Nurse Practitioners had never, or only sometimes, had health literacy emphasized in the Nurse Practitioner academic curriculum, despite patient education, and information provision with patients with complex needs and poor health literacy, being a significant focus of their role (24).Nowadays, a large number of people are at risk of poor HL, and it is vital that nurses be knowledgeable and be skilled in promoting these peoples' health through comprehensive educational initiatives(25). Therefore, it is essential to assess the knowledge about health literacy and experience of related communication strategies in nurse practitioners. It can guide and ease continuing education regarding HL issue and help nursing educators to determine how well nurses being prepared to face the needs of patients with low health literacy skills. It can also be beneficial for developing curriculum provides nursing students with the knowledge, skills and confidence to meet the health care needs of their patients, especially who may have limited health literacy skills. So far, there is no evidence to demonstratethat how is the Iranian nurse's knowledge and experience required to make purposeful communication and assist with patients during all interactions to reaching them. Thus, in this study, we aimed to explore the nurses' knowledge and experience about health literacy and its strategies in patient education.

METHODS

Study population and setting

This was a quantitative study using survey methods. In the two months of May to June 2014, 152 nurse practitioners of Al-Zahra educational hospital (in the city of Isfahan, Islamic Republic of Iran) were introduced to participate in the study. Al-Zahra educational hospital is one of the largest such facility in Iran. It has 950 beds and more than 2600 personnel, and about 970 of them are nurse practitioners. The majority of patients referred to this hospital are from Isfahan and surrounding provinces, which have a variety in ethnicity and races (26). Because of the inexpensive services of educational hospitals and the geographical situation, a large number of patients who referred to this hospital are from low socio-economic and educational levels (27) who need additional support.From 152 nurse practitioners who were introduced to participate in the study, four dropped out because of incomplete filling out the questionnaires. Therefore, the final sample consisted of 148 nurses. All participants were nurses who reported they were currently employed as a nurse in Al-Zahra hospital, they had at least one year of nursing experience, and they were selected using convenience sampling. After getting a brief explanation of the research purpose, and instructions for completing the survey, nurse practitioners were guaranteed anonymity. Participants were reassured that results of the study would not have any influence on their job evaluation, and all of them provided a written informed consent. Ethical approval for the study was given by the Ethical Committee of Isfahan University of Medical Sciences.

Data Collection Instruments

The questionnaire used in this study included three sections and comprised twenty eight questions.

Health Literacy Knowledge

This section included 15 multiple-choice items created to assess participants' knowledge about health literacy in four content areas: Basic facts about HL (3 items), Low HL consequences (3 items), HL screening tools (4 items), Standards for written health-related materials (5 items). Furthermore, we asked participants to define health literacy with their own words through an open question at the end of this section. We used the content validity index (CVI) to quantify the extent of expert agreement. Eight experts in areas of health literacy, health education and nursing education were asked to evaluate Simplicity (1 = not simple to 4 = very simple), relevance (1 = not relevant to 4 = very relevant) and Clarity (1 = not clear to 4 = very clear) of each item using a 4-point Likert-type scale. A CVI score of .78 or above indicates acceptable content validity (28), and Average Content Validity Index (CVI) of the measurement was obtained 0.80. In the present study, Cronbach's alphas internal consistency coefficients was acceptable for the overall

scale (α = 0.78) and for the all content areas, ranging from α = .67 to α = .73. The test–retest reliability coefficient was 0.85 ($p < 0.01$).

Health literacy Experiences

Health literacy experience was assessed by 10 items designed to elicit one of three Likert-type responses. Questions asked nurse practitioners to rate the frequency of their use of health literacy strategies in clinical practice. Valid responses ranged from "Don't use" to "Routinely use". The three options included "Don't use"", "Use but not routinely" and "Routinely use". Average Content Validity Index (CVI) of this measurement was obtained 0.82 and demonstrated acceptable content validity. In the present study, the Cronbach's alphas internal consistency coefficients were 0.81 for the overall scale. The test–retest reliability coefficient was 0.78 ($p < 0.01$).

Demographics

Demographic information was collected from all participants. This included age, gender, previous education preparation, and years of practice as a nurse practitioner.

Statistical analysis

The internal consistency and reliability for the survey were calculated using Cronbach's alpha. Pearson correlation coefficient was used for Test–retest reliability. 30 subjects completed the questionnaires twice, with a 2-week interval between assessments. Descriptive statistics (means, SD, and percentage) were used to examine the levels of health literacy knowledge and experiences among completed data. We usedt-test to identify whether there were differences in means of health literacy knowledge and experiences between different demographics. We also used Pearson's correlation test of association to explore the relationship between ages, years of practice as a nurse practitioner, health literacy knowledge and experiences. All statistical analyses were performed using SPSS Version 16.0 (SPSS Inc.).

RESULTS

Participant characteristics

Mean age of the subjects was 36.75 (SD: 5.78) year (range, 24-49 year). 89.9% of respondents were female and 10.1% were males. 80% of participants were married and 33.8% of them had 5 to 10 years of practice as a nurse practitioner. More than 64% of respondents were attended to patient education retraining courses in last year.

Health literacy knowledge

The mean score for HL knowledge was 6.14 (SD: 2.21; range, 1-11). The mean content area scores were 1.21(SD: 0.88) for HL basic facts, 1.50(SD: 0.85) for Low HL consequences, 1.37(SD: 1.07) for nurses' knowledge about HL screening and 2.04 (SD: 1.02) for standards for writing health care materials (Table 1). Although participants showed some health literacy knowledge, the knowledge was not consistent throughout each of the four content areas. There were three items classified as "basic facts'' content. In general, only 8.8% were able to answer all three questions correctly in this content area and 21.6% of participants don't answered correctly to any of this items. 45.9% of participants demonstrated the knowledge that limited HL is most prevalent among patients who are 65 years old and older. Only 31.8% correctly identified that literacy skill level was the best predictor of health care status. 45.9% correctly answered that a nurse working in a health clinic, mostly serving low-income minority patients, will very often encounter a patient with low health literacy.

"Low HL consequences" content area was consisted of three items, 43.9% of respondents were correctly answered that low health literacy patients are regularly diagnosed late which often lead to fewer treatment options for patients. 37.2% were also less likely to know that the nurse practitioner should consider that low health literacy patients may have trouble in applying health care information in to their health situation. For the third item 26.1% correctly recognized common health behavior among low health literacy patients such as lack of participation in preventative health care. Four items were designed to examine "nurses' knowledge about HL screening". 9.5% of respondents didn't answered correctly to any of this items, 44.6% of them correctly answered to one item and 14.2% of respondents were consistently answered correctly to all three items. Only 30.4% of participants identified the most effective way for nurses to determine how well a patient understands health information. Furthermore, 72.3% percent indicated an understanding that when patients ask to take information home to read, it may be a red flag and an indication that the patient has difficulty reading. 84.5% of participants exhibited knowledge of the questionnaire as the most precise way to assess health literacy level of patients and 35.8% of participants exhibited knowledge of the frequently used health literacy screening tools such as the Test of Functional Health Literacy and the Newest Vital Sign.

There were five items related to the "standards for writing health care materials" content area and results suggest that four of the items were answered correctly by only 10.8% of participants while no body were answered correctly to all of the items. Only 30.4% of respondents displayed the knowledge that main ideas about specific diseases should be limited to 3 or 4 major points. In responding to the using positive sentences with active voice for behavioral recommendations only 38.5% were selected the true answer. Only 20.3% of participants gave correct answer to the recommended reading levels for health care materials. Most of the nurses (86.6%) showed the knowledge that illustrations can improve a patient's understanding of written information, and 58.8% of them were informed about importance of ensuring culturally appropriateness of health care materials by including community members in developing them.

Health literacy experience

Experience with health literacy strategies in clinical setting was reported by participants through asking them to indicate how often they participated in activities related to health literacy. The mean score of health literacy experience was 11.28 (SD: 3.94; range, 4-21). The results showed that although participants revealed that they had experience in some areas of health literacy, they lacked experience in other areas of health literacy.90.5%of participants reported that they had never used a health literacy screening tool. Respondents indicated that they routinely used HL related strategies such as reading written instructions aloud and speaking more slowly (54.7%), educated 2 or 3 points in each learning section (48.3%), assessing difficulty level of written materials (39.9%) and avoiding jargons (39.2%). Of the more advanced HL strategies, none were used by a majority of nurse practitioners. For example, just (10.2%) of the respondents in this study routinely used the teach-back technique, and (6.1%) done follow up telephone contact to check understanding and patients compliance. Table 2 shows the responses to the HL experience scale by nurse practitioners.

Relationships among knowledge, experience and demographic Factors.

HL knowledge scores in "Low HL consequences" content area ($r = .268$, $p < .01$) and "HL screening" content area ($r = .195$, $p < .05$) were found to be significantly higher in nurses who participate in previous patient education workshop. Age was positively associated with HL knowledge in "Basic facts about HL" content area ($r = .216$, $p < .01$) and "Low HL consequences" content area ($r = .277$, $p < .01$). Years of practice as a nurse practitioner was positively associated with HL knowledge in "Low HL consequences" content area ($r = .268$, $p < .01$) and "HL screening" content area ($r = .195$, $p < .05$). No significant association were found between gender and any content area of HL knowledge. The other results showed that the bivariate correlation between HL experience, and participation in previous patient education workshop was positively significant ($t = .464$, $p < .01$). Age, gender and years of practice as a nurse

practitioner were not related to HL experience. The Pearson correlation coefficient was used to measure the relationships between HL knowledge and HL experience. Based on the findings, HL experience had a significant positive correlation with HL knowledge in "Standards for written health related materials" content area ($r = .357$, $p < .001$), and an inverse correlation with "Basic facts about HL" content area ($r = .186$, $p < .05$).

DISCUSSION

Nurses may be the best solution to the HL crisis because they are already in an excellent position to promote effective communication between patients and care providers. Therefore, in this study, we examined the extent to which nurse practitioners had HL knowledge and experience and we also examined the specific relationships among HL knowledge and experience. An assessment of the HL knowledge and experience of nurse practitioners can provide valuable information needed to implement effective HL intervention strategies. The findings demonstrated that participants had some knowledge about HL but there were gaps in their knowledge, thus they could benefit from additional instruction in some of the content areas of HL. According to the results, nurses had more knowledge in the content areas of consequences associated with low HL and were less knowledgeable about HL screening. This results were similar to what was found in previous studies (20, 29), and may be an indication that nurses are aware of the effects and impact of low HL due to their nursing experience and observations in the clinical setting rather than from formal health literacy training. This may explain the lack of knowledge in other areas such as HL screening that may be due to a lack of rigorous HL training.

According to the other results, the most common HL strategies employed were reading written instructions aloud and speaking more slowly, presenting 2 or 3 concepts in each learning course and checking for difficulty of written materials, while Making follow up telephone contact to check understanding and compliance, assessing patients HL level using a standard method and using "teach-back" were used the least often. Since, it is essential that nurse practitioners assess patient's levels of HL in order to provide tailor health education and simultaneously use Teach-back as an effective method to validate that information given to patients has been delivered in a way that the patient understands, these strategies should be considered in nursing education programs.As expected and similar to other studies (29), older respondents and participants with more years of practice as a nurse practitioner, had higher levels of knowledge in most of the content areas. One possible explanation is that older nurses with more years of practice may be exposed to HL concepts through their experience or institutional policies. Other results displayed that participating in previous patient education workshop can effect on the levels of HL knowledge and experiences among nurses and respondents who participate in previous patient education workshop produced higher scores in some content areas of HL knowledge and use more HL strategies. Our findings highlight the vital and potential role of training that can have a large impact on improving nurse's knowledge and practice. To improve nurse practitioners' ability in order to deliver care to low health literate patients, It is essential that education programs and better training related to HL be provided.

Moreover, our findings demonstrated a direct relationship between HL knowledge in "Standards for writing health materials" content area and HL experience. It can be concluded that HL knowledge and willingness to use the HL strategies and techniques for communicating with low health literate patients covered during the training. This relationship in previous research is well documented (30). While we expected a direct relationship between HL knowledge in "basic facts" and HL experience, results from this study demonstrated an inverse relationship between them. Probable explanations behind this observation might be the recent attention and incorporation of HL topics into the nursing curriculum but lacking HL experience especially among novice nurses. This study has some limitations that are worth mentioning. The limitations also point to opportunities for future research. This study was conducted at a single hospital in the city of Isfahan, Islamic Republic of Iran, and a convenience sample was used, therefore it is possible that our findings may not be representative of other nurses across the nation and the results may not be generalizable to the entire nurse practitioner population. We also assessed HL Health Literacy

Knowledge and Experience with a self-report instrument and which could lead to an overestimation of the HL Knowledge level and Experience.

CONCLUSION

As a whole nurses had some knowledge of HL and used some health literacy strategies in practice, but there were significant gaps in both HL knowledge and experience. Nurses had more knowledge in the content areas of consequences associated with low HL and were less knowledgeable about HL screening. The most common HL strategies employed were reading written instructions aloud and speaking more slowly, presenting 2 or 3 concepts in each learning course and checking for difficulty of written materials, while Making follow up telephone contact to check understanding and compliance and using "teach-back" were used the least often. Older nurses and those with more years of practice as a nurse practitioner had higher levels of knowledge in most of the content areas. Nurses who participate in previous patient education workshop had more HL knowledge and experiences. A direct relationship between HL knowledge in "Standards for writing health materials" content area and HL experience and an inverse relationship between HL knowledge in "basic facts" and HL experience was found.In total, nurse practitioners in practice need additional support from nursing education, so we recommend developing a series of workshops that may enhance the nurses' learning of HL and, consequently, the effects on their patient care.

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Table 1. Mean scores of the health literacy knowledge (n = 148)

Content area	Total score possible	Minimum	Maximum	Mean	SD
Total items correct	15	1	11	6.14	2.21
basic facts	3	0	3	1.21	0.88
Low HL consequences	3	0	3	1.50	0.85
HL screening	4	0	4	1.37	1.07
Standards for writing health materials	5	0	4	2.04	1.02

Table 2: Responses to the health literacy experience scale by nurse practitioners (n = 148).

Health Literacy Strategies	Routinely use		Use but not routinely		Don't use	
	N	%	N	%	N	%
Assessing patients health literacy level using a standard method	14	9.5	94	63.5	40	27
checking for difficulty of written materials	59	39.9	85	57.4	1	0.7
Avoiding jargons	58	39.2	72	48.6	18	12.2
reading written instructions aloud and speaking more slowly	81	54.7	63	42.6	4	2.7
Drawing pictures	63	42.6	57	38.5	28	18.9
Present 2 or 3 concepts in each learning course	69	46.6	38	25.7	36	24.3
Using living room language	49	33.1	72	48.6	27	18.2
Creating a shame-free environment	43	29.1	70	47.3	35	23.6
Using "teach-back"	15	10.2	60	40.5	43	49.3
Making follow up telephone contact to check understanding and compliance	9	6.1	12	8.1	127	85.8

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RESEARCH ARTICLE

Design Optimization of a Low-Power CMOS OTA using gm/I_D Methodology

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ABSTRACT

In this paper, a new knowledge-based design and optimization technique for low-power design of analog integrated circuits is presented based on gm/I_D design methodology. In this method, the (gm/I_D) vs. normalized drain current In=I_D/(W/L) characteristic curve in CMOS technology is used to calculate the optimized values of transistor dimensions (W, L) with respect to the required design performance parameters such as: power consumption, gain, bandwidth, slew-rate. The circuit performance is simulated in HSPICE using 0.18µm CMOS technology parameters. However, simulation results show good agreement with theoretical results which justifies the very good accuracy and performance of the proposed design methodology.

Key-words: Optimization, gm/I_D, Analog, Low-Power, Integrated circuits, CMOS, OTA.

INTRODUCTION

Due to the growing demand for battery-powered and portable electronic devices as well as the trend toward lower supply voltage values, design of low-power analog integrated circuits is one of the major challenges in the field of integrated circuits and systems. Although, some low-power design methodologies have been reported in the literature such as Geometric programming, Genetic algorithm and fuzzy logic [1-6], but, most of these methods use very complex mathematical analysis to successfully evaluate the circuit performances which is the main drawback of these methods, due to the fact that, very complex mathematical equations (level 49) should be considered by the circuit designer to increase the accuracy of the design process which is a very time consuming and complex task in the field of analog integrated circuit design. So, in order to decrease the error value between theoretical and simulation results, a knowledge-based design methodology based on the physical (gm/I_D) characteristic curve (which is a universal characteristic for all transistors in the same technology) is proposed in [7] and successfully used in [9, 10] to design of analog integrated circuits. However, in the gm/I_D method, the knowledge of an expert analog

designer is used to define the region of operation for each transistor (weak, moderate or strong inversion) based on the role of the transistor in the analog circuit to benefit from the advantages of each region in the design process and enables the designer to obtain a reasonable speed-power trade-off which is a very challenging task in low-power analog integrated circuit design [9, 10]. For example, in the case of a transistor which is operating as a current source it should be biased in the strong inversion region[7], while, in the moderate inversion regionthe transistor has a good gain-power performance which means a higher gain in a reasonable power budget can be obtained.

This paper is organized as follows: in section 2, the gm/I_D methodology is described. As a case study, an OTA circuit and design equations as well as design considerations are presented in section 3. In section 4, the OTA performance and HSPICE simulation results as well as some discussions are presented. Finally, the conclusions are presented in section 5.

Gm/I_D knowledge-based design methodology

As it is previously discussed in the literature [11, 12], the major design variables in equation-based design methods are transistor dimensions (W, L). So, due to the fact that the design algorithm evaluates the circuit performances using simplified (first or second-order estimations) circuit equations and transistor models and does not consider the higher order effects which are very important in the behavior modeling of deep-submicron transistors in the recent CMOS technologies; the obtained solution may deviate from the real solution and in some cases this approach may fail to provide even a feasible solution or has a large error value. Therefore, in this paper, due to the use of gm/I_D characteristic curve, the (gm/I_D) value and drain current of each transistor (I_D) is considered as major design variables which relaxes the designer from considering and solving very complex design equations. The proposed design methodology is as follows:
First, the region of operation for each transistor should be chosen considering the role of each transistor and the required values for the performance measures such as power consumption, gain, bandwidth and slew-rate. Considering the above constraints, the designer selects a proper value of (gm/I_D) for each transistor. Then, with the aim of gm/I_D characteristic curve, the value of normalized drain current,$I_n = I_D/(W/L)$, for each transistor can be calculated. In the next step, considering the power consumption value, the drain current value for each transistor (I_D) is defined which leads to the calculation of transistor aspect ratio (W/L). Fig.1, shows the gm/I_D vs. normalized drain current (In) for both NMOS and PMOS transistors in 0.18µm CMOS technology.As it is obvious in fig.1, the gm/I_D design method provides the designer a clear vision to bias each transistor in the proper region of operation (weak, moderate and strong inversion) as it is summarized in table.1, in order to design low-power analog integrated circuits.However, considering table.1, the designer can choose the operation region for each transistor which leads to a more reliable and accurate technique to find the proper values of (W, L). As it is obvious in fig.2, considering the equations of the performance measures, the proper values for (gm/I_D) parameter and drain current (I_D) for each transistor are resulted. Then, using the gm/I_D characteristic curve, the values of (W, L) are obtained.

Design and optimization of a CMOS OTA (Case Study)

In order to justify the performance of the proposed low-power design algorithm, the operational transconductance amplifier (OTA) reported in [13], is designed for the main purpose of reducing power consumption with respect to other required design constraints. The OTA consists of a folded-cascode amplifier and a class AB amplifier. The cascode compensation technique [14, 15], is used for frequency compensation. The output of the first stage is used in the current source of the second stage to add a pole to the transfer function of the system which improves the stability of the circuit. In order to design the OTA circuit using the proposed design algorithm based on the design equations discussed in [13], the design variables should be changed to new variables: $(gm/I_D)_i$ and $(I_D)_i$ which are the (gm/I_D)parameter value and drain current of i_{th} transistor respectively.

The voltage gain of the OTA circuit is as follows:
As it is obvious in eq. (2), the gain of the OTA (eq. (1)) can be re-considered based on the gm/I_D, I_D design variables as follows:

$$A_V \approx gm_2.\{\underbrace{gm_5.r_{ds5}.(r_{ds2} \parallel r_{ds3})}_{R_B} \parallel r_{ds4}\}.gm_6 r_{ds6} \quad (1)$$

After some mathematical manipulations:

$$A_V \approx gmb_2.r_{ds4}.gm_6 r_{ds6} \rightarrow A_V \approx B.(gm/I_D)_2.(gm/I_D)_8.I_{D2}.I_{D4}^{-1}$$

$$B = \frac{1}{\lambda_4.\lambda_6} \quad (2)$$

Furthermore, since the output resistance of each transistor is proportional to the channel length of each transistor, so, increasing the channel length leads to a higher value of amplifier gain, while, reduces the frequency bandwidth. So, the designer should choose the proper values for the length of the transistors with respect to the required gain performance of the amplifier.
Moreover, the unity-gain bandwidth and slew-rate performances of the OTA are as follows:

$$f_{GBW} = \frac{gm_2}{2\pi.C_C} \rightarrow f_{GBW} \approx \frac{(gm/I_D)_2.I_{D2}.C_C^{-1}}{2\pi} \quad (3)$$

$$\begin{cases} SR_1 = \dfrac{2I_{D2}}{C_C} \\ SR_2 = \dfrac{I_{D6}}{C_C + C_L} \end{cases} \rightarrow SR = \min\{SR_1, SR_2\} \quad (4)$$

So:

$$\frac{C_C.I_{D2}^{-1}}{2} \le \frac{1}{SR_{\min}} \quad (5)$$

$$(C_C + C_L).I_{D6}^{-1} \le \frac{1}{SR_{\min}} \quad (6)$$

However, the phase-margin (PM) performance of the OTA circuit is calculated for frequency response stability considerations and can be re-written based on the new design variables (gm/I_D, I_D)and non-dominant pole W_{p2} frequency as follows:

$$PM = 90^\circ - \tan^{-1}\left(\frac{GBW}{\omega_{P2}}\right) \quad (7)$$

$$|\omega_{P2}| = \frac{gm_6 + gm_7}{C_L} \rightarrow |\omega_{P2}| = \frac{I_{D6}((gm/I_D)_6 + (gm/I_D)_7)}{C_L} \quad (8)$$

However, the main objective of this paper is to reduce the power consumption of the OTA circuit subject to other constraints such as: gain, bandwidth and slew-rate.

$$P_{diss} = 2.VDD\left(I_{D2} + I_{D4} + I_{D9}\right) \quad (9)$$

As it is obvious in eq. (2) – (9), all the circuit performance measures are calculated based on the new design variables gm/I_D and I_D. Considering the role of each transistor in the circuit and with the aim of the knowledge of an expert analog designer, the value for the (gm/I_D) parameter for each transistor should be chosen.Then, by considering the $(gm/I_D$-In) characteristic curve, the normalized drain current $(In=I_D/(W/L))$ for each transistor can be obtained. Finally, having the drain bias current (I_D) for each transistor from power consumption value, the optimized transistor aspect ratio (W/L) for each transistor can be resulted. In the next section, OTA circuit simulations in HSPICE are presented.

RESULTS AND DISCUSSION

As it is discussed before, the optimized values for transistor dimensions (W, L) for each transistor are resulted from gm/I_D design methodology. The OTA circuit is simulated in HSPICE using 0.18µm CMOS technology parameters at 1.2V supply voltage. Table 2, summarizes the proper range of gm/I_D values for each transistor in weak, moderate and strong inversion regions where the calculated values for (gm/I_D) design variable are reported.In table.3, the results of the proposed design approach are compared with the performance of the conventional design approach reported in [13]. As it is obvious in table 3, the power consumption of the OTA circuit is reduced considerably in comparison with the design reported in [13], while, other performance measures are improved which is the main advantage of the proposed design algorithm over previously reported design algorithms [13]. Finally, fig.4, shows the AC performance (frequency response) of the OTA circuit.

CONCLUSIONS

In this paper, a new design and optimization methodology to the design of low-power analog integrated circuits based on the gm/I_D characteristic is presented. The proposed design algorithm uses new design variables (gm/I_D) and $I_D$as well as the transistor operation region based on the (gm/I_D)-I_n characteristic curve to calculate transistor dimensions (W, L) more accurate and reliable.In order to verify the performance of the proposed design methodology, a low-power cascode compensated OTA circuit is designed and simulated in HSPICE using 0.18µm CMOS technology parameters. Finally, the simulation results justify the good performance and accuracy of the design methodology in designing low-power analog integrated circuits in sub-micron technologies.

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Table.1 Main characteristics of each inversion region

Inversion region	Characteristics of the region
Weak inversion	Low-power, High gain
Moderate inversion	Moderate gain and bandwidth
Strong inversion	High speed, High power consumption

Table.2 gm/I_D ranges and gm/I_D values for each transistor

MOSFETs	gm/I_D range (1/v)	gm/I_D (1/v)
M1	[1-5]	5
$M2_{a,b}$	[5-22]	20
$M3_{a,b}$	[2-12]	9
$M4_{a,b}$	[2-15]	13
$M5_{a,b}$	[8-20]	18
$M6_{a,b}$	[5-22]	18.5
$M7_{a,b}$	[8-24]	22.5
$M8_{a,b}$	[15-22]	22
$M9_{a,b}$	[15-22]	18

Table.3 Comparison of simulated performance parameters for proposed design methodology and conventional circuit

Desired values	Conventional [13]	Proposed Approach
DC Gain (dB)	68.5	72
GBW (MHz)	165	262
Phase margin	65^0	60^0
Slew-rate (v/μs)	329	259
Single-ended Swing (V_{p-p})	0.9	0.95
Load Capacitor (pF)	4	4
Power consumption	**5.8 mw**	**879.7 μw**

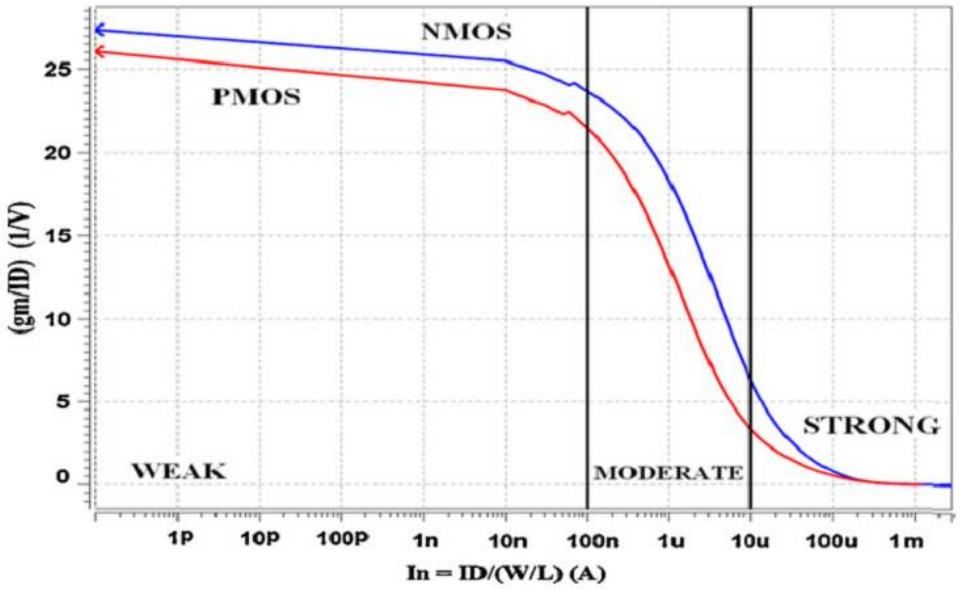

Fig.1 Simulated gm/I_D characteristic in 0.18μm CMOS technology

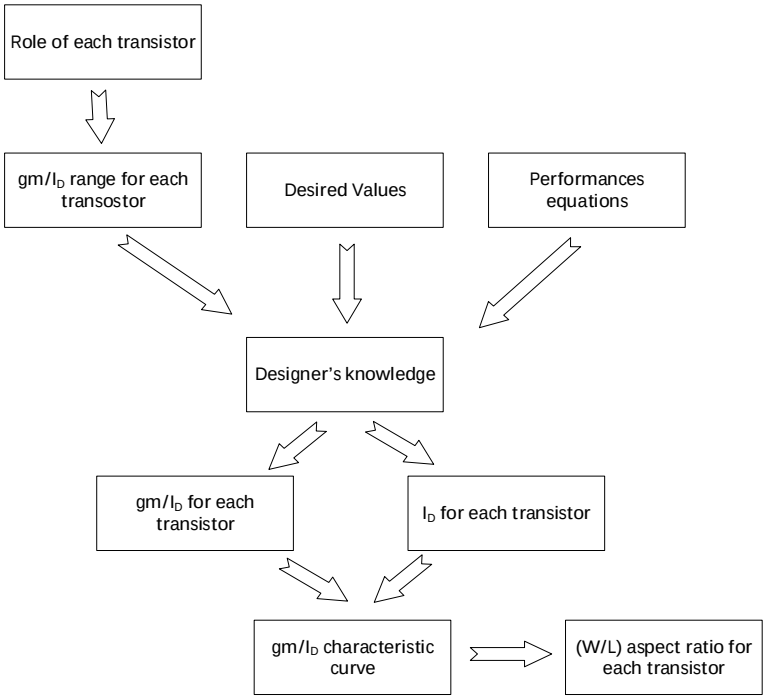

Fig.2 Algorithm of proposed design methodology

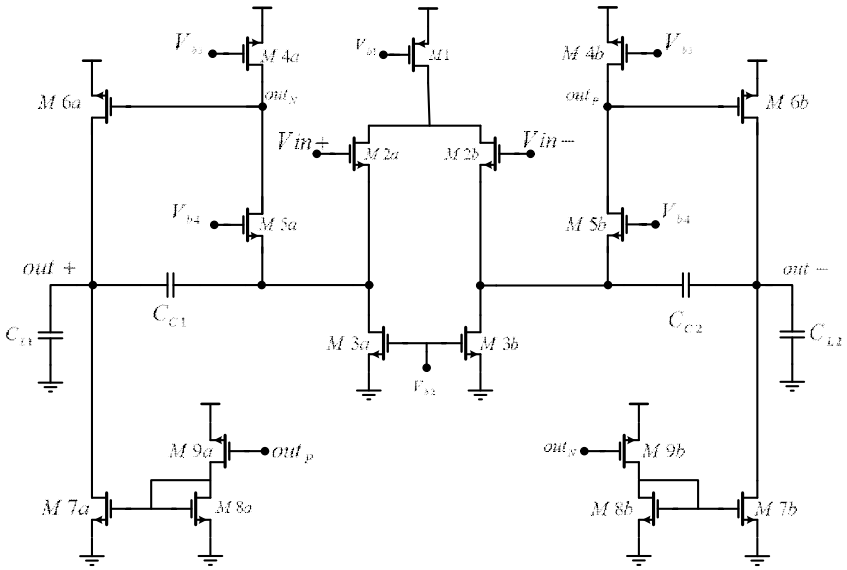

Fig3 Two-stage CMOS OPAMP using cascode compensation [13]

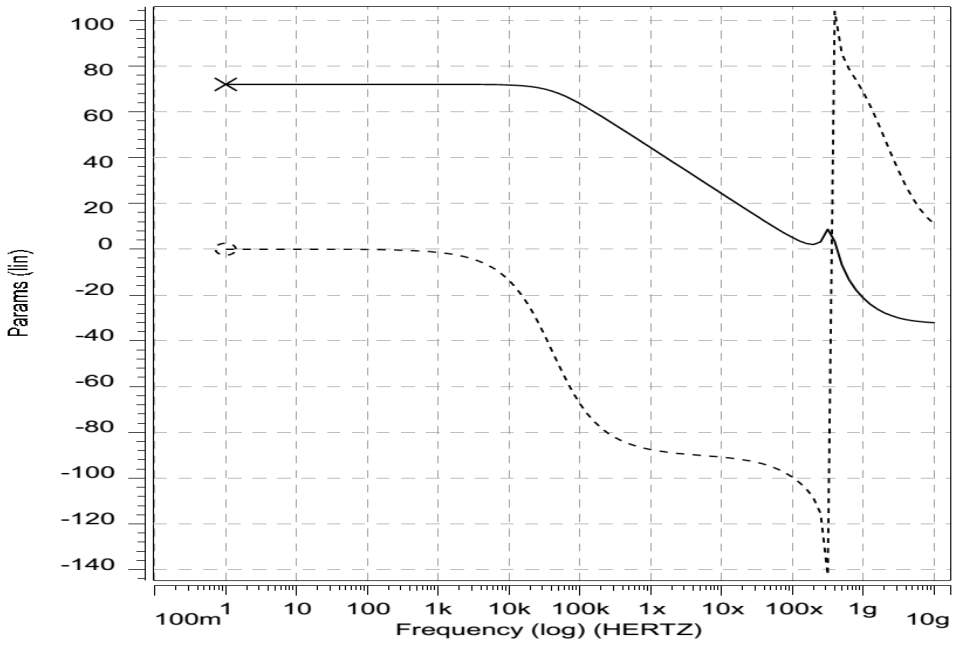

Fig.4 Simulation results for AC performances obtained from HSPICE

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RESEARCH ARTICLE

Effect of TiF_4 and NaF Solutions with and without Diode Laser Irradiation on Microhardness of Deciduous Enamel

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ABSTRACT

The purpose of this current study was to assess the effect of diode laser (λ = 810nm) treatment in combination (or not) with 4% TiF_4 and NaF solution on deciduous enamel microhardness.Seventy-two mandibular deciduous incisors were polished and randomly allocated to the following treatments (*n* = 12): (1) NaF solution (2.26% F); (2)NaF solution + diode laser; (3) 4% TiF4 solution (2.45% F); (4) TiF4 solution + diode laser; (5) diode laser; (6) control group (no treatment).For the formation of artificial caries, the samples were immersed in 50 ml of 0.01 M hydrochloric acid (pH 2.0) for 5 min. Enamel alternation were determined with Vickers surfacemicrohardness (VMH) tests after treatment and after erosion challenge, under 500 gr load and dwell time of 10 S. Three hardness values were recorded for each enamel surface .The mean VMH were tested using Variance and Tukey tests. Samples were examined by Scanning Electron Microscopy (SEM) after treatment and after erosion challenge.All treatments improved the hardening of enamel surface ($p < 0.05$) and increased the resistance of samples against demineralization. The TiF_4 + Laser and NaF + Laser groups had significantly higher surface microhardness value than the other groups ($p < 0.05$). The highest surface microhardnesswas seen in TiF_4 + Laser group and the least surface microhardness was seen in NaF group.The association between laser

and fluoride resulted in the highest surface microhardness and improved the rehardening of enamel; therefore, the effect appears to be synergistic.

Keywords: Diode laser, Fluoride, Deciduous teeth, Surface hardness

INTRODUCTION

Despitethe manyresearchhave been doneinthe preventionofdental caries,dental cariesisthe most commonchildhooddiseases [1]. The increased consumption of acidic drinks such as soft drinks, fruit juices and the chronic condition such as gastroesophageal reflux disease cause to increasing prevalence of dental erosion[2].Dental erosion is a chemical process that lead to loss of tooth surface substances, has led to an increased dentinal sensitivity[3]. Therefore appropriate approaches to control dental erosion are important.Fluoride is the best tool has been used for caries prevention for many years[4]. The fluoride agents that have been used for caries prevention for many years are sodium fluoride (NaF), acidulated phosphate fluoride (APF), stannous fluoride (SnF_2) and amine fluoride (AmF) [5,6].The potential of sodium fluoride in prevention of dental erosion is related to the formation of a CaF2 layer that acts as a barrier and reservoir during a cariogenic challenges[7, 8]. The ability of NaF in erosion protection is limited because of the easily solubility of CaF_2 in acidic environment and requires frequent application to reduce dental erosion [9]. More recently, investigation into dental erosion focused on the preventive effect of titanium tetrafluoride (TiF_4). Its preventive effect is related to the three mechanisms: formation of a glaze_like layer as an acid-resistant surface coating, increase of fluoride uptake and incorporation of titanium in the hydroxyapatite lattice [10]. Thus, itseems to be more effective in prevention of dental demineralization than the calcium fluoride precipitate formed by sodium and amine fluoride.

Studies have shown that use of laser may reduce the progression of the demineralization process but high_power laser irradiation (Nd:YAG, argon, CO_2 , and Er:YAG) may cause undesirable thermal alterations, melted areas, fracture lines and are more expensive and less accessible [11].The effect of diode lasers irradiation with wavelengths in the visible and near-infrared regions enhancement the resistance of teeth against erosion [11, 12].Studies have demonstratedthat the application of laser in combination with fluoride on dental hard tissue could be the creation of fluoride reservoir on the dental surface or penetrated in the microporosities formed due to laser irradiation or the increasing the enamel fluoride uptake and reduce its acid solubility [13].

Even though TiF_4 solution was shown to be more effective than NaF and also diode laser decreases the enamel demineralization.The efficacy of TiF4, NaF and diode laser on deciduous teeth might be different compared to permanent teeth but there is no study testing the efficacy of TiF_4 in combination with diode laser on deciduous teeth. Therefore, the objective of this study was to compare the effectiveness of NaF and TiF_4 in combination with diode laser on preventive of deciduous enamel demineralization.

MATERIALS AND METHODS

Sample preparation

This study usedseventy-two human soundmandibular deciduous incisors that had been stored in0.9% physiological saline solution (pH 7.0) at room temperature for no longer than 60 days.After inspection under stereomicroscope (×10 magnifications) the teeth with carious lesions, cracks, white spot lesions and hypocalcification were excluded from the study. The root of each tooth was sectioned and the crown were embedded in acrylic resin and polished with 400,600,800 and 1000 grit silicon carbide paper and immediately stored in 0.2% thymol for 2 days. The teeth were covered with nail varnish, leaving 3×3 mm window on buccal surfaces at the middle third of the crown. The initial

surface hardness determination was performed by three indentations (Vickers diamond, 500 gr, 10 s, Koopa-MH1-Tehran-Iran), at distances of 100 µm from each other.

Laser treatment

Gallium aluminum arsenide (GaAlAs) diode laser (LAMBDA ScientificaS.p.a, LAEDL001.1, ITALY) was used with a wavelength of 810 nm and a power of 1.5 W and continuouswave for 15 s. The fiber hand piece was held at a distance of approximately 1 to 2 mm from the enamel surface during irradiation and the samples were irradiated in horizontal direction in order to promote homogeneous irradiation and to cover the entire sample area. The laser irradiation was done without using water spray.

Study design

Sound teeth with hardness ranging from 224-296 VMH were randomly assigned to one control (untreated) and 5 groups (*n*=12): Group 1, enamel window treated for 4 min with NaF solution (2.26% F, pH 4.5); Group 2, enamel window treated with NaF solution plus application of diode laser; Group 3, enamel window treated with 4% TiF4 solution (2.45% F, pH 1.2); Group 4, enamel window treated with TiF4 solution plus application of diode laser; Group 5, enamel window treated with application of diode laser; Group 6; control group (without any treatment).

Treatment

The NaF (5.42 gr/100 mL) and TiF_4 (4gr/100 mL) powders (Alfa Aesar, MA, USA) were dissolved in water immediately before the application. The solutions were applied over the enamel surface with microbrush and removed after 4 min washed with tap water and dried with a cotton swap. In the groups of laser and fluoride, teeth were irradiated immediately after fluoride application without removing the solution. After treatment, the samples were rinsed with tap water and transferred to artificial saliva (10 mL/sample, 25º C) for 30 min.

Erosion experiment

Each sample of all groups was placed in 50 ml of 0.01 M hydrochloric acid (pH 2.0)for 5 min. The samples were removed and rinsed with tap water. All samples prepared to be examined by Vickers microhardness tester.

Microhardness measurement:

Initially, enamel surface hardness was assessed (Vickers diamond, 500gr, 10 s, Koopa, MH1, Tehran, Iran) as baseline (SH). Three indentations were made in the center of the sample window, at distances of 100 µm from each other. The value of all 3 measuring points was then averaged.
After the treatment, hardness test (SH1) was made. The percentage of surface hardness change (SHC1) was calculated as follow: %SHC1 = 100 × (SH1- SH)/ SH.
After the erosion experiment, final hardness test (SH2) was made.The percentage of surface hardness change (SHC2) was calculated as follow: %SHC2 = 100 × (SH2- SH1)/ SH1

Scanning Electron Microscopy (SEM)

After the treatment and erosion experiment, one sample in each group selected for observation by scanning electron microscopy (SEM)(KYKY, EM3200, China) with a minimum of four observations with magnifications ranged from 500× to 5000×, for each samples. Prior to studying, each specimen coated with a thin layer of gold.

Statistical analysis

The data was imported into SPSS 16 software (Chicago-USA) for statistical analysis. After the assumptions were satisfied, the data were analyzed by two-way ANOVA and Tukey's*post hoc* tests. The level of significance was set at$p < 0.05$.

RESULTS

Table 1 shows the mean SH, SH1 and SH2 as well as the SHC1 and SHC2 of samples. With regard to the % SHC1, all treatments improved the hardening of enamel surface ($p < 0.05$)and in respect to %SHC2 all treatment increased the resistance of samples against demineralization. TheTiF_4 + Laser and NaF + Laser groups had significantly higher surface microhardness value than the other groups ($p < 0.05$). The highest SH1 and SH2 in treatment groups were seen in TiF_4 + Laser and the least SH1 and SH2 were seen in NaF group. Table 2 shows comparisons between groups. Figures 1,2show the results of the SEM observation of the enamel surfaces of untreated control and the various treatment groups. As can be seen in the figures, all the samples of different treatment groups was less etched against HCl than the control group, therefore, acid resistances of samples have been improved. Alsowe can see unnoticeable abrasion and microexclusionarea in the laser groups. In the TiF_4groups, $TiF_4$is deposited on the surface of enamel.

DISCUSSION

This current study was conducted to compare the effect of a diode laser and fluoride and combination laser and fluoride effect on deciduous enamel demineralization. We have been evaluated surface microhardness changes to compare these various groups. According to the results,Combination of diode laser ($\lambda = 810$nm) treatment with 4% TiF_4 solution and NaF solution increased enamel hardness and decreased enamel solubility significantly more than each treatment alone. In addition, there were no statistically significance differences between NaF, TiF_4 and laser groups.Many researches have been performed to define the best fluoride therapy for caries prevention. Fluoride is the major caries preventive agent that has been used for many years, but fluoride cannot completely prevent dental caries development and also need to frequent application in regular programs.

The potential of sodium fluoride in prevention of dental erosion is related to the formation of a CaF_2 layer that acts as a barrier and reservoir during a cariogenic challenges [7, 8]. The ability of NaF in erosion protection is limited because of the easily solubility of CaF_2 in acidic environment and requires frequent application to reduce dental erosion [9]. More recently, investigation into dental erosion focused on the preventive effect of titanium tetrafluoride (TiF_4). The preventive effect of TiF_4 has been related not only to the effect of fluoride, but also to the action of titanium [14]. As a result its preventive effect is related to the three mechanisms: formation of a glaze_like layer as an acid-resistant surface coating, increase of fluoride uptake and titanium ionsmight substitute calciumin the hydroxyapatite lattice [10]. Thus, itseems to be more effective in prevention of dental demineralization than the calcium fluoride precipitate formed by sodium and amine fluoride (1).

According to previous investigation, the low pH of TiF_4 (pH 1.2) cause to perform linking between titanium and oxygen of the phosphate group, therefore, the titanium dioxide glaze-like layer on the surface was formed[15,16].Megalhaes et al [17] in their study mentioned that in contrast to permanent enamel, the TiF_4 in deciduous enamel cause enamel loss but in our study the TiF_4 solution increase acid resistance of deciduous enamels same as a NaF.The results achieved in this study in agreement to a number of studies demonstrated that combining laser irradiation with fluoride therapy could have a synergistic effect on caries prevention. There are several concepts for describing the mechanism how laser irradiation could increase enamel's acid resistance: (1) laser changes carbonated hydroxyapatite (HA) in the enamel to HA that is less soluble, therefore, enamel acid resistance would increase [18]. (2) Laser irradiation lead to the HA crystals melting or partial fusion and recrystallization of enamel

prism, in conclusion the surface of enamel sealed and the enamel demineralization would be decreased [19, 20].In contrast to Santaella et al [21] and Ilkat et al[22] the diode laser application had similar effect to topical fluoride treatment and by additional application of the laser enhancement in acid resistance was obtained.Several studies performed to evaluation the effect of different lasers. These high-power lasers may cause undesirable thermal alterations, melted areas, fracture lines and are more expensive and less accessible [11]. To our knowledge there are few studies about the cariostatic effects of diode laser. Further studies are needed to gain more information about this laser type.

CONCLUSION

Combination of diode laser (λ = 810nm) treatment with 4% TiF_4 solution and NaF solution increased enamel hardness and reduced enamel softening significantly more than using each treatment alone. In addition, there were no statistically significance differences between NaF, TiF_4 and laser groups. Therefore, we recommended using laser irradiation immediately after fluoride application to enhance protection of enamel against demineralization.

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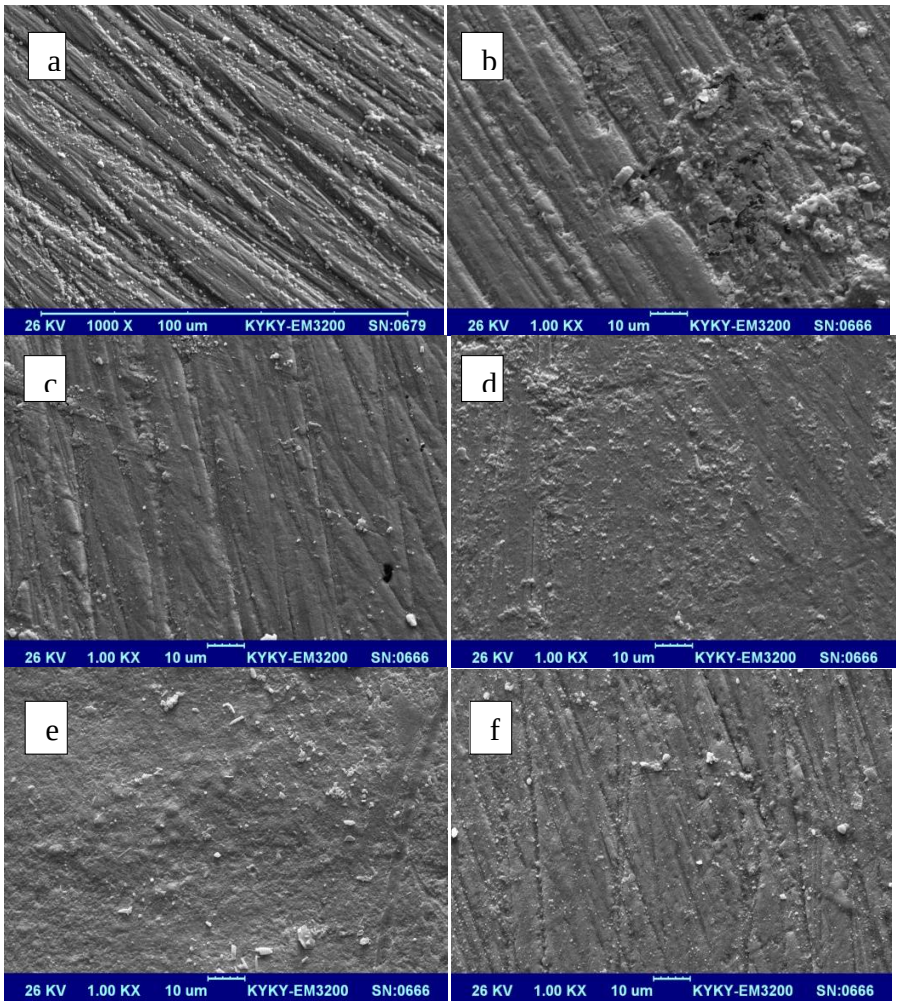

Fig. 1. SEM micrograph (original magnification, ×1000) of the enamel surface after treatment in various groups; a) control, b) TiF_4, c) laser, d) TiF_4+ laser, e) NaF, F) NaF+ laser

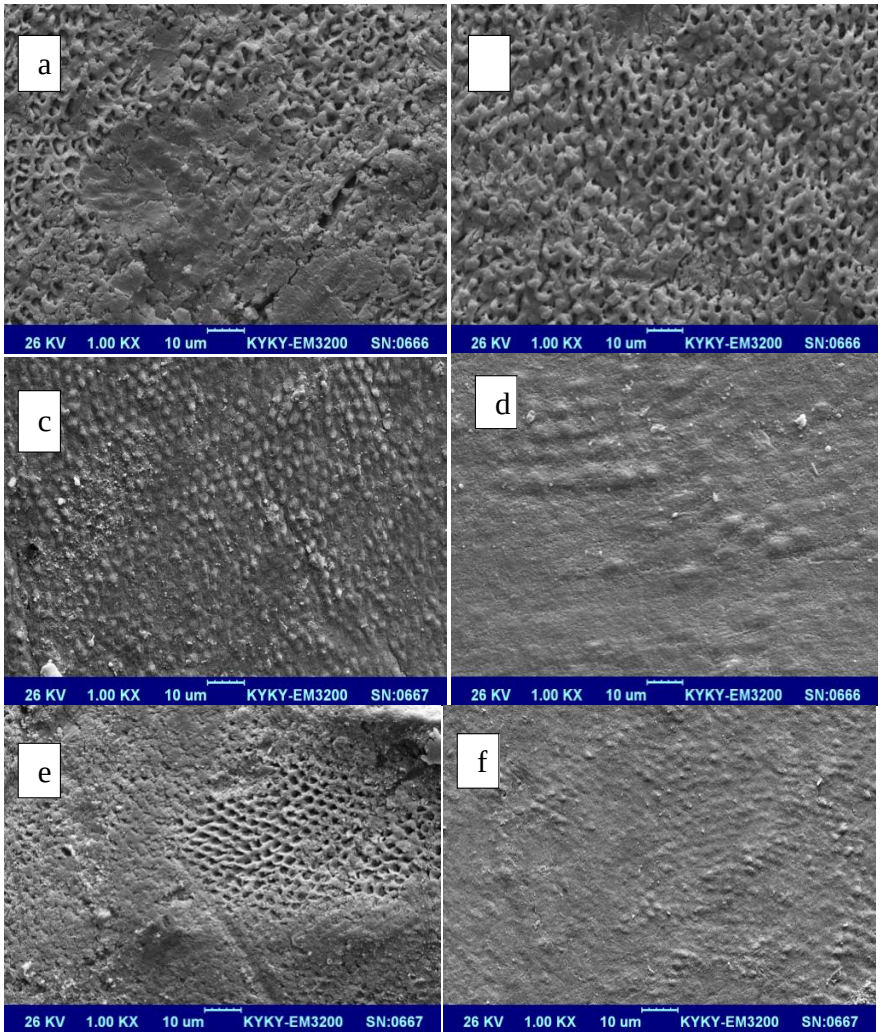

Fig. 2. SEM micrograph (original magnification, ×1000) of the enamel surface after erosion challenge in various groups; a) control, b) TiF_4, c) laser, d) TiF_4+ laser, e) NaF, F) NaF+ laser

Table 1 -mean SH, SH1, SH2, SHC1 and SHC2 of sample

Factors	Mean SH	Mean SH1	%SHC1	Mean SH2	%SHC2
NaF	254.50	327/08	%32	84.08	%74
NaF + Laser	260.25	374/58	%44	143.83	%61
TiF_4	256.42	344/58	%34	95.33	%72
TiF_4 + Laser	257.50	398/25	%54	189.42	%52
Laser	244.33	331/50	%35	107.25	%67
Control	249.33	249.33	%0	37.08	%86
*P*_value	0.634	<0.001	<0.001	<0.001	0.037

The mean difference is significant at the 0.05 level.

Table 2 – Multiple comparisons of groups after treatment by Tukey post hoc test.

Group	Group	Mean difference	Std.error	significance
NaF	NaF+laser	-47.500*	9.696	0.000
	TiF_4	-17.833	9.696	0.448
	TiF_4+laser	-71.167*	9.696	0.000
	laser	-4.417	9.696	0.997
	control	78.000*	9.696	0.000
NaF+laser	TiF_4	29.667*	9.696	0.036
	TiF_4+laser	-23.667	9.696	0.158
	laser	43.083*	9.696	0.000
	control	125.500*	9.696	0.000
TiF_4	TiF_4+laser	-53.333*	9.696	0.000
	laser	13.417	9.696	0.737
	control	95.833*	9.696	0.000
TiF_4+laser	laser	66.750*	9.696	0.000
	control	149.167*	9.696	0.000
laser	control	82.417*	9.696	0.000

*. The mean difference is significant at the 0.05 level.

Table 3 – Multiple comparisons of groups after erosion challenge by Tukey post hoc test.

Group	Group	Mean difference	Std.error	significance
NaF	NaF+laser	-59.750*	8.321	0.000
	TiF_4	-11.250	8.321	0.755
	TiF_4+laser	-105.333*	8.321	0.000
	laser	-23.167	8.321	0.073
	control	47.000*	8.321	0.000
NaF+laser	TiF_4	48.500*	8.321	0.000
	TiF_4+laser	-45.583*	8.321	0.000
	laser	36.583	8.321	0.001
	control	106.750*	8.321	0.000
TiF_4	TiF_4+laser	-94.083*	8.321	0.000
	laser	-11.917	8.321	0.708
	control	58.250*	8.321	0.000
TiF_4+laser	laser	82.167*	8.321	0.000
	control	152.333*	8.321	0.000
laser	control	70.167*	8.321	0.000

*. The mean difference is significant at the 0.05 level.

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RESEARCH ARTICLE

Using Decision Tree Algorithm for Analysts' Owner's Equity Clustering

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ABSTRACT

The technology for building knowledge-based systems by inductive inference from examples has been demonstrated successfully in several practical applications. This paper summarizes an approach to synthesizing decision trees. In the research were used 11 inputs that involve Cash ،Short-Term Investments ،Notes Receivable, Inventory، Spare Parts, Inventory Stock and Other Inventory, Advance Payment, Long-Term Assets, Notes Payable, Prepaid, Long-Term Liability that applied for classification of owner's equity by decision trees. The results show that seven classes for the data.

Keywords: technology, knowledge-based systems, Long-Term Liability

INTRODUCTION

Since artificial intelligence first achieved recognition as a discipline in the mid 1950's, machine learning has been a central research area. Two reasons can be given for this prominence. The ability to learn is a hallmark of intelligent behavior, so any attempt to understand intelligence as a phenomenon must include an understanding of learning. More concretely, learning provides a potential methodology for building high-performance systems.Research on learning is made up of diverse subfields. At one extreme there are adaptive systems that monitor their own performance and attempt to improve it by adjusting internal parameters. This approach, characteristic of a large proportion of the early learning work, produced self-improving programs for playing games (Sammut, 1985), balancing poles (Michie, 1982), solving problems (Quinlan, 1969) and many other domains. A quite different approach sees learning as the acquisition of structured knowledge in the form of concepts (Hunt, 1962; Winston,

1975), or production rules (Buchanan, 1978). The practical importance of machine learning of this latter kind has been underlined by the advent of knowledge-based expert systems. This paper focuses on decision trees for classification of owner's equity

MATERIALS AND METHODS

Materials

In the study area used 12 charactristics that is following Table 1:

Methods

A decision tree is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. It is one way to display an algorithm. Decision trees are commonly used in operations research, specifically in decision analysis, to help identify a strategy most likely to reach a goal. A decision tree is a flowchart-like structure in which internal node represents test on an attribute, each branch represents outcome of test and each leaf node represents class label (decision taken after computing all attributes). A path from root to leaf represents classification rules.In decision analysis a decision tree and the closely related influence diagram is used as a visual and analytical decision support tool, where the expected values (or expected utility) of competing alternatives are calculated.

A decision tree consists of 3 types of nodes:

Decision nodes - commonly represented by squares
Chance nodes - represented by circles
End nodes - represented by triangles

Decision trees are commonly used in operations research, specifically in decision analysis, to help identify a strategy most likely to reach a goal. If in practice decisions have to be taken online with no recall under incomplete knowledge, a decision tree should be paralleled by a probability model as a best choice model or online selection model algorithm. Another use of decision trees is as a descriptive means for calculating conditional probabilities. the program of the method is following: tree=ClassificationTree.fit(Inputs,Targets,'MinParent')

RESULTS

Rules of decision tree

Decision tree for classification

1 if x11<2.5 then node 2 elseif x11>=2.5 then node 3 else 2
2 if x8<5 then node 4 elseif x8>=5 then node 5 else 2
3 if x3<6.5 then node 6 elseif x3>=6.5 then node 7 else 6
4 if x8<1.5 then node 8 elseif x8>=1.5 then node 9 else 2
5 class = 4
6 if x8<2.5 then node 10 elseif x8>=2.5 then node 11 else 1
7 if x5<5 then node 12 elseif x5>=5 then node 13 else 6
8 if x10<2.5 then node 14 elseif x10>=2.5 then node 15 else 4

```
 9  if x4<3.5 then node 16 elseif x4>=3.5 then node 17 else 2
10  if x1<2.5 then node 18 elseif x1>=2.5 then node 19 else 2
11  class = 1
12  class = 6
13  class = 7
14  if x1<1.5 then node 20 elseif x1>=1.5 then node 21 else 4
15  class = 2
16  if x6<2.5 then node 22 elseif x6>=2.5 then node 23 else 2
17  if x3<6.5 then node 24 elseif x3>=6.5 then node 25 else 3
18  class = 3
19  if x3<4.5 then node 26 elseif x3>=4.5 then node 27 else 5
20  class = 4
21  if x5<5.5 then node 28 elseif x5>=5.5 then node 29 else 3
22  class = 2
23  class = 1
24  if x3<5.5 then node 30 elseif x3>=5.5 then node 31 else 4
25  if x10<2.5 then node 32 elseif x10>=2.5 then node 33 else 3
26  if x10<2.5 then node 34 elseif x10>=2.5 then node 35 else 5
27  class = 2
28  if x9<1.5 then node 36 elseif x9>=1.5 then node 37 else 3
29  class = 4
30  class = 1
31  class = 4
32  if x1<1.5 then node 38 elseif x1>=1.5 then node 39 else 2
33  class = 3
34  class = 5
35  class = 2
36  if x1<4.5 then node 40 elseif x1>=4.5 then node 41 else 5
37  class = 2
38  if x4<6 then node 42 elseif x4>=6 then node 43 else 2
39  class = 2
40  if x1<3 then node 44 elseif x1>=3 then node 45 else 5
41  class = 3
42  class = 3
43  class = 2
44  if x2<1.5 then node 46 elseif x2>=1.5 then node 47 else 5
45  class = 5
46  class = 5
47  class = 3
```

The results of the recearch is show in Figure 1 and Table 1.

CONCLUSION

In the research were used 11 inputs that involve Cash ،Short-Term Investments ،Notes Receivable, Inventory، Spare Parts, Inventory Stock and Other Inventory, Advance Payment, Long-Term Assets, Notes Payable, Prepaid, Long-Term Liability that applied for clustering owner's equity. For classification of data used decision trees method.

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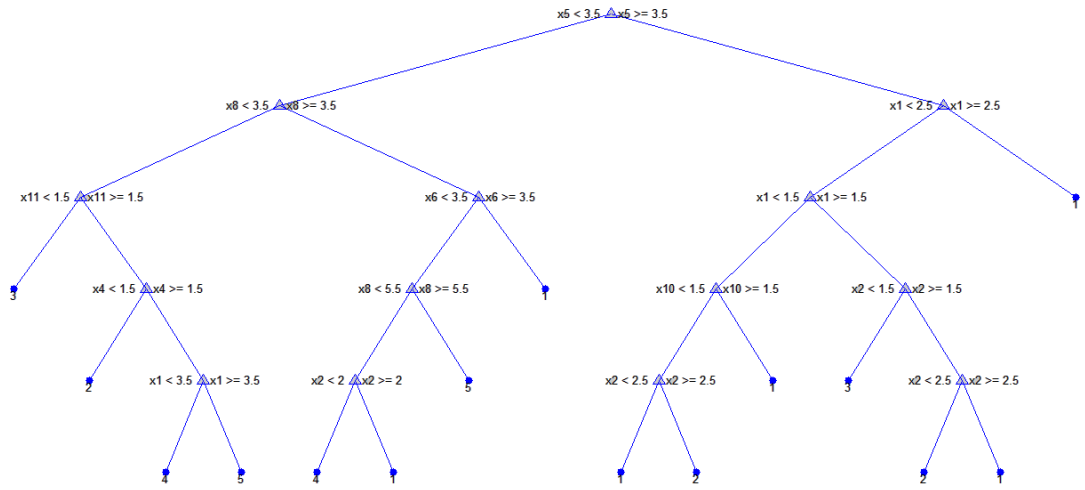

Figure 1. Decision trees for the study

Table 1. Inputs data for the study

Elements	Notes receivable	Inventory	Inventory stock and other inventory	Advance payment	Long-term assets	Notes payable	prepaid	spare parts	Cash	Long-term liability	Short-term investments	owner's equity
Maximum	5253206	688701	2542277	2521124	17363330	5695291	3139402	9726510	1182705	3001470	3564611	5253206
Minimum	3885	0	0	39	54030	16278	3068	0	900	0	3868050	3885
Average	1261087	120072	636372	326940	4689123	1478423	704671	1653372	214590	368339	270927	1261087
STDEV	1399529	163515	623930	655760	4879249	1763770	791798	2447987	308493	759892	1794244	1399529

Table 2. Classes for the features

Features	Classes						
	1	2	3	4	5	6	7
Notes receivable	<0	0-500000	500000-1000000	1000000-2000000	2000000-3000000	3000000-4000000	>4000000
Inventory	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
Inventory stock and other inventory	<0	0-500000	500000-1000000	1000000-2000000	2000000-3000000	3000000-4000000	>4000000
Advance payment	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
Long-term assets	<0	0-500000	500000-1000000	1000000-2000000	2000000-3000000	3000000-4000000	>4000000
Notes payable	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
prepaid	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
spare parts	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
Cash	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
Long-term liability	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
Short-term investments	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000
owner's equity	<0	0-50000	50000-100000	100000-200000	200000-300000	300000-400000	>400000