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Aim and Scope:

The Journal of Emerging Technologies in Accounting (JETA) has started with the aim of expanding the concepts of accounting, auditing and finance in English in order to identify and eliminate gaps in these areas.

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- Corporate Governance and the related subjects
- Internal and external auditing and there innovation
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- Internal control and new technologies
- Integrated and modern accounting information systems in the organization
- Other research topics related to emerging technologies in accounting

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Performance Evaluation of Different Districts of the Shiraz City Municipality Using DEA based on financial indicators

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Abstract

Objectives: The purpose of this research is to evaluate and rank the performance of various districts within the Shiraz municipality based on different financial criteria. Therefore, we evaluated the performance of 11 districts of Shiraz municipality in the second half of 2022.

Design/methodology/approach: Efficiency values were obtained for the areas using different technologies, and a suitable model was provided for the ineffective areas. The evaluation of the districts was based on input variables such as the number of employees, the area (in square meters) of the district building, and deferred income, as well as output variables including sold bonds, tax income, service income, and construction income. Input and output values were determined by consulting the informatics department of each district.

Results: Based on the results, optimal performance recommendations can be made to senior managers of the municipality.

Innovation: The current research is focused on evaluating financial aspect of performance in various districts of Shiraz Municipality. The goal is to find a suitable model for ranking these areas. This research can provide researchers and managers with an innovative perspective that can be applied in both theory and practice.

Keywords: Data Envelopment Analysis, Efficiency, Ranking, Municipality.

1. Introduction

In the age of information and competition between organizations, every organization is trying to create a new method for the transformation of its organization to surpass its competitors, maintain and gain a competitive advantage, and examine the important role that efficiency has in the development of societies. All its dimensions, especially in the form of mathematical analysis as a standard for measuring performance, are inevitable. Since the main heart and artery of the country's cities is tied to the municipalities, it is obvious that the correct growth and development of the municipalities will increase their efficiency, which will make the economy flourish and help escape from financial crises. In addition, increasing the efficiency of municipalities can be a big step in the better implementation of the beautiful city plan (Barakpour et. al., 2010).

The current era and the tremendous changes in management knowledge have made the existence of an evaluation system inevitable. In such a way, the lack of evaluation in different dimensions of the organization, including the evaluation of the use of resources and facilities, goals, and strategies, is considered one of the symptoms of the organization's illness.

Evaluating the performance of organizations and economic enterprises with similar activities and examining the results of their performance in a certain period is considered an important and strategic process that, while determining the competitive position of the organization, plays a significant role in continuous improvement and increasing quality and effectiveness.

Performance evaluation and measurement provide the necessary feedback in the following cases:

1. By tracking the amount of progress toward the set goals, it is determined whether the developed policies have been implemented successfully or not.

2. By measuring the expected results of the organization, as well as evaluating and measuring the satisfaction of employees and customers, it is determined whether the policies have been compiled correctly or not.

3. Performance evaluation and measurement make it possible to identify areas to which management should pay more attention and help identify opportunities and limitations.

4. Performance evaluation will provide information for managers in managerial decisions. A large part of the necessary information for managerial decisions is provided by measuring and evaluating the performance system (Razovian et. al., 2014).

Today, the city administration industry has become very competitive. Based on proven experience in competitive conditions, strong institutions that operate efficiently and effectively will survive. Success in a competitive market requires a high level of performance through continuous learning and operational improvement. Managers should know their relative success compared to competitors and how best practices are related to their productivity. In other words, they should be aware of their success compared with other similar institutions and their previous years.

The key to solving this problem is to find out how much of the available capabilities have been used. Banks, as the most important institutions in the money market, are not exempt from this. Since the optimal functioning of municipalities has a significant impact on the country's economic growth and development, creating the necessary conditions and platforms to improve the quality and quantity of banks' performance in the shadow of a healthy competitive environment can play a significant role in achieving these goals (Faraji, 2017).

In the current situation, the need to analyze the financial situation of banks is important for both the government and depositors, and in this way, it facilitates the movement of the wheels of society's economy toward growth and development. In this regard, evaluating the financial performance of banks is an important tool for making investment decisions, and many investors can use it to determine the fate of their money and investments. In addition, the primary goal of the bank, like other for-profit organizations, is to maximize the wealth of its owners. In increasing the wealth of shareholders, the management of the

municipality must decide whether to acquire assets with lower quality and more income, assets with higher quality and less risk, or whether the municipality should invest and provide facilities with long maturity and liquidity. Should the municipality reduce it or choose assets with shorter maturities and provide a high degree of liquidity?

The answer to the above questions made it necessary to evaluate financial performance so that banks can examine their performance in terms of profitability, capital adequacy, asset structure, and liquidity compared to rival municipalities so that they can measure their situation and improve their performance (Mousavi, 2016).

The efficiency of municipalities and how to calculate it is an important issue that, in addition to the municipal managers of these financial institutions, is of interest to the supervisory department of the urban system and customers using banking services. Considering the existing challenges, the entry of private service companies, and the increase in the activities of financial and credit institutions, it is important to evaluate the performance of municipalities and examine the efficiency of these organizations. The efficiency of municipalities is not at the desired level. The dissatisfaction of the public with the performance of municipalities is proof of this claim. There are many reasons for the decline in performance, among which we can point out that the municipalities are state-owned, the inefficiency of government management, and the facilities assigned to the municipalities. Since the group of city council officials is trying to improve the efficiency of the municipal system, it is important to conduct research that examines and compares the efficiency of the urban system over a certain period. Despite the importance of the country's municipal system in the domestic and regional economies, few studies have examined the efficiency of municipal organizations in the long term (Mousavi, 2016).

To evaluate the performance, the data envelopment analysis (DEA) method is used as a tool to evaluate the performance of decision-making units. Efficiency measurement has always been considered because of its importance in evaluating the performance of an organization. In the current research, due to the researchers' emphasis on data coverage analysis, special attention has been paid to the selection of inputs and outputs. DEA is a comprehensive approach that is accepted to evaluate performance in the municipal service industry (Charnes et. al.,1978).

Several studies have been conducted in the field of efficiency, both inside and outside the country. Among the research conducted regarding efficiency inside the country, the following can be mentioned:

Amiri (2001) defined and calculated the measure of efficiency in municipal organizations. His goal was to identify the shortcomings of previous planning in the urban system using the efficiency index. Based on this study, there is a relationship between the efficiency of municipal districts and their structure, and it has been determined in this research that there is a negative relationship between improper monitoring and major weaknesses in the service network monitoring system. In addition, in this study, a positive relationship between executive power and the efficiency of the municipal service system has been confirmed.

Hadian (2013) examined the efficiency of 10 banks in the country for the period 1997–1999. According to the results obtained from his research, three service companies in the municipality were technically efficient in the mentioned years, assuming the existence of variable returns to scale. The average technical, specialized, and economic efficiency of these three companies is 84.2%, 86.4%, and 74.3%, respectively.

For example, some shareholders may move their shares from where they fear the uncertainty of future sales. However, other investors take advantage of this chance to acquire shares at a discounted rate due to current inflation and then sell them at a higher price. (Levine et al. 2001).

Secme et al. (2009) evaluated the financial performance of the urban service industry in Turkey using hierarchical analysis and TOPSIS. In this study,

the evaluation of the macro-performance of the municipality is investigated in two financial and non-financial sectors. Capital quality index, asset quality, profitability, liquidity, income and cost structure, and stock group are studied to evaluate financial performance, and pricing index, marketing, productivity, and service provision are studied to evaluate non-financial performance.

Worthington and Dollery (2012) developed a model for measuring efficiency in local government that applied an analysis of New South Wales municipalities' domestic waste management.

Rogge and De Jaeger (2001) proposed an adjusted "shared-input" version of the popular efficiency measurement technique DEA, which enables the evaluation of municipal waste collection and processing performances in settings in which one input (waste costs) is shared among treatment efforts of multiple municipal solid waste fractions. The model is a DEA model that not only provides estimates of the overall cost efficiency of municipalities but also provides estimates of the cost efficiency of municipalities for treating various fractions of municipal solid waste (MSW)

Yang et al. (2015) applied the CCR model in the DEA to obtain the green development frontier surface based on 31 regions' annual cross-sectional data from 2008 to 2012. In addition, to classify the regions where assessment values are equal to1 in the CCR model, we chose the Super-Efficiency DEA model for further sorting. Using the five-year panel data, the green development efficiency in 31 regions can be manifested by the Malmquist index.

The organization of this paper is as follows: In the second part, the basic concepts related to performance evaluation models in DEA and the concept of super-efficiency are presented. In the fourth part of this paper, we present a model for evaluating the efficiency of the municipal districts of Shiraz using the DEA models presented in the previous sections. Finally, we present the results of the paper.

2. DEA model

Consider the n DMUs as, $DMU_j = (X_j, Y_j)\ \ j = 1, \dots, n$, where X_j and, Y_j are the vectors of input and output corresponding, $DMU_j\ \ j = 1, \dots, n$, also we have, $X_j \geq 0$, $X_j \neq 0$ and.$Y_j \geq 0, Y_j \neq 0$

In the input-oriented CCR, the goal is to reduce the level of input with a ratio. Theθinput-oriented CCR model is presented as follows:

(1)

$$\theta^* = Min \quad \theta$$
$$S.t. \quad \sum_{j=1}^{n} \lambda_j X_j \leq \theta X_o$$
$$\sum_{j=1}^{n} \lambda_j Y_j \geq Y_o \qquad \lambda_j \geq 0\ ,\ j = 1, \dots, n$$
$$\theta\ is\ free\ in\ sign.$$

Definition 1. $DMU_o = (X_o, Y_o)$is called an efficient CCR in the input-oriented sense if and only if,$\theta^* = 1$otherwise, it is inefficient.

If we consider the slacks corresponding to the input and output variables in the model (1.2), we can consider the following model to calculate the Pareto efficiency as follows:

$$Min \quad \theta - \varepsilon(\sum_{r=1}^{s} s_r^+ + \sum_{h=1}^{m} s_i^-)$$
$$S.t \quad \sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{io}, \qquad i = 1, \dots, m$$
$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{ro}, \qquad r = 1, \dots, m$$
$$\lambda_j \geq 0, \qquad j = 1, \dots, n \qquad s_i^- \geq 0, \qquad i = 1, \dots, m, \qquad (2)$$
$$s_r^+ \geq 0\ , \qquad r = 1, \dots, s, \qquad \theta\ is\ free\ in\ sign.$$

Definition 2. $DMU_o = (X_o, Y_o)$ is called Pareto efficient CCR in the input-oriented case if and only if,$\theta^* = 1$and in every optimal solution, all slack variables are equal to zero.

The score θ^* in the input-oriented model is called technical efficiency and $(1 - \theta^*)$ is called technical inefficiency.

The dual of the input-oriented CCR model is as follows:

$$Max\ U^t Y_o$$

$$S.t.\ U^tY_j - V^tX_j \le 0,\ j = 1,..n,$$
$$V^tX_o = 1, \qquad (3)$$
$$U \ge 0, V \ge 0.$$

Model (3) is called the input-oriented CCR model in multiple forms. $DMU_o = (X_o, Y_o)$is efficient in evaluating with the multiple models (model (3)), if and only if there is (U^*, V^*) as an optimal solution to model (3) that satisfies the following conditions:
$U^{*t}Y_o = 1, (U^*, V^*) > 0.$
In the output-oriented CCR, the goal is to increase the output level with a ratio. Theφoutput-oriented CCR model is presented as follows:

$$\varphi^* = Max \quad \varphi$$
$$S.t. \quad \sum_{j=1}^{n} \lambda_j X_j \le X_o$$
$$\sum_{j=1}^{n} \lambda_j Y_J \ge \varphi Y_o \qquad (4)$$
$$\lambda_j \ge 0 \quad , \quad j = 1, \dots, n.$$

Definition 3. $DMU_o = (X_o, Y_o)$is called efficient CCR in the output-oriented case if and only if,$\varphi^* = 1$else it is inefficient.
The score φ^* in the output-oriented model is called technical efficiency and $\left(1 - \frac{1}{\varphi^*}\right)$ is called technical inefficiency. The input-oriented BCC model is presented as follows:

$$\theta^* = Min \quad \theta$$
$$S.t. \quad \sum_{j=1}^{n} \lambda_j X_j \le \theta X_o$$
$$\sum_{j=1}^{n} \lambda_j Y_j \ge Y_o \qquad (5)$$
$$\sum_{j=1}^{n} \lambda_j = 1,$$
$$\lambda_j \ge 0,\ j = 1, \dots, n,$$
$$\theta\ is\ free\ in\ sign.$$

Definition 4. $DMU_o = (X_o, Y_o)$is called an efficient BCC in the input-oriented case if and only if, $\theta^* = 1$else, it is inefficient.
If we consider the slacks corresponding to the input and output variables in the model (1.8), we can consider the following model to calculate the Pareto efficiency as follows:

$$Min \quad \theta - \varepsilon\left(\sum_{r=1}^{s} s_r^+ + \sum_{h=1}^{m} s_i^-\right)$$
$$S.t \quad \sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{io}, \qquad i = 1, \dots, m,$$
$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{ro}, \qquad r = 1, \dots, s,$$
$$\sum_{j=1}^{n} \lambda_j = 1, \quad \lambda_j \ge 0, \qquad j = 1, \dots, n$$
$$s_i^- \ge 0, \qquad i = 1, \dots, m, \qquad (6)$$
$$s_r^+ \ge 0\ , \qquad r = 1, \dots, s, \quad \theta\ is\ free\ in\ sign.$$

Definition 5. $DMU_o = (X_o, Y_o)$ is called Pareto-efficient BCC in the input-oriented sense if only it is,$\theta^* = 1$, and in every optimal solution, all slack variables are equal to zeros$s_i^{-*} = 0, i = 1, \dots, m, s_r^{+*} = 0, r = 1, \dots, s$
The dual of the model (6) is as follows:

$$Max \quad \sum_{r=1}^{s} u_r y_{ro} - u_0$$
$$S.t. \quad \sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} - u_o \le 0,$$
$$j = 1, \dots, n \quad \sum_{i=1}^{m} v_i x_{io} = 1$$
$$u_r \ge \varepsilon, \qquad r = 1, \dots, s \qquad v_i \ge \varepsilon, \qquad i = 1, \dots, m \qquad (7)$$

The output-oriented BCC model is presented in envelope form as follows.

$$\varphi^* = Max \quad \varphi$$
$$S.t. \quad \sum_{j=1}^{n} \lambda_j X_j \le X_o$$
$$\sum_{j=1}^{n} \lambda_j Y_j \ge \varphi Y_o$$
$$\sum_{j=1}^{n} \lambda_j = 1 \quad \lambda_j \ge 0, \quad j = 1, \dots, n \qquad (8)$$

Definition 6. $DMU_o = (X_o, Y_o)$is called efficient BCC in the output-oriented case if and only if,$\varphi^* = 1$otherwise, it is inefficient.
If we consider the slacks corresponding to the input and output variables in model (8), we can consider the following model to calculate the Pareto efficiency:

$$
\begin{aligned}
&Min \quad \varphi + \varepsilon(\textstyle\sum_{r=1}^{s} s_r^+ + \sum_{h=1}^{m} s_i^-) \\
&S.t. \quad \textstyle\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = x_{io}\ , \qquad i = 1, \dots, m \\
&\textstyle\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = \phi y_{ro}, \qquad r = 1, \dots, s \\
&\textstyle\sum_{j=1}^{n} \lambda_j = 1 \qquad \lambda_j \geq 0, \qquad j = 1, \dots, n \\
&s_i^- \geq 0, \qquad i = 1, \dots, m \\
&s_r^+ \geq 0, \qquad r = 1, \dots, s \qquad (9)
\end{aligned}
$$

Definition 7. $DMU_o = (X_o, Y_o)$is called Pareto efficient BCC in the output-oriented if only if$\varphi^* = 1$, and in every optimal solution, all slack variables are equal to zero.$s_i^{-*} = 0, i = 1, \dots, m, s_r^{+*} = 0, r = 1, \dots, s$

The dual of model (9) is as follows:

$$
\begin{aligned}
&Max \quad \textstyle\sum_{i=1}^{n} v_i x_{ip} + v_0 \qquad S.t. \quad \sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} + v_0 \geq 0\ , \qquad j = 1, \dots, n \\
&\textstyle\sum_{r=1}^{s} u_r y_{rp} = 1 \\
&u_r \geq \varepsilon, \quad r = 1, \dots, s\ v_i \geq \varepsilon\ , \quad i = 1, \dots, m \qquad (10)
\end{aligned}
$$

Anderson and Peterson (1993) proposed the super-efficiency model. The super efficiency model for ranking efficient decision-making units was such that the first decision-making unit was removed from the production possibility set and the DEA model was implemented for the remaining decision-making units. and evaluated its efficiency in DMU compared to other decision-making units. By removing DMU_o from the production possibility set, the feasible space of the linear programming problem becomes larger, in which case the value of the optimal solution for DMU_o becomes larger. When this is done for all effective decision-making units, arrange them in descending order. The decision-making unit whose optimal value of the objective function is greater than the others has the first rank, and in the same way, all the efficient decision-making units are ranked.

The super efficiency model of CCR in the input-oriented model is as follows:

$$
\begin{aligned}
&Min \quad \theta \quad S.t. \quad \sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j X_j \leq \theta X_o \qquad \sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j Y_j \geq Y_o \\
&(11), \\
&\lambda_j \geq 0 \quad , \quad j = 1, \dots, n\theta\ is\ free\ in\ sign
\end{aligned}
$$

The super efficiency model of BCC in the input-oriented model is as follows:

$$
\begin{aligned}
&Min \quad \theta \\
&S.t. \quad \sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j X_j \leq \theta X_o \qquad \sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j Y_j \geq Y_o \\
&\sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j = 1 \qquad (12) \\
&,\lambda_j \geq 0 \quad , \quad j = 1, \dots, n\theta\ is\ free\ in\ sign
\end{aligned}
$$

Performance evaluation and ranking of different districts in Shiraz municipality

Today, municipalities play an essential role in creating a successful city in a way that is of great importance to the political, social, and cultural structure of society. Therefore, evaluating their performance can help managers in city administration. One of the most important tools for examining the performance of organizations, such as municipalities, is data coverage analysis. Considering the geographical location and strategy of Shiraz City in terms of population and the scientific and medical situation in the country, the administration of mayors is important from various economic and cultural aspects. In this article, we evaluated the performance of different municipal districts in Shiraz City in 2022. The number of these districts is 11 in different parts of Shiraz. First, according to the opinion of municipal experts and using a questionnaire, we determined the inputs and outputs. In this study, three inputs and four outputs were considered. The inputs and outputs are as follows:

Input variable included

Number of employees (by person), area (square meters) of the district building, and delayed income (billion Rials).

Output variables included

Sold securities, tax revenues, service revenues, and construction revenues (The unit of all outputs is a billion Rials).

The input and output data are shown in Table 1.

Now, we evaluate the efficiency of different areas based on the different models. The results are shown in Table 2.

As can be seen, areas 1, 2, 3, 5, 6, 7, and 8 are efficient based on all models. Areas 9 and 9 are inefficient based on all models. Areas 10 and 11 are efficient for variable returns to scale and inefficient for constant returns to scale.

To rank the efficient areas, we apply models (11) and (12) to the constant and variable returns to scale, respectively.

The rank corresponding to the efficient units is given in the form of numbers in parentheses next to the super efficiency score of the areas. As can be seen, the ranks of the areas in the two technologies are different. Based on the super-efficiency CCR model, namely model (11), area 6 has the best performance. We expected this because this area also has the best financial performance. Based on the super efficiency BCC model, namely model (12), area 6 has the best performance, because this area has the highest income due to the area being covered by a smaller number of employees due to its location.

Figure 1 shows a comparison of efficiency values for constant and variable technologies.

Table 3 shows targets corresponding to inputs and outputs of different areas of the CCR and BCC models in the input orientation, respectively.

Table 1. Inputs and Outputs.

Areas	Input1	Input2	Input3	Output1	Output2	Output3	Output4
1	10	230	2220	4228	6850	41200	645
2	17	550	9850	8450	96500	59550	1180
3	12	350	4210	6430	77250	38550	720
4	8	220	850	2450	35235	19550	230
5	8	210	780	3550	45254	16200	243
6	9	265	1135	6884	55450	28350	387
7	8	220	645	3720	42210	30580	264
8	9	260	336	2420	23285	19200	175
9	8	250	765	3820	25554	24350	248
10	7	300	955	3350	28550	26520	225
11	7	250	448	2750	27540	19250	187

Table 2. The results of different models.

Areas	Model (2)	Model (4)	Model (6)	Model (9)	Model (11)	Model (12)
1	1	1	1	1	1.528 (2)	1.9136 (3)
2	1	1	1	1	1.1356 (6)	Infeasible
3	1	1	1	1	1.1454 (5)	1.3689 (4)
4	0.7818	0.7818	0.9853	0.8629	0.7818 (11)	0.9853 (9)
5	1	1	1	1	1.0672 (7)	1.0969 (7)
6	1	1	1	1	1.5908 (1)	4.8261 (1)
7	1	1	1	1	1.4824 (3)	2.046 (2)
8	1	1	1	1	1.2608 (4)	1.3333 (5)
9	0.854	0.854	0.9646	0.885	0.854 (10)	0.9646 (10)
10	0.9882	0.9882	1	1	0.9882 (8)	1.0917 (8)
11	0.9802	0.9802	1	1	0.9802 (9)	1.1938 (6)

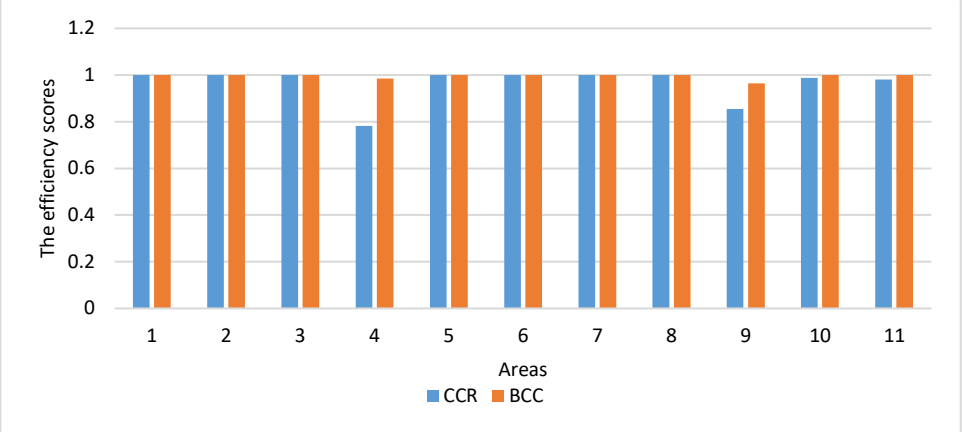

Figure 1. Comparison of efficiency values between the two technologies used.

Table 3. Targets the corresponding inputs and outputs of different areas of the CCR model.

Areas	Input1	Input2	Input3	Output1	Output2	Output3	Output4
1	10	230	2220	4228	6850	41200	645
2	17	550	9850	8450	96500	59550	1180
3	12	350	4210	6430	77250	38550	720
4	6.0096	171.9888	664.5023	3915.939	35235	19550	234.7713
5	8	210	780	3550	45254	16200	243
6	9	265	1135	6884	55450	28350	387
7	8	220	645	3720	42210	30580	264
8	9	260	336	2420	23285	19200	175
9	6.832	191.9088	653.3101	3820	37795.82	24679.91	248
10	6.9171	183.1948	853.88	3350	28550	26520	294.1634
11	6.8613	195.11	439.1217	2750	27540	19788.18	187.2578

Table 4. Targets the corresponding inputs and outputs of different areas of the BCC model.

Areas	Input1	Input2	Input3	Output1	Output2	Output3	Output4
1	10	230	2220	4228	6850	41200	645
2	17	550	9850	8450	96500	59550	1180
3	12	350	4210	6430	77250	38550	720
4	7.8827	216.7737	712.9586	3491.516	42542.37	19550	240.7996
5	8	210	780	3550	45254	16200	243
6	9	265	1135	6884	55450	28350	387
7	8	220	645	3720	42210	30580	264
8	9	260	336	2420	23285	19200	175
9	7.7164	241.1385	646.3698	3820	37938.48	24350	249.2389
10	7	300	955	3350	28550	26520	225
11	7	250	448	2750	27540	19250	187

4. Conclusion

Municipalities play a crucial role in the progress and economic development of every city. Currently, due to the growth of the population of megacities, evaluating their performance is particularly important. This organization operates in various fields, including economic, cultural, and health, in a city and deals directly with people's lives. A municipality with a good performance can be the basis for improving the lives of the people under its coverage. Due to its geographical location and high population, Shiraz is one of the most important cities in Iran. This organization has different subgroups. Evaluating the performance of different covered areas can help managers choose appropriate strategies. In addition, many economic works are done in Shiraz City through the municipality. Therefore, due to the importance of this organization in the economic system of the country, it prompted us to assess and evaluate the efficiency of different districts of Shiraz municipality using a suitable method. The performance of the districts was evaluated in one year related to 2022. We evaluated and ranked different areas of the municipality using the DEA model as a suitable technique. In the following, considering that several areas became efficient in each of the technologies used, we used supper-efficiency models to rank the efficient branches to determine the areas with the best performance. Finally, we presented the effective targets corresponding to the ineffective areas. According to the results, the optimal performance policy of the municipal districts for city council managers was determined. In future work, we will develop the models presented in this paper for evaluation during consecutive periods. We can also develop an evaluation to consider the cost and revenue factors simultaneously.

References

Barakpour, N., Goharipour, H., and Karimi, M., (2010). Evaluation of the performance of municipalities based on the measurement of people's satisfaction with municipal services (case example: Districts 1 and 11 of Tehran). Urban Management, 8(25), 203-218.

Razovian, M. T., Qadermarzi, H., Alian, M., Cheraghi, R, (2014). Urban management research strategy for sustainable development in historical contexts, a case study: the historical context of Yazd city, Urban and Regional Development Planning Quarterly, 1(1), 24-28.

Faraji, A., Adinevand, A. A., Alian, M., (2017). Evaluation of the performance of the municipalities of the eight regions of Ahvaz city in the framework of the good urban governance model", Urban and Regional Development Planning Quarterly, 3(5), 115–142.

Mousavi, M., (2016). Designing a performance evaluation model for urban management subordinate organizations using the development of a balanced scorecard (Mashhad municipality case study), Government Organizations Management, 14(2), 117–97.

Charnes A, Cooper WW, Rhodes E., (1978). Measuring the efficiency of decision-making units, European Journal of Operational Research, 2, 429–44.

Amiri, H., (2001). Investigating and determining the efficiency of municipalities in Iran. Master's thesis, University of Tehran.

Hadian, E., Azimi Hosseini, A., (2013). Calculating the efficiency of the banking system in Iran using the comprehensive data analysis method, Iranian Economic Studies Quarterly, 6(20), 1–20.

Levine, R., Smith, B. D., (2001). The impact of inflation on financial sector performance. Monetary Economics. 47(2), 221-248.

Secme, N., Yalcin, B., Kahraman, A., (2009). Fuzzy the financial performance evaluation in the Turkish banking sector using the analytic hierarchy process and Topsis, Expert Systems with Applications 36, 11699-11709.

Rogge, N., De Jaeger, S. (2012). Evaluating the efficiency of municipalities in collecting and processing municipal solid waste: A shared input DEA-model, Waste Management, 32, 1968–1978.

Worthington, A.C., Dollery, B.E., (2001). Measuring efficiency in local government: an analysis of New South Wales municipalities' domestic waste management function. Policy Studies Journal, 29, 232–249.

Yang, Q., Wan, X., and Ma, H., (2015). Assessing the Green Development Efficiency of Municipalities and Provinces in China: Integrating Models of Super-Efficiency DEA and Malmquist Index, Sustainability, 7, 449–4510.

Andersen, P., Petersen, N.C., (1993). A procedure for ranking efficient units in data envelopment analysis. Management Science, 39, 1261–1264.

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Presenting a Model for Contributing Factors to Fin Tech Implementation in the Banking System of a Country Using a Blended Approach

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Abstract

Objectives: This paper aims to identify and present a model for the contributing factors to FinTech implementation in the country's banking system using a blended approach.

Design/methodology/approach: The scholar initially analyzed 30 specialists in the banking system in various stages in the qualitative section using a mixed approach. Secondly, in the quantitative section, the efficacy of variables was evaluated by distributing a questionnaire among 267 employees of Bank Refah Kargaran. This was conducted using Smart PLS Software and a structural equation approach.

Results: The results indicate that factors such as "economic governance of the state," "culture building and training," "structural preparation," "banking system transparency," and "facilities and incentives" can impact the implementation of FinTech in the banking system. Additionally, quantitative analysis in the next phase demonstrates that all research constructs, presented as five hypotheses, play a direct role in influencing FinTech implementation in the financial system.

Originality/value: As traditional banking around the world is transitioning into digital evolution, this paper focuses on one of the significant events in digital banking: FinTech. Despite the importance of FinTech, there have been few studies on its implementation.

Keywords: Financial Startups, Fin Tech, Implementation, Banking System, Blended, Theme, Validation.

1. Introduction

Today, banks are facing various challenges, including changes in customer expectations, technological advancements, regulatory requirements, and economic crises, which could influence changes in the banking system. Hence, banks benefit from firm development or startups in financial technology (FinTech) (Balyuk & Davydenko, 2019). Recent developments in financial technology have motivated rapid changes in new and innovative financial services, referred to as FinTech (Lee & Shin, 2018). On the other hand, due to immobility and bureaucratic structure, traditional banks must align with FinTech companies (Chishti & Barberis, 2016). Hence, banks adopt different strategies to address potential FinTech threats, the most prominent of which is the formation of strategic alliances. Among the advantages of FinTech's presence in the banking system, we can refer to efficiency in speed, cost, and access to new customers. The problems faced by traditional banks include developing complicated structures, high recognition levels, increased operational costs, presenting high-cost and timely banking services, a lack of innovation in providing services, and failure to meet customers' expectations (Llewellyn, 2014). Some factors and prerequisites must effectively align between the banking industry and FinTech. Jagtiani and Lemieux (2019) observed that one of the identifying factors for the use of FinTech in banks is the presence of well-documented rules and regulations. Legislators and lawmakers are cognizant of the potential of FinTech companies to address issues related to financial partnerships,

economic procedures, and knowledge, and are investing in this area to increase awareness and knowledge to attract more people by providing FinTech services to be effective in facing any risk and describe the rules on the advantages the users and new investors obtain (Jagtiani et al., 2021). One of the key success factors in reaching FinTech goals is preserving innovative features at the banking level (Drasch et al., 2018). The FinTech industry in Iran is not fully developed, and its application in financial services is new. Despite the development of the industry in Iran and the emergence of some successful and operational companies, some challenges, like a monopoly in some banking services like the Country Payment System, a lack of maturity of financial tools, like financial validation systems, person-to-person facilities, and comprehensive rules in FinTech, are examples of growth barriers to FinTech advancement in Iran. FinTech in Iran is a challenging issue that must be organized, and standard relations must be established between companies, service providers, banks, and credit institutions. Regarding the application of FinTech in banking, banks have four options to respond to structural changes in financial services, resulting in the flourishing of FinTech innovators. These options are as follows (Hughes et al., 2019):

1) To do nothing (become archaic over time and eventually lead to exorbitant costs)
2) Using minimum resources to maximize FinTech benefits (cheapest and fastest)
3) Possessing a FinTech (potentially, but still expensive and demanding culturally)
4) Copying or imitating FinTech (slow and extremely expensive)

A survey conducted by a global legal company named Mayer Brown shows three key areas in which typical banks today believe that partnerships with FinTechs result in profitability. They include (Jagtiani & Lemieux, 2018): Region 1 (saving costs): such savings are most likely due to lower costs in new business development as well as expanding the efficiency of traditional processes by using financial technologies and establishing an agile structure; Region 2 (rebranding): working with FinTechs expedites the path to market and allows banks to have a better position to provide services for a specific market and have a platform for flourishing; Region 3 (increasing income): more than half of the participants in the study believe that collaboration with FinTechs leads to more income. Most banks are challenged by complex collaboration scenarios, and previous studies have not kept up with current changes in the financial sector, especially in bank-FinTech partnerships (Jaubert et al.,

2014). Although previous studies have addressed several concerns about the factors contributing to the implementation of FinTech in the banking industry, the theory did not explain the nature of bank-FinTech collaboration (Drasch, Schweizer, and Urbach, 2018).

As mentioned earlier, the diversity of assessing variables in collaboration, the novelty of the topic of collaboration among banks as large, wealthy organizations equipped with complex structures, FinTechs as startup companies with simple structures and weak financial potential, and the lack of national and international studies make this study very important. To assess the issue and create a structure and model, the researcher is seeking a better understanding of the multifaceted topic addressed for the first time in the country. The research question is, "How is the FinTech implementation model in the banking industry, and what factors contribute?". In this regard, it is crucial to identify and assess the contributing factors that pave the way for the establishment and use of FinTech. As seen in previous studies, operational contributing factors to FinTech implementation have not been evaluated in terms of required policies and executive areas. Therefore, it is essential to assess the issue and create a comprehensive structure and model. Among other significant aspects, we can focus on the study's concentration on the target population with the most connections to the topic to evaluate the factors in the banking system with the most impact. Overall, this study aims to present an implementation model in line with the appropriate use of FinTech in the country's banking system and assess the concluding factors.

2. Theoretical principles and Literature Review

2.1. FinTech

FinTech, short for financial technology, refers to the use of new technologies to create products and services in the financial industry. It combines the words "finance" and "technology" and encompasses any business that leverages technology to enhance or automate financial services and processes. FinTech is a rapidly growing industry that serves both consumers and businesses (Hertzberg et al., 2018). Its applications range from mobile banking and insurance to digital currency and investment platforms. The industry is vast and expected to continue expanding in the future.
One of the driving factors behind FinTech's growth is the increasing involvement of traditional banks, which are becoming more tech-savvy and investing in, acquiring, or partnering with FinTech startups to reach digitally-oriented customers. This allows them to better serve these customers while integrating technology into their financial services (Hughes et al., 2022).

The term "FinTech" encompasses all types of technology used in financial services, catering to both businesses and consumers. It includes companies that offer financial services through software or other technological means, such as mobile payment solutions and cryptocurrency platforms. Essentially, any company that utilizes the internet, mobile devices, software technology, or cloud services to provide or interact with financial services falls under the FinTech category. Many FinTech products are designed to streamline financial transactions for consumers and also cater to business-to-business technologies (Suryono et al., 2020).

Bhandari (2021) conducted a study on the strategies required for the deployment and implementation of FinTech. The research explored the role of electronic communication in organizational strategies and the use of assessment and modeling techniques for digital media content. The study also delved into the historical credibility of banks and how the current FinTech industry can learn from past mistakes. Additionally, the study provided insights into effective mechanisms for enhancing e-reputation. Bhandari (2021) suggested that implementing crowdfunding strategies, policies, and creating social networks for easy access to banking services could drive the development of FinTech within the banking system.

Lee and Shin (2018) highlighted how disruptive innovation, online banking, FinTech business models,

information technology, and innovation impact the financial services industry. Gai et al. (2018) focused on FinTechs providing dynamic solutions across five technical dimensions: security and privacy, data techniques, hardware and infrastructure, applications, and service model management.

Startups are newly established businesses centered around technology that operate in the realm of new technologies. They possess high growth potential but

often lack a concrete business model and struggle with limited budgets and funding. Despite these challenges, startups have a flexible and agile structure, quick product development cycles, and market entry. Collaborating with the banking system can provide startups with financial support and brand credibility, enhancing customer value and strengthening the competitive advantage of banks (Balyuk, 2018).

The USSBA defines startups as businesses that typically revolve around technology and exhibit high growth potential (Tang, 2019). This growth potential necessitates a focus on financing, as startups often require more funding than small non-startup businesses. Steve Blank, a prominent figure in startup theory, defines a startup as an organization formed to discover a reproducible and scalable business model. According to Blank, startups are characterized by their ongoing search for a viable business model, the pursuit of a repeatable model, and a scalable business model that can cater to varying customer volumes (Wei and Lin, 2017).

Biotech, a portmanteau of finance and technology, refers to companies that utilize technology to disrupt traditional financial service models and transform the delivery of these services. By leveraging communication, the internet, and automated information processing, biotech companies aim to revolutionize the financial services sector (Fortnum et al., 2017; Arner, Barberis & Buckley., 2016a; Chen, 2016; Gabor and Brooks, 2017; Springer, 2016).

3. Research Methodology

This study combines an applied purpose with a research approach. The qualitative research method and content assessment strategy were used in the first stage. The six stages of the content test using this approach are described below:

Step 1: Familiarize yourself with the data. At this stage, the researcher identifies, refines, and thematically categorizes relevant articles, research, and interviews with organizational experts and academic elites to identify interview codes.

Step 2: Creating the initial code and coding extracted from related articles, research, and the text of interviews with experts are presented in the form of a preliminary list.

Step 3: Search and identify topics After the data has been initially coded and compiled and a long list of different codes in the dataset has been prepared, the researcher focuses on the report at a higher level than the codes. The different codes are sorted, and all encoded data related to each theme is identified and collected. In other words, in this step, the codes are developed and analyzed in Table 3 as basic, organized, and comprehensive themes, and attention is paid to how different codes are combined to form the basic themes.

Step 4: Drawing a network of themes At this stage, the thematic networks are drawn, reviewed, and analyzed. Content networks are a tool for analysis, not examination itself. These networks help the researcher gain a deeper understanding of the meanings of the texts, describe the themes obtained, and identify their patterns. After creating thematic networks, the researcher must refer to the original text again and interpret it with the help of these networks.

Step 5: Analyzing the network of themes In this step, the thematic networks are drawn, reviewed, and analyzed. Content network is a tool for analysis, not insight itself. These networks help the researcher gain a deeper understanding of the meanings of the texts, describe the themes obtained, and identify their patterns.

Step 6: Compiling the Report Examination and compilation of the final research report are conducted at this stage. Writing a content study aims to tell a complete and complex story in the data so that the

reader is convinced of the validity and competence of the researcher's study. The interviewees were selected purposefully (directional or theoretical sampling). The data collection process continues until the researchers reach the saturation point in the data and no new material is added to the model. Table 1 shows the information about the interviewees.

Most qualitative methodologies rely on trustworthiness to evaluate qualitative results rather than reliability, validity, and philosophical foundations rooted in the quantitative paradigm. Trustworthiness includes four criteria: credibility, transferability, dependability, and confirmability. In this study, these strategies are utilized to ensure trustworthiness. A questionnaire is distributed following a specific pattern to measure research indicators in the second phase (quantitative). After describing the questionnaire and presenting it to five professors and relevant experts, the validity of the measurement tools is assessed. The concept of the population in this paper refers to all individuals to whom the results are intended to apply, and the nature of the study shapes the scope of the research. The statistical population in this study includes all staff members working in various departments of Bank Refah Kargaran; based on the Cochran Formula, a sample size of 267 individuals is estimated. The details of the statistical sample are outlined in Table 2.

The factor loadings of items that demonstrate the reliability of the measurement model are calculated using the correlation values of the construct indicators. If the value is equal to or greater than 0.4, the reliability is considered acceptable. In this study, all items had factor load values >0.5, which were deemed acceptable. Additionally, reliability was assessed using Cronbach's alpha and combined reliability indices, while the validity of the construct was evaluated using divergent and convergent reliability. Table 3 displays the reliability and validity of the measurement model.

A confirmatory factor analysis was conducted to assess the reliability and validity of the measurement scale. The closer the factor load is to 1, the stronger the relationship between the questionnaire items and hidden variables. A factor load of 0 indicates no relationship between the two factors, while a negative factor load suggests an inverse relationship.

Fornell and Larcker (1981) established two criteria for factor load: observed variables should have factor loads greater than 0.5, and the total reliability of variables should exceed 0.6. The results of the confirmatory factor analysis, as shown in Table 3, reveal that the factor loads of variables are mostly around 0.5 or higher. Additionally, Cronbach's alpha coefficient indicates a reliability and internal validity greater than 0.6, confirming that the items reflect the factors.

Based on these results, we can affirm the reliability and validity of the model at the construct level, as per Fornell and Larcker's criteria, by examining the correlations and average variance extracted (AVE).

Table 1. The information of respondents

Gender	Male	25
	Female	5
Education	Master’s	9
	PhD	21
Work experience	Between 5 and 10 years	2
	Between 10 and 15 years	4
	Between 15 and 20 years	6
	Between 20 and 25 years	8
	Between 25 and 30 years	10
Field of study	Financial management	12
	Financial engineering	13
	Economy	5

Table 2. The demographical statistics of the quantitative section

Specifications	Classification	Number	Frequency percentage
Age	Between 20 and 30	89	33.3
	Between 31 and 40	85	31.8
	Between 41 and 50	79	29.6
	More than 50	14	5.2
Work experience	Between 5 and 10 years	65	24.3
	Between 10 and 15 years	53	19.9
	Between 15 and 20 years	53	19.9
	Between 20 and 25 years	46	17.2
	Between 25 and 30 years	50	18.7
Education	Bachelor's	123	46.1
	Master's	126	47.2
	PhD	18	6.7

Table 3. The convergent reliability and divergence of variables

Variable	Cronbach	CR	AVE	Variable	Cronbach	CR	AVE
Structural integration in bank	0.746	0.817	0.416	Controlling macroeconomic indicators	0.679	0.757	0.696
Centralism	0.921	0.951	0.869	Aligning governmental policies	0.910	0.830	0.549
Progressivism and systematization	0.614	0.861	0.732	Government economic capacity building	0.891	0.792	0.943
Stabilization of financial affairs	0.769	0.908	0.762	Specialization and framing	0.908	0.847	0.859
Information integration	0.865	0.816	0.791	Discourse and culture-building in society	0.940	0.833	0.617
Reducing financial speculation	0.671	0.855	0.617	Building trust among investors	0.729	0.794	0.768
Customers' access to financial information	0.651	0.891	0.652	Adapting strategies with FinTech	۷۴۹.۰	0.891	0.959
Establishing model financial tools	0.781	0.916	0.762	Adaptation to FinTech standards	0.905	0.891	0.946
Providing the required incentives	0.671	0.619	0.865	Financial discipline in bank	0.759	0.850	0.896

4. Research findings

As previously mentioned, respondents answered the relevant questions. The 30 interviews yielded 416 codes, which were then reduced to 380 after review and integration of similar codes. Scholars identified five themes after conducting theme analysis: state economic governance, transparency, structuralism and unification, facilities and incentives, and culture-building and training. Table 4 displays the basic organizer, learner, and interviewee codes:

After following the above steps, a connection was established between the categories resulting from the open coding stage. By expanding one of the categories in the axial coding, which is the basis of the communication process, the output of the Fin Tech implementation model in the country's banking system is finally shown in Figure 1.

The structural equation modeling technique tests the research hypotheses derived from the conceptual model. Figure 2 shows the path coefficient model for hypothesis testing:

Table 4. The results of the respondents' analysis

Basic themes	Organizing themes	Inclusive themes	Interviewee's code
Failure to connect to knowledge-based companies by identifying FinTech needs in the banking industry can make achieving FinTech requirements and components difficult. Therefore, downsizing the government disrupts the recruitment of elites in the banking industry.	Lack of elite recruitment in the government due to the downsizing of the government	specialism	First interviewee
The traditional bureaucratic system in government must be transformed to meet the requirements of FinTech. Therefore, the banking system must comply with the latest international standards.	Bureaucratic and traditional management systems in government	Centralism	Second interviewee
The formulation of public policies by the central bank to implement the FinTech system can facilitate alignment mechanisms between all branches and banking centers.	Reforming public policies of FinTech implementation	Policymaking	Third interviewee
Developing long-term and short-term plans to effectively index and periodically monitor banking developments to comply with FinTech requirements in the form of a FinTech roadmap is necessary and inevitable.	Developing long-term and in-depth plans for the digital banking industry	Policymaking	Third interviewee
Developing and imagining a favorable vision for the transformation of the banking industry can facilitate and smooth the goals and strategies in a transcendent way to achieve and implement financial startups.	Drawing the right perspective for the banking industry	Policymaking	Third interviewee
Alignment and orientation of all banking measures with banking development models can activate industrial and economic policies. One of the most important elements of implementing FinTech is paying attention to industrial and economic policies.	Alignment of the banking development model with industrial and economic policies	alignment of the banking industry	Fourth interviewee
Attention and emphasis on global standards and compliance and non-deviation from international laws and norms in the banking industry can connect the banking industry to global markets.	Paying attention to global standards and monitoring global markets in this industry	Per international standards	Fifth interviewee
Iran's economic structure based on FinTech standards must change.	Reforming the economic structure	Structural discipline-making	Sixth interviewee
Creating economic stability can pave the way for the formation of digital transformation in the field of investment in the banking system. This leads to a good foundation for playing FinTech roles.	Establishing long-term economic stability	Establishing stability	Seventh interviewee
Creating value for existing businesses to implement FinTech can lead to an increase in the GDP growth rate.	Increasing the growth rate of GDP	Controlling macroeconomic indicators	Eighth interviewee
Based on the digital transformation in the banking industry and the facilitation of investment exchanges in the context of the FinTech platform, it can grow the production-oriented economy.	Production-oriented economy	Policymaking	Ninth interviewee
Economic and political sanctions have caused the greatest damage to the banking industry. This has disrupted many financial mechanisms in international monetary and banking relations. Therefore, reducing political and economic sanctions to implement FinTech can be effective.	Reducing political and economic sanctions	Removing sanctions	Tenth interviewee
Iran's economic structure based on FinTech standards	Reforming the economic	Providing	Eleventh

Basic themes	Organizing themes	Inclusive themes	Interviewee's code
must change.	structure	structural discipline	interviewee
With the implementation of financial startups, many economic cartels and business enterprises in the country have entered the field of financial startups.	The entry of large industrial holdings into this industry	Providing structural discipline	Eleventh interviewee
The government can enter the field of financial startups with small and large shares and provide the foundations for the formation of FinTech through effective rail laying.	State's participation with fewer shares	State's governance	Twelfth interviewee
The Vice President for Science and Technology facilitates the implementation of FinTech by establishing government research and technology funds and liaising with the private sector.	Transferring shares of government research and technology funds to the private sector	Providing structural discipline	Fifteenth interviewee
One of the essential factors for success is creating discourse and a culture of community participation in the development of financial startups.	Creating a common understanding of the development of financial startups	Building culture	Sixteenth interviewee
Having different climates, cultures, schools, religions, political tastes, social systems, and geographical dispersions, Iran must create a banking system to meet the requirements of FinTech and provide solutions appropriate to the above cases.	Building culture through the geographical dispersion of	Building culture	Nineteenth interviewee
It is necessary to create interaction among the pillars of the banking system to implement FinTech. Therefore, the type of interaction, exchange, and sharing of information among the executive elements of the industry, market banking, and capital markets is important.	Proper interaction between industry actors and financial startups	Economic relations and exchanges	22nd interviewee
Networking among financial startup industry actors is one of the success factors in creating civil and administrative partnerships in the implementation of FinTech.	strong networking among financial startup industry actors	Economic relations and exchanges	23rd interviewee
Many investors pay attention to the financial risks in FinTech, which can increase the challenges in this area.	The attention of risky investors to financing based on the life cycle	Risk-taking	25th interviewee
Rapid and convenient access to capital by companies and customers is one of the advantages of implementing FinTech.	Proper and rapid access to capital	Economic relations and exchanges	27th interviewee
Legal mechanisms are effective in determining the requirements of FinTech. Development of property rights for individuals: Structural discipline	Establishing legal mechanisms	Providing structural discipline	28th interviewee
One of the key issues in developing financial startups is the creation of intellectual property rights structures.	Developing property rights of individuals	Providing structural discipline	29th interviewee
The formation of centralized structures for information validation can be considered an official reference in the startup process.	Establishing a formal and legal reference for information validation	Providing structural discipline	30th interviewee

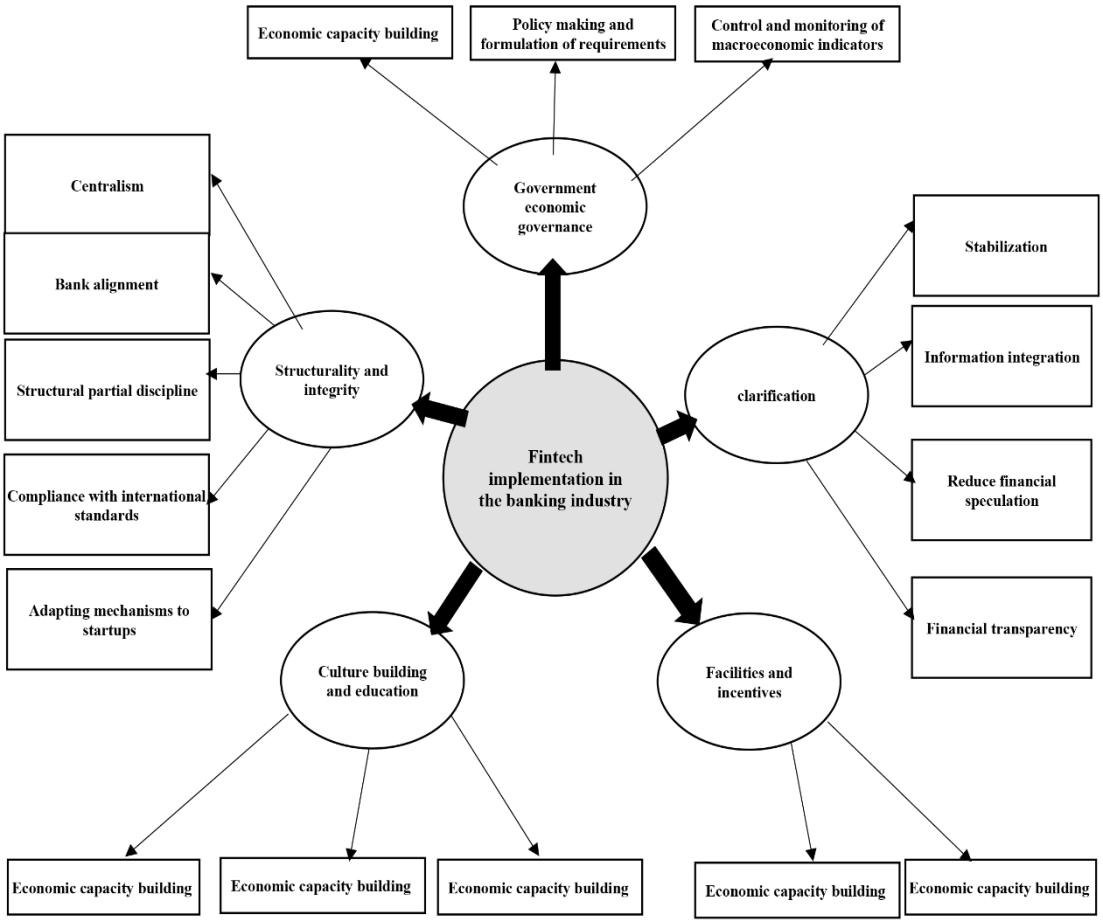

Figure 1. The output of the FinTech implementation model in the country's banking system

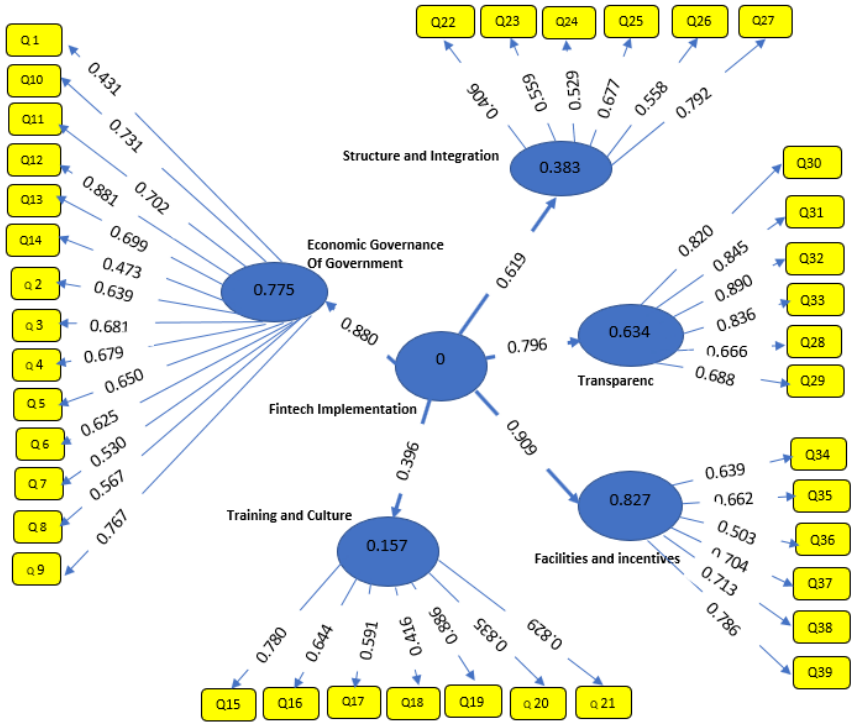

Figure 2. The research model is in the form of standard path coefficients

To assess the significance of the path coefficients, the T statistic value for each path should be displayed. If the T statistic value at a confidence level of 95% is greater than 1.96, then the effect of the path coefficient is considered significant.

Table 4 confirms all research hypotheses. In Figure 2, the impact of state economic governance on FinTech implementation in the country's banking system is 0.880; structuralism and unification on FinTech implementation in the banking system is 0.619; transparency on FinTech implementation is 0.796; training and culture building on FinTech implementation is 0.396; and facilities and incentives on FinTech implementation is 0.905. The R2 value for different constructs is deemed acceptable.

Furthermore, based on the Q2 value, the predictability of research constructs is of medium to large value, indicating that the model has appropriate predictability. The GOF criterion is used to evaluate the overall fit of the model, which is derived from the average mean root of reflective constructs in the coefficient of determination of endogenous constructs.

$$GoF = \sqrt{communicating \times R2}$$

The mean common construct value (AVE) is 0.698, and the mean coefficient of determination of the hidden endogenous variable is 0.741, so the GOF value is equal to 0.651. Since these three values are 0.01, 0.25, and 0.36, referring, respectively, to weak, medium, and strong values for GOF, the figure of 0.398 shows a strong fitting for the research model.

5. Discussion and conclusion

To identify and enumerate the factors influencing FinTech implementation in the banking industry, interviews were conducted with experts in the field. Ten specialized questions were designed for this purpose, and 30 experts from Iranian banks such as Rafeh-e Kargaran, Parsian, Pasargad, Mellat, and Melli, as well as academic professionals, including financial graduates, were included in the study. The identified factors were sorted into five basic dimensions. These dimensions include:

1. State governance, which oversees strategic decisions and requirements to align executive actions in the banking industry with FinTech processes.
2. Structural and integration, which focuses on creating the infrastructure, executive contexts, and formal mechanisms for the FinTech operations at both macro and micro levels of the organization.
3. Facilities that enhance the advancement of FinTech goals, strategies, and planned activities.
4. Education and culture-building, and promoting the development of financial startups among individuals.
5. Clarification of measures to create transparency in the mechanisms of the banking industry. Due to the interrelationship between these dimensions, the study determined the levels of influence of factors on FinTech implementation in the banking industry.

To adopt effective strategies in the FinTech sector of the banking industry, the prioritization of the identified factors is crucial. The prioritization operations were conducted using the structural equation method to determine effectiveness. The results were formulated into five main hypotheses. Based on the findings of the structural equation analysis:

- The first hypothesis, "State governance has a positive and significant effect on implementation in the country's banking system, was confirmed with a path coefficient of 0.880 and a significance level of 0.001. This aligns with previous studies by Jagtiani and Lemieux (2019) and Sharma et al. (2018), on the impact of government actions on FinTech implementation.
- The second hypothesis, "Structural and integration have a positive and significant effect on FinTech implementation in the country's banking system," was confirmed with a path coefficient of 0.619 and a significance level of 0.015. This is consistent with findings by Hertzberg, Liberman, and Paravisini (2018) and Hughes et al. (2022), regarding the effectiveness of aligned banking structures.
- The third hypothesis, "Clarification has a positive and significant effect on FinTech implementation in the country's banking system," was confirmed with a path coefficient of 0.796 and a significance level of 0.027. This supports the importance of clarification in the banking system, as noted by Suryono et al. (2020).
- The fourth hypothesis, entitled "Education and culture-building has a positive and significant effect on FinTech implementation in the country's banking system," was confirmed with an impact factor of 0.396 and a significance level of 0.001. This is in line with the significance of education highlighted by Sharma et al. (2018) and Lee and Shin (2018).
- The fifth hypothesis, "Facilities and incentives have a positive and significant effect on FinTech implementation in the country's banking system," was confirmed with an impact factor of 0.905 and a significance level of 0.022. This finding is consistent with the results of Balyuk (2016).

6. Research Suggestions

1) It is suggested that to determine the limits of activities in FinTech, a FinTech policy document should be compiled. Some existing

laws in the banking industry may need to be amended and optimized.

2) It is suggested that to implement FinTech, the development of instructions and directives as well as the correct implementation of FinTech provisions should be examined.
3) It is suggested that to align and direct all activities, the Central Bank should develop executive policies that meet the needs of FinTech and notify all executive bodies in the banking industry.
4) It is suggested that the wording of laws related to financial transparency in banks and institutions be prepared and announced to implement FinTech and fulfill the role of social responsibility by the banking industry.
5) Appropriate mechanisms should be developed to design a performance appraisal system for financial startups in the banking industry that can facilitate entry into the FinTech arena.
6) It is suggested that long-term and short-term plans are necessary and inevitable to effectively monitor banking developments periodically and comply with FinTech requirements in a FinTech roadmap.
7) It is suggested that the banking industry's favorable outlook should be facilitated to align goals and strategies for the realization and implementation of financial startups.
8) It is suggested that appropriate culture and capacity be built, and proper strategies be expressed to connect startups with the banking industry
9) It is suggested that the economic structure of Iran should be changed based on FinTech standards.

References

Arner, D. W., Barberis, J., & Buckley, R. P. (2016). 150 Years of Fintech: An Evolutionary Analysis. *Jassa*, (3), 22–29.

Baker, T. H. (2017). FinTech Alternatives to Short-term Small-dollar Credit: Helping low-income Working Families Escape the High-cost Lending Trap. *Harvard Kennedy School M-RCBG Associate Working Paper*, (88).

Balyuk, T., & Davydenko, S. (2019). Reintermediation in FinTech: Evidence from Online Lending. *Michael J. Brennan, Irish Finance Working Paper Series Research Paper (18–17)*.

Balyuk, T. (2016). *Financial Innovation and Borrowers: Evidence from Peer-to-peer Lending*. University of Toronto-Rotman School of Management.

Bhandari, V. (2021). FinTech: A Study of Enablers, Opportunities, and Challenges in the Banking and Financial Services Sector. Research*Anthology on Concepts, Applications, and Challenges of FinTech* (pp. 24-31). IGI Global.

Chen, L. (2016). From Fintech to in Life: the Case of Fintech Development in China. *China Economic Journal*, *9*(3), 225-239. https://doi.org/10.1080/17538963.2016.1215057

Chishti, S., & Barberis, J. (2016). *The Fintech Book: The Financial Technology Handbook for Investors, Entrepreneurs, and Visionaries*. John Wiley & Sons.

Drasch, B. J., Schweizer, A., & Urbach, N. (2018). Integrating the 'Troublemakers': A Taxonomy for Cooperation between Banks and Fin Techs. *Journal of Economics and Business*, *100*, 26–42. https://doi.org/10.1016/j.jeconbus.2018.04.002

Fortnum, D., Pollari, I., Mead, W., Hughes, B., & Speier, A. (2017). The pulse of fintech Q1 2017: Global analysis of investment in fintech. *KPMG. Recuperado de https://bit. ly/3x0nqJY*.

Gabor, D., & Brooks, S. (2017). The digital revolution in financial inclusion: international development in the fintech era. *New Political Economy*, *22*(4), 423–

436,https://doi.org/10.1080/13563467.2017.1259298.

Gai, K., Qiu, M., & Sun, X. (2018). A survey on FinTech. *Journal of Network and Computer Applications*, *103*, 262-273. https://doi.org/10.1016/j.jnca.2017.10.011

Hertzberg, A., Liberman, A., & Paravisini, D. (2018). Screening on Loan Terms: Evidence from Maturity Choice in Consumer Credit. *The Review of Financial Studies*, *31*(9), 3532–3567.

Hughes, J. P., Jagtiani, J., & Moon, C. G. (2022). Consumer Lending Efficiency: Commercial Banks versus FinTech Lenders. *Financial Innovation*, *8*(1), 1-39.

Jagtiani, J., & Lemieux, C. (2018). Do Fintech Lenders Penetrate Areas that are Underserved by Traditional Banks? *Journal of Economics and Business*, *100*, 43–54. https://doi.org/10.1016/j.jeconbus.2018.03.001

Jagtiani, J., & Lemieux, C. (2019). The Roles of Alternative Data and Machine Learning in Fintech Lending: Evidence from the Lending Club Consumer Platform. *Financial Management*, *48*(4), 1009-1029. https://doi.org/10.1111/fima.12295

Jagtiani, J., Lambie-Hanson, L., & Lambie-Hanson, T. (2021). Fintech Lending and Mortgage Credit Access. *The Journal of FinTech*, *1*(01), 2050004.

Jaubert, M., Marcu, S., Ullrich, M., Malbate, J. B., & Dela, R. (2014). Going Digital: The Banking Transformation Roadmap. *AT Kearney*.

Lee, I., & Shin, Y. J. (2018). Fintech: Ecosystem, Business Models, Investment Decisions, and Challenges. *Business Horizons*, *61*(1), 35–46. https://doi.org/10.1016/j.bushor.2017.09.003

Llewellyn, D. T. (2014). Reforming the Culture of Banking: Restoring Trust and Confidence in Banking. *Journal of Financial Management, Markets, and Institutions*, *2*(2), 221-236. https://doi.org/10.12831/78760

Szpringer, W. (2016). FinTech is a New Phenomenon in the Financial Services Market. *E-MENTOR*, (2), 56–69.

Kaur, D., Sahdev, S. L., Sharma, D., & Siddiqui, L. (2020). Banking 4.0:The Influence of Artificial Intelligence on the Banking Industry & How AI Is Changing the Face of Modern-Day Banks. *International Journal of Management*, *11*(6),577-585

Suryono, R. R., Budi, I., & Purwandari, B. (2020). Challenges and Trends of Financial Technology (Fintech): a Systematic Literature Review. *Information*, *11*(12), 590. https://doi.org/10.3390/info11120590

Tang, H. (2019). Peer-to-peer Lenders versus Banks: Substitutes or Complements? *The Review of Financial Studies*, *32*(5), 1900–1938. https://doi.org/10.1093/rfs/hhy137

Wei, Z., & Lin, M. (2017). Market Mechanisms in Online Peer-to-peer Lending. *Management Science*, *63*(12), 4236–4257. https://doi.org/10.1287/mnsc.2016.2531

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The Role of Human Factors and Culture in the Upcoming Challenges in Safety with the Approach of Increasing Financial Productivity

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Abstract

Objectives: The purpose of this study is to explore the role of human factors and culture in the upcoming safety challenges associated with increasing financial productivity.

Design/methodology/approach: In the face of environmental crises, human factors and safety culture play a crucial role in navigating challenges and seizing opportunities. Issues such as population participation and the promotion of environmental values are met with obstacles like violations of environmental protection laws. However, by leveraging opportunities to advance clean technologies and smart management practices, we can progress towards maintaining and enhancing the environmental situation. This study utilized a descriptive research method to investigate human factors, safety culture, environmental challenges, and opportunities in Isfahan. Data was collected from library resources in 2024, and practical results were presented.

Results: The findings indicate that fostering coordination between human factors and the development of an environmental safety culture is essential for striking a balance between environmental protection and sustainable development.

Innovation: By capitalizing on opportunities to enhance clean technologies and smart management practices, it is feasible to improve the environmental condition of Isfahan. The city faces challenges such as environmental protection law violations, unsustainable activities, and rapid urban and industrial growth that strain the environment. These challenges underscore the urgency of implementing robust environmental protection measures. However, Isfahan also benefits from opportunities like transparent environmental management and a deeper understanding of the economic and social impacts of environmental initiatives. Increasing public awareness and transparency in decision-making processes can enhance environmental management and natural resource conservation. Additionally, the potential for upgrading clean technologies and utilizing renewable energy presents a key opportunity to mitigate environmental harm. These actions can contribute to creating a more sustainable environment and reducing greenhouse gas emissions. Overall, Isfahan has leveraged its resources to preserve and enhance the environment by effectively balancing challenges and opportunities.

Keywords: Environment, Safety Culture, Challenges and Opportunities.

1. Introduction

To protect the environment, first of all, human groups should be educated, this education should be aimed at understanding the environment and nature and making friends with it (Hosseini et al., 2013). Today, the environment is exposed to various threats. Since many of these changes and occurrence of environmental problems are the result of human activities and due to the lack of awareness and understanding of the environment, promotion of public culture and environmental education can be considered as one of the basic measures in solving these problems. The crystallization of the environmental culture in the society is that all the people of the society consider the environment as a vital and valuable phenomenon and do not harm it. The main purpose of this research is to investigate the role and relationship of culture and education in preserving the environment. Since the expansion of awareness requires education, today, in parallel with the increase of human activities and their effects, the need for extensive and comprehensive education of people in exchange for their responsibility towards the environment has also become more noticeable. This research was conducted by a review method and the required information was collected from library and internet sources. From the conducted investigations, it can be concluded that practical, basic and long-term education can cause environmental culture and lay the groundwork for improving and reforming environmental behaviors in society (Azizi, 2014).

Isfahan, with its long history and culture, as one of the big cities of Iran, faces unique issues and challenges in the field of environment. The influence of people and safety culture is of particular importance in this context; Because cultural behaviors, beliefs, and habits can have profound effects on environmental protection.

In this article, we will first examine how humans interact with the environment of Isfahan and examine the role of human factors in the formation of challenges and opportunities. Then, we will present the existing attitudes and policies in the field of safety culture and environmental protection and analyze the obstacles and possibilities in this field.

Finally, according to the achievements, we will make suggestions to improve the environmental condition of Isfahan. This analysis is the first step towards a deeper understanding of the challenges and taking advantage of the opportunities to protect the environment of this region. In this article, we will investigate the human factors and safety culture in relation to the environment of Isfahan. This review includes the challenges and opportunities that these factors create for the protection and sustainable development of the environment in this region. In order to improve the future of Isfahan's environment, it is necessary for these factors to face the challenges and benefit from the available opportunities.

Some of the previous studies on the subject are as follows:

Mashari (2016) reviewed environmental management challenges and methods of working, highlighting that if the current rate of deforestation in the country continues, Iran will lose its forests within the next 30 to 40 years. In the last forty years alone, one third of Iran's forests have been destroyed. This is an unforgivable sin that will punish both the perpetrators and the bystanders. The remnants of nature in the future will serve as a reminder to future generations that Iran's natural resources were exploited by those who made mistakes and crossed boundaries until there was nothing left. Each year in Iran, approximately 15 tons of soil per hectare are lost due to water erosion. Additionally, major floods in the 1360s have doubled to 400 compared to the 1330s. Preserving biodiversity at the levels of genes, species, and ecosystems is a key indicator of environmental protection. According to the "Red Book of Basic Information of Iran," out of 1727 native plant species in the country, 453 are threatened with extinction, 21 are at risk of near-term extinction, and 432 are at risk of medium-term extinction. The awareness and acknowledgment of such issues in other countries began in the 60s, leading to conferences like Brantland (1987) and Rio de Janeiro (1992), the development of

ISO 14000 series standards, and the "Sustainable Development" world summit in 2002 as examples of global actions. Third world countries are less proactive in environmental management compared to industrialized nations. In Iran, there has been significant growth in environmental goal-setting, policy-making, and planning over the past decade, but these efforts have mostly resulted in symbolic laws and statements due to social and cultural constraints, failing to achieve desired outcomes. This article aims to trace the evolution of environmental attitudes and identify commonalities with public administration to address the ineffectiveness of policies, goals, and programs.

Zarei et al. (2014) investigated the role of education in promoting environmental culture in society, emphasizing the importance of increasing environmental awareness in the modern era. Humans and other creatures impact their surroundings differently, with early humans having a lesser impact due to less pollution. However, technological advancements and changing civilizations have led to more complex environmental issues, necessitating a correct balance between human needs and the environment. Promoting public culture through environmental education is crucial to addressing environmental problems and making environmental awareness a part of public culture.

Karmi et al. (2012) examined the environmental challenges of inter-basin water transfer projects in Iran and globally, emphasizing the need to evaluate the environmental impacts alongside economic and social effects when deciding on project implementation. Changes in water resources affect vegetation and soil quality, leading to ecosystem and environmental effects. The article discusses the economic, social, and environmental impacts of various projects and outlines criteria and considerations for inter-basin water transfers.

Amiri et al. (2012) explored Iran's challenges, opportunities, and position in attracting carbon storage to protect the environment. Fossil fuel plants and refineries emit large amounts of CO2, contributing to climate change. The development of carbon capture and storage (CCS) technology can help address this issue, reducing the threat of climate change. The study evaluates the challenges and opportunities of CCS technology, including cost, safety, storage capacity, injection conditions, and Iran's CO2 storage potential. Identifying suitable storage locations is crucial, with considerations for reservoir engineering, geology, hydrodynamics, economics, and monitoring requirements. Saline reservoirs have the largest capacity for CO2 storage, but injecting CO2 into oil reservoirs may be more economically viable in Iran.

Shokri (2021) investigated the environmental governance system in Iran and its challenges and pointed out that currently the Islamic Republic of Iran is facing many problems in the field of environment. Air and water pollution, desertification, deforestation, loss of biodiversity and water scarcity crisis have brought the country's environmental situation to a critical level. The crisis of water scarcity and drought forces people to migrate, air pollution has made life challenging, soil erosion and increasing desertification have made agricultural land useless. Biodiversity is under threat. The main idea of this article is: while external factors such as global climate change and international economic sanctions are generally recognized as external drivers in creating environmental problems, a major part of Iran's environmental problems is caused by the weak governance of the country in this is the field. Improper management in policies related to energy consumption, especially water, weak public awareness of the state of the environment, lack of proper understanding of development, weak fertilizers and population policies are among the human factors affecting the destruction of the environment in Iran.

Corrigan (2020) reviewed Human Factors and Safety Culture: Challenges and Opportunities for the Port Environment and noted that the critical role of understanding human factors and the importance of safety culture in the maritime sector is becoming a prominent topic. While much research has focused on ships at sea, it is crucial to recognize that ports and

docks can also be dangerous and hazardous environments. The purpose of this paper is to report an exploratory research study assessing safety culture and human factors awareness in a large European port environment. The study utilized a multi-method awareness of human factors and a positive shift towards approach, including a safety culture assessment survey in a port environment (161 responses) and research interviews (11 in total) with a reference port company. The research concludes that there is a growing a safety culture that promotes openness and flexibility in safety measures. However, more focused research on the complexities, constraints, and shared processes of port environments is necessary.

Ciavarelli (2016) reviewed the integration of human factors into safety and environmental management systems and addressed human performance risk reduction strategies for integration into a safety and environmental management system (SEMS). A framework is presented that identifies the human factors considerations and evaluation criteria needed for successful integration into a company's SEMS. A methodology for evaluating the safety culture and effectiveness of SEMS implementation is also presented. Survey results from employees in various high-risk industries will be discussed, emphasizing common problems in creating and maintaining a strong safety culture and the challenges of achieving an effective SEMS.

Successfully integrating human factors into SEMS for the oil and gas industry can reduce the risks of human-caused accidents and disasters like the Macondo well blowout. Integrating human factors into a SEMS can also enhance operational efficiency and effectiveness by considering all levels of performance improvement, from individual workers to management. Optimal performance by all employees is essential for achieving a high level of organizational reliability.

Certain human factors components can improve safety performance and help prevent human error incidents and organizational failures, such as specifying personnel qualification standards, utilizing advanced simulation training, analyzing and displaying critical safety data, identifying human factors hazards, providing safety training for line supervisors, and assessing safety climate and culture regularly based on High Reliability Organization principles.

These factors are crucial components of an effective SEMS that, when absent or poorly implemented, can lead to man-made accidents and disasters. They are essential areas of assessment for evaluating the strength of safety culture and the successful integration of human factors into a company's SEMS. These methods and lessons learned should be considered for implementation in the oil and gas industry. Environmental research is vital in Isfahan, confirming the necessity from multiple perspectives.

- **Protection of natural resources:**

Research in the field of environment helps to preserve Isfahan's natural resources, including water, air, soil and biodiversity, in a sustainable manner. These measures prevent the destruction of the environment and the reduction of the quantity and quality of natural resources.

- **Sustainable urban management:**

Environmental research allows the municipality and city officials to implement sustainable urban management programs and projects based on accurate and scientific information. These measures improve the quality of life of citizens and reduce damage to the environment.

- **Coping with climate change:**

Research in the field of environment can help to better understand the patterns and climate changes in Isfahan. This knowledge is essential to adopt appropriate policies and measures to deal with climate change and reduce its effects.

- **Maintaining public health:**

Environmental research helps to better understand the polluting agents and the correct risks associated with them. This information helps public health organizations to implement appropriate health programs and policies and prevent disease outbreaks.

In general, environmental research in Isfahan is necessary to take serious measures to preserve the environment, improve the quality of life of citizens, and deal with climate challenges and air and water pollution.

2. Research method

In this study, human factors and safety culture, challenges and opportunities for the environment of Isfahan were investigated by using descriptive research method and by collecting library sources, and the results were collected in the findings section of the article.

3. Findings

Human factors and safety culture in Isfahan can be related to environmental protection or threat. The strengths of safety culture and social cooperation can help reduce pollution and preserve natural resources. On the other hand, challenges such as violation of environmental protection laws may lead to environmental degradation. Considering the harmony between the pros and cons, creating awareness and promoting a responsible environmental culture can help improve the environmental condition of Isfahan:

- **Human factors**
  - Increasing the population's awareness about the importance of environmental protection through educational programs.
  - Promoting the active participation of people in protective measures, such as cleaning contaminated areas.
- **The role of local groups:**
  - Encouraging and supporting local groups and associations in the implementation of environmental protection plans and projects.
  - Promoting positive interactions between individuals and local groups in order to preserve and benefit from natural resources.

Emphasizing the active participation of the population as well as the cooperation of local groups in this field can help to develop a culture of environmental protection and reduce its harmful effects.

- **Safety culture**:

  Surveys show that weak safety culture is the determining factor of accidents. On the other hand, the change in people's behaviors and attitudes and their greater focus on safety can only be realized through the formation of a safety culture, which also requires understanding and identifying the current culture. Safety culture includes the application of all necessary values in the field of occupational health and safety, effective and useful attitudes in this field, application of laws, systems and methods of management and participation in order to create a healthy and safe work environment. In fact, it is possible to create a culture in the field of safety through

  1) creating physical and psychological safety grounds,
  2) legal support and supervision,
  3) promotion and persuasion of people in the organization.

In addition, the HSE category in Iran is a new discussion. For this reason, the structure of giving it an identity as well as the implementation of HSE laws, like the implementation of other laws, requires the provision of appropriate tools, resources and infrastructure. Providing facilities requires the use of financial, scientific and human resources. Therefore, it is necessary to manage the use of these resources and facilities in order to reduce costs (Razavi, 2013).

- **Promoting environmental values in society:**

  In Isfahan, environmental values are promoted through various measures. This includes education and information in schools and the community, holding workshops and educational meetings about biodiversity conservation, waste management, and effective use of energy. Also, Isfahan Environmental Organization promotes environmental values in this region by implementing environmental projects and supporting people's activities.

It is inevitable to use cultural tools to provide change in knowledge, values, behavior and in general way of life. The environment is defined as a system in which humans, nature and culture are its constituent elements. Therefore, changing the attitude and behavior of society regarding the value and importance of the environment is essential for the continuation of human life. In order to achieve the development of environmental culture, we have the following solutions in the forefront: public education at all age levels, specialized environmental education, encouraging agents active in the matter of environmental protection, appropriate policy making and foundation, expansion of environmental research, Supporting environmental non-governmental organizations, establishing strong laws and regulations to protect the environment, monitoring and punishing polluting industries and people, using mass communication tools such as television, radio and the press to inform the public, revive beliefs and customs. and environmental customs of the past and finally creating new customs related to preserving the environment in accordance with social and cultural conditions. The noteworthy point is that for a teaching to become cultural, it must be institutionalized in a continuous and stable process. The beginning of any change in the society is mainly the people in charge of that society. The officials of the society must first be justified and get the necessary training in the field of the environment, and then their performance can lead to the injection of the spirit of environmental protection in the whole society and create a sensational movement in this field (Hosseini et al., 2012).

- **Creating a culture of safety against air and water pollution.**

  The damage caused by the lack of water is more than the damage caused by other environmental hazards such as floods, earthquakes, storms, etc., and the effects of the water crisis in various sectors of agriculture, social, economic, health, international relations and also environmental. It appears gradually and leaves negative effects, that is why water shortage has become a challenge or crisis. If the necessary measures are not taken to deal with and reduce the adverse effects of water crisis, this crisis will turn into war and tension. between countries, which will have irreparable effects. What is necessary is to create a global action to ensure safe access to safe water for everyone. Also, considering everyone's enjoyment of water as one of the basic factors of human rights, developing National and regional and increasing international aid to developing and underdeveloped countries along with the global action plan to solve the water crisis is very effective. The importance and influence of water in the economic and social life of nations is not a new issue. The way of human life and technology have played a very important role. The limitation of water resources will be the first obstacle to the expansion and development of agricultural production in the next decade. The incorrect pattern of consumption in industrialized and advanced countries will aggravate the water crisis and reduce food in other parts of the world. The lack of food in countries with a high population growth rate is quite noticeable, on the other hand, the occurrence of droughts, social problems, inflation and economic recession make the situation of these countries more vulnerable. The situation of these countries is such that with millions of refugees, they are actually environmental refugees. They are faced with having to leave their lands. They potentially endanger the environmental balance in the host country (Shariatmadari and Ansari, 2014).

In Isfahan, creating a culture of safety against air and water pollution is done through community awareness and implementation of awareness campaigns by related organizations and departments. Educational programs in schools and universities, promoting sustainable behaviors and reducing the

consumption of water and energy resources, among other measures, have been carried out.

4. Challenges

Issues caused by violations of environmental protection laws and unsustainable financial resources and activities. In Isfahan, violating environmental protection laws and performing unsustainable activities, including misuse of natural resources and unpleasant wastes, lead to challenges. Failure to effectively implement environmental laws and violation of environmental protection standards can increase the factors of pollution and damage to the environment. The process of urban and industrial growth increases the pressure on the environment.

Rapid urban and industrial growth in Isfahan increases the need for natural resources, decreases air and water quality, and reduces urban green spaces. The increase in traffic, the decrease in air quality and the destruction of green spaces are known as the main challenges caused by urban and industrial growth in Isfahan.

5. Opportunities

Creating transparency in environmental management and understanding how financial resources are spent in the environment is crucial for better understanding the economic, social, and financial effects of environmental actions.

The lives of all creatures, including humans, depend on a healthy and pollution-free environment. The rapid increase in population and their contribution to pollution and environmental destruction is a significant issue today. The conversion of large farmland into cities, the destruction of forests and pastures due to unprincipled exploitation, and the construction of factories without regard for environmental protection principles have all contributed to the serious threat to the environment we face today.

Many countries have recognized the right to a healthy environment by incorporating it into their constitutions. Preserving the environment is essential for meeting the needs of society, respecting public rights, and preventing social inequalities and misuse of nature that violate human rights. Iran is also facing environmental challenges, but with efficient management and increased public participation in environmental issues, threats can be transformed into opportunities (Mirzadeh Kohshahi and Yousefi, 2022).

In Isfahan, there is an opportunity to increase transparency in environmental management, improve understanding of economic effects, and optimize the allocation of financial resources for environmental measures. By increasing public awareness of the environmental impact of actions taken and enhancing transparency in financial decision-making processes, environmental management can be improved, and natural resources can be better protected. Promoting clean technologies and renewable energies is also essential to reduce harmful effects on the environment.

Transitioning to clean energy systems, utilizing renewable resources effectively, and developing environmental technologies can enhance environmental sustainability and reduce greenhouse gas emissions in Isfahan. By responsibly utilizing these opportunities and coordinating these efforts, it is possible to help preserve and improve the environmental condition of Isfahan.

6. Discussion and Conclusion

Interference between human factors, safety culture, challenges, and opportunities in the Isfahan environment is a serious challenge. Human factors have the ability to contribute to or violate environmental protection, along with the culture of safety and transparency in financial spending in the environmental field. These factors may either help promote the values of environmental protection or be powerless in the face of challenges, creating a complex scenario.

To improve the environmental condition of Isfahan, it is necessary for individuals, local communities, and officials to cooperate in creating a responsible environmental culture. Intelligent management of financial challenges and costs, such as unsustainable urban growth, and taking advantage of

financing opportunities to develop financial efficiency and environmental accounting indicators can help achieve the goals of environmental protection and sustainable development. Developing an environmental safety culture is also essential for active participation in environmental protection and continuous improvement of financial management processes, moving towards a healthy and sustainable life with balanced costs.

Environmental research in Isfahan plays a vital role in maintaining stability and intelligent financial and administrative development in the city. Challenges from unsustainable activities and urban and industrial growth highlight the need for serious measures to protect the environment. On the other hand, opportunities to create transparency in financial and environmental management, use clean technologies, and adopt renewable energies offer significant potential for improving the environment and reducing harmful effects.

Therefore, attention to environmental research and optimal management of environmental costs in Isfahan is crucial not only for preserving biodiversity and natural resources but also for creating a sustainable and healthy city. Decisions based on accurate and scientific information in the environmental field can improve the quality of life for citizens and preserve the region's natural resources.

7. Holding educational programs:

These proposals, through the coordination and cooperation of individuals, local communities, and officials, can help improve the environmental condition of Isfahan and guide towards achieving sustainable development.

a. Holding educational programs:

Raising public awareness in the field of environmental protection and promoting environmental culture through workshops and educational programs.

b. Encouraging social participation:

Creating incentive methods for population participation in environmental protection activities and projects.

c. Development of clean technologies:

Investing in research and development of clean technologies and renewable energy to reduce harmful effects on the environment.

d. Determining and implementing environmental laws:

Developing and implementing sustainable environmental laws in cooperation with local stakeholders to control harmful activities.

e. Promoting social responsibility:

Encouraging social responsibility in business and industry to promote environmentally friendly behaviors.

f. Transparency in financial management and development of financial indicators:

Providing clear information about financial management in the environment and the economic and social effects of financial measures affecting the improvement of the environment.

g. Promoting sustainable transport:

Encouraging the use of public transportation, cycling, and clean and sustainable cars.

h. Interaction with young people:

Encouraging active participation of young people in programs and decisions related to the environment to promote motivation and innovative ideas.

References

Amiri, H.R, Azin, R, Fatehi, R, Asfouri, Sh,(2013). Examining the Challenges, Opportunities and Position of Iran in the Absorption and Storage of Carbon in Underground Formations in order to Preserve the Environment. The First National Conference and Specialized Environmental Exhibition. Clean Energy and Industry, Tehran.

Ciavarelli, A. (2016). Integration of Human Factors into Safety and Environmental Management Systems. In Offshore Technology Conference (p. D041S048R001). OTC.

Corrigan, S., Kay, A., Ryan, M., Brazil, B., & Ward, M. E. (2020). Human Factors & Safety Culture: Challenges & Opportunities for the

Port Environment. Safety Science, 125, 103854.

Fatemeh Azizi, Y, Badeyan, Z. (2014). Investigation of the Role of Culture and Education in Environmental Protection. The Second National Conference on Protection of Natural Resources and Environment, Ardabil.

Hosseini Thabit, M, Shabiri, S.M and Emami, J,(2012). Challenges of Education and Development of Environmental Culture. The First National Conference on Environmental Education, Culture and Ethics, Tehran.

Karmi, E, Karimi, H, Banparuri, Gh, Karamshahi, A,(2013). Environmental Challenges Facing Inter-basin Transfer in Iran and the World. The Second National Conference on Environmental Protection and Planning, Hamedan.

Mashari, M, (2016). Environmental Management; Challenges and Solutions. The First Engineering Conference on Planning and Management of Environmental Systems, Tehran.

Mirzadeh Kohshahi, N, Yousefi Hashjin, M. Y,(2022) opportunities and threats of the environment in Iran, the first national conference on environmental challenges: green industry and mining, Tehran.

Pourqasem, M, Khalaj, A. (2017). Development of Environmental Culture and Its Role in Sustainable Development. The First International Conference on the Position of Safety, Health and Environment in Organizations, Isfahan.

Razavi, S. M, Razavi, S. M,(2012). Evaluation of Safety, Health and Environment Culture in a Manufacturing Company. The First National Conference and Specialized Exhibition on Environment, Energy and Clean Industry, Tehran.

Shariatmadari, A, Ansari Moghadam, D. (2014). The Challenge of Water Crisis and Environment in Iran and in the world. National Conference on Water Scarcity Crisis and Solutions, Hamedan.

Shokri, M,(2020) Environmental Governance System in Iran and Its Challenges. The First International Conference on Governance and Statecraft in Iran, Tehran.

Zarei, A.M, Hosseini, S.Z, Behrman, H, (2014). Lack of Education in Improving Society's Environmental Culture. The Second International Conference on Environmental Engineering, Tehran.

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Impact of Environmental Regulations and Financial Restrictions on the Technological Innovation of Company

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Abstract

Objectives: Compliance with environmental regulations and financial resources is crucial for the survival of companies. Additionally, in a competitive market, paying attention to technological innovation is vital for companies. Therefore, the aim of this research is to investigate the impact of environmental regulations and financial constraints on technological innovation in companies.

Design/methodology/approach: This research is practical in nature and falls under post-event studies. A statistical sample of 124 firms listed on the Tehran Stock Exchange from 2018 to 2022 was selected using the screening method. Data analysis was conducted using a multivariate regression model with Eviews software.

Results: The results obtained indicated that environmental regulations and financial constraints have both an inverse and direct relationship with technological innovation in firms. In simpler terms, the more firms adhere to environmental regulations and financial constraints, the less technological innovation occurs within those companies.

Innovation: In the current era, focusing on technological innovation within companies is a crucial and impactful factor. Therefore, the innovative aspect of this research lies in the fact that there has been no prior research conducted on the correlation between environmental regulations, financial constraints, and technological innovation.

Keywords: Environmental regulations, Financial restrictions, Technological innovation.

1. Introduction

What differentiates companies and organizations today from those of a few decades ago is the unstable and complex environment, increased competition, rapid changes and developments, technological advances, the ever-growing development of communications, and rapid information exchanges. Undoubtedly, the changing environment of today does not allow organizations to be managed traditionally and permanently, despite the pressures from competitors' skills, abilities, and technologies. A key characteristic of successful organizations today is the power of innovation and the ability to leverage technological advancements. Technological innovation is crucial for organizational development, and neglecting it can lead to the failure of the organization (Tahmasabi Limoni, 2022).

The market's increasing competitiveness for products and services, the need to gain a competitive advantage, and the growing bargaining power of customers and suppliers are examples of external pressures that companies face. To survive in this environment, companies must exhibit adaptive behavior and respond to these pressures. Innovation, particularly in technological advancements, is undoubtedly the best and most effective response to these challenges in all organizational and operational aspects. Technological innovation can manifest in both processes and products. However, due to the rapid pace of environmental changes, accelerating and intensifying the organization's response through the identification and utilization of effective catalysts is essential. Catalysts and innovation drivers within companies are internal or external factors that directly or indirectly enhance technological innovations (Zarei and Ebrahimi, 2018).

Finances, as the cornerstone of modern economic development, play a crucial role in fostering innovation and company growth. Financial development, particularly strong financial support for research and development in science and technology, enhances production efficiency and directly impacts production. Access to information in advanced financial markets or comprehensive financial systems is faster and more cost-effective, reducing external financing costs for companies and alleviating financial constraints. Conversely, in countries with slow or imperfect financial markets, firms may face financial constraints due to information asymmetry (Ge et al., 2020). A financial system dominated by banks may limit financing channels for companies, hindering successful entrepreneurship and economic growth in developing countries (Bormans and Willebrands, 2018).

Innovation not only influences national and global economies but also environmental protection. Monitoring environmental pollution from industrial activities, implementing government policies, and setting environmental regulations to promote and guide technology are essential. This research aims to explore the relationship between environmental regulations, financial constraints of companies, and technological innovation among those listed on the Tehran Stock Exchange. The study seeks to understand how environmental regulations and financial restrictions impact technology adoption and innovation within companies.

2. Theoretical foundations and research background

Technological innovation was first described by Schumpeter (1912) in five dimensions: new products, new methods of production, new technology, the opening of new markets, access to new raw materials, and new methods of organization (Nakamori, 2020).
Innovation is a process that begins with an idea. As the invention progresses, it undergoes significant changes, resulting in new products, processes, and services being introduced to the market. Companies strive to gain a competitive edge by providing added value to customers. To achieve this, they choose strategies such as price leadership, differentiation, orientation, and focus on differentiation (effective structures for innovation). Competitive strategies are obtained in various ways. Innovation is a rare resource that allows

companies to differentiate themselves from competitors (Namazi & Moghimi, 2018).

Tidd and Bessant (2014) classified innovations into four categories: product innovation, process innovation, positional innovation, and paradigm innovation. Technological innovation involves the creation of new technology and the development and introduction of products, processes, or services based on it (Hamidi & Benabdeljlil, 2015).

Enterprise innovation is a complex process that involves economic input and output, requiring significant investment in high-volume R&D. Sources of funding for research and development investment include domestic capital accumulation, government subsidies, and foreign funding. Financial limitations are mainly caused by information asymmetry. Research and development innovation activities are more sensitive to financial constraints compared to other investment activities due to the complexity and specificity of the innovation process, high risk, R&D activity accumulation, and uncertainty of innovation benefits (Jiang, 2015).

Innovation, as a major factor, plays a crucial role in creating value and enhancing business performance. Technological innovations are essential for business growth, improving the growth trajectory of many organizations and markets. Successful management involves skillfully allocating resources to drive technological changes that bring growth and wealth to an innovative organization. Developing appropriate policies to support innovation in economic institutions requires examining factors influencing companies' innovative efforts and their impact. Achieving and increasing technological innovations is crucial for all companies, regardless of size or industry. Technological innovation involves introducing methods or materials for operational and commercial purposes through a complex, long-term process involving searching, selecting, implementing, and creating value. It is a key factor in a company's competitive strength, essential for developing and maintaining a competitive advantage or entering new markets. Technological innovation can transform the economic and political system within society, influencing external pressures. While much research has focused on identifying factors influencing innovation, external environmental pressures play a significant role in driving innovation (Zarei & Ebrahimi, 2018).

Environmental regulations

According to the standard view, strict environmental regulations affect productivity and competitiveness by imposing restrictions on the behavior of industries. Companies face direct costs such as technology, research, and development investments, necessary for reforming and restructuring production activities. Additionally, companies face indirect costs (opportunity costs) by accepting environmental regulations, as they cannot invest these incomes in other profitable opportunities. However, Porter (1991) challenged this view. He states that if a country applies stricter environmental regulations than its competitors, the promotion of innovations will cause that country to become a net exporter of new advanced environmental technologies (Azmi et al., 2017). Porter's hypothesis shows that well-designed environmental regulations can induce and facilitate technological innovation within companies, thereby strengthening business competitiveness (Costa-Campi et al., 2017).

Since entering the industrial society, many developed countries have experienced rapid economic growth; however, this "economic miracle" has been realized at a high cost to the environment. Developed countries competing for industrialization have observed similar problems, such as environmental pollution and ecological imbalance. Failure to pay attention to environmental considerations in development planning and implementation without studying the plans has had adverse environmental effects in many countries. Because of this neglect, the quality of the natural and human environment has greatly decreased, leading to the destruction of natural resources and public dissatisfaction. This issue is taking on wider dimensions in Iran, mainly because of the disregard for environmental laws. The

improvement of the environmental environment is mainly achieved through technical progress, process transformation, deep processing and comprehensive use, dust reduction, energy savings, emission reduction, and social monitoring. However, the theory of environmental modernization shows that environmental problems can be solved through technical progress carried out by government policies (Zho., 2015). While in the past, companies were seen as the main source of pollution, they are now increasingly seen as a possible solution, especially because of the potential of companies to act with innovative products. Resource-based perspectives show that positive participation in innovation activities can help companies improve their productivity and competitiveness; thus, companies also gain long-term competitive dominance.

2. Financial constraints

To categorize companies based on funding limitations, it is essential to first define financial constraints. The most comprehensive and clear definition in this context is that companies face financial constraints when there is a disparity between their internal costs and the external costs of obtaining funds. According to the Miller-Modigliani theory, there is no distinction in the cost of financing from internal or external sources for a company in a perfect capital market. In such circumstances, companies can acquire the necessary financial resources through the capital market seamlessly, with a certain capital cost rate (Rezaei, 2023).

One notable factor influencing a company's competitiveness is the financial constraints of economic enterprises. Financial limitations are a significant challenge that all companies encounter. Establishing and expanding economic enterprises necessitates substantial financial resources, which often exceed the founders' capabilities. In essence, companies have finite resources to draw upon, and they face constraints in obtaining financial support. These constraints impede access to the funds required to capitalize on investment opportunities, and companies that struggle to access external financing are deemed to have financial limitations. Therefore, under this definition, all companies can be viewed as having financial constraints, but the severity of these limitations varies (Farji et al., 2019).

3. Background of the research

He et al. (2021) studied whether environmental regulations and financial constraints stimulate technological innovation in Chinese companies. The results showed that environmental regulations have a significant effect on technological innovation. Additionally, financial constraints mediate the relationship between environmental regulations and technological innovation. The moderating effect of financial constraints differs between environmental regulations and technological innovation.

Ge et al. (2020) investigated the relationship between environmental regulations, financial constraints, and green exports. The results showed that environmental regulations and financial restrictions have both positive and negative effects on green exports. However, the positive effect of environmental regulations does not fully offset the negative effect of financial restrictions, resulting in a net negative deviation from the effective level.

Debnath (2015) examined the relationship between environmental regulations and innovation in Nissan and Toyota companies. The results revealed that environmental regulations, typically introduced and enforced by the government, are perceived as threats by companies. Companies strive to understand and comply with new environmental standards, which often leads to increased costs. To offset these costs, companies choose to improve production processes or innovate by creating new products. This presents opportunities for companies to develop cost-effective production processes and environmental products.

Ford et al. (2014) explored the impact of environmental regulations on innovation in Australian oil and gas companies. The study found that new products/services and innovations necessitate compliance with new environmental regulations,

enhancing competitive skills and driving investment in research and development activities.

Salimifar et al. (2019) investigated the effect of quality management on green innovation with the moderating role of environmental regulations at Zagores Petrochemical. The research indicated that quality management initially hinders green technology innovation, but environmental regulations help mitigate this negative impact.

Rahimi et al. (2019) studied the effect of environmental commitment on green innovation and sustainable performance, with the moderating role of environmental education among employees at Mahshahr petrochemical companies. The results showed that environmental commitment positively influences green innovation, indirectly affecting sustainable performance. Green innovation, in turn, positively impacts sustainable performance, while environmental education did not play a moderating role in the study.

Bayat and Ebrahimi (2018) examined the financial situation and financing methods of companies and their impact on social and environmental reporting. The study revealed that companies with better financial status do not necessarily have higher levels of voluntary disclosure (social and environmental reporting index). Financing through debt, however, positively influences the level of voluntary disclosure, with the financial status of the company influencing the relationship between financing methods and disclosure levels.

Nazaripour and Mirzaei (2018) investigated the impact of strategic cost management, particularly environmental costs, on financial performance. The research showed that tracking environmental costs and implementing environmental initiatives significantly affect financial performance. Environmental executive cost management and environmental initiatives cost management are closely linked and jointly impact financial performance.

Azami et al. (2017) studied the impact of environmental regulations on the competitiveness of manufacturing industries in the United States, England, and Canada. The results demonstrated that increased industry spending to reduce pollutants leads to more innovations, ultimately enhancing industry competitiveness. This supports Porter's hypothesis that environmental regulations positively affect industry competitiveness.

Dianti Deilmi and Khodakarmi (2017) analyzed the impact of environmental news on the stock prices of companies listed on the Tehran Stock Exchange. The research revealed that positive environmental news boosts stock prices and elicits a positive response from investors. Conversely, negative environmental news does not affect stock prices and results in a lack of investor reaction.

4. Research hypotheses

1) Environmental regulations affect technological innovation.
2) Financial restrictions affect technological innovation.

5. Research methodology

This research is applied in terms of purpose and descriptive correlational research in terms of nature. The field of post-event studies relies on actual information from the financial statements of companies listed on the Tehran Stock Exchange and other real data that can be generalized to the entire statistical population using an inductive method. Hypothesis testing was conducted using the Eviews software. The statistical population in this research includes all companies listed on the stock exchange that were active from 2018 to 2022. Additionally, the sample for investigation was selected using the screening method (systematic elimination) of 124 companies as a statistical sample.

5.1.Research variables

5.1.1. Dependent variable:

Technological Innovation of the Company (CTI): He et al. (2021) utilized the following equation to quantify the company's technological innovation. The data for

this variable was obtained from the explanatory notes of the company.

Relationship (1) $$CTI = \frac{R\&D}{OP}$$

CTI: Corporate Technological Innovation
R&D: Cost of Research and Development
OP: Operating profit

5.1.2. Independent variables:

Environmental regulations

Based on the model presented by He et al. (2021), is shown to measure environmental regulations with the GDP/Energy ratio, which can measure the real effect of a set of environmental laws and regulations approved by the government. For this purpose, the ratio of gross domestic product to total final energy consumption was used as follows:

Relationship (2) $$ER = \frac{GDP}{TEC}$$

ER: Environmental Regulation
GDP: gross domestic product
TEC: final energy consumption

Financial constraints

In this study, we followed the research conducted by He et al. (2021) and used the size and age index of companies to measure financial constraints. According to Hay et al., the higher the value of financial constraints, the lower the degree of financial constraints that the company faces. Therefore, the Financial Constraint (FC) index was calculated based on the size of the company using the natural logarithm of the total assets. As for the age of the company, the natural logarithm of the number of years since its establishment was used in the following relationship:

Relationship (3)

SA = 0.043 × $Size^2$ – 0.737 × Size – 0.04 × Age

*SA value is negative.

FC=SA: financial constraint
Size: The size of the company
Age: Age of the company

Control variables:

Sales growth rate (S_GROWT): Sales in the current year minus sales in the previous year divided by sales in the previous year.

Return on assets (ROA): ratio of profit before extraordinary items divided by total assets.

Leverage ratio (the LEV): ratio of total debt to total assets.

5.2. Regression model of the research

The following multivariate regression model was used to test the research hypotheses:

Model (1)

$$\mathrm{CTI}_{i.t} = \beta_0 + \beta_1 \mathrm{ER}_{i.t} + \beta_2 \mathrm{S}_{\mathrm{Growth}_{i.t}} + \beta_3 \mathrm{ROA}_{i.t} + \beta_4 \mathrm{LEV}_{i.t} + \varepsilon_{i.t}$$

Model (1)

$$\mathrm{CTI}_{i.t} = \beta_0 + \beta_1 \mathrm{FC}_{i.t} + \beta_2 \mathrm{S\_Growth}_{i.t} + \beta_3 \mathrm{ROA}_{i.t} + \beta_4 \mathrm{LEV}_{i.t} + \varepsilon_{i.t}$$

6. Research findings

6.1. Descriptive statistics

Table No. (1) shows the descriptive statistics of research variables, including mean, median, maximum, minimum, and standard deviation.

Table 1. Descriptive statistics of the research variables

Variable	symbol	Average	Middle	Max	min	standard deviation	Number of views
Technological innovation	CTI	0.021291	0.0000	3.754639	0.00000	0.240212	620
Environmental regulations	ER	2.614058	2.718827	2.825653	2.267079	0.197670	620
Financial constraints	FC	3.139706-	3.319986-	1.481716	4.789316-	1.039929	620
Sales growth	GROWTH	0.265495	0.174729	6.594740	0.825557-	0.549212	620
leverage ratio	The LEV	0.537292	0.548307	0.986760	0.013863	0.191481	620
Return on assets	ROA	0.121279	0.098299	0.603493	0.297729-	0.134938	620

6.2.Inferential statistics

6.2.1 F test (Limer)

Table number (2) shows the results of the F-Limer of the model.

As can be seen in table number (2), at the 95% confidence level, the null hypothesis of the test has been rejected in the research models, so the panel data method should be used.

Table 2: Results of F (Limer)

Model	Null hypothesis (H0)	Statistic	d. f.	prob	Test result
1	Company-specific effects are not significant (Pooling method is suitable)	39.690720	(588،۱۲۳)	0.0000	H0 is rejected (the panel data method is selected)
2	Company-specific effects are not significant (Pooling method is suitable)	39.537392	(588،۱۲۳)	0.000	H0 is rejected (the panel data method is selected)

6.2.2 Hausman test

Table No. (3) shows the results of the Hausman test for choosing between fixed effects and random effect models.

Table 3. Hausman test results

Model	Null hypothesis (H0)	Chi-Sq. Statistic	Chi-Sq. d. f.	prob	Test result
1	The random effect method is suitable	2.649749	4	0.6180	H0 is accepted (the random effect method is suitable)
2	The random effect method is suitable	3.574553	4	0.4666	H0 is accepted (the random effect method is suitable)

6.2.3 Breusch-Pagan Variance Heterogeneity Test

Because the P-value listed in Table No. (4) of the models is less than the significance level of 5% and has heterogeneity of variance. To solve this problem, the generalized least squares (GLS) method was used to estimate the model.

Table 4) The results of the heterogeneity of variance test of the research model

Model	statistics	prob	result
1	817.24	0.000	Variance heterogeneity
2	871.99	0.000	Variance heterogeneity

6.3 Hypotheses test

Hypothesis 1: Environmental regulations affect technological innovation.

Table number 5 displays the results of the estimation of the first research model. The F-test was utilized to determine the significance of the entire model. Based on the probability of the calculated F statistic (0.0000), the fitted regression model is deemed significant. The coefficient of determination of the fitted model indicates that approximately 82% of the changes in the dependent variable of the model (technological innovation) are explained by the independent and control variables. Additionally, the Durbin-Watson test value of 1.824175 suggests the absence of autocorrelation among research variables and the appropriateness of the independence of model errors.

Upon examining the t statistic value, the variable of environmental regulation (-4.616285) demonstrates a negative and significant impact on the level of technological innovation of the company at a 5% error level. This is because its significance level is below the error rate of 0.05. Consequently, based on the results

obtained, it can be concluded that environmental regulations have a negative and significant effect on technological innovation.

Hypothesis 2: Financial limitations affect technological innovation.

Table 6 shows the results of the estimation of the first research model. The F-test was used to check the significance of the entire model. According to the Given the probability of the calculated F-statistic (0.0000), the fitted regression model is deemed significant. The coefficient of determination of the fitted model indicates that approximately 82% of the changes in the dependent variable (technological innovation) are explained by the independent and control variables. Additionally, the Durbin-Watson test value of 1.819508 suggests the absence of autocorrelation between the variables and the appropriateness of the independence of errors in the research model.

Upon examining the t-statistic value, the financial constraint variable (2.307983) shows a positive and significant effect on the level of technological innovation of the company at a 5% error level. Its significance level is lower than the error rate of 0.05, indicating that financial limitations have a direct and significant effect on technological innovation.

Table 5: Summary of the statistical results of the model test (1)

Model (1)	$\mathbf{CTI_{i.t} = \beta_0 + \beta_1 ER_{i.t} + \beta_2 S_{Growth_{i.t}} + \beta_3 ROA_{i.t} + \beta_4 LEV_{i.t} + \varepsilon_{i.t}}$			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob**
C	0.159387	0.032804	4.858798	0.0000
ER	0.056573-	0.012255	4.616285-	0.0000
GROWTH	0.004749	0.002259	2.102596	0.0359
ROA	0.036691-	.0.011490	3.193299-	0.0015
The LEV	0.000675	0.007829	0.086158-	0.09314
CTI(-1)	1.001076	0.005153	194.2838	0.0000
(F-statistic) Prob	545.1527 0.0000	Durbin-Watson stat		1.824175
R-squared	0.823055	Adjusted R-squared		0.821545

Table 6: Summary of the statistical results of the model test (2)

Model (1)	$\mathbf{CTI_{i.t} = \beta_0 + \beta_1 ER_{i.t} + \beta_2 S_{Growth_{i.t}} + \beta_3 ROA_{i.t} + \beta_4 LEV_{i.t} + \varepsilon_{i.t}}$			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob**
C	0.020193	0.006919	2.918279	0.0037
FC	0.002772	0.001201	2.307983	0.0213
GROWTH	0.002868	0.002214	1.295402	0.1957
ROA	0.055174-	0.011550	4.776852-	0.0000
The LEV	0.004120-	0.007833	0.525935-	0.5991
CTI(-1)	0.999462	0.005148	194.1581	0.0000
(F-statistic) Prob	545.1527 0.0000	Durbin-Watson stat		1.819508
R-squared	0.823055	Adjusted R-squared		0.821201

7. Discussion and conclusion

As mentioned, this research investigates the impact of environmental regulations and financial restrictions on technological innovation in companies. The results of the first hypothesis test indicate that environmental regulations have a significant inverse effect on technological innovation. In other words, as a company's environmental regulations increase, its technological innovation decreases. Environmental policies and regulations are critical factors that influence organizational innovation. Therefore, compliance with environmental regulations can be costly for companies. If company managers anticipate a decrease in profits due to environmental regulations, they may opt for preventative measures to manage the company's environmental performance rather than taking a more dynamic and innovative approach based on the company's resources and capabilities.

Successful innovation largely depends on how effectively firms identify, seek, achieve, manage, and implement promising resources. Companies in different regions and industries face varying levels of environmental scrutiny. In some cases, firms with weak innovation capabilities rely more on technology introduction, imitation, or minute-by-minute management to avoid costs.

The results of the second hypothesis test reveal a significant direct impact of financial restrictions on technological innovation. In essence, the presence of financial restrictions hinders technological innovation in companies, reducing the costs associated with it. By prioritizing innovation, companies can leverage market opportunities to grow, succeed, and achieve better financial and economic performance.However, companies encounter significant challenges such as knowledge gaps and financial limitations while implementing innovation, which can impact their financial and economic performance.

References

Azami, Somaye, Almasi, Mojtaba, Golmohammadi, Afsaneh. (2017), Impact of Environmental Regulations on the Competitiveness of Industries: Evidence from the Manufacturing Industries of the United States, England, and Canada. Economic Modeling Quarterly, Volume 11, Number 39, 119–139.

Bayat, Ali, Ebrahimi, Zahra. (2018). Financial Status and Financing Methods of the Company and Their Effect on Social and Environmental Reporting. The Fifth National Conference of Applied Research in Management and Accounting, Tehran.

Boermans, M.A., & Willebrands, D. (2018). Financial Constraints Matter: Empirical Evidence on Borrowing Behavior, Microfinance, and Firm Productivity. J. Dev. Enterpr., 23(2), 1–24.

Costa-Campi, M.T., García-Quevedo, J., & Martínez-Ros, E. (2017). What Are the Determinants of Investment in Environmental R & D? Energy Policy, 104, 455–465.

Debnath, S.C. (2015). Environmental Regulations Become a Restriction or a Cause for Innovation: A Case Study of the Toyota Prius and Nissan Leaf. Procedia Soc. Behav.Sci., 195, 324–333.

Dayanti Dilmi, Zahra and Khodakarmi, Elham. (2017). The Impact of Publishing Environmental News on the Stock Prices of Firms Listed on the Tehran Stock Exchange. Investment Knowledge Quarterly, Year 6, Number 23, 212-189.

Faraji, Omid, Fathi, Mohammad Reza and Bardi, Fatemeh. (2019). Financial Constraints and Competition in the Product Market: the Mediating Role of Product Pricing in Business Cycles. Journal of Financial Accounting Research.

Ford, J.A., Steen, J., & Verreynne, M.L. (2014). How Environmental Regulations Affect Innovation in the Australian Oil and Gas Industry: Going beyond the Porter Hypothesis. J. Clean. Prod., 84, 204–213.

Ge, T., Li, J., Sha R., & Hao, X. (2020). Environmental Regulations, Financial Constraints, and Export Green-Sophistication:

Evidence from China's Enterprises. J. Clean.Prod., 251, 1–13.

He, Y., Ding, X., & Yang, C. (2021). Do Environmental Regulations and Financial constraints stimulate Corporate Technological Innovation? Evidence from China. Journal of Asian Economics, 72, 101265.

Hamidi, S., & Benabdeljlil, N. (2015), Managerial and Technological Innovations: Any Relationship?, Procedia- Social and Behavioral Sciences, 181, 286-292.

Jiang, W. (2015). Does Environmental egulation affect the technological innovation of manufacturing firms in China? An empirical study based on microdata. J. Financ. Econ., 41(2), 76–87. (In Chinese).

Nazaripour, Mohammad; and Mirzaei, Fahmia. (2018). Investigating the impact of strategic cost management on financial performance, with an emphasis on environmental costs. Industrial Management Studies, Year 16, Number 51, 234–207.

Namazi, Mohammad, Moghimi, Fatemeh. (2018). Investigating the impact of structures related to innovation growth and the mediating role of innovation challenges on the financial and economic performance of Tehran Stock Exchange companies. Journal. of financial accounting research. Year 11, spring 2018, number (39).

Nakamori Y. (2020). Innovation Theory. In: Knowledge Construction Methodology. Translational Systems Sciences, vol 20. Springer, Singapore.

Rezaei, Halimah. (2023). Investigating the Effect of Financial Constraints and Liquidity on Investment Opportunities. New Research Approaches in Management and Accounting quarterly, 7th year, number 88, spring 1402, pp. 888-877.

Rahimi, Faraj Elah, Mehrabi, Ali and Eskandari, Yasser. (2019). The Effect of Environmental Commitment on Green Innovation and Sustainable Performance with the Moderating Role of Environmental Education of Employees in Mahshahr Petrochemical Companies. Man and Environment, Volume 17, No. 4, 25-38.

Salimifar, Anita, Khanleri, Amir and Masoumi Khalji, Hamid Reza. (2019). The Impact of Quality Management on Green Innovation with the Moderating Role of Environmental Regulations (Zagores Petrochemical). The second National Conference of Modern Economics, Management, and Accounting Studies in Iran, Tehran.

Tahmasabi Limoni, Safiya. (2022). Factor analysis of technological Innovation Capabilities based on Individual Knowledge Management, case study: Public Libraries of the Country. Quarterly Journal of Resource Management and Information Services, 9th year, 2nd Issue.

Tidd, J., Bessant, J. (2014). Managing Innovation Integrating Technological, Market, and Organizational Change. John Wiley and Sons Ltd.

Zhou, Y. (2015). State Power and Environmental Initiatives in China: Analyzing China's Green Building Program Through an Ecological Modernization Perspective. Geoforum, 61.

Zarei, Ali Asghar, Ebrahimi, Seyyed Abbas. (2018). Technological Innovation: Efficient and Effective Internal and External Organizational Factors. Technological Development Quarterly, Year 14, Volume 55.

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The Effect of Political Connections and Affiliation with Business Groups on Changes in the Cost of Goods Sold and the Risk of Financial Turmoil

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Abstract

Objectives: Business groups are common in economies worldwide and play a significant role in both emerging and developed economies. While business groups have a legal personality in most countries, they also have an economic personality from an economic and accounting perspective. A business group typically consists of a collection of companies operating in one or multiple markets or industries under the supervision of a parent company or joint control. Essentially, a business group refers to a group of legal entities with individual legal personalities but a unified reporting structure, operating in diverse markets, and managed under the financial oversight of the parent unit.

Design/methodology/approach: The statistical method used in this research is multivariate regression using the panel data method. This study explores the impact of political connections and reliance on business groups on changes in the cost of goods sold and the risk of financial turmoil. A sample of 111 firms listed on the Tehran Stock Exchange was chosen using the systematic elimination method. The research analyzes the influence of political connections and affiliation with business groups on changes in the cost of goods sold and the risk of financial turmoil from 2017 to 2022, with a total of 666 observations.

Results: The research findings suggest that political connections and reliance on business groups have a negative impact on changes in the cost of goods sold and increase the risk of financial turmoil for companies.

Innovation: This research is the first to examine the impact of political connections and affiliation with business groups on changes in the cost of goods sold and the risk of financial turmoil. By presenting new evidence, this study can contribute to the literature on this subject.

Keywords: Political Relations, Dependence on Business Groups, Changes in the Cost of Goods Sold, Risk of Financial Turmoil.

1. Introduction

Trade groups have a unique organizational structure that consists of several legally independent companies that are formally and informally linked together. However, there has been little research done on financial reporting methods in such companies. Business groups play a significant role in many emerging and developed economies. A business group is a collection of companies operating in various markets under common financial or administrative control, with members connected through personal, ethnic, or commercial backgrounds. (Chang et al., 2020). Therefore, reliance on business groups can influence changes in the cost of goods sold and the financial turmoil risk for companies.

Due to the availability of international evidence regarding the impact of political connections on cash balances, Chang et al. (2020) decided to investigate this relationship. The index of political relations has three dimensions: economic, social, and personal. The economic dimension refers to the percentage of government ownership of companies' shares, where more than fifty percent of the shares belong to the government. The social dimension involves government-affiliated institutions investing in the company's ownership structure, indicating government support. This dimension includes shares held by state and public companies in the total capital stock, which encompasses insurance companies, financial institutions, banks, state companies, and other government components. The personal dimension of political relations includes companies whose ownership structure includes one of the major shareholders (a shareholder that owns more than 10 percent of the company's shares) being a former or current government figure. However, recent research literature suggests that the political connections of a company are often evident through the presence of major investors affiliated with the government in the company's ownership structure. Facio (2006) and Lin et al. (2022) define this as having "at least one major shareholder (someone who owns at least 10 percent of the shares and controls the vote) or one of its senior executives (CEO and board members) who is a member of parliament, a minister, head of government, or closely related to a prominent politician. It is important to note that the presence of shareholders with political connections in companies can significantly affect all aspects of the company's activities and performance. This influence can be observed in the form of incoming or outgoing cash flows, which can affect profitability, changes in the cost of goods sold, and the risk of financial turmoil (Lin et al., 2022). Therefore, the focus of this research is to examine the effect of political connections and dependence on business groups on changes in the cost of goods sold and the risk of financial turmoil in firms of business groups listed on the Tehran Stock Exchange, as well as the factors influencing it.

This research examines the impact of political connections and affiliation with business groups on changes in the cost of goods sold and the risk of financial turmoil. The study begins with an outline of the theoretical foundations and background related to the subject, followed by an explanation of the research method and hypotheses derived from the problem and theoretical foundations. The results of the hypothesis test are then presented, and finally, conclusions and suggestions are provided.

2. Theoretical foundations and research background

This study examines the impact of political connections and affiliation with business groups on changes in the cost of goods sold and the risk of financial turmoil. Trade groups have become one of the most important types of organizations worldwide, especially in emerging economies, where they play a crucial role in economic development. They are defined as a set of companies with independent legal rights where the ultimate majority shareholders control the management of the group. As a legal entity, each member company of a business group prepares its financial statements, which are certified by an auditor. Therefore, this research examines the factors influencing the member companies of the group, the

conditions for changes in the cost of goods sold, and the risk of financial turmoil in business groups. Similar to studies related to multidimensional organizations, it is essential not only to examine the behaviors or profitability of member firms but also to examine the group effects of the management of different member firms under the umbrella of a business group (Chang et al., 2020).

Despite the importance of changes in the cost of goods sold and the risk of financial turmoil, little research has been done in the field of changes in the cost of goods sold and the risk of financial turmoil in business groups. Past research that has been conducted on business groups has focused on various aspects. Some studies have investigated the effects that business groups have on profitability, such as Chang (2003), Joh (2003), Khanna and Palpo (2000), and others have investigated the effects of business groups on dividend policy, such as Manos et al. (2012), the relationship between business groups and earnings management, Kim and Yee (2006), and the effect of business groups on the profit information system, as reviewed by Jung and Kwon (2002). Lin et al. (2022) researched the impact of political connections and business groups on changes in the cost of goods sold and the risk of financial turmoil in Chinese companies, adding new empirical evidence to the research on business groups. In this research, following Lin et al. (2022), we tried to investigate the effect of political connections and affiliation to business groups on changes in the cost of goods sold and the risk of Iranian financial turmoil. To complete the research process in the field of groups, we have commercial and political connections.

Today, business groups play a prominent role in financial markets. The member companies of business groups not only utilize the resources and capabilities of their own companies, but also have the unique ability to leverage the technology, capital, human resources, products, and services of other member companies within the group. With a common ownership structure in place within these groups, the management of shares of companies under control is a key issue that is often raised.

The increasing growth and expansion of society's needs, along with the growth of social activities, led to the creation of large companies. Numerous small and large capital owners provided the capital of these companies. The growth and development of joint stock companies increased the number of capital owners. The management of the company's operations was entrusted to limited people as experienced managers, and the separation of ownership from management (agency theory) was proposed. Shareholders needed information to ensure the optimal and effective use of their funds, measure the performance of managers, etc. This caused the companies to submit financial statement reports (Haji Beigi, 2015). The possibility of bad intentions in the preparation and adjustment of these financial statements by the board of directors of the companies caused the asymmetry of information to cause a phenomenon called changes in the cost of goods sold and the risk of financial chaos.

This research examines the effect of political connections and dependence on business groups on changes in the cost of goods sold and the risk of financial turmoil. Business groups around the world are an important pillar of organizations, especially in emerging economies, and play an important role in economic development. They are defined as a set of legally independent companies in which the majority of ultimate shareholders control the management of the group. As with multiple organization studies, it is important to examine not only the behavior or profitability of member firms but also the effects of the management group of different firms within a business group. (Lin et al., 2022).

It was also documented in the existing literature that political connection provides valuable resources to the firm through easy access to external resources and relationship-based contracts and affects investment decisions (Clasens et al., 2008; Hosten et al., 2014; Piotrowski and Zhang, 2014). On the other hand, political connections can help reduce the problems caused by financial constraints and provide the

necessary capital for the company's investment activities. Despite this, access to a lot of foreign capital through political connections encourages the company to invest below the optimal level. On the other hand, political connections may be associated with severe government intervention and deviation from the ultimate goals of the company. Therefore, to achieve social or political goals that the government is interested in, senior managers of companies were forced to invest in unprofitable, politically desirable Projects that cause investment inefficiency and poor company performance (Pan and Tian, 2017). In this way, companies with poor political relations will have low performance due to ignoring the value of the company. Therefore, the effect of political communication on the company's investment process is different and needs more research. It should also be kept in mind that this type of investment under the influence of political relations has an impact on the profitability of companies and ultimately has an impact on the changes in the cost of goods sold and the risk of financial turmoil under their ownership.

Therefore, in this research, the main approach is the effect of political connections and affiliation to business groups on changes in the cost of goods sold and the risk of financial turmoil in companies listed on the Tehran Stock Exchange and the factors affecting it.

3. Research background

Goa et al. (2024) investigated the contagion effect of overconfidence in business groups. The results prove that if one group member shows overtrust, other group members are more likely to overtrust in the following year, proving the contagion effect of overtrust in the business group. Further analysis shows that sociological theory, psychological theory, and business group theory can explain the mechanism of the contagion effect of overconfidence. In addition, this paper also shows that there are many factors, from macro to micro, which may affect this effect. Our findings not only enrich research on business group contagion effects but also provide empirical evidence as to why overtrust has become a widespread psychological phenomenon. Chong et al. (2023), in research titled Investigating the effect of being a member of a business group with commercial credit on the financing of Korean companies, the results showed that the companies that are members of business groups are less in need of external financing due to the high power of providing financial resources within the group. The business credit of this company is less for external financing.

Lin et al. (2022) investigated the effect of political connections and affiliation with business groups on changes in the cost of goods sold and the risk of financial turmoil. The results of their research showed that if the companies have political connections or belong to business groups, they would be less affected by changes in the cost of goods sold and the risk of financial turmoil.

Gupta (2023) Investigates geopolitical risk and investment-cash flow sensitivity: An empirical analysis for Indian conglomerate and non-conglomerate firms. The results show that the impact of geopolitical risk on investment risk-cash flow sensitivity is less (more) for companies affiliated with independent business groups. Furthermore, the results of this study are robust to alternative measures of geopolitical risk (the geopolitical risk law and geopolitical risk), the dependent variable, and the exclusion of the crisis period and COVID-19.

Keoru et al. (2023) investigated the non-financial goals of owners and the diversification and internationalization of business groups. Studies of business groups, a collection of legally separate firms operating in unrelated industries under common control, tend to compare the behavior of firms affiliated with business groups and firms that are independent firms. Unfortunately, this ignores the diversity between business groups based on their controlling owners. Therefore, in this conceptual article, they studied how the types of controlling owners affect the diversity and internationalization of business groups.

Hiran et al. (2023) investigated the influence of indigenous culture and business group affiliation on

the corporate governance of African companies. The results showed that manufacturing companies less relate business group ownership to the adoption of Anglo-American corporate governance. However, this relationship reversed in the institutional context of higher tribalism, while it was similarly exacerbated in the context of low tribalism.

Yeh and Lin (2022) investigated the sensitivity of cash flow in business groups and the structure of institutional shareholders. The results of their research show that transactions related to business groups are related to investment opportunities and the type of shareholding structure, which support both the financial advantages and agency hypotheses. Evidence shows that business groups transfer intergroup capital from low-growth to high-growth member firms, but the results show that the type of control reinforcement structure affects these transitions.

Guo et al. (2021), in a study titled Business Groups and Corporate Social Responsibility: Evidence from China, examine the effect of corporate business group affiliation on their corporate social responsibility performance in China. They found that companies with a dual status of being a business group member and a state-owned enterprise (SOE) at the same time have poor CSR performance. Their findings are consistent with the view that participation in corporate social responsibility is a strategy for companies seeking political legitimacy from the government and the public in general as legitimacy. Business group affiliation and SOE identity lend legitimacy to the company and reduce the need for corporate social responsibility activities.

Cai et al. (2020), in research entitled "The Effect of Business Groups on the Cash Obtained from Operations," the main purpose of this research is to examine the effects that being affiliated with a business group can have on the cash obtained from the operations and investments of companies. Member of the group and have financial flexibility. This research was conducted in the period 2000–2019. The results of this research indicate that dependence on business groups causes an increase in cash obtained from operations, investments, and flexibility. It has been financed.

Rezazadeh et al. (2023) investigated the relationship between dependence on business groups and discretionary profit mechanisms about the role of audit quality. The research findings indicate that affiliation with business groups has a significant and positive effect on profit management. In addition, the results showed that audit quality has a negative moderating role in the relationship between affiliation to business groups and profit management. That means audit quality reduces the positive relationship between the relationship between affiliation to business groups and earnings management.

Azizi et al. (2022) investigated the relationship between membership in a business group and business credit, emphasizing the financial limitation and competitiveness of the product market in companies admitted to the Tehran Stock Exchange. The results showed that there is a direct relationship between membership in a business group and business credit, and the competitiveness of the product market aggravates the above relationship, but financial restrictions weaken the above relationship.

Mousavi et al. (2022) investigated the role of the business group in the relationship between financial performance and risk in firms listed on the Tehran Stock Exchange. The results of the hypothesis test showed that commercial uncertainty has a significant direct effect on the company's risk. In addition, financial leverage has a significant direct impact on the company's risk.

Shakrian et al. (2021) investigated the relationship between dependence on business groups and the risk of falling stock prices, taking into account the role of the adjusting variable of the company's market value in companies admitted to the Tehran Stock Exchange. The results showed that there is a negative and significant relationship between business groups and the risk of falling stock prices.

Abri et al. (2019) investigated the effect of profitability on capital structure by considering the moderating role of membership in business groups

through the structural equation modeling approach. The results showed that profitability has a negative and significant effect on the capital structure. On the other hand, the examination of this relationship in both groups of companies that are members of commercial and independent groups shows that the managers of independent companies show less tendency to use debt in the capital structure as compared to the companies that are members of commercial groups.

Toloui et al. (2019) investigated the relationship between affiliated business groups and profit management. The results showed that business groups perform more profit management than other companies, and there is no significant difference between business groups and profit management in the use of large and small auditors.

Mohammadi et al. (2019) investigated the relationship between affiliation to the business group and the simultaneity of stock prices in companies listed on the Tehran Stock Exchange. The results obtained in this study show that there is no significant relationship between direct and indirect dependence on the business group and the coincidence of stock prices.

Rezaei et al. (2018) investigated the membership in business groups and sustainability reporting of the company. The results show that membership in business groups improves the level of sustainability reporting by companies. In addition, the results of additional analysis indicate that in larger companies, the relationship between membership in business groups and the level of sustainability reporting is stronger. Companies affiliated with business groups have more incentives for sustainability reporting because they are less concerned about short-term financial benefits.

Badvardnehandi et al. (2017) investigated the effect of political connections on overinvestment and company performance. The results show that political connections have a positive effect on investment and a negative effect on company performance. Political connections can help companies obtain more financing, but access to business loans originating from political connections creates additional credit and increases financing costs. In addition, the intervention of politicians may cause distortions in the allocation of social resources and lead to overinvestment and a weakening of the company's performance.

4. Research hypotheses

1) Political connections have an effect on changes in the company's cost of goods sold.
2) Political connections have an effect on the risk of financial turmoil for companies.
3) Dependence on business groups has an effect on changes in the company's cost of goods sold.
4) Dependence on business groups has an effect on the risk of financial turmoil for companies.

5. Research method

According to the scientific classification in terms of the purpose of this research, it is of the type of applied research and since the subject of this research is the effect of political connections and dependence on business groups on changes in the cost of goods sold and the risk of financial turmoil, therefore this research can be classified as descriptive research. From a theoretical point of view, it is a part of proof research, and from the point of view of reasoning, it is also a deductive-inductive part. Also, the research methodology is post-event, which means that the research is based on past information. The information used in this research is from the financial statements and the notes attached to the financial statements, as well as from the basic information of the stock exchange board (compiled in Rahevard Novin software).

The statistical population of this research is the companies accepted in the Tehran Stock Exchange.

Sampling was done using the systematic sampling method in such a way that the companies that had the conditions to be in the sample were selected as samples, and if they did not have the conditions, they would be excluded from the sample.

A statistical sample should have the following conditions:

1) Be admitted to the Tehran Stock Exchange before 2016.
2) It should not be part of investments, banks, or insurance companies.
3) Their financial year should be related to the end of March.
4) The information needed for this research is also available.

According to the limitations considered, the number of statistical samples was 111 participants.

5.1. Research model and variables:

To investigate the relationship between political connections on changes in the cost of goods sold in companies listed on the Tehran Stock Exchange, a regression model will be used as follows:

$$\text{Log}\, COGS_{it} = \beta_0 + \beta_1 PC_{it} + \beta_2 Cash_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} + \beta_5 M/B_{it} + \beta_6 CF_{it} + \beta_7 Capex_{it} + \beta_8 Divd_{it} + \beta_9 CFVol_{it} + \varepsilon_{it}$$

LogCOGS = logarithm of changes in the cost of goods sold

PC = political connections (a dummy variable equal to 1 if the company is politically connected and 0 otherwise) (Facio 2006 and Lin et al. 2020 defined a company as a politically connected company if "At least one of its major shareholders (one who controls at least 10% of the voting shares) or one of its senior executives (CEO, Chairman of the Board of Directors, Deputy Chairman of the Board of Directors) is a Member of Parliament, a Minister or is the head of state, or is closely related to a prominent politician.}

$$Cash_{it} = log \frac{(Cash + Cash\ equivalents)}{net\ Assets}$$

Cash = the company's cash balance at the end of the financial year

Cash equivalents = cash assets that can be quickly converted into cash (cash equivalents that are classified in the company's cash balance, such as bonds...)

net Assets = net assets of the company, calculated as follows:

Net assets = total assets – (cash + cash equivalents)

Size = company size (equal to the natural logarithm of total company assets)

Leverage = financial leverage of the company (total liabilities divided by total assets)

M/B = market value of the company divided by the book value of the company

CF = operating cash of the company (operating cash of the company divided by the total assets of the company)

Capex = capital expenditure (capital expenditure of the company divided by the total assets of the company)

DIVD = 1 if the company has distributed cash dividends and 0 otherwise

CFVol = standard deviation of cash flows of the last three years

To investigate the relationship between political connections on the risk of financial turmoil in companies listed on the Tehran Stock Exchange, a regression model will be used as follows:

$$DR_{it} = \beta_0 + \beta_1 PC_{it} + \beta_2 Cash_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} + \beta_5 M/B_{it} + \beta_6 CF_{it} + \beta_7 Capex_{it} + \beta_8 Divd_{it} + \beta_9 CFVol_{it} + \varepsilon_{it}$$

DR = is equal to the risk of financial turmoil in companies

In this research, to measure the risk of financial turmoil, Richard Toffler's (2007) model is used, which is as follows:

$$DR = 1 - \frac{e^{-z-score}}{1 + e^{-z-score}}$$

Z-score = Altman bankruptcy prediction model which is calculated as follows:

$$Z = 1.2 * \frac{\text{turnover in capital}}{total\ assets} + 1.4 * \frac{\text{Retained earnings}}{total\ assets} + 3.3 * \frac{taxes\ and\ interest\ from\ previous\ income}{total\ assets} + 0.6 * \frac{\text{market value of equity}}{\text{book value of debt}} + 0.999 * \frac{\text{total sales}}{\text{total assets}}$$

According to Richard Toffler's research in 2007, the risk of financial turmoil will be calculated using Z obtained from Altman's model, which is placed in the above equation.

A regression model will be used as follows to investigate the relationship between dependence on business groups and changes in the cost of goods sold in companies listed on the Tehran Stock Exchange:

$$\text{Log}\, COGS_{it} = \beta_0 + \beta_1 BG_{it} + \beta_2 Cash_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} + \beta_5 \frac{M}{B}_{it} + \beta_6 CF_{it} + \beta_7 Capex_{it} + \beta_8 Divd_{it} + \beta_9 CFVol_{it} + \varepsilon_{it}$$

BG = dependence on business groups (if the company is affiliated with a business group, it is equal to 1, and otherwise, it is equal to 0) (business groups mean companies that invest in each other, and ultimately the main company or the parent company should prepare consolidated financial statements)

To investigate the relationship between dependence on business groups and the risk of financial turmoil in companies listed on the Tehran Stock Exchange, a regression model will be used as follows:

$$DR_{it} = \beta_0 + \beta_1 BG_{it} + \beta_2 Cash_{it-1} + \beta_3 Size_{it} + \beta_4 Leverage_{it} + \beta_5 \frac{M}{B}_{it} + \beta_6 CF_{it} + \beta_7 Capex_{it} + \beta_8 Divd_{it} + \beta_9 CFVol_{it} + \varepsilon_{it}$$

6. Research findings:

Conducting the hypothesis test requires establishing the assumptions of the significance of the research variables, homogeneity of variance, and lack of autocorrelation. If it is not established, the obtained results are not reliable and this causes wrong conclusions. After making sure that the regression assumptions have been established, the research hypotheses have been tested.

As shown in the above table, all research variables in the unit root test are smaller than 0.05, which indicates that the variables are significant. This means that the mean and variance of the variables over time and the covariance of the variables were constant between different years. As a result, using these variables in the model does not cause false results.

As the results are presented in the above table, for all the variables, the obtained values are below 5, so there is no collinearity between the variables, and the obtained regression estimate is valid.

Further, to avoid ignoring the violation of the assumption of homogeneity of variance and the occurrence of possible false results in the estimation process, it is necessary to use the appropriate method to detect the presence or absence of heterogeneity of variance with a valid test. For this purpose, the Brush-Pagan test was used with the null hypothesis that there is no heterogeneity of the variance of the remaining sentences.

The results obtained from this test, which are reflected in the table below, indicate the confirmation of the null hypothesis that the variances are the same for the model, so there is no variance heterogeneity problem in the model (p>0.05).

Table 1. The results of the mean test of the variables

Possibility	statistics	Symbol
0.000	54.7018	LOGCOGS
0.000	64.7564	DR
0.000	50.9512	BG
0.000	132.649	PC
0.000	103.856	CAPEX
0.000	98.2398	CASH
0.000	105.095	CF
0.000	105.001	CFVOL
0.000	112.707	DIVD
0.000	126.804	LEVERAGE
0.000	98.686	MB
0.000	129.645	SIZE

Table 2. Variance increase factor test results

VIF value	variable symbol	VIF value	variable symbol
1.129401	BG	1.143484	PC
1.123659	CASH	1.121605	CASH
3.854972	SIZE	3.935098	SIZE
1.613989	LEVERAGE	1.622665	LEVERAGE
1.658023	MB	1.690047	MB
1.526560	CF	1.518044	CF
1.064935	CAPEX	1.061616	CAPEX
1.206992	DIVD	1.207362	DIVD
3.787094	CFVOL	3.763459	CFVOL

Table 3. The results of the heterogeneity of variances test

Result	p-value	The value of the statistic	sample
Absence of variance heterogeneity	0.3426	1.368	Model 1
Absence of variance heterogeneity	0.7864	0.4851	Model 2
Absence of variance heterogeneity	0.5334	0.8904	Model 3
Absence of variance heterogeneity	0.5126	0.9138	Model 4

Testing hypotheses

The significance level of the f statistic for the first hypothesis of the research is less than five percent, so the first hypothesis of the research is confirmed considering that the value of the t statistic related to political relations is equal to -13.551 and its significance level is less than 0.5 is 0. In addition, according to the t statistic, it can be said that political connections have a significant inverse relationship with the changes in the cost price of the company's sold goods, and this relationship means that political connections reduce the changes in the cost price. The goods sold by the companies have become

The significance level of the f statistic for the second hypothesis of the research is less than five percent, so the second hypothesis of the research is confirmed considering that the value of the t statistic

related to political relations is equal to -15.165 and its significance level is less than 0.5 is 0. Also, according to the t statistic, it can be said that political connections have a significant inverse relationship with the company's financial turmoil risk, and this relationship means that political connections have reduced the companies' financial turmoil risk.

The significance level of the f statistic for the third hypothesis of the research is less than five percent, so the third hypothesis of the research is confirmed considering that the value of the t statistic related to the dependence on business groups is equal to -13.445 and its significance level is less than It is 0.05. Also, according to the t statistic, it can be said that dependence on business groups has a significant inverse relationship with changes in the cost of goods sold by the company, and this relationship means that dependence on business groups causes a decrease in changes in the cost of goods sold by companies.

The significance level of the f statistic for the fourth hypothesis of the research is less than five percent, so the fourth hypothesis of the research is confirmed considering that the value of the t statistic related to dependence on business groups is equal to -16.543 and its significance level is less than It is 0.05. In addition, according to the t statistic, it can be said that dependence on business groups has a significant inverse relationship with the risk of financial turmoil of the company, and this relationship means that dependence on business groups reduces the risk of financial turmoil of companies. has been

Table 4. The results of the first research hypothesis test:

Variables	Estimated coefficient	standard error	Test statistics t	Test probability t
PC	-0.395655	0.02919	-13.5514	0.000
CASH	0.051501	0.01327	3.8791	0.0001
SIZE	0.029322	0.008533	3.4365	0.0006
LEVERAGE	0.117675	0.044494	2.6447	0.0086
MB	0.063674	0.012061	5.2795	0.000
CF	0.192375	0.056391	3.4114	0.0007
CAPEX	0.076135	0.114967	0.6622	0.5081
DIVD	0.044836	0.019211	2.3338	0.0199
CFVOL	0.036886	0.01687	2.1864	0.0291
C	0.208886	0.095113	2.1961	0.0284
The coefficient of determination	0.746821	Watson distance criterion		2.214587
Adjusted coefficient of determination	۰.۷۱۱۵۶۳			
Fisher's F statistic	۱۹۸.۵۷۰۳			
Fisher's F statistic	۰.۰۰۰۰			

Table 5. The results of the second research hypothesis test:

Variables	Estimated coefficient	standard error	Test statistics t	Test probability t
PC	-0.5125	0.033796	-15.1654	0.000
CASH	0.5694	0.034419	16.5435	0.000
SIZE	0.07996	0.024914	3.20963	0.0014
LEVERAGE	0.1668	0.06296	2.64938	0.0083
MB	0.00981	0.004509	2.17695	0.0299
CF	0.00035	0.00837	0.04269	0.966
CAPEX	0.01532	0.11001	1.39261	0.1643
DIVD	0.01489	0.00621	2.39781	0.0168

Variables	Estimated coefficient	standard error	Test statistics t	Test probability t
CFVOL	0.00726	0.02913	0.24926	0.8032
C	0.06104	0.00309	19.7183	0.000
The coefficient of determination	0.76412	Watson distance criterion		1.94801
Adjusted coefficient of determination	0.72514			
Fisher's F statistic	21.4152			
Fisher's F statistic	0.000			

Table 6. The results of the third research hypothesis test:

Variables	Estimated coefficient	standard error	Test statistics t	Test probability t
BG	۰/۳۹۵۶۵۵-	۰/۰۲۹۱۹۶	۱۳/۴۴۵۴۸-	0.000
CASH	۰/۰۵۱۵۷۹	۰/۰۱۳۲۸۹	۳/۸۸۱۴۰۹	0.000
SIZE	0.02917	0.00844	3.45437	0.0006
LEVERAGE	0.11786	0.04437	2.65601	0.0081
MB	0.06348	0.01194	5.31461	0.000
CF	0.19258	0.05654	3.40566	0.0007
CAPEX	0.07605	0.11514	0.66047	0.5092
DIVD	0.04481	0.01920	2.33317	0.0199
CFVOL	0.03693	0.01692	2.18265	0.0294
C	0.20714	0.09535	2.17225	0.030
The coefficient of determination	0.69524	Watson distance criterion		2.325416
Adjusted coefficient of determination	0.65413			
Fisher's F statistic	187.470			
Fisher's F statistic	0.000			

Table 7. The results of the fourth research hypothesis test:

Variables	Estimated coefficient	standard error	Test statistics t	Test probability t
BG	-0.5694	0.034419	-16.5435	0.000
CASH	0.061048	0.003096	19.7183	0.000
SIZE	0.512532	0.033769	15.16545	0.000
LEVERAGE	0.211087	0.023465	8.99602	0.000
MB	0.0042	0.000189	22.27685	0.000
CF	0.569406	0.034419	16.54353	0.000
CAPEX	0.053469	0.012367	4.320944	0.000
DIVD	0.329886	0.07473	4.414362	0.000
CFVOL	0.813153	0.034404	23.63566	0.000
C	0.186429	0.034703	5.372129	0.000
The coefficient of determination	0.720014	Watson distance criterion		1.824516
Adjusted coefficient of determination	0.703492			
Fisher's F statistic	301.8516			
Fisher's F statistic	0.000			

7. Discussion and conclusion:

It is well documented in the existing literature that political communication provides valuable resources for companies through easy access to external resources and relationship-based contracts, affecting key decisions that affect company performance.

On the other hand, dependence on business groups is linked to the long-term orientation of companies. Ownership of a business group is associated with longer investment horizons, which can reduce manager's incentives to make risky investment decisions. Generally, the research literature indicates that companies with financing needs requiring commercial affiliation have greater access to financial resources. This research aims to investigate the role of commercial dependence on factors related to operational decisions that can affect the risk of financial turmoil and fluctuations in the cost of goods sold.

The results obtained from testing research hypotheses showed that political connections and affiliation with business groups have a negative effect on changes in the cost of goods sold and the risk of financial turmoil for companies. These results are consistent with the findings of Lin et al. (2022), Mousavi (2022), Shakrian et al. (2021) and Nahandi et al. (2018).

According to the results obtained from the test of the research hypotheses, it is suggested that investors and other actors in the capital market consider political connections as an effective factor in the changes in the cost of goods sold by companies. The results show that by increasing the number of political connections, the amount of changes in the company's cost of goods sold will decrease. Therefore, companies with higher political connections have lower fluctuations in their cost prices, leading to higher profitability. This can be attributed to companies with political connections having access to necessary resources to sustain their operations, as well as access to cheaper financial resources, higher information, and relationships with influential individuals. This ultimately results in increased profitability, which in turn boosts working capital and reduces changes in the cost of goods sold. Shares of companies with stronger political relations may be more favorable for investors to hold or purchase.

It is recommended to consider purchasing and holding shares of companies with strong political connections. Research shows that companies with more political connections have lower financial risks, as they are better equipped to handle debts and make profitable investments. Shareholders and investors should also consider the impact of business group affiliations on changes in the cost of goods sold. Companies affiliated with larger business groups receive support and resources, leading to increased profitability and cash flows. These companies are more stable in terms of the cost of goods sold, making their shares a good investment option. Companies affiliated with business groups and with lower financial risk are recommended for investment. Affiliation with business groups can increase cash flow and reduce financial risks, providing companies with the necessary resources for current operations and future projects. These companies are likely to generate higher profits for shareholders, making them a suitable investment choice.

References

Abri, Mahsa and Arzanlou, Mehdi (20۲۰), Investigating the Impact of Profitability on Capital Structure Considering the Moderating Role of Membership in Business Groups through the Structural Equation Modeling Approach, 6th International Conference on Management and Accounting Sciences, Tehran.

Badavar Nehandi, Yunus, Taghizadeh Khanqaeh, Vahid (201۸), The Effect of Political Connections on Overinvestment and Company Performance. Accounting and Auditing Reviews, 25(2), 181-198.

Haji Beigi Mohsen (20۱٦) "Evaluation of the effectiveness of Audit reports and legal inspectors on the decisions of the Assemblies

Of banks listed on the Tehran Stock Exchange" Master's Thesis.

Rezazadeh, Mohammad (2023), investigating the relationship Between dependence on business groups and discretionary profit Mechanisms about the role of audit quality, the 9th International Conference on New Perspectives in Management, Accounting and Entrepreneurship, Tehran,

Rezai Pitehnoi, Yaser, Safari Graili, Mehdi. (20١٩). Membership in business groups and corporate sustainability Reporting. Accounting Knowledge, 10(3), 169-197.

Shakrian, Fatemeh and Kiaei, Ali and Nikkar, Javad (2021), Investigating the relationship between dependence on business Groups and the risk of falling stock prices, considering the role of The variable that adjusts the company's market value in companies Listed on the Tehran Stock Exchange, the 4th conference National Institute for the Development of New Technologies in Management, Accounting and Computer Sciences, Tehran,

Toloui, Hassan and Jahangirnia, Hossein and Pourfakharan, Mohammad Reza (20٢٠), investigation of the relationship between Affiliated business groups and profit management in companies Listed on the Tehran Stock Exchange, National Conference on Improvement and Reconstruction of Organization and Business, Tehran.

Azizi, Awazzadeh, & Ata(2022), Investigating the Relationship between Membership in a Business Group and Business Credit with Emphasis on Financial Limitations and Product Market Competitiveness in Firms listed on the Tehran Stock Exchange. Konkash Management and Accounting, 7(2), 125–143.

Mohammadi, Mohammad, Mahmoudi, Siavash, & Sarabadani, Saeeda. (2020), Investigating the Relationship between Affiliation to The Business Group and the Simultaneity of Stock Prices in Firms Listed to the Tehran Stock Exchange. Accounting And Management Perspective, 3(37), 19-34.

Mousavi, Seyyedsiamak and Rashtbarzadeh, Davoud, (2022), Investigating the Role of the Business Group on the Relationship Between Financial Management and Risk in Firms listed on the Tehran Stock Exchange, the 6th International and National Conference on Management, Accounting and Law Studies, Tehran,

Cai, W., Zeng, C. C., Lee, E., & Ozkan, N. (2020). Do Business Groups Affect Corporate Cash Holdings? Evidence from a Transition Economy, China Journal of Accounting Research, 9(1), 1-24.

Chang, S. J. (2003), Ownership structure, Expropriation, and the performance of group-affiliated Companies in Korea. Journal of the Academy of Management, 46 (2), 238–253.

Chang, W. C., Lin, H. Y., & Koo, M. (2020), The Effect of Diversification on Auditor selection in Business Groups: A Case from Taiwan. International Review of Economics & Finance, 49, 422-436.

Chong. Byung & Hyun Joong Im and Heonsoo Kim. (2023), The Effect of BusinessGroup Affiliation on Trade Credit Financing: Empirical Analysis of Public Firms in Korea. SSRN Electronic Journal.

Claessens, S., Feijen, E., Laeven, L., (2008), Political Connections and Preferential Access to Finance: The role of Campaign contributions. Journal of Financial Economics, 88 (3), 554-580.

Cuervo-Cazurra, A., & Colpan, A. M. (2023), Owners' Nonfinancial Objectives and the Diversification and Internationalization of Business Groups. Corporate Governance: An International Review.

Gao, P., Vochozka, M., & Niu, S. (2024), The contagion Effect of overconfidence in business groups. International Review Of Financial Analysis, 91, 102989.

Guo, M., He, L., & Zhong, L. (2021), Business groups and Corporate social responsibility: Evidence from China. Emerging Markets Review, 37, 83-97.

Gupta, G. (2023), Geopolitical Risk and Investment-cash Flow Sensitivity: An Empirical Analysis for Indian Business Group-Affiliated Firms and Non-business Group-affiliated Firms. Finance Research Letters, 58, 104574.

Hearn, B., Oxelheim, L., & Randøy, T. (2023). The Impact of Indigenous Culture and Business Group Affiliation on Corporate Governance of African Firms. Corporate Governance: an International Review.

Houston, J., Jiang, L., Lin, C., Ma, Y. (2014). Political Connections and the Cost of Bank Loans. Journal of Accounting Research, 52(1), 193-243.

Joh, S.W. (2003). Corporate Governance and Firm Profitability: Evidence from Korea before the Economic Crisis. Journal of Financial Economics, 68 (2), 287–322.

Jung, K., & Kwon, S.Y. (2002). Ownership Structure and Earnings: Informative Evidence from Korea. The International Journal of Accounting, 37 (3), 301–325.

Kim, J. B., & Yi, C. H. (2006). Ownership Structure, Business Group Affiliation, Listing Status, and Earnings Management: Evidence from Korea. Contemporary Accounting Research 23 (2), 427–464.

Khanna, T., & Palepu, K. (2000a). Is group affiliation Profitable in emerging markets? An Analysis of Diversified Indian Business groups. The Journal of Finance 55 (2), 867–891.

Khanna, T., & Palepu, K. (2000b). The Future of Business Groups in Emerging Markets: Long run Evidence from Chile. Academy of Management Journal 43 (3), 268–285.

Lin, T. J., Chang, H. Y., Yu, H. F., & Kao, C. P. (2022). The Impact of Political Connections and Business Groups on COGS: Evidence from Chinese Listed Firms. Global Finance Journal, 40, 65-73.

Manos, R., Murinde, V., & Green, C. (2012). Dividend Policy and Business Groups: Evidence from Indian Firms. International Review of Economics & Finance 21 (1),42–56.

Pan, X., Tian, G. G. (2017). Political Connections and Corporate Investments: Evidence from the Recent Anti-corruption Campaign in China. Journal of Banking and Finance, In Press, DOI: 10.1016/j.jbankÞn.2017.03.005.

Yeh, Y. H., & Lin, J. J. (2022). Investment-Cash Flow Sensitivity to Internal Capital Markets and Shareholding Structure: Evidence from Taiwanese Business Groups. Eurasian Business Review, 11, 637–657.

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The Effect of Political Relevance on the Rate of Adjustment of Financial Leverage in Firms Listed on the Tehran Stock Exchange

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Abstract

Objectives: The main purpose of this study is to investigate the effect of political communication on the speed of adjustment of financial leverage.

Design/methodology/approach: To achieve the research objectives, a sample of 130 firms listed on the stock exchange that were selected according to a systematic exclusion pattern was collected for 7 years, from 2016 to 2022. To test the research hypotheses, a linear multivariate regression model was used.

Findings: Testing the research hypotheses showed that the financial leverage of the firm depends on the speed of its adjustment during its periods, but political communication does not affect the speed of adjustment of the financial leverage.

Innovation: Current research provides evidence that the political relations of managers could not help them develop financial leverage.

Keywords: Adjustment Speed, Financial Leverage, Political Communication.

1. Introduction

Flexibility is a feature that allows an enterprise to control and manage uncertainty. Financial flexibility is defined as the degree of capacity of a company to mobilize its financial resources in response to activities that maximize the value of the company. It is the most important part of determining the firm's leverage and can be used to maintain borrowing capacity. To study and develop the future of the enterprise, or to minimize debts and prevent financial distress in the face of economic recessions (Salehinia and Tamradi, 2019). The speed of adjustment of financial leverage reflects the company's move toward an optimal capital structure and clearly shows the financing policies of the firm. The importance of leverage optimization is such that the growth and survival of companies depend on this factor. Optimal financial leverage is a combination affected by the proper and targeted use of financial resources and earning reasonable returns with the risks of these resources. The speed of movement of firms toward optimal ratios depends on various factors, with the cost of adjusting the financial leverage being one of the most important factors (Hashemi & Keshavarz Mehr, 2015). The most important issue in the research on capital structure of enterprises is the correct estimation of their speed of movement towards the target leverage. Most firms deviate from their target capital and often take action to adjust their capital structure when the benefits of adjusting capital structure outweigh its costs. According to dynamic balance theory, it can be argued that each of the firms faces different adjustment costs considering their characteristics and consequently, with different speeds, companies are moving towards their target leverage (Rameshe et al., 2016).

The theory of political economy has entered the economic literature of the world since the second half of the twentieth century, with the spread and influence of the liberal school of thought. This theory has not only been considered by economists and politicians, but sociologists have also provided works in the development and explanation of this theory, which is based on the fact that economics and politics have mutual influence. This means that political action and decision-making are intertwined. Political activity and decision-making have a direct and indirect impact on economic activities and vice versa (Khalife Soltani et al., 2018). The interdisciplinary field of political communication, which connects the two main fields in the social sciences, communication, and political science, is a relatively new realm in terms of its academic background and its beginning, from an academic perspective, to research and scientific studies of the 1950s. Michael Rush gives a fairly comprehensive definition of political communication: Political communication is the transfer of politically appropriate information from one part of the political system to another between social and political systems. Appropriate information is not only about the real issues (what happened) but also the transmission of ideas, values, and attitudes. Now the fundamental question is whether these political relations can change the capital structure of the enterprise or not, whether these connections benefit or disadvantage the enterprise? In the continuation of the structure of the research, firstly, the development of the theoretical foundations, hypotheses and experimental foundations of the research are presented, and then the implementation method and operational definitions of the research variables and finally the findings and conclusions of the research are presented.

Hypothesis development

Optimal leverage is a measure of debt-to-asset ratio in which the value of the company is maximized and the total cost of capital is at the least possible (Behbahani et al., 2018). Therefore, managers are always looking to choose the optimal capital structure to show the company's status and performance to the stakeholders. Chang and All (2014). Hence, the optimal capital structure is determined as the target capital structure that companies are trying to put their actual capital structure within its limits. Based on theoretical concepts, managers should plan the optimal capital

structure of the company (Nazemi Ardakani & Zaree, 2016).

The economy has many horizons and is influenced by a variety of factors, including political relations, the financial situations of firms, and their financial levers. Political and economic relations are inseparable, political influence in determining economic outcomes has become very powerful and affects macroeconomic decisions. The impact of politics at the domestic level of countries and smaller units has been proven. At the macro level, it is caused by alternations and changes in political power and changes in regulation and policies, such as the presidential election. Before elections, businesses operate under the possibility that unpredictable and specific political situations may lead to poor decision-making and worse performance. After the election, subsequent changes in laws and regulations and financial, monetary, and foreign policy will have a long-term impact on the decision-making of an enterprise. These policy changes may directly affect how the firm makes investment decisions, how it receives and increases capital, and how much it pays for capital (Julio and Yoke (2012 and 2016), Houston, Jiang & Lin (2014), Blizzard and Darnay (2017)). At the micro level, political communication plays a greater role in the day-to-day operations of enterprises. Firms make political investments in the form of political donations, lobbying, and presenting positions and advisory positions. Enterprises with stronger political connections receive more state investment (Dachin and Sociara (2012), Cohen, Caval, and Malloy (2011), Goldman & Rochelle (2009). At the micro level, political communication facilitates access to external financing; political communication is the communication between the government and large enterprises through the performance or capability of operations. In the way that this communication leads to an interaction between the enterprise and the government, the government considers establishing contacts with enterprises as a means of controlling them (Rezaei and Rafieinia, (2014), Rezaei and Afroozi, 2014)).

Political influence and support have two aspects: government political support may create value for enterprises (e.g., firms that have good political ties to the government, pay fewer taxes, take more market share for goods and services, provide loans easily, pay lower customs tariffs, get exemptions, and also get paid by the company. Bringing in the state currency dramatically reduces their import costs to the government and in fact, the political relevance they have helps in the public offering of these firms in the stock exchange, the political enterprises with political connections more easily than other firms and with the minimum cost of the most important concessions). Although government support brings an advantage, such as lower financing costs for these enterprises, it may also lead to high efficiency of the enterprise (Rahnema Roodposhti and Mohseni, 2018). One of the most important tasks of financial managers in achieving the goals of companies is to combine financial resources in the capital structure in an optimal way, so that internal and external risks have the least effect on the deviation of financial leverage from the target financial leverage, and finally, the combination of equity and debt can be the least cost of capital and bring the highest value to the company (Owino and Yukaegbo, 2015). Finally, the managers are trying to use the mentioned advantages in political relations with the government by establishing relations with the government and make optimal use of access to resources and other things, while the government will also include more benefits for its Firms. According to the presented basics, the research hypothesis is presented as follows:

Research hypothesis: Political communication is effective in the speed of adjustment of financial leverage.

Research background

Babaj et al (2024) in a research titled Does economic state matter for leverage adjustments? An India–China comparison they said, We examine the impact of the economic state on capital structure dynamics of Indian and Chinese listed firms using a 10-year sample

period. The empirical analysis is based on the standard partial adjustment mechanism. The economic state (in the base model) is categorised into a good and bad state based on the gross domestic product growth rate. Using system generalised method of moments estimation, our findings suggest that the capital structure speed of adjustment is pro-cyclical for Indian firms, i.e., they exhibit faster adjustments during a good state of the economy than the bad state. In contrast, the speed is countercyclical in the context of Chinese firms, i.e., they exhibit slower adjustments during a good state of the economy and vice versa. Furthermore, consistent with the existing literature, Indian firms do faster rebalancing than the Chinese ones. Our findings are robust across alternate measures of leverage as well as the economic state.

Rostami et al. (2022) conducted a study titled "The Impact of Risk Management on the Pace of Adjustment of Financial Leverage in the Life Cycle Stages of Companies". They found that the speed of adjustment of financial leverage reflects companies' movement towards an optimal capital structure and reveals their financing policies. The significance of optimal leverage is critical for the growth and survival of companies, as it affects risk and expected returns. The study showed that risk management directly influences the speed of adjustment of financial leverage. Specifically, risk management has a direct impact on the speed of adjustment during the growth phase of companies, while it does not affect the speed of adjustment during the maturity phase. In the decline phase, risk management has a negative effect on the speed of adjustment. Overall, managing risks can help companies achieve optimal leverage faster, although this effect diminishes during the transition stages of the corporate life cycle.

Moradi and Parhizkar Malekabad (2021) focused on the impact of inflation rate risk and company-specific risk on the speed of adjustment of capital structure. They concluded that both inflation rate risk and company-specific risk negatively affect a company's financial leverage and slow down the speed of adjustment toward target leverage. Internal risks within the company have a more significant impact on the speed of adjustment compared to external factors.

Asadi et al. (2021) explored the relationship between financial situation, industry characteristics, and the speed of adjustment of capital structure. They found that companies with a higher debt ratio than the target ratio are more inclined to reduce their debt. Companies under centralized leverage are less likely to adjust their debt ratio, while those above dynamic leverage tend to reduce their debt ratio faster.

Sabzi et al. (2021) studied the effect of recession and boom on the speed of adjustment of capital structure. They determined that capital structure adjusts towards the goal regardless of the financial sector's boom or recession, and the real economy has no impact on the speed of adjustment.

Khalifeh Soltani et al. (2018) explored the impact of political communication on the risk of stock price crash under information asymmetry. They found that political communication has a positive and significant impact on the risk of a stock price crash, as managers withholding bad news can lead to a stock price crash in the long run.

Rahnemaye Roudposhti and Mohseni (2018) concluded that government and political interference in a company's board of directors can disrupt decision-making processes and negatively impact business operations.

Chalaki et al. (2018) investigated the mediating role of financial flexibility in explaining the relationship between management ability and financial distress. They found a positive relationship between management ability and financial flexibility, while financial distress was negatively correlated with both management ability and financial flexibility.

Davoodi Nasr and Habibi (2017) studied the effect of political communication on real earnings management and found that the reward plan affects the relationship between political communication and real profit management.

Geo et al. (2017) discovered a positive and significant correlation between capital expenditure and deviation from optimal capital structure. Companies

with higher sensitivity in capital expenditure tend to adjust their capital structure at a faster rate.

Rahmani (2016) investigated the relationship between political communications and cash holdings in companies listed on the Tehran Stock Exchange. They found a negative and significant relationship between cash holdings and political communications, indicating that cash holdings decrease with an increase in political costs.

Sheeri Anaghiz et al. (2015) studied the relationship between financial flexibility and the speed of adjustment of capital structure in firms listed on the Tehran Stock Exchange. They found a positive and significant relationship between financial flexibility and the speed of adjustment for firms operating under optimal leverage.

Trang et al. (2022) conducted a study titled "Product Market Threats and Leverage Adjustment" and found that the impact of product market threats on leverage adjustment is more significant for companies with poor governance quality and exposure to these threats. Achieving the target capital structure ultimately increases the company's value.

Wua and Tai (2021) explored "The Impact of COVID-19 on the Speed of Leverage Adjustment" and discovered that, on average, companies adjusted their capital structure more rapidly after the COVID-19 outbreak. Companies in countries severely affected by COVID-19 adjusted their target leverage faster than those in less affected countries.

Chen et al. (2021) in their study "Foreign Ownership and the Speed of Leverage Adjustment" established a positive relationship between external institutional ownership and the speed of corporate leverage adjustment. Foreign institutional investors play a crucial role in reducing conflicts between shareholders and directors.

Maloul et al. (2018) investigated the impact of political communication on the performance and value of Tunisian economic firms. Their findings showed that political communication enhances firm performance and value, attracting investors to economically connected firms with higher profits.

Wang et al. (2017) concluded in their study "Investigating Political Communications and Fraudulent Financial Reporting with an Emphasis on Management Ability" that as management ability increases, financial reporting quality improves, particularly in non-governmental enterprises.

Norfrisal et al. (2017) examined the relationship between firm governance, political communications, and accounting conservatism, finding no significant correlation between government governance, political communication, and accounting conservatism.

Ideham and Imrashan (2017) found in their study on the impact of political communication on earnings management that politically connected companies tend to report lower profits, while self-directed companies do not significantly influence earnings management behavior.

Ling et al. (2016) discovered that firms with stronger political connections have easier access to long-term financing sources, though this intervention by politicians may weaken the firms in the long run.

Harry Mawan and Nuland (2016) analyzed political communications and profit quality in Indonesian companies, observing that profit quality increases with political connections due to improved government effectiveness but decreases with political stability.

Wang (2015) found that political managers in government-controlled firms exacerbate the risk of stock price crashes while hiring political individuals in private firms reduces this risk. Institutional quality does not mitigate the positive correlation between political communication and stock price risks.

Li and Zhou (2015) studied the relationship between political connections and access to China's stock exchange, revealing that political communication significantly impacts IPOs, with politically connected firms facing lower scrutiny during initial public offerings.

Oztekin (2015) examined factors influencing capital structure decisions and leverage adjustment speed globally, finding that institutional factors

significantly affect leverage adjustment speed, with high-quality institutions leading to faster adjustments.

Viet An Dong et al. (2013) investigated capital structure adjustment in U.S. companies from 2002-2012, noting the negative impact of the global financial crisis on leverage adjustment speed, with finite-finite firms adjusting their capital structure more rapidly pre-crisis.

Falkander et al. (2012) concluded in their study on the effect of cash flow and trading costs on leverage adjustments that operational cash flow allows for low-cost leverage adjustments, impacting both target leverage and adjustment speed.

In 2009, Maramour explored the relationship between financial leverage and firm performance, establishing a significant correlation between the two.

Research Methodology

Due to the existence of basic theoretical foundations related to the studied variables, the present study is classified as applied research in terms of the purpose of implementation and terms of the method of execution. This classification is due to the lack of investigation of the effect of changing one variable (independent) to measure its effect on another variable (dependent). Additionally, the study aims to investigate the variables as they are, without tampering with them, making it classified as descriptive-causal research.

Furthermore, historical and post-event data were collected using the library and archival methods to test the research hypotheses. The statistical population of the study includes all listed companies on the Tehran Stock Exchange. Companies with financial periods other than the end of March, those that changed their financial period during the research period, companies with insufficient information for comparability, as well as investment companies, banks, and insurance companies were excluded to ensure homogeneity of the required data.

A total of 130 companies were selected using a systematic screening pattern, and their data were collected for a period of 7 years from 2016 to 2022. Combining data by applying the dimensions of time and place in different periods provides the researcher with complete and reliable information. Regression analysis using a powerful standard error tool is considered the best option for investigating the relationships in the present research.

A multivariate linear regression model was applied to the combined nature of the research data after ensuring homogeneity and meeting other preconditions for regression analysis using Eviews 12 software. The use of powerful standard error tools and appropriate statistical methods for the final testing of hypotheses was performed.

Comprehensive regression model of research:

$$
\begin{aligned}
Actual\ Leverage_t\ = (\lambda\beta)\big[\hat{\alpha} &+ \widehat{\beta_1}(M/B)_{i,t-1} \\
&+ \widehat{\beta_2} Aseet\ tangibility_{i,t-1} \\
&+ \widehat{\beta_3} Porfitability_{i,t-1} \\
&+ \widehat{\beta_4} R\&D\ Expense_{i,t-1} \\
&+ \widehat{\beta_5}\ R\&D\ Dommy_{i,t-1} \\
&+ \widehat{\beta_6} Selling\ Expenses_{i.t-1} \\
&+ \widehat{\beta_7}\ Firm\ Size_{i,t-1}\big] \\
&+ \big[(1-\lambda) Actual\ Leverage_{i,t-1}\big] \\
&+ \big[(1-\lambda) Actual\ Leverage_{i,t-1}\big] \\
&\times Politics
\end{aligned}
$$

Table (1), Operational Definitions of Variables

Definitions	Symbol
Real leverage of this year (total liability/total assets)	$Actual\ Leverage_t$
Real leverage last year	$Actual\ Leverage_{t-1}$
Stock market value/book value of equity	$Market\_to\_Book\ (M\ /\ B)$
Fixed Asset / Total Asset	$Asset\ Tangibility$
Net profit / Total assets	$Profitability$

Definitions	Symbol
R&D cost divided by total sales	*R&D Expense*
R&D If a company does not report a number 1 on it, otherwise the cost is zero.	*R&D Dommy*
Sales/Sale Costs	*Selling Expenses*
Logarithm of Total Assets	*Firm Size*
Political Communication: If the largest shareholder of an enterprise is a public sector, the number is 1, and otherwise the number is zero.	*Politics*

Research Findings

Descriptive statistics of research variables:

Table 2 displays descriptive statistics. In descriptive statistics, the mean and standard deviation play a crucial role as they indicate the distribution. From the first table, it is evident that the average financial leverage of companies is approximately 0.53 percent. For instance, the average growth rate of companies is 4.72 percent. Interestingly, company growth exhibits the highest standard deviation, while the cost of research and development has the lowest standard deviation.

As shown in Table 3, 387 (42.53%) of the companies were politically connected, while 523 (57.47%) were not politically related. Additionally, 749 (82.31%) of the year-firms did not disclose research and development costs, while 161 (17.69%) of the year companies had disclosure in their financial statements.

The results in Table 4 show that the significance level of the test in the research model is less than 5%. This indicates a difference in variance in the disruptive sentences, which has been resolved in the final estimation of the model by implementing the GLS command.

According to the results of Table 5, it is observed that the significance level of the serial autocorrelation test for the research models is more than 5%, indicating the absence of serial autocorrelation in the model.

According to the results obtained in Table 6, it is observed that the significance level of variables in the stability test is less than 5%, indicating the stability of the variables.

According to the results obtained in Table 7, it is observed that the significance level of the test for the research models is less than 5%, indicating the acceptance of the panel data pattern. Additionally, the significance level of the test in the research model was less than 5%, indicating acceptance of the fixed effects of the width from the source.

The results of Table 8 indicate that the rate of adjustment of financial leverage is approximately 53%, meaning that companies can reduce the annual gap between real and optimal leverage by 53%. The key coefficient in this study is the political communication coefficient, as shown in the table above, with a significant level above 5% (0.10), indicating that political relations do not impact the speed of adjustment of financial leverage. This implies that political communication does not influence the speed of adjustment of leverage to achieve optimal levels. Therefore, the research hypothesis is rejected at a 5% error level.

The variables of company growth, investment growth, and sales cost ratio exhibit a significant relationship with the dependent variable of the research. The coefficient of determination is 92%, suggesting that the independent and control variables in the model explain 92% of the dependent variables. Additionally, the Durbin-Watson statistic is 1.94, indicating no serial autocorrelation in the model. Statistical tests with a significance level below 5% demonstrate that the research model fits well. The Durbin-Watson test is close to 1, below 5, suggesting no correlation between the research variables.

Table (2), Descriptive statistics of quantitative variables of research

Variable	Mean	S. dev.	Min.	Max.
ACTUAL_LEVERAGE	0.53	0.53	1.10	0.10
ASSET_LONGIBILITYT_1	0.26	0.22	0.80	0.019
MBT_1	4.72	2.94	15.98	1.01
PROFITABILITYT_1	0.13	0.10	0.59	0.20-
R_DT_1	0.0004	0.0000	0.022	0.0000
SELLING_EXPENSEST_1	0.73	0.75	1.16	0.19
SIZET_1	14.7	14.4	20.18	11.40

Table (3), Frequency Distribution of Qualitative Variables

Variable	Value	Frequency	Percent Frequency
politics	1	387	42.53
politics	0	523	57.47
Dummy R&D	1	749	82.31
Dummy R&D	0	161	17.69
-	-	910	100

Table(4), Variance Heterogeneity Test Results

Test Model	Test Statistics	Significance level
White	210.83	0.0000

Table(5), serial autocorrelation test results

Test Model	Test Statistics	Significance level
Breusch-Godfrey	5.59	0.061

Table (6), Stability Test Quantity Variables

Variable	Test Statistics	Sig	Results
ACTUAL_LEVERAGE	-21.4757	0.0000	Stationary
ACTUAL_LEVERAGE-1	-16.7793	0.0000	Stationary
ASSET_LONGIBILITYT_1	-26.3076	0.0000	Stationary
MBT_1	-3.59660	0.0000	Stationary
PROFITABILITYT_1	-12.9462	0.0000	Stationary
R_DT_1	-14.4339	0.0000	Stationary
SELLING_EXPENSEST_1	-12.3176	0.0000	Stationary
SIZET_1	-15.6027	0.0000	Stationary

Table(7), F-Limmer and Hausman test results

Test Model	Test Statistics	Sig
F Limer	1.70	0.0000
Hausman	158.8	0.0000

Table (8), Hypothesis Test Result

Variables	Coef	Std	Statistic t	Sig	VIF
MBT_1	-0.003	0.0009	-3.82	0.0001	1.15
ASSET_LONGIBILITYT_1	0.10	0.037	2.71	0.006	1.19
PROFITABILITYT_1	0.015	0.059	0.25	0.80	2.89
R_DT_1	0.99	0.77	1.28	0.19	1.32
DUMMY_R_D_T_1	-0.021	0.011	-1.81	0.070	1.39
SELLING_EXPENSEST_1	0.10	0.038	2.74	0.006	2.04
SIZET_1	-0.001	0.007	-0.15	0.88	1.17
ACTUAL_LEVERAGE t_1	0.47	0.11	4.12	0.0000	2.27
ACTUAL_LEVERAGE t_1×Politics	-0.025	0.015	-1.61	0.10	1.20
C		0.20	0.16	0.21	-
Coefficient of determination		0.92			
Watson Durbin		1.94			
F		65.077			
Sig		0.0000			

Research Results

The purpose of this study is to investigate the role of political communication in the speed of adjustment of financial leverage. Since the second half of the twentieth century, the theory of political economy has become prominent in economic texts worldwide with the spread and influence of liberalism. This theory has captured the attention of economists, politicians, and sociologists alike in its development and explanation. It is based on the idea that economics and politics mutually influence each other, meaning that political parties' actions and decision-making impact each other. Political actions and decisions have direct and indirect effects on economic activity, and vice versa.

Statistical analysis shows that the estimated coefficient of the previous period's financial leverage and political communication does not significantly affect the speed of adjustment of financial leverage. Other factors should be considered when examining the effects on financial leverage adjustment speed. Companies that receive government support may not feel the need to adjust their leverage to reach an optimal level, as they have sufficient liquidity with government protections. This lack of adjustment may contribute to the bankruptcy of many state-owned companies, such as automobile and social security firms.

The findings of this study align with Rafi'inia's (2014) results, which suggested that political relations with the government do not impact a firm's leverage. Shareholders and stakeholders can assess a firm's debt capital by analyzing its leverage and determining whether the firm is striving for optimal leverage. This knowledge can lead to safer investments and higher returns. Companies should establish specialized teams knowledgeable in market economics and financial issues to address increases in leverage and work towards achieving optimal leverage.

References

Asadi, Gh, Tajvidi, E, Esmaeilpour, S. (2021). Investigating The Relationship Between Financial Situation And Industry Characteristics With the Speed Of Adjustment Of Capital Structure. Journal Of Investing, 10(37), pp. 1-21.

Bayegan, N, Kargar, H., Mehravar, M., Zangeneh, S. (2019)."Investigating The Relationship Between Political Communication, Capital Structure And Cash Holding in Companies Listed in Tehran Stock Exchange" 2nd

National Conference on Fundamental Research in Management and Accounting.

Behbahaninia, P. S, Akbarian Shoorkaei, R; Hoseinzadeh, F. (2018). Relationship Between Capital Structure Selection Information Asymmetry And Debt Capacity In Listed Companies In Tehran Stock Exchange. Perspective of Financial Management, 1(40).9-34

KhalifehSoltani, S.A, Rahnama, M, Komasi, F. (2018). The Effect Of Political Communication On The Risk Of Stock Price Crash under Information Asymmetry of Audit Knowledge Journal, 9(4), 15-30.

Ramesheh, M, Soleimani Amiri, Gh.R, Eskandari, R. (2016). Investigating The Speed Of Adjustment Of Capital Structure Based On a Prediction Of Equilibrium And Hierarchical Theories In The Tehran Stock Exchange. Empirical Research in Accounting 12(2), 161-186

Rahnemaye Roodposhti, F, Mohseni, A. (2018). Political Communication, Cash Profit, and Return on Shares in Companies Listed in Tehran Stock Exchange.Quarterly Journal of Financial Knowledge of Securities Analysis, 11(38). 22-40.

Zamani Sabzi, M, Saeedi, A; Hasani, M. (2020). The Speed Of Adjustment Of Capital Structure And The Impact Of Boom And Recession On It. Financial Research, 22(2), 160-181.

Salehinia, M; Tamoradi, A. (2019). "The Impact of Political Communication on Financing Policies" quarterly journal of financial accounting researches 2(11).

Moradi, M., Parhizkar Malekabad, S.E. (2021). Investigation Of The Effect Of Inflation Rate Risk And Company-specific Risk On The Speed Of Adjustment of Capital Structure of The Company: Generalized Method of Moments. Experimental Accounting Researches, 11(29), 23-51.

Nazemi Ardakani M, Zare, A. (2016). The Effect of Corporate Governance on the Speed of Capital Structure Adjustment Using Generalized Torque Method. 6(15), 43-59

Valizadeh Larijani, Azam, Esnaashari, H. (2017). Capital Structure And Its Speed of Adjustment In The Life Cycle Of The Company And The Role Of Profitability. Quarterly Journal of Financial Management Strategy, 5(4), 62-69.

Hashemi, S. A, Keshavarzmehr, D. (2015). Investigating The Asymmetry Of The Speed Of Adjustment Of Capital Structure: Dynamic Threshold Model, Journal of Financial Engineering and Securities Management, 23(2). 254-270.

Li, Guoping, and Zhou, Hong. (2015). "Political Connections And Access To IPO Markets In China, China Economic Review", 33(1), 76–93.

Arikawa, Y and Hoang, H.N. (2022). Capital Structure Adjustment in Emerging Markets: Evidence from Vietnam.2(21), 265-280.

Bajaj, Y , Smita K, Shveta S.(2024). Does Economic State Matter For Leverage Adjustments? An India–China comparison. The word economy. 47(2). 492-518

Chang, Y., Robin, K.C., Chou, Huang, T. (2014). Corporate Governance And The Dynamics Of Capital Structure: New Evidence. Journal of Banking and Finance, 48(5), 374-385

Chen, Y., Lin, F. (2015). "Does Institutional Short-termism Matter With Managerial Myopia?" Journal of Business Research, 68(10), 845-854.

Cohen, L, Joshua C, and Christopher, M. (2011). "Do Powerful Politicians Cause Corporate Downsizing?" Journal of Political Economy 119 (6). University of Chicago Press Chicago, IL: 1015–60.

Colak, G, Gungoraydinoglu, A and Öztekin, Ö. (2017). "Global Leverage Adjustments, Uncertainty, and Country Institutional Strength."21(2), 13-28.

Duchin, R, and Sosyura, D. (2012). "The Politics of Government Investment." Journal of Financial Economics 106 (1), 24–48.

Goldman, E, Jörg R, and Jongil, S. (2009). "Do Politically Connected Boards Affect Firm Value?" Review of Financial Studies 22 (6), 2331–60.

Houston, Joel F., Liangliang J. Chen L, and Yue M. (2014). "Political Connections and the Cost of Bank Loans." Journal of Accounting Research 52 (1). 193–243.

Fitzgerald, J Ryan, J. (2018). The Impact of Firm Characteristics On The Speed of Adjustment to Target Leverage: a UK study. Applied Economics, 2019 - Taylor & Francis 51(3). 654-670.

Julio, B, and Youngs Y. (2012). "Political Uncertainty and Corporate Investment Cycles." The Journal of Finance 67 (1). 45–84.

Li, G, and Zhou, H. (2015). "Political Connections And Access to IPO Markets In China, China Economic Review", 33(2), 76–93.

Ling, L, Zhou, X, Liang, Q, Song, P, and Zeng, H. (2016). "Political Connections, Overinvestments, and Firm Performance: Evidence from Chinese listed real estate firms". Finance Research Letters,10(2), 1–6.

Maaloul, A., Chakroun, R., Yahyaoui, S. (2018). The Effect of Political Connections on Companies' Performance and Value: Evidence from Tunisian companies after the revolution. Journal of Accounting in Emerging Economies, 8 (2), 185-204

Stock, James H., and Motohiro Y. (2004). "Testing for Weak Instruments in Linear IV Regression." Working Paper, NBER Technical Working Papers, National Bureau of Economic Research, Inc. 10(2), 241-254.

Szamosszegi, A, and Cole, K. (2011). An Analysis of State-Owned Enterprises and State Capitalism in China. Capital Trade, Incorporated for U.S.-China Economic and Security Review Commission. 25(3), 12-25.

Thuy, A. Voa, M MazurbcAn, T. (2022). The Impact of COVID-19 Economic Crisis on the Speed of Adjustment Toward Target Leverage Ratio: An international analysis. Finance Research Letters. 32(2). 25-40.

Trung K. Doa, H, Hongren, H, Puman, O. (2022). Product Market Threats And Leverage Adjustments. Journal of Banking & Finance.135(45). 1-18.

Waisman, M, Pengfei Y, and Yun Z. (2015). "The Effect of Political Uncertainty on the Cost of Corporate Debt." Journal of Financial Stability 16 (January):4(1), 106–17.

Wang, J, Yang Z, and Qingbin W. (2014). "Fiscal Transfers from the Central Government to Provinces in China: Potential Influence of the Native-Place Connections of Politburo Members." Journal of Chinese Economics 2 (3). 12-20.

Woidtke, T. (2002). "Agents Watching Agents? Evidence from Pension Fund Ownership and Firm Value." Journal of Financial Economics 63 (1). Elsevier: 99–131.

Yu, F, and Xiaoyun Y. (2011). "Corporate Lobbying and Fraud Detection." Journal of Financial and Quantitative Analysis 46 (6): 1865–1891.