

Investigating the Effect of Business Intelligence, Organizational Learning, and Organizational Innovation on Creating Competitive Advantage in Market Development and Exports (Case Study: Companies and Factories of North Khorasan Province)

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Citation: Jafar vafaei, et al (2023), Investigating the Effect of Business Intelligence, Organizational Learning, and Organizational Innovation on Creating Competitive Advantage in Market Development and Exports (Case Study: Companies and Factories of North Khorasan Province) *Educational Administration: Theory And Practice*, 29(4), 1097-1109
Doi: 10.53555/kuey.v29i4.6256

RTICLE INFO

ABSTRACT

Objective: Nowadays, companies and factories are trying to take the lead in creating a competitive advantage for maintaining and expanding the market and export through new technologies, organizational learning, and innovation. Companies and factories face opportunities and threats in domestic and foreign markets because of growing competition, more informed customers, more expectations, and rapid technological developments. Therefore, this research investigates the impact of business intelligence, organizational learning, and organizational innovation on creating a competitive advantage in market development and export.

Methodology: This research is descriptive-survey methodologically and applied and correlational in terms of purpose. Its statistical population includes 201 managers and experts of companies and factories in North Khorasan Province (Bojnord Cement Company, Jajrom Alumina Factory, Esfarain Industrial Complex, Esfarain Lule Gostar Company, etc.). Cochran's formula was used to determine the sample size for the statistical population of 201 people. It selected 132 people as a sample through a stratified relative random method. Its tools were standard questionnaires of business intelligence {Perovich, (2012)}, organizational innovation {Jimens et al., (2008)}, organizational learning {Nifa, (2001) quoted by Azizi, (2013)} and competitive advantage {Lee et al., (2006)}. The validity of the questionnaires was confirmed by the supervisor. Cronbach's alpha coefficient was appropriate for measuring the reliability of the questionnaires. The coefficient was (0.898) for the variable of business intelligence, (0.931) for organizational learning, (0.874) for organizational innovation, and (0.889) for competitive advantage. The research used Spss 26 software for analyzing descriptive statistics, and Amos 24 software for inferential statistics (structural equation method).

Findings: As the results show, companies should reduce costs to increase efficiency and effectiveness by improving customer service and creating more value. Companies will survive and improve their positions by focusing on all aspects of competition, i.e., up-to-date technology, quality, price, speed of customer response, and innovation; in this way, they take the lead by gaining a competitive advantage. Conclusion: Achieving a competitive advantage is vital in today's business world. This advantage leads to a company's ability to attract customers, increase market share, increase profits, and finally survive in the market. Several factors can create a competitive advantage, the most important of which are business intelligence, organizational learning, and organizational innovation.

Keywords: Business Intelligence, Competitive Advantage, Market Development and Export, Organizational Learning, Organizational Innovation

Introduction

Business intelligence is one of the most crucial research and applied fields. It was presented by Howard Dresner in 1989. According to him, business intelligence is a set of concepts and methods for developing business decisions through computer support systems (Valvav et al., 2021). Business intelligence is not considered as a product or as a system, but as a new approach that includes a set of practical and analytical programs that help make decisions in business activities (Cheng et al., 2020). The goal of business intelligence is to support the decision-making process. Its advantages include data refinement, developed plans, improved tactical decisions, cost savings, and efficient processes (Ting-Peng and Yu-His, 2018). Innovation is one of the critical factors for the success of organizations. It is often known as the representation and conscious application of ideas, processes, products, or procedures that are new in different parts of the organization (Peng et al., 2014). Innovation is a complex organizational process that becomes unique by overlapping organizational boundaries. Being outside the organization's framework plays a major role in innovation. Knowledge sources can also lead to unwanted sources of knowledge and increase the company's capability to obtain efficiency. In other words, innovation is a new paradigm for maintaining a competitive advantage in the company (Brockman et al., 2018).

Knowledge sharing is one of the most crucial factors affecting innovation. It plays a vital role in the success of an organization in today's competitive environment (Ghorbani et al., 2016). Learning and knowledge management in the organization can play a significant and vital role in the transfer of resources, capital, and labor as the basic principles of the modern economy. It can also increase the competitive advantages of the organization. In other words, it is known as investment in the process of organizational learning and knowledge management in companies and organizations to maintain their position. It is one of the major ways that the organization can use it to continuously create and improve knowledge management (Wu and Chen, 2014). Organizational learning refers to a wide range of activities of the organization regarding the creation and use of knowledge to improve competitive advantage (Majdi et al., 2018). Competitive advantage directly depends on the actions of creating new ideas and innovation cycles. It provides the conditions for interaction between stakeholders in addition to development (Roodsaz et al., 2020). The studies have investigated the creation of competitive advantage by using business intelligence, organizational learning, and organizational innovation and its effects on market development and exports.

Research background

Several studies have been conducted in Iran and other countries in this regard. We refer to four of them in this article:

Table 1- Research background

Row	Research year	Researchers	Research title	Statistical population	Methodology	Results
1	2021	Roshan Ghias et al	Investigating the role of marketing capabilities, innovation, research, and development in creating a new product's competitive advantage	To collect data, 180 questionnaires were randomly distributed among the managers of food companies in Mashhad.	This study was conducted using an applied and descriptive survey method.	The results revealed that organizational capabilities can be considered as a source of competitive advantage in the food industry and can improve company performance.
2	2000	Delghpoosh et al	Designing a successful business intelligence model based on Islamic philosophy and the components of business intelligence and successful intelligence	The statistical population of the study included 200 male second-grade high school students in Gilan province in the academic year of 2020-2021	This study is applied in terms of purpose and cross-sectional and correlation methodologically	Based on the results, applying the successful business intelligence model based on Islamic educational philosophy significantly affects the components of business intelligence and successful intelligence
3	2022	Gomez-Prado et al	Product innovation, business intelligence and pricing capability as a competitive advantage in the international performance of start-ups.	The statistical population includes 200 startups active in Peru	This research is applied in terms of purpose and descriptive survey methodologically	The results of this study revealed that competitive advantage does not act as a mediator between pricing capabilities and the international performance of start-ups. It was also found that competitive advantage acts as a mediator between two of the three evaluated capabilities: market intelligence capabilities and product innovation capabilities.
4	2022	Setiyo ADI et al	Sustainable competitive advantage based on loyalty and repurchase intention	A total statistical population included 24,675 with a sample size of 250 bank customers in Indonesia	This research is applied in terms of purpose and descriptive survey methodologically	Service quality and innovation improve the company's image and sustainable competitive advantage based on loyalty and repurchase intention. Sustainable competitive advantage based on loyalty affects repurchase intention

Methodology

This study was descriptive-survey methodologically and applied and correlational in terms of purpose.

Statistical population

The statistical population of this study included 201 managers and experts of companies and factories in North Khorasan province, including (Bojnoord Cement Company, Jajrom Alumina Factory, Esfarain Industrial Complex, Esfarain Lule Gostar Company, etc.

Sampling method

The stratified random sampling method was used in this study.

Sample size

To determine the sample size, Cochran's formula was used in the statistical population of 201 people. Accordingly, 132 people were selected as a sample using a stratified proportional random method.

$$n = \frac{201 \times 1.96^2 \times 0.5(1 - 0.5)}{201 \times 0.05^2 + 1.96^2 \times 0.5(1 - 0.5)} = 132 \quad \text{Equation 1}$$

Data collection methods and tools

Field and library methods were used for data collection. They were collected by referring to Persian and Latin theses and articles. The standard business intelligence (Popovič et al, 2012), organizational innovation (Jimenez et al, 2008), organizational learning (Nifa, (2001) quoted by Azizi, 2014), and competitive advantage (Lee et al., 2006) questionnaires were used for data collection.

Validity

Face validity known also as symbolic validity indicates whether the research tool is logical, interesting, and appropriate. Face validity considers how much the test questions are similar in appearance to the subject they were prepared to measure. A test has face validity if the test questions appear to be similar to the subject they were prepared to measure (Rezaeifar and Montazer Ataei, 2015).

A) Face validity: Obtaining confirmation from the professors.

b) Determining construct validity: including exploratory and confirmatory factor analysis

Based on most statistical books, factor analysis can be implemented in two forms: exploratory factor analysis and confirmatory factor analysis. In this study, exploratory factor analysis was used to identify latent variables, and confirmatory factor analysis was used to confirm measurement models. Also, measuring the validity of the constituent components of the variables is one of the basic applications of factor analysis techniques. Thus, this technique was used in this study to measure factor validity. Since the scales used in this study and the items related to them were translated into Persian, it is necessary to use exploratory factor analysis. Thus, in this section, exploratory factor analysis was first used to examine the validity of the constituent components of the variables. Then, the accuracy of the results of exploratory factor analysis was tested using confirmatory factor analysis. Factor analysis can be calculated through Spss and Amos software. In this study, the results of exploratory factor analysis obtained from Spss -26 and Amos-24 software are presented. To reduce the variables and consider them as a latent variable, the obtained factor load should be more than 0.3 (Momeni and Faal Ghayumi, 2017).

Reliability (internal consistency)

In this study, Cronbach's alpha coefficient was used to confirm the reliability of the data collection tool. This method is used to calculate the internal consistency of measurement tools, including questionnaires or tests that measure different characteristics. In such tools, the answer to each question can take different numerical values. To calculate the Cronbach's alpha coefficient, the variance of the scores of each sub-set of questions in the questionnaire (or sub-test) and the total variance should be calculated. Then, the alpha coefficient is calculated using the following formula. The mathematical formula of Cronbach's alpha is as follows:

$$ra = \frac{j}{j-1} \left(1 - \frac{\sum S^2 j}{S^2} \right) \quad \text{Equation 2}$$

Where:

ra = credit coefficient

j= the number of subsets of questionnaire or test questions

s2j= the variance of the jth test

s2 = the total variance of the test

Cronbach's alpha was calculated using SPSS software. The output of this process is presented in the table below.

Table 2. Cronbach's alpha coefficients for research questionnaires in the final sample

Key variables	Calculated Cronbach's alpha	Accepted Cronbach's alpha	Conformation/rejected of reliability
Business intelligence	0.898	Higher than 0.7	Final confirmation
Organizational Learning	0.931	Higher than 0.7	Final confirmation
Organizational Innovation	0.874	Higher than 0.7	Final confirmation
Competitive Advantage	0.889	Higher than 0.7	Final confirmation

Data analysis

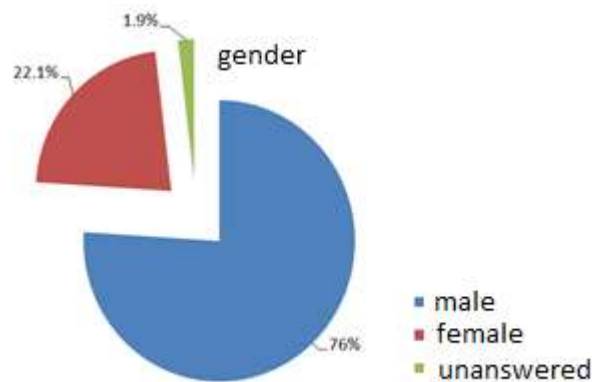
In this section, we will use the descriptive statistics technique to analyze the data to examine the distribution of statistical samples from different aspects of demographic information. This information is explained as follows using tables and graphs:

Gender

Based on surveys, about 76% of the respondents were male, about 22.1% were female, and 1.9% did not answer these questions.

Table 3. Distribution of respondents based on gender

Gender	%
Male	76
Female	22.1
Unanswered	1.9
Total	100

**Chart 1- Percentage distribution of respondents based on gender**

Age

Investigating the distribution of respondents based on age indicated that most of the respondents are in the age group of 31-40 years (about 69%).

Table 4. Distribution of respondents based on age

Age (year)	%
20-30	18
31-40	69
41-50	5
51 years and above	4
Unanswered	5
Total	100

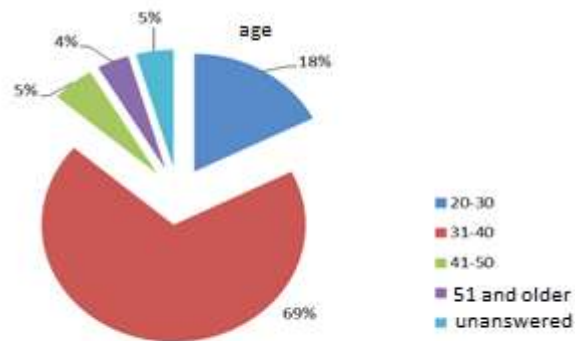


Chart 2. Distribution of respondents based on age
Education

As seen in the table below, the highest number of the participants had a bachelor's degree and the lowest number of them had a PhD degree.

Table 5. Distribution of respondents based on education

Education degree	%
Bachelor's degree	37
Master's degree	44
P.H.D	19
Total	100



Chart 3. Distribution of respondents based on education
Employment history

Investigating the distribution of the respondents based on their employment indicated that most of the respondents had an employment history of 5-10 years (about 53.9%).

Table 6. Distribution of respondents based on employment history in the industry

Employment history in the industry (years)	%
Less than 5	20.1
5-10	53.9
11-20	21.4
21 and over	1.9
Unanswered	2.6
Total	100

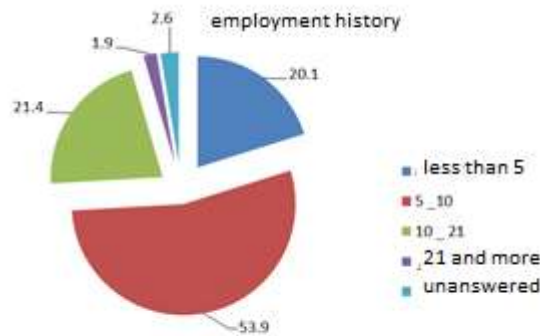


Chart 4. Distribution of respondents based on employment history in the industry
Testing research hypotheses

To analyze data analysis and test the research hypothesis based on structural equations, Amos software was used. Each hypothesis was analyzed in this section and finally, the result of the effect was determined. Using structural equation modeling and Amos-24 software, the causal relationship of variables was investigated in the form of research hypotheses. In this semantic network, each vector represents a cause-and-effect relationship. The end of the vector indicates the "cause" and the top of the vector indicates the "effect". The primary factors are placed at the highest level of the model (Ghasemi, 2010, 84). The final model drawn in Amos software is as shown in the figure below.

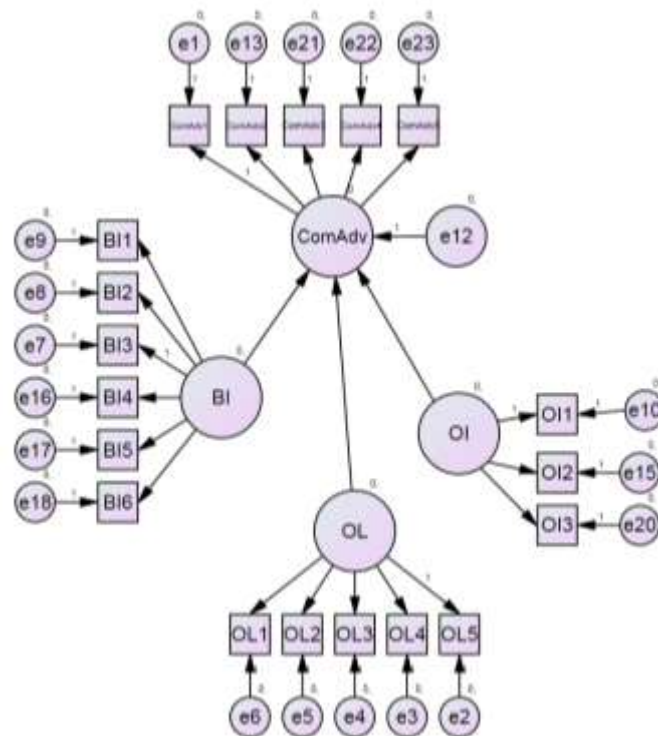


Figure 1. Structural equation model of research

Based on Figure 1, the following dimensions are considered in the model for each of the components:

1-The most significant dimensions for the business intelligence component are "data integrity", "analytical capabilities", "information content quality", "information access quality", "use of information in the business process", and "analytical decision-making culture".

2- The most significant dimensions for the learning component are "individual skills", "mental models", "common vision", "team learning", and "systemic thinking".

3-The most significant dimensions for the innovation component were "production innovation", "process innovation", and "administrative innovation."

4-The most significant dimensions for the competitive advantage component are "price or cost", "quality", "delivery capabilities", "product innovation", and "time to offer the product to the market."

Investigation of factor loadings

Factor loadings are obtained by calculating the correlation value of the items of a structure with that structure. If this value is equal to or greater than 0.4, it confirms that the variance between the structure and its indicators is greater than the variance of the measurement error of that structure, and the reliability of that measurement model is acceptable. After calculating the factor loadings between the structure and its items, if the values of items are less than 0.4, they should be modified or removed from the research model. According to the results obtained from the research data and the fitting of the research model, all the factor loadings are more than 0.4, indicating a positive relationship between the items and the research structures.

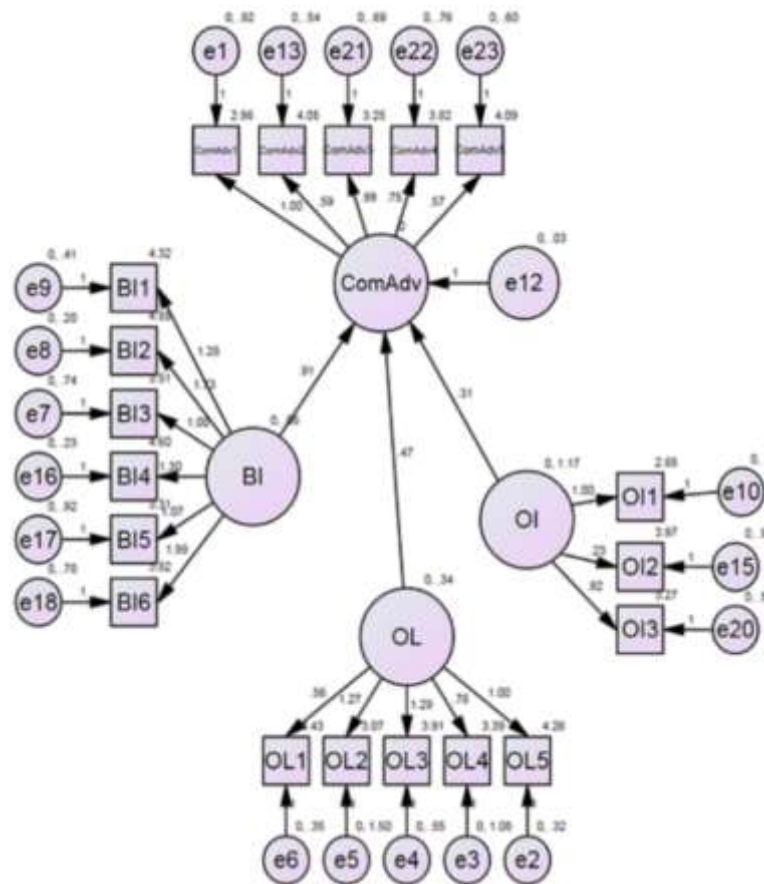


Figure 2. Structural equation model in the case of investigating factor loadings

Path analysis

Path analysis is a statistical method based on multivariate regression analysis used to measure the relationships of variables in a causal model. In this method, the standard beta coefficient of regression is used to determine the direction and intensity of relationships between variables. The t-statistic value also shows the significance of relationships. The goal of path analysis is to obtain quantitative estimates of the causal relationships (one-way interaction or covariate) between a set of variables. Building a causal model does not necessarily mean the existence of causal relationships among the variables of the model, but this causality is based on correlational assumptions and the background of the research. Path analysis in the causal model shows the effect of one variable on another variable. In path analysis, the path is mostly displayed with a one-way directional arrow drawn from the exogenous variable to the corresponding endogenous variable. The effect of variable i on variable j is represented by the symbol β_{ij} . If this value is negative, the relationship will be an inverse relationship, but if it is positive, this relationship will be direct. The beta coefficient value is between 1 and -1. If the absolute value of this coefficient is greater than 0.3, the effect will be stronger. If the t-statistic value is greater than 1.96, the relationship will be significant.

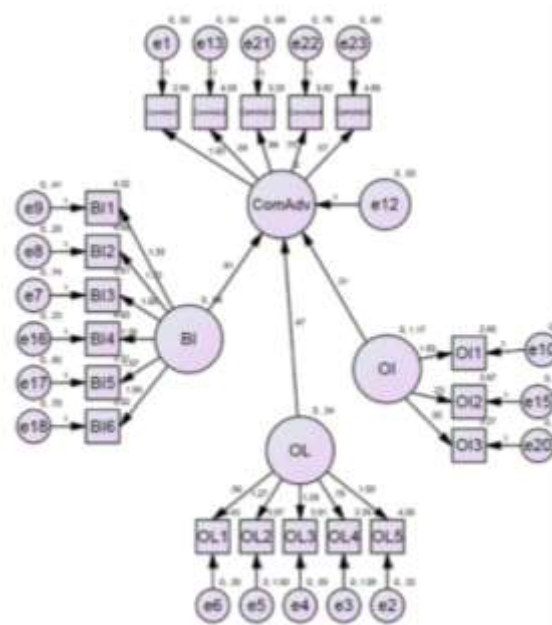


Figure 3. Structural equation model in path analysis mode based on t index

According to Figure (3), the results obtained from the research hypotheses are as follows.

Results of testing the research hypotheses

Research HA sub-hypothesis

Business intelligence has a positive and significant effect on creating a competitive advantage in market development and exports.

According to the result obtained from the path analysis, the significant number related to the effect of business intelligence on creating a competitive advantage in the development market and export is estimated at 0.91, which is between 1.96 and -1.96. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. Based on the obtained result, this effect is evaluated as strong. Accordingly, the results of the present study are consistent with the results of Gomez-Prado et al. (2022) and Cheng et al. (2020).

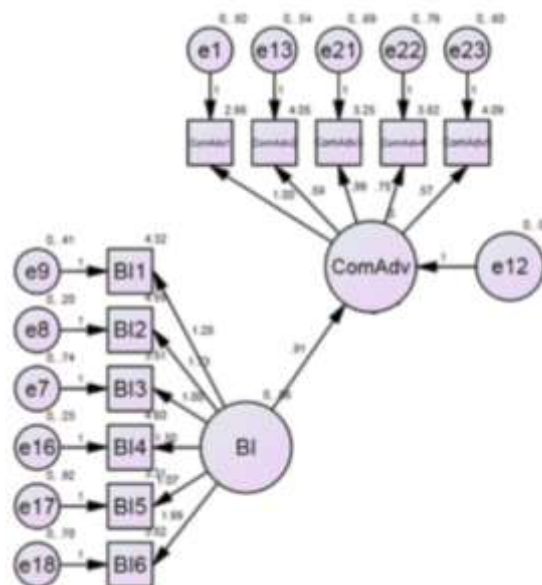


Figure 4. Structural equation model for investigating the effect of business intelligence on creating competitive advantage

Sub-hypothesis H1A

According to the result obtained from the path analysis, the significant number related to the effect of data integration on creating a competitive advantage in market development and exports is estimated at 1.28. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H2A

According to the result obtained from the path analysis, the significant number related to the effect of analytical capability on creating a competitive advantage in market development and exports is estimated at 1.73. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H3A

According to the result obtained from the path analysis, the significant number related to the effect of the information content quality on creating a competitive advantage in market development and exports is estimated at 1.00. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H4A

According to the result obtained from the path analysis, the significant number related to the effect of the quality of access to information on creating a competitive advantage in market development and exports is estimated at 1.30. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H5A

According to the result obtained from the path analysis, the significant number related to the effect of using information in the business process on creating a competitive advantage in market development and exports is estimated at 1.07. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H6A

According to the result obtained from the path analysis, the significant number related to the effect of the analytical decision-making culture on creating competitive advantage in market development and market is estimated at 1.98. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis HB

Organizational learning has a positive and significant effect on creating a competitive advantage in market development and exports.

According to the result obtained from the path analysis, the significant number related to the effect of organizational learning on creating a competitive advantage in market development and exports is estimated at 0.47, which is between 1.96 and -1.96. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as relatively strong. Accordingly, the results of the present study are consistent with the results of Azim et al. (2021) and Eidizadeh et al. (2017).

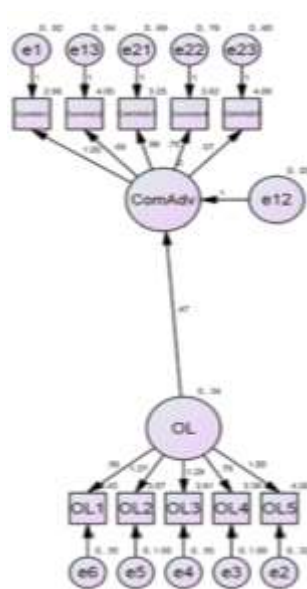


Figure 5. Structural equation model to investigate the effect of organizational learning on creating competitive advantage

Sub-hypothesis H1B

According to the results obtained from the path analysis, the significant number related to the effect of team learning on creating a competitive advantage in market development and exports is estimated at 0.56. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as relatively strong.

Sub-hypothesis H2B

According to the result obtained from the path analysis, the significant number related to the effect of individual learning on creating competitive advantage in market development and exports is estimated at 1.27. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H3B

According to the result obtained from the path analysis, the significant number related to the effect of the common vision on creating a competitive advantage in market development and exports is estimated at 1.29. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H4B

According to the result obtained from the path analysis, the significant number related to the effect of systemic thinking on creating a competitive advantage in market development and exports is estimated at 0.78. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. Based on the obtained result, this effect is evaluated as relatively strong.

Sub-hypothesis H5B

Based on the result obtained from the path analysis, the significant number related to the study of the effect of the mental model creating competitive advantage in market development and exports has been estimated at 1.00; Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. Based on the obtained result, this effect is evaluated as strong.

Sub-hypothesis HC

Organizational innovation has a positive and significant effect on creating a competitive advantage in market development and exports.

According to the result obtained from the path analysis, the significant number related to the effect of organizational innovation on creating competitive advantage in market development and exports is estimated at 0.31, which is between 1.96 and -1.96. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as average.

Accordingly, the results of the present study are consistent with the results of Gomez-Prado et al. (2022), Azim et al. (2021), Chen et al. (2019), and Distanont & Khongmalai (2018).

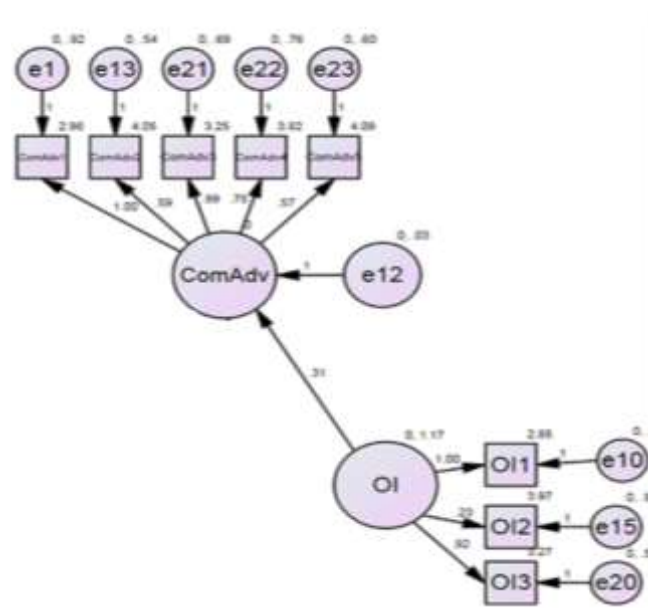


Figure 6. Structural equation model for investigating the effect of organizational innovation on creating competitive advantage

Sub-hypothesis H1C

According to the result obtained from the path analysis, the significant number related to the effect of process innovation on creating a competitive advantage in market development and exports is estimated at 1.00. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Sub-hypothesis H2C

According to the result obtained from the path analysis, the significant number related to the effect of production innovation on creating competitive advantage in market development and exports is estimated at 0.23. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as weak.

Sub-hypothesis H3C

According to the result obtained from the path analysis, the significant number related to the effect of administrative innovation on creating competitive advantage in market development and exports is estimated at 0.92. Thus, the hypothesis of a direct effect is accepted at the 95% confidence level. According to the obtained result, this effect is evaluated as strong.

Recommendations

A- Recommendations based on research results

The research recommendations are presented based on the results obtained in 4 areas:

According to the research results and the effect of the components of business intelligence, organizational learning, and organizational innovation on competitive advantage in companies and factories of North Khorasan province, practical recommendations can be presented in the following 4 areas:

Recommendations for business intelligence development

- Setting up business intelligence systems: Companies and factories can create modern business intelligence systems to collect, analyze, and transform their business data.
- Labor training: developing data analysis skills and using business intelligence tools in making decisions is crucial for team members and employees.
- Active participation of all members: encouraging all members of the organization to share data and analyze them to improve processes and improve efficiency.

Recommendations for organizational learning development

- Creating a learning culture: encouraging employees to participate in learning processes and sharing experiences.

- Encouraging flexibility: developing skills and strategies that allow the organization to react quickly and take advantage of changes in the best possible way.

Recommendations for the organizational innovation development

- Encouraging innovative processes: creating an environment that allows employees to present their ideas to facilitate the innovation production process.
- Investment in research and development: increasing investment in research and development to create new and innovative products and services.
- Cooperation with universities and research centers: establishing effective cooperation with research centers to obtain new knowledge and advanced technologies.

Recommendations for combining components

- Development of an integrated strategy: Paying attention to the combination of business intelligence, organizational learning, and organizational innovation to create an integrated and coordinated strategy to achieve competitive advantage.
- Creating mixed teams: creating teams composed of experienced members in each of these components and promoting interaction between them.

B- Recommendations for future studies

To conduct future studies on the effect of the components of business intelligence, organizational learning, and organizational innovation on the competitive advantage of companies and factories in North Khorasan province, the following recommendations can be useful:

- Investigating case components in North Khorasan province: conducting case studies and in-depth studies in various factories and companies in this province to examine the experiences and effects of these components on competitive advantage in the specific conditions of North Khorasan province.
- Investigating the effect of environmental factors: Investigating the effect of environmental factors such as economic, social, cultural, and political conditions on investigating the components of business intelligence, organizational learning, and organizational innovation in creating a competitive advantage.

-Investigating the role of leadership: Investigating the role of leadership in encouraging business intelligence, organizational learning, and organizational innovation and the way it affects competitive advantage.

-Measuring macro factors: developing models and indicators to measure business intelligence, organizational learning, and organizational innovation to investigate the exact relationship of these components with competitive advantage.

-Comparison with other provinces: comparing the effect of the mentioned components in the companies and factories of North Khorasan province with the companies of other provinces to examine the differences and similarities.

Research limitations

Research inherent limitations

The concept of attitude refers to the general set of prejudices, thoughts, judgments, and opinions about any subject. It is not revealed unless there is a special motivation to express it. In other words, when they are questioned, they appear in the form of an expression or some kind of behavior. However, attitude cannot be measured with a question since thoughts do not necessarily appear in practice as they are expressed.

Generalization limitation

-The present study was conducted using a cross-sectional approach in a short period. Conducting studies with a longitudinal method may yield different results.

-The inherent limitation of questionnaires, which is also discussed in other similar studies.

The difficulty of collecting information from companies and factories

-Like most studies in human sciences in less developed countries, the data required for this study were collected with difficulty and a lot of time.

- Time limitation and the impossibility of investigating the subject in larger populations and comparing the results with each other

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