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Identification and Ranking of Business Intelligence Components Using the Fuzzy TOPSIS Technique

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A B S T R A C T

Objective: The primary objective of this research is to identify and prioritize the components of business intelligence within subsidiaries of the National Bank by employing the fuzzy TOPSIS technique. This endeavor aims to establish a foundation for presenting a scientific approach to enhance business intelligence capabilities.

Methodology: This study adopts a mixed-methods approach, initially gathering qualitative data through semi-structured interviews with senior managers from the bank's subsidiaries, followed by quantitative data collection using questionnaires. The fuzzy TOPSIS method was employed to handle the inherent ambiguity and uncertainty in the data, with linguistic variables used to represent the acceptability of each business intelligence component.

Findings: Final model was including the dimensions of technical factors (components of information tools, characteristics of information and data, and analysis), business factors (components of stakeholders, economic and financial factors, and customer orientation), and intangible factors (including components of human capital and organizational capital) and 27 indicators. Subsequently, the identified components were ranked using the fuzzy TOPSIS technique, ultimately selecting "information confidentiality", "data reliability", and "high profit margin" as the most important indicators.

Conclusion: It can be concluded that the dimensions of innovation in online advertising and its implications in digital marketing are interpretable, and legal supports for innovation in online advertising through the enforcement of laws, enactment and amendment of specific laws and regulations for digital marketing, removal of legal barriers to investment, revenue generation, and clarification of legal ambiguities and definitions in digital marketing are effective.

Keywords: *Business intelligence, Technical factors, Business factors, Intangible factors, Fuzzy TOPSIS*

1 Introduction

Due to advancements and expansions in every branch of science and knowledge, all types of businesses face intense competition. This proliferation of knowledge has led to advancements in various technologies, the globalization of businesses, increased customer awareness, high expectations from products and services, and their quality, among other factors. Nowadays, the application of concepts such as business intelligence is particularly noteworthy due to its role in organizational decision-making and enhancing productivity across various industries. Indeed, while the implementation of business intelligence technology can provide capabilities for faster and better organizational decision-making, it often comes with numerous failures and leads to significant time and resource wastage (Sadeghi et al., 2023).

In today's tumultuous world, organizations are continually faced with vast waves of perpetual change, positioning strategic management as one of the finest tools for those determined to shape their destiny without succumbing to change, ensuring a successful and conscious presence in the competitive arena (Ghasemi et al., 2020). Strategic management allows organizations to act creatively and innovatively, enabling them to influence rather than merely react to actions (Ghasemi et al., 2020). This proactive approach is essential as technological advancements, especially in the information technology sector, have become one of the most crucial aspects of the technology and business domain today. Such transformations enable organizations to distinctly feel change and transformation, thereby enhancing their performance (Hilbert, 2020; Ragazou et al., 2023).

Laws and guidelines require organizational leaders to document their business processes; moreover, the lifecycle of businesses has become significantly compressed. Accordingly, better, more informed, and faster decision-making is among the competitive necessities. In fact, managers need appropriate information at the right time and place, and the primary benefit of business intelligence for a company is that it enables the provision of precise information when needed, including a real-time picture of the company's performance and its various departments. Such information is essential for decision-making, strategic planning, and even survival (Sadeghi et al., 2023).

To fully leverage the potential of business intelligence, it is necessary to understand the success factors through which businesses can benefit from this intelligence (Al-Okaily et al., 2021). There is no consensus in the academic literature about the effectiveness or the method for measuring the success of business intelligence (Torres & Sidorova, 2019). Typically, there is no single culprit responsible for the unsuccessful implementation of business intelligence, nor is there a singular reason that validates its success (Huang et al., 2022).

Nowadays, due to extensive interactions with natural and legal persons, banks possess a wealth of raw data. It is a given that they are always seeking to attract investments and offer profitable services and innovative products. These seemingly simple data have financial value and are included in banking reports, but what makes utilizing these data challenging is the time-consuming nature and the extensive human effort required in the process of collecting, classifying, summarizing information, and preparing financial and banking reports. Business intelligence in banks is a system that organizes the necessary information for managers in the shortest possible time and in an effective manner, while integrating data to enable control and tracking of key processes for managers. In other words, business intelligence refers to supporting and improving decision-making, which in turn leads to increased productivity in an organization (Rezaie et al., 2018).

To date, numerous studies have been conducted in the field of business intelligence, but each of these studies has examined the subject from a specific aspect. In fact, a systematic and holistic approach to the comprehensive study and examination of business intelligence has not been undertaken (Rahimi et al., 2021). Also, these studies have not fully explored the relationships and interactions between the factors affecting the business intelligence implementation process, while business intelligence has technical-social dimensions and involves many elements and complexities. Designing and explaining a model in this field requires an understanding of the elements and internal relationships of dimensions and components within a specific social context (Rashidi Goghakhor & Rezaian, 2022).

Business intelligence has emerged as a consequence of these transformations, defined as the organizational capability to optimally utilize digital technologies and smart tools (Hilbert, 2020). The digital transformation offers advanced technologies and a plethora of information and data, setting the stage for the application of business intelligence (Hilbert, 2020). Commercial and industrial organizations strive to align themselves with the global digitization trend, instigating fundamental changes in their

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practices and approaches. The most significant achievement of digital transformation, besides benefits like customer satisfaction, performance improvement, and optimization, is the asset named data, which can revolutionize various aspects of human life, including organization and management (Nazarian-Jashnabadi et al., 2023).

Business intelligence, introduced by Howard Dresner of the Gartner Group in 1989, is an umbrella term for concepts and methods that improve decision-making through reality-based computer systems. It's a comprehensive concept allowing the entire organization to effectively utilize provided information systems for timely and quality decision-making, creating competitive advantages (Rezaie et al., 2018). In the era of information explosion and the development of information systems, whether isolated or integrated, the correct use and reporting of information for any decision-making process are unavoidable. Thus, with the economy and business becoming more competitive, making organizational data meaningful and facilitating the decision-making process has become a focal point for IT experts and management and business specialists (Rezaie et al., 2018).

Business intelligence comprises a set of techniques and tools for accessing and transforming raw data into useful and meaningful information for business analysis processes. The concept of data presentation is usually associated with the performance of business intelligence. Business intelligence systems can handle a large amount of structured and sometimes unstructured data to aid in identifying, developing, and constructing strategic business opportunities. The goal of business intelligence is the easy interpretation of this data volume, which can provide a competitive advantage and long-term stability based on precise insights (Yaghli, 2020).

Business intelligence signifies the intelligent utilization of information to promote and grow business, encompassing the organization of information, its analysis, and reporting of processed data. It also provides an appropriate analysis of a business's past performance and shows its future growth and improvement path (Al-Eisawi et al., 2021).

Technical factors can be defined as a collection of knowledge, processes, tools, methods, and systems used to create products or provide services (Alikhani et al., 2021). Business factors are those through which organizations, with their creativity and entrepreneurship, create business opportunities, generate employment, and offer a variety of services and products to their target market (customers) (Nisar et al., 2021). Intangible factors are considered organizational assets not reflected in financial statements or balance sheets (Al-Khatib & Ramayah, 2023).

Various studies have utilized different dimensions to measure business intelligence, focusing on managerial infrastructure, technical infrastructure, capabilities, integration, content quality, information access and use, and the impact of business intelligence on financial information quality, emphasizing principles, constraints, and measurements in accounting (Hosein Goli & Khadem Hojati, 2022; Najjari et al., 2020; Rashidi Goghakhor & Rezaian, 2022; Rezaie et al., 2018). These studies highlight the significance of understanding the role of business intelligence in decision-making, strategic planning, identifying new opportunities, and gaining new competitive advantages, as well as its impact on managerial decision-making styles, the development and deployment of business intelligence models, and the critical components of business intelligence in enhancing organizational performance and competitive advantage in the market (Danaeifard & Aligholi, 2022; Yaghli, 2020).

Accordingly, in the present research, a model for measuring competitive intelligence in the subsidiaries of the National Bank is presented, and subsequently, the indicators of this model have been ranked using the fuzzy TOPSIS technique.

2 Methods and Materials

The current study is applied in nature, as the designed model ultimately leads to a basis for offering scientific solutions for business intelligence. Since the aim of this research is to present a business intelligence model, it is also considered developmental. Our approach here is exploratory because, in an exploratory approach, the researcher seeks to identify factors, present models, frameworks, etc.

This research, being conducted in both qualitative and quantitative stages and combining these two, is a mixed-methods design. In the qualitative and quantitative phases, data were collected using semi-structured interviews and questionnaires, respectively. Qualitative research tools (expert interviews) and quantitative research tools (questionnaires) were utilized and implemented on a selected sample from the target population.

From the perspective of the method and manner of data collection, the research is survey-based and descriptive as it deals with the current situation; it is also considered field research since it was conducted in a real and field environment, namely the subsidiaries of the National Bank

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of Iran. The statistical population for the first part for collecting qualitative data in this research included 12 senior managers of the subsidiaries of the National Bank.

The selected experts for conducting the semi-structured interviews had the following characteristics:

a) Holding a Ph.D. or being a Ph.D. student

b) At least 15 years of experience in banking

c) Graduates in one of the fields of Information Technology, Management (with specializations in Business and Entrepreneurship). (One of the educational levels of the experts should have been in the aforementioned fields).

Therefore, purposive and judgmental sampling methods were selected, identifying individuals for interviews in two groups: academic and practical, regarding qualitative data.

The second part of the current research's statistical population consists of 1,110 experts and managers at various levels of the National Bank's subsidiaries located in Tehran (including the National Development Group, National Bank Brokerage, Pioneer Capital Development, Future Development Management, Behshahr Investment Group, Shafadarou Investment Group, and Cement Investment Group). Given the large size of the statistical population, Cochran's sample size formula was used. Therefore, the sample size was 286 individuals, and the sampling method was random stratified.

In this research, for the analysis of quantitative data, a coding method was used. In the open coding phase, through interviews with experts, 58 indicators were identified, and in the axial coding phase, 31 indicators (due to being mentioned by only one expert and similarity of codes) were eliminated, leaving only 27 codes. In the selective coding phase, the main research variable (business intelligence) was divided into three main dimensions: technical factors (including components of informational tools, information and data characteristics, and analysis), business factors (including components of stakeholders, economic and financial factors, and customer orientation), and intangible factors (including components of human capital and organizational capital).

In this study, content validity (CVR index) was used to assess the validity of the questionnaire.

After the validity assessment, none of the questions were eliminated, and ultimately 27 questions were finalized. Therefore, it can be claimed that the content validity of the measurement tool has been confirmed.

Cronbach's alpha technique was used to assess the reliability of the questionnaire. The results presented below show that:

Cronbach's alpha values for all variables were above 0.7, thus confirming the reliability of the variables with the Cronbach's alpha technique.

3 Findings and Results

In the real world, due to the presence of incomplete or inaccessible information, data are usually not definite; rather, they are often fuzzy. Therefore, this research has attempted to use the fuzzy TOPSIS method for prioritizing the components of business intelligence. Linguistic variables refer to those variables for which the accepted values are words and sentences of human or machine languages, instead of numbers. Just as numerical variables are used in mathematical computations, linguistic (verbal or non-numerical) variables are used in fuzzy logic. Linguistic variables are expressed based on linguistic (verbal) values contained within a set of expressions (words/terms).

The fuzzy values of linguistic variables for the acceptability of each component are shown in Table 1.

Table 1

Linguistic Variables for Determining the Weight of Each Criterion

Description	Symbol	Fuzzy Numbers
Very Low	VL	(0 0 1 2)
Low	L	(1 2 2 3)
Less than Average	ML	(2 3 4 5)
Average	M	(4 5 5 6)
More than Average	MH	(5 6 7 8)
High	H	(7 8 8 9)
Very High	VH	(8 9 10 10)

The fuzzy decision matrix and fuzzy weights of the components of business intelligence have been derived using the opinions of managers and experts. As observed, creativity and innovation capability, with a very high score, has been selected as the most important perspective for

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competitiveness, and input resources, with a medium score, have been considered less important than other perspectives.

Table 2

Fuzzy Decision Matrix and Fuzzy Weights

Criteria/Components	Intangible Factors	Business Factors	Technical Factors
Internet	(5, 6, 7, 8)	(7, 8, 8, 9)	(2, 3, 4, 5)
Blockchain	(0, 0, 1, 2)	(7, 8, 8, 9)	(5, 6, 7, 8)
Management Information Systems	(5, 6, 7, 8)	(7, 8, 8, 9)	(7, 8, 8, 9)
Decision Support Systems	(2, 3, 4, 5)	(4, 5, 5, 6)	(2, 3, 4, 5)
Data Reliability	(8, 9, 10, 10)	(8, 9, 10, 10)	(7, 8, 8, 9)
Information Confidentiality	(7, 8, 8, 9)	(8, 9, 10, 10)	(8, 9, 10, 10)
Data Availability	(2, 3, 4, 5)	(7, 8, 8, 9)	(2, 3, 4, 5)
Discovery of Data Relationships	(8, 9, 10, 10)	(2, 3, 4, 5)	(7, 8, 8, 9)
Data Mining	(2, 3, 4, 5)	(2, 3, 4, 5)	(2, 3, 4, 5)
Data Integration	(0, 0, 1, 2)	(1, 2, 2, 3)	(0, 0, 1, 2)
Requirements	(0, 0, 1, 2)	(2, 3, 4, 5)	(1, 2, 2, 3)
Number of Connections	(5, 6, 7, 8)	(5, 6, 7, 8)	(5, 6, 7, 8)
Type of Requested Services	(2, 3, 4, 5)	(7, 8, 8, 9)	(7, 8, 8, 9)
High Profit Margin	(8, 9, 10, 10)	(7, 8, 8, 9)	(7, 8, 8, 9)
Managers' Economic View	(4, 5, 5, 6)	(4, 5, 5, 6)	(1, 2, 2, 3)
Financial Resources	(7, 8, 8, 9)	(7, 8, 8, 9)	(5, 6, 7, 8)
Identification of Environmental Threats and Opportunities	(4, 5, 5, 6)	(1, 2, 2, 3)	(2, 3, 4, 5)
Customer Satisfaction and Loyalty	(2, 3, 4, 5)	(8, 9, 10, 10)	(7, 8, 8, 9)
Service Quality Improvement	(1, 2, 2, 3)	(4, 5, 5, 6)	(7, 8, 8, 9)
Service Diversity	(8, 9, 10, 10)	(0, 0, 1, 2)	(2, 3, 4, 5)
Focus on Customer Needs and Desires	(2, 3, 4, 5)	(4, 5, 5, 6)	(5, 6, 7, 8)
Employee Knowledge	(2, 3, 4, 5)	(2, 3, 4, 5)	(0, 0, 1, 2)
Employee Skills	(8, 9, 10, 10)	(1, 2, 2, 3)	(0, 0, 1, 2)
Employee Expertise	(2, 3, 4, 5)	(5, 6, 7, 8)	(2, 3, 4, 5)
Organizational Culture	(7, 8, 8, 9)	(2, 3, 4, 5)	(2, 3, 4, 5)
Organizational Structure	(1, 2, 2, 3)	(0, 0, 1, 2)	(0, 0, 1, 2)
Processes	(5, 6, 7, 8)	(7, 8, 8, 9)	(4, 5, 5, 6)

In Table 2, which represents the first stage of decision-making, the importance of each sub-criterion relative to the three main dimensions of business intelligence (technical factors, business factors, and intangible factors) is measured, and instead of each quantitative variable, the corresponding value according is placed. The normalized fuzzy weight matrix can be seen in Table 3.

Table 3

Normalized Fuzzy Weight Matrix

Indicators	Source-Based View				Market Position				Creativity and Innovation Power			
Internet	0.16	0.27	0.4	0.5	0.35	0.48	0.56	0.72	0.05	0.12	0.14	0.24
Blockchain	0.4	0.54	0.7	0.8	0.35	0.48	0.56	0.72	0.05	0	0.02	0.06
Management Information Systems	0.56	0.72	0.8	0.9	0.35	0.48	0.56	0.72	0.05	0.12	0.14	0.24
Decision Support Systems	0.16	0.27	0.4	0.5	0.2	0.3	0.35	0.48	0.02	0.06	0.08	0.15
Data Reliability	0.56	0.72	0.8	0.9	0.4	0.54	0.7	0.8	0.08	0.18	0.2	0.3
Information Confidentiality	0.64	0.81	1	1	0.4	0.54	0.7	0.8	0.07	0.16	0.16	0.27
Data Availability	0.16	0.27	0.4	0.5	0.35	0.48	0.56	0.72	0.02	0.06	0.08	0.15
Discovery of Relationships Among Data	0.56	0.72	0.8	0.9	0.1	0.18	0.28	0.4	0.08	0.18	0.2	0.3
Data Mining	0.16	0.27	0.4	0.5	0.1	0.18	0.28	0.4	0.02	0.06	0.08	0.15
Data Integration	0	0	0.1	0.2	0.05	0.12	0.14	0.24	0	0	0.02	0.06

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Requirements	0.08	0.18	0.2	0.3	0.1	0.18	0.28	0.4	0	0	0.02	0.06
Number of Connections	0.4	0.54	0.7	0.8	0.25	0.36	0.49	0.64	0.05	0.12	0.14	0.24
Type of Requested Services	0.56	0.72	0.8	0.9	0.35	0.48	0.56	0.72	0.02	0.06	0.08	0.15
High Profit Margin	0.56	0.72	0.8	0.9	0.35	0.48	0.56	0.72	0.08	0.18	0.2	0.3
Managers' Economic View	0.08	0.18	0.2	0.3	0.2	0.3	0.35	0.48	0.04	0.1	0.1	0.18
Financial Resources	0.4	0.54	0.7	0.8	0.35	0.48	0.56	0.72	0.07	0.16	0.16	0.27
Identification of Environmental Threats and Opportunities	0.16	0.27	0.4	0.5	0.05	0.12	0.14	0.24	0.04	0.1	0.1	0.18
Customer Satisfaction and Loyalty	0.56	0.72	0.8	0.9	0.2	0.3	0.35	0.48	0.02	0.06	0.08	0.15
Improvement of Service Quality	0.56	0.72	0.8	0.9	0.2	0.3	0.35	0.48	0.01	0.04	0.04	0.09
Service Diversity	0.16	0.27	0.4	0.1	0	0	0.07	0.16	0.08	0.18	0.2	0.3
Focus on Customer Needs and Desires	0.4	0.54	0.7	0.8	0.2	0.3	0.35	0.48	0.02	0.06	0.08	0.15
Employee Knowledge	0	0	0.1	0.2	0.1	0.18	0.28	0.4	0.02	0.06	0.08	0.15
Employee Skills	0	0	0.1	0.2	0.05	0.12	0.14	0.24	0.08	0.18	0.2	0.3
Employee Expertise	0.16	0.27	0.4	0.5	0.25	0.36	0.49	0.64	0.02	0.06	0.08	0.15
Organizational Culture	0.16	0.27	0.4	0.5	0.1	0.18	0.28	0.4	0.07	0.16	0.16	0.27
Organizational Structure	0	0	0.1	0.2	0	0	0.07	0.16	0.01	0.04	0.04	0.09
Processes	0.32	0.45	0.5	0.6	0.35	0.48	0.56	0.72	0.05	0.12	0.14	0.24

In the third step of the decision-making stage, the normalized fuzzy weight matrix, according to Table 3, was obtained. It is worth mentioning that due to the voluminous calculations, mentioning the normalized fuzzy matrix obtained using formulas 2 and 3 has been omitted. Table 4 has been formed using the fourth formula. In the final stage, the sets of positive and negative ideal points will be obtained using formulas 8 and 9. Positive ideal points show the distance from the positive ideal, and negative ideal points show the distance from the negative ideal. Therefore, the closer the indicators are to the positive ideal and the further from the negative ideal, the higher their priority. The closeness coefficient, which is calculated through formula 10, indicates the degree of importance of the indicators. Meaning that the higher the closeness coefficient, the better the rank of the variables. The sets of positive and negative ideal points, closeness coefficient, and the final ranking of the variables can also be seen in Table 4.

Table 4

Set of Ideal Positive and Negative Points, and Final Weights of Indicators (Source: Research Findings)

Indicatior	Ideal Positive Set	Ideal Negative Set	Closeness Coefficient	Rank
Internet	2.0361	1.0542	0.3411	14
Blockchain	1.8903	1.2047	0.3892	9
Management Information Systems	1.64	1.453	0.4698	4
Decision Support Systems	2.2786	0.795	0.2586	18
Data Reliability	1.5163	1.5895	0.5118	2
Information Confidentiality	1.4603	1.6838	0.5355	1
Data Availability	2.0946	0.9915	0.3213	15
Discovery of Relationships Among Data	1.8657	1.2257	0.3965	8
Data Mining	2.3717	0.7122	0.2309	19
Data Integration	2.7742	0.2968	0.9665	26
Requirements	2.5623	0.502	0.1635	23
Number of Connections	1.8675	0.2409	0.3992	7
Type of Requested Services	1.6986	1.3903	0.4501	5
High Profit Margin	1.5886	1.505	0.4865	3
Managers' Economic View	2.3852	0.6691	0.2191	20
Financial Resources	1.7479	1.3527	0.4362	6
Identification of Environmental Threats and Opportunities	2.4413	0.6261	0.2041	22
Customer Satisfaction and Loyalty	1.8825	1.1935	0.388	10
Improvement of Service Quality	1.9142	1.1561	0.3765	12
Service Diversity	2.4383	0.6493	0.2103	21

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Focus on Customer Needs and Desires	2.0176	1.0669	0.3459	13
Employee Knowledge	2.6206	0.4674	0.1514	25
Employee Skills	2.6076	0.4706	0.1529	24
Employee Expertise	2.1870	0.906	0.2929	16
Organizational Culture	2.286	0.8011	0.2595	17
Organizational Structure	2.8289	0.2525	0.0819	27
Processes	1.8982	1.1759	0.3825	11

Considering Table 4, it is observed that the indicators "information confidentiality," "data reliability," "high profit margin," "financial resources," and "management information systems" have the highest closeness coefficients and are among the most important components of business intelligence. Meanwhile, "stakeholder requirements," "data integration," and "organizational structure" have the least importance. Also, among the main criteria of business intelligence, technical factors have been selected as the most important dimension, followed by business factors in the second rank.

4 Discussion and Conclusion

In this research, the components of the business intelligence model in the subsidiaries of the National Bank have been ranked using the fuzzy TOPSIS technique. Initially, 27 indicators were presented in the form of 8 components and 3 dimensions using the coding method, and then the identified indicators were ranked using the fuzzy TOPSIS technique. These dimensions are technical factors (including components of informational tools, information and data characteristics, and analysis), business factors (including components of stakeholders, economic and financial factors, and customer orientation), and intangible factors (including components of human capital and organizational capital).

The results also showed that the "information confidentiality" indicator was selected as the most important, and "organizational structure" as the least important indicator.

As mentioned, technical factors were identified as the primary dimension of business intelligence. Generally, it can be claimed that the main role of business intelligence is to improve organizational performance through the effective use of relevant data. The subsidiaries of the National Bank, by effectively utilizing business intelligence tools and techniques for data analysis, will be able to gain valuable insights about current and future market trends, organizational processes, and business strategies, using such insights for better business decision-making, which leads to increased productivity and revenue, thereby accelerating business growth and profit.

Through the use of business intelligence, the subsidiaries of the National Bank will be able to analyze the performance of employees, competitors, different organizational units, profitability, and other important indicators. Additionally, by using advanced charts and diagrams, they can compare related indicators and thus, conduct a correct analysis of internal factors such as employees and organizational infrastructure, as well as external factors like depositors, market conditions, inflation, and environmental issues.

The second identified dimension is business and commercial factors. Given that the primary nature of the deposit companies (as subsidiaries of the National Bank) is to provide accurate, fast, high-quality, and appropriate services to their depositors, it can be claimed that improving the quality of services and offering new and diverse services can lead to improved customer satisfaction and loyalty, and consequently, higher profitability for these organizations. Moreover, given the financial nature of these organizations and the volatility and uncertainty of the environment, undoubtedly achieving higher profitability of financial resources and a suitable profit margin is of utmost importance.

The third and last dimension is intangible factors. This dimension, like the first, emphasizes organizational factors. However, while technical factors focus on the aspect of information technology, intangible factors are based on human and organizational factors. Undoubtedly, one of the most strategic weapons of any organization is its human resources. Considering that deposit companies deal with a large volume of financial resources, it can be claimed that the employees of these organizations must possess high skill and expertise in financial matters to be able to accurately analyze financial data. Employees, by utilizing business intelligence tools, will be capable of analyzing the financial status of depositors faster and better, thus achieving higher accuracy and speed in all their related affairs.

On the other hand, the prevailing culture in these organizations should be a learning culture, and managers should always encourage their employees to learn. Given the

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updating of the software used, if employees do not update their knowledge and learn to use new software, the organization will undoubtedly face many problems and may lose many of its depositors.

The selection of the "information confidentiality" indicator as the most important can be interpreted as the subsidiaries of the National Bank striving to gain the trust of their customers by protecting various customer information such as personal, financial, business-related, security (such as passwords, access information, etc.), and thereby improving their loyalty.

The reliability of collected data, being the second most important indicator of business intelligence, highlights the role of business intelligence in distinguishing a mass of data from reliable data. Because having reliable data and being in possession of trustworthy data allows the subsidiaries of the National Bank to classify and analyze these data correctly and avoid examining other less important and unreliable data.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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