

How Artificial Intelligence Drives Operational Cost Reduction: Evidence from Jordanian Companies

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Abstract: This study aims to propose a conceptual framework that links the components of artificial intelligence applications to operational costs. The framework included machine learning, computer vision, planning, task management, Smart thinking as an independent variable, with operational costs in Jordanian companies as a dependent variable. A quantitative research approach was used to evaluate the proposed measurement consisting of 31 items. A total of 250 questionnaires were distributed and 163 valid responses were received. The initial analysis showing that some factors loading and AVE values did not meet the recommended thresholds, requiring refinement of the measurement model. After modification, the model achieved acceptable levels of factor loadings, Composite Reliability, Cronbach's Alpha, and AVE. Discriminant validity was confirmed using the Fornell-Larcker criterion and the HTMT ratio. The study focused on validating the measurement model, while future research should examine both the measurement and structural model.

Keywords: Artificial intelligence, Operational costs, Cost reduction, Automation, Process optimization

1. INTRODUCTION

Artificial intelligence applications play an important role in making various decisions related to financial and economic issues. It also has a significant impact on the development of organizations (Hemanand et al, 2022). Artificial Intelligence applications are an essential element for successful business operation and cost reduction. It helps the accounting department create and provide reliable and relevant information. In an AI application environment, the characteristics of the use of applications and the reports generated from them can affect overall internal control. In addition, these internal controls are operated to ensure that operational objectives are achieved and operational costs are reduced (Fountaine et al, 2019).

Artificial intelligence applications play a prominent role in decision-making processes in multiple areas related to financial and economic issues. In addition, it plays a vital role in the progress and development of organizations. (Qudah, et al, 2025). These applications are an essential part of ensuring organizations' business success and reducing costs. It enables accounting departments to produce and provide reliable and relevant information. In the context of AI applications, the characteristics of use and the resulting reports can significantly impact overall internal control. This internal control works to ensure that operational objectives are achieved and operational costs are reduced.

It is generally believed that investing in AI applications can provide important opportunities for organizations to enhance business process effectiveness (Petkov, 2020) and (Weshah, 2025). Artificial Intelligence (AI) applications add value to an organization, as they provide accurate and timely information, perform key activities efficiently and effectively, and enhance cost control (Ansari et al, 2022). One of the most important systems in organizations is the systems that are based on artificial intelligence (Rodríguez et al, 2020). It aims to provide the necessary information for management. Such information helps management effectively perform its duties in planning, monitoring the company's resources, making decisions, enhancing performance, and controlling costs (Shkarlet et al, 2020).

It is generally believed that investing in AI applications can give organizations important opportunities to enhance the effectiveness of their operations (Petkov, 2020). These applications provide tangible value to organizations, as they provide accurate and timely information, carry out key activities efficiently and effectively, and contribute to cost control (Ansari et al, 2022). The artificial intelligence system is considered one of the most important systems used in organizations, as it aims to provide management with the necessary information. This information effectively helps management perform its tasks related to planning, monitoring the company's resources, making decisions, improving performance, and controlling costs (Shkarlet et al, 2020).

Effective implementation of an AI system has many benefits such as improving work quality and product flow, flexibility, motivation and development in using software applications, developing employees' ability to solve various problems and increasing employee productivity. and its performance in relation to the cost of production (Weber, 2021). In addition, the use of AI is able to reduce company costs, develop employees' work, innovation and attitudes (Al-Lawama, et al, 2025) aking within organizations in exploiting resources (Hemanand et al, 2022). However, there are many previous studies related to company performance under the use of artificial intelligence, such as (Alrfai et al 2021); (Ahmad, et al, 2022); (Al-Okaily, et al, 2022); (Saleh, Mousa et al 2021) It has been studied and applied in some developing countries such as the United Arab Emirates and Saudi Arabia, as well as in the Jordanian context. Jordan is considered a starting point for adopting modern and advanced technologies in the Middle East and North Africa region (Al-Lawama, et al, 2026) The problem of the study revolves around understanding the difficulties and challenges facing companies in Jordan in using artificial intelligence and applying it effectively, and how these problems can be overcome to achieve a reduction in operational costs. Here the following study problem appeared:

“The role of artificial intelligence applications in reducing service operational costs in Jordan?”

2. Literature Review

Artificial intelligence applications are considered the most important part of preparing accurate financial reports that detect errors and audit data. Therefore, accounting information obtained from artificial intelligence applications is a kind of basic knowledge for an effective management system. Moreover, the data obtained from these applications together with the computer base ensure very significant contributions to the success of management systems.

(Al-Tarawneh et al, 2020) concluded that external auditors are depending more on internal auditors work under ERP implementation. If ERP considered as a form of modern digital transformation, then perhaps AI will have the same impact.

The following Table 1 describes some definitions of AI and business.

Author	Definition
Mishra and Amit, 2021	Artificial intelligence applications are used to analyze large amounts of data and generate accurate predictions using machine learning and data mining techniques.
Sarker, 2022	AI applications depend on the ability of systems to learn and improve their performance based on data and experiences, without the need for manual programming.
Khatib, 2020	AI applications allow human language to be understood and processed naturally, enabling it to interact with humans in a more intelligent way.
Górriz, 2023	Artificial intelligence applications are used to create and develop robots and integrated self-decision systems to improve productivity and achieve automation in various fields.

Bharadiya, 2023	It relies on artificial intelligence applications to enable systems to effectively understand and analyze images, video and visual data, opening doors to wide applications
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Bharadiya, Jasmin Praful. (2022), the features of artificial intelligence applications are a process of extracting reports in an integrated manner and in the best possible way (Vollmer et al, 2020). It basically reflects the integration of several processing subsystems or artificial intelligence subsystems, since all reports need data built in an integrated and correct form.

Vollmer et al (2020) defined why we need AI applications in companies as follows: (1) Providing useful reports in the decision making process (2) Providing relevant data regarding decision making, (3) Providing data that enhances the efficiency of the decision taken (Trunk et al, 2020). There are many studies that provide evidence that AI applications are able to provide benefits to decision makers in organizations and all stakeholders (El Khatib and Ahmad, 2021), (Schneider et al., 2022).

2.1 Features of the AI

In a typical corporate environment, AI systems consist of different components. According to Schneider et al. (2022), and 23); Rana et al. (2022), AI systems consist of six components, namely; Data and input, data processing, machine learning, user interaction, navigation and movement, performance improvement and development (Rana et al, 2022), (Collins et al, 2021).

In addition to the quality of the reports and information it provides and its services (Cubric, 2020), (Benbya et al, 2021) and the infrastructure of information technology (IT) agents within the AI system are considered some of the most important factors influencing the effectiveness of AI in organizations, since they enable companies to track, record, and produce Financial and accounting data easily, in addition to these factors can quickly process the company's transactions in the financial statements (Nguyen et al, 2022), (Bodendorf et al, 2021) in In the current study, the components of the AI system consist of the following components: machine learning, computer vision, planning, task management, and intelligent thinking.

2.1.1 Machine learning

Frank et al. (2021) and Sect et al. (2020) stated that machine learning allows huge amounts of data to be analyzed quickly and accurately. This analysis can be used to identify trends and patterns in data, helping to make better decisions and improve operations - and machine learning can be used to improve production processes in factories and companies. Organizing production schedules and determining the optimal time for equipment maintenance, which reduces production and maintenance costs - and also through machine learning, routine and repetitive processes can be improved intelligently, saving time and effort for workers and reducing human errors - in addition to using machine learning, quality can be monitored and analyzed in a way Continuous, thus immediate improvements can be made to ensure improved quality of products or services (Tayefeh et al, 2020), (Antun et al., 2020).

2.1.2 Computer vision

Antun et al. (2020) And Pan et al. (2021) talks Computer vision systems can accurately analyze images and video clips, which helps in monitoring processes, verifying quality, and analyzing performance. Companies use computer vision systems to improve production processes, such as quality control and automated product inspection, which leads to increased productivity and reduced human error. Computer vision can be used to improve supply chain operations, such as tracking and inspecting products during their transportation and storage, which leads to improving distribution efficiency and reducing costs. Computer vision can be used to analyze visual data and extract future patterns and forecasts, which helps in making informed strategic decisions. It can also be applied Computer vision in creating interactive systems based on facial and movement recognition, which improves the user experience and reduces human effort (Baduge et al, 2022).

2.1.3 Planning and task management

Baduge, et al (2022) and Wamba-Taguimdje et al (2020) AI applications in planning and task management are key to increasing the efficiency of operations and improving better resource allocation. These applications allow companies to analyze huge amounts of data and turn it into valuable knowledge that helps make informed and accurate decisions. Artificial intelligence systems can analyze patterns and trends that are difficult to detect manually, thus guiding the company towards better production planning, distribution, and task management.

In addition, artificial intelligence technologies can improve the organization of schedules and determine the best ways to distribute tasks among employees. Reducing interference and improving arrangement contributes to increasing productivity and reducing wasted time, which reflects positively on operations costs and helps achieve the company's goals more efficiently and at a lower cost.

In short, leveraging advanced AI technologies in planning and managing tasks is a necessary step for companies to achieve an optimal balance between quality and cost, leading to improved business sustainability and increased competitiveness in the market.

2.1.4 System Quality

One of the most significant elements of operational processes improvement in companies is intelligent thinking in the use of artificial intelligence applications. This thinking allows the application of big data and advanced analytics to generate strategic insights and accurate analysis, which in turn aids in increasing productivity, and cost savings. Intelligent thinking also involves being able to learn from machines and adapting accordingly to achieve better outcomes and to be more efficient at meeting company goals.

The applications use sophisticated technology like machine learning and artificial neural networks, enabling the leveraging of big data for modelling and predictions. The system can learn from the past data and experiences, so it can automatically make intelligent decisions. This helps enhance production processes and effective use of resources, resulting in substantial cost savings on operations.

2.2 Features of artificial intelligence applications and operational costs

AI applications are built on the principles of analyzing large volumes of data and machine learning to make informed decisions. These applications comprise forecasting, analyzing data complexities, and more.

AI applications can also assist in the optimization of business operations by analyzing data and providing insights for decision-making. Minimizing unnecessary operations and maximizing efficiency help to lower operating costs.

Applications help in better planning and effective task management. Giving directions which help to improve the allocation of resources and time, so minimising waste and enhancing productivity.

Furthermore, the applications allow for the application of cloud computing and big analytics technologies to support with efficiency integration and data processing, making structural costs and investments in infrastructure lower.

In sum, the benefits of AI applications provide an essential resource for companies to enhance efficiency and manage quality and cost, ultimately boosting operational efficiency and delivering real cost savings.

2.3 Overview of the Conceptual Framework

Process Optimization Theory: This theory suggests that artificial intelligence applications can help improve the efficiency of operational processes by improving the use of resources and increasing productivity. This theory is applied to analyze how operations can be improved thanks to artificial intelligence technology and reduce costs related to operations.

Data Analytics Theory: This theory indicates the importance of analyzing data and information in making correct administrative decisions. Artificial intelligence applications help in collecting and analyzing data effectively, which can lead to a better understanding of operational processes and related costs.

Cost Control Theory: This theory is based on the concept of controlling and reducing costs. AI applications can play a crucial role in analyzing and monitoring operational costs and providing opportunities to control them effectively.

Nowadays, the demand for AI applications is increasing due to its significant impact on costs. Most of the previous literature has been conducted in developed countries where AI technologies have been widely accepted. Therefore, it is recommended that more research be conducted in developing countries in this area to fill the gap in the literature (Górriz, 2023).

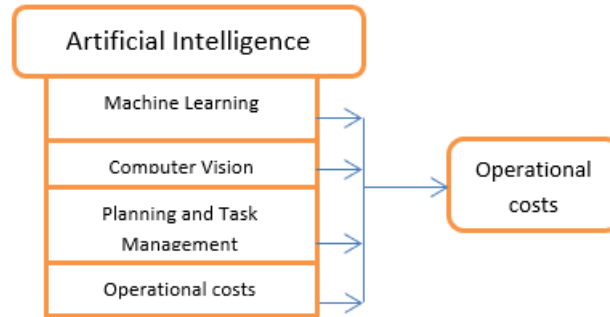


Figure 1: conceptual framework

3. Research Methods

The type of research method that will be used for this research is quantitative research. The primary data were gathered from the employees of the Jordanian companies listed in Amman Stock Exchange (ASE) in Industrial and Services Sector companies in Jordanian Industrial and Services that use accounting information system. The Amman Stock Exchange records show that there were a total of 70 industrial and service companies listed (2022). The researcher gave out 250 questionnaires, with a return rate of 163 questionnaires completely answered (75.1%) and suitable for analysis. A total of 104 questionnaires (out of the 150 questionnaires distributed) were received from companies that were active in the service sector. Second place was taken by the industrial sector with valid questionnaires being 59 out of 100 questionnaires.

Table 2. Response rate

#	sector	Distributed questionnaires	Respondents
1	Services sector	150	104
2	Industrial sector	100	59
Total	250	163	

4. Developing the questionnaire

The instruments were carefully structured to reflect the nature of this research. The questionnaire was carefully designed to include 20 items, and variables were measured using a five-point Likert scale, where five points represented “strongly agree” and one point represented “strongly disagree.” Since the participants spoke Arabic, it was necessary to accurately translate the questionnaire from English to Arabic. Hence, back translation was performed, which is a common method for determining translation accuracy in cross-cultural surveys.

Table 3. Research Instrument

Citation	Adapted	No Item	Construct
	AML1: Your company currently uses e-learning and artificial intelligence technologies to manage and analyze the costs of its activities AML 2 : The challenges you faced while implementing the e-learning and artificial intelligence strategy in cost management AML3 : Your company intends to increase its investment in e-learning and artificial intelligence to improve cost management in the future	4	AI (Machine Learning) AML

	AML4: Your company has seen an improvement in the efficiency of cost management and financial decision making thanks to the application of e-learning and artificial intelligence technologies		
	ACV1: Uses of computer vision and artificial intelligence that you see as important in improving company costs ACV2: Your company has implemented systems or technologies that use computer vision and artificial intelligence to improve cost management ACV3: Computer vision and artificial intelligence will contribute to improving your company's profitability by improving cost management ACV4: computer vision and artificial intelligence be the focus of innovation in cost analysis and production planning in your company	4	AI(Computer Vision) ACV))
	APM1 : Your company will use AI applications in planning and managing tasks within the organization APM2: The use of artificial intelligence in planning and task management positively affects the performance of company employees APM3: Your company has encountered the implementation of artificial intelligence systems in planning and task management APM4: The use of artificial intelligence can help achieve a work-life balance for company employees	4	AI (Planning and Task Management) APM
	ACC1: Your company uses AI applications in cognitive computing to support operations and decision-making within the organization ACC2: Using AI in cognitive computing can help save employees time and effort ACC3: Artificial intelligence contributes to improving the organization's interaction with customers and better meeting their needs ACC4 : Cognitive computing and artificial intelligence will be one of the engines of digital transformation for your company in the future	6	AI(Cognitive Computing) ACC
	OTC1: The company uses artificial intelligence technologies in its operational processes OTC2: Using technology and artificial intelligence to improve the efficiency of the company's operational costs	8	Operational costs OTC))

	OTC3: The company is integrating operational costs with artificial intelligence technologies OTC4 : Specific strategies followed by leaders in the company to achieve improved cost efficiency using technology and artificial intelligence		
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5. Results and analysis

The current study evaluated the measurement model in two steps consisting of assessing convergent validity and discriminant validity. Prior to these two steps, however, a brief explanation of the respondents' profiles is first provided.

5.1 Respondent profile

The first sections of the instrument received data on the background of the respondents including their gender, sector, experience and the age of organization and system. These are described in the following Table 4 for each of the demographical profiles.

Table 4. Respondent Profile (Frequencies)

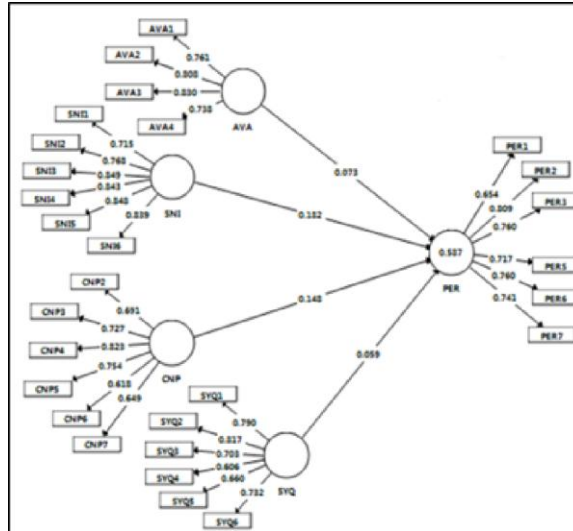
Construct	Options	Frequency	Percent
Gender	Male	106	0.65
	Female	57	0.35
Sector	Services sector	96	0.59
	Industrial sector	67	0.41
Experience	Less than 5 years	65	0.39
	5 – 9 years	74	0.45
	10- 15 years	15	0.10
	More than 15 years	9	0.06
Organization Age	Less than 5 years	24	0.14
	5 – 9 years	42	0.31
	10- 15 years	68	0.42
	More than 15 years	29	0.13
System	A combination of manual and computer processed	34	0.21
	Completely computerized	129	0.79
Total		163	100%

5.2 Convergent Validity

This study employed the research model which was tested with the application of SmartPLS 3.3. Furthermore, an analysis was performed on the measurement model (validity and reliability of the measures). Therefore, for each group of data, all constructs were found to have composite reliabilities above the recommended 0.7 value. Which have a Cronbach's Alpha higher than 0.7? In addition, not all of the constructs in the first run recorded AML values higher than 0.5 for each group of data, as the lowest AVE value reported is for Operational costs (OTC) (0.439), followed by Computer Vision (ACV) (0.440), Cognitive Computing (ACC) (0.520), (Machine Learning (AML) (0.615) and Planning and Task Management (APM) (0.660). Furthermore, ACV 1, PER4, and PER8 scored low factor loadings (-.100, .169, and .150 respectively) which all were below the recommended level of 0.4. Therefore, a form of modification was considered in the second run and, consequently, To attain desirable levels of AML and factor loadings, three variables (ACV 1, OTC 4 and OTC 8) were removed from the data. Overall, all the variables have reached the cut-off, as shown in table 5 and figure 2.

Table 5. Convergent Validity Results

Construct	Item	Factor Loading	Cronbach's Alpha	CR	AVE
AI (Machine Learning) AML	AML1	.761	.795	.865	.617
	AML2	.808			
	AML3	.830			
	AML4	.738			
AI(Computer Vision) ACV	ACV2	.691	.807	.860	.509
	ACV3	.727			
	ACV4	.823			
	ACV5	.754			
	ACV6	.618			
	ACV7	.649			
AI (Planning and Task Management) APM	APM1	.715	.896	.920	.659
	APM2	.768			
	APM3	.849			
	APM4	.843			
	APM5	.848			
	APM6	.839			
AI(Cognitive Computing) ACC	ACC1	.790	.815	.866	.521
	ACC2	.817			
	ACC3	.703			
	ACC4	.606			
	ACC5	.660			
	ACC6	.732			
Operational costs OTC)	OTC1	.654	.840	.880	.550
	OTC2	.809			
	OTC3	.760			
	OTC5	.717			
	OTC6	.760			
	OTC7	.741			
(*)ACV 1, OTC 4 and OTC 8 were deleted due to low factor loading, Cronbach's Alpha, and AVE, as follows: - ACV AVE was 0.440 before deleting CNP1 (factor loading -0.100) - OTC AVE was 0.439 before deleting both of OTC 4 (factor loading 0.369) and OTC 8 (factor loading 0.150)					



5.3 Discriminant validity

Second, discriminant validity was explored to determine how well the construct was discriminating between other constructs. In the area of the distinction of validity, the correlations of the variables. The model estimate was not higher than 0.95, and the validity of the model was assessed by the root mean square variance for the construct and by the correlations between the constructs. Thus, no value in Table 6 is greater than the suggested cut-off of 0.95, as given by the Fornell and Larcker criterion.

Table 6. Fornell and Larcker Criterion

Constructs	AML	ACV	OTC	APM	ACC
AML	.785				
ACV	.410	.713			
OTC	.417	.597	.742		
APM	.445	.656	.679	.812	
ACC	.523	.648	.634	.749	.722

In addition, the Heterotrait-Monotrait (HTMT) ratio is a calculation which estimates the actual correlation between two constructs when they are assessed properly (when they are fully reliable). In addition, the HTMT is the average of all correlations of indicators across constructs measuring different constructs (HTMT correlations) compared to the (geometric) mean of the correlations of indicators measuring the same constructs (HTMT correlations) and can be used to test and check discriminant validity. The acceptable level of HTMT should be below 0.90. Thus the acceptable level for HTMT is 0.90, and can be observed in Table 7.

Table 7 HTMT Criterion

Constructs	AML	ACV	OTC	APM	ACC
AML					
ACV	.479				
OTC	.464	.675			
APM	.522	.755	.744		

ACC	.666	.751	.710	.859	
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6 Discussions

1. Operation and effectiveness:

AI applications can automate routine and repetitive tasks, increasing operational efficiency and reducing the time and effort required to complete these tasks. This automation can lead to labor cost savings and increased productivity.

2. Demand forecasting and forecasting analytics:

AI-based forecasting analytics can more accurately anticipate market needs, allowing companies to optimize supply chains, inventory levels and production schedules, reducing excess inventory costs and avoiding stock-outs.

3. Energy management and optimization:

AI can be used to optimize energy consumption within a company. Smart energy management systems can recognize energy usage patterns and suggest energy saving measures, reducing energy and other utility costs.

4. Data-driven decision making:

AI applications can process large amounts of data quickly and accurately, providing actionable insights for decision making. Data-driven decisions can lead to cost savings by identifying areas for operational improvements and optimizing resource utilization.

5. Customer Service and Chat Bots:

Customer queries and requests can be answered 24/7 with the help of AI-powered chatbots. Automating the customer service process can save companies from having to hire a large customer support team, which can lead to cost savings.

6. Maintenance and asset management:

AI can forecast equipment/machine failures and facilitate proactive maintenance. This kind of preventive maintenance leads to decreased downtime and maintenance expenses, which helps to achieve overall savings in operation costs.

7. Improving supply chains:

By examining multiple factors like demand, transportation expenses, supplier performance, and more, AI can optimize supply chain operations. This enhances procurement, inventory management, logistics, which in turn reduces the cost of the supply chain.

8. Fraud detection and security:

AI can also improve security systems with the ability to identify anomalies and potential fraud. This is especially important in financial transactions, as the system can protect against financial losses as a result of fraudulent activities.

7 Theoretical and Practical Implications

7.1 Theoretical influences:

7.1.1 An increased knowledge and understanding of the impact of AI:

The research and analysis helps in a deeper understanding of how artificial intelligence can contribute to improving efficiency and reducing costs in the context of Jordanian companies.

7.1.2 The technical horizon is being expanded:

The study contributes to the broader knowledge available on the technical capabilities and potential of AI applications, which can inform the technological innovation in the local market.

7.1.3 Develop policies and strategies:

The study can inform industry and government with policies and strategies that incentivize effective adoption of AI applications within companies to gain cost savings.

7.2 Practical effects:

7.2.1 Improving process efficiency:

AI can also be used to analyze and enhance processes, which can lead to increased productivity and decreased time spent on tasks and therefore operational costs can be saved.

7.2.2 Improve planning and decision making:

Advanced analytics provided by AI can improve planning and decision-making processes, reducing waste and cost resulting from ineffective decisions.

7.2.3 Improve quick response and customer experience:

By analyzing data and providing quick and accurate answers to customer queries, the customer experience can be improved and thus cost savings can be achieved by increasing customer satisfaction and loyalty.

7.2.4 Saving human costs:

AI applications contribute to the load that can lead to reduction in manpower related costs through machine instead of humans.

7.2.5 Increase productivity and efficiency:

By optimizing processes, improving planning and responding quickly, increased productivity and resource efficiency can be achieved, helping to achieve tangible cost savings.

7.2.6 To sum up, AI contributes to operational cost savings in Jordanian companies by improving operations, improving planning and decision-making, increasing productivity, improving customer experience, and saving human costs.

8 Limitations and Future Recommendations

8.1 Limitations:

8.1.2 Initial cost and implementation costs:

The huge initial investment required to implement AI applications can be a drawback, especially for SMEs in Jordan.

8.1.2 Data availability and quality:

Artificial intelligence relies heavily on data. Without quality and relevant data, the effectiveness of AI applications in cost reduction is affected.

8.1.3 Skills shortage:

AI implementation requires skilled employees, and lack of qualified personnel can delay adoption and reduce its effectiveness.

8.1.4 Integration challenges:

Integrating AI with existing systems and business processes can be complex, leading to technical challenges.

8.1.5 Regulatory and privacy concern:

Organizations should comply with Jordan's data privacy regulations, this may complicate the implementation of AI.

8.2 Future recommendations:

8.2.1 Skills development and education:

Encouraging educational institutions to offer educational programs focusing on artificial intelligence and data science to bridge the skills gap. Training programs for professionals must also be provided to upgrade existing skills.

8.2.2 Government support and incentives:

The government can provide financial support and tax incentives to encourage companies to adopt AI technologies, especially SMEs.

8.2.3 Joint data sharing initiatives:

Encouraging companies to collaborate and share data to solve the problem of data shortages and enhance the ability of artificial intelligence to achieve cost savings.

8.2.4 Spreading awareness and spreading knowledge:

Organizing awareness campaigns and workshops to educate companies about the potential of artificial intelligence to reduce costs. Successful case studies can be particularly effective.

8.2.5 Partnerships and Collaborations:

Encouraging partnerships between local companies and international companies in the field of artificial intelligence to facilitate technology transfer and access to specialized artificial intelligence solutions suitable for Jordanian companies.

Research and development funding:

Allocate funding for research and development in the field of artificial intelligence, with a focus on how to improve operations and reduce costs for Jordanian companies.

Safe testing environment:

Companies may should use a controlled testing environment to evaluate AI applications, reduce risks, and support innovation before full deployment.

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