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The Impact of Continuous Improvement Using Intelligent Automation on Cost Rationalization and Enhancing Administrative Decisions

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Abstract

The main objective of this research is to show the effect of continuous improvement through intelligent automation in rationalizing costs and improving administrative decisions in government institutions, and to apply this research to human resources units at Baghdad University. The relevance of the research is due to the problems of government institutions in the era of digital transformation and the rapid development of information technologies, which necessitates the use of new management approaches that will help increase the efficiency of government work, enhance the quality of services, and minimize resource waste. The research relied on the deductive approach in building the theoretical framework through reviewing literature and previous studies related to continuous improvement, intelligent

automation, cost rationalization, and administrative decisions, as well as the analytical approach in the practical aspect to test research hypotheses. Data were collected through a questionnaire distributed to a sample of employees in the human resources units at Baghdad University, where the number of valid forms for analysis reached 82. Data were analysed using the statistical program (SPSS) based on a set of statistical methods such as Cronbach's Alpha, normal distribution, descriptive statistical indicators, T-Test, and multiple linear regression analysis. The research reached a set of results, most notably the existence of a significant effect of continuous improvement in rationalizing costs, as well as the active role of intelligent automation in reducing paper procedures, accelerating the completion of administrative transactions, and improving the efficiency of resource use. The results also revealed that the integration of continuous improvement and intelligent automation has a positive impact on improving the quality of administrative decisions in terms of providing accurate and timely information to help management select the best alternatives and make more rational decisions. The research ended with several recommendations, among which are the need for government institutions to adopt an integrated strategy for continuous improvement supported by intelligent automation, developing integrated administrative information systems, training human resources in the use of modern technologies, and promoting the culture of decision-making based on data to contribute to the achievement of efficiency and effectiveness in institutional performance.

Keywords: Continuous Improvement, Intelligent Automation, Cost Rationalization, Enhancing Administrative Decisions

Introduction

In recent years, the government institutions have experienced tremendous changes due to the development of information and communication technology that has compelled them to adopt modern administrative techniques which can improve the performance efficiency and meet the demands of the current environment. The traditional ways of handling administrative tasks are no longer able to provide the level of efficiency that is needed to meet the requirements, particularly considering the volume of work, the complexity of procedures, and the need for speed and accuracy in the provision of services. Therefore, the need for continuous improvement as a modern administration method to develop processes and procedures continuously and to improve the performance level, waste reduction and use of resources optimally. Meanwhile, the world has seen a tremendous advancement in the area of intelligent automation that uses information technologies and digital systems to carry out administrative tasks, reducing the use of paper tasks, streamlining processes, and improving the quality of information reaching management. Intelligent automation has become a key tool in supporting administrative decision-making, as it provides accurate and updated data that helps decision-makers analyze problems and choose appropriate alternatives. The combination of continuous improvement and intelligent automation represents an important entry point for developing administrative work in government institutions, because of the integration it achieves between organizational development and technical development, which is reflected positively in cost rationalization and enhancing the quality of administrative decisions. Institutions that rely on continuous improvement and seek to digitize their operations are

more capable of reducing errors, accelerating procedures, and improving the level of transparency, as well as achieving higher efficiency in resource use. Based on this, this research seeks to study the impact of continuous improvement using intelligent automation in rationalizing costs and enhancing administrative decisions in government institutions, with an application to human resources units at Baghdad University, by analyzing the theoretical framework of the subject and testing the relationships between its variables field-wise. The research also aims to provide a set of results and recommendations that can contribute to supporting digital transformation efforts and developing administrative performance in government institutions.

Methodology

Research Problem

The research problem is represented by the fact that most government institutions in the Iraqi environment suffer from obstacles to transformation into automation and digitization in transactions. Based on that, the research problem starts with the following questions:

1. Does the application of continuous improvement using intelligent automation contribute to cost rationalization?
2. Does the application of continuous improvement using intelligent automation contribute to enhancing administrative decisions?

Research Objectives

The research aims to:

1. Demonstrate the role of continuous improvement as a tool of management accounting in reducing waste and rationalizing costs.
2. Demonstrate the effect of intelligent automation in improving the efficiency of resource use.
3. Clarify the extent to which continuous improvement and intelligent automation contribute to providing relevant information to support administrative decisions.
4. Provide practical suggestions that help top management in government institutions adopt modern management accounting tools to improve performance and rationalize costs.

Research Importance

The research derives its importance from the problem and the goal to:

1. Provide practical solutions to improve management performance in government institutions.
2. Enhance employee confidence in government services.

Research Hypotheses

The research starts with a hypothesis that works to provide a solution that can be formulated after verification through data collection and analysis, as follows:

First: Continuous improvement tools contribute to cost rationalization and reducing waste in administrative activities.

Second: Intelligent automation contributes to improving information provided to management.

Third: There is a statistically significant effect of using intelligent automation under continuous improvement in supporting administrative decisions and raising the efficiency of institutional performance.

Spatial Boundaries:

Human resources departments, sections, and units at Baghdad University were selected.

Research Approach

To achieve the research objective and attempt to answer the question described by the researcher, which examined the core of the problem and tried to test the hypothesis, the following were used:

1. Deductive Approach: To complete the theoretical side based on references and sources of scientific literature related to the research topic, to identify the possibility of benefiting from applying continuous improvement and intelligent automation to improve human resource management procedures in government institutions.
2. Analytical Approach: In completing the practical side, the analytical approach was used, leading to conclusions and recommendations.

Section Two

Theoretical Framework – Continuous Improvement and Intelligent Automation

Continuous Improvement

In the following table, we list some definitions of continuous improvement according to the perspective of some researchers:

Table 1. Some Definitions of Continuous Improvement

No.	Researcher	Definition from the perspective of researchers
1	(Kumar, 2017, 2)	"A dynamic process, requiring emphasis on evaluating processes that work well in bringing about change, and those that work well."
2	(Al-Tai, 2018, 78)	"It is a management philosophy that includes all aspects of the organization through involving all employees, by their suggestions regarding work."
3	(Akla, 2021, 33)	"The process of improving, developing, and accelerating the best use of resources, without additional costs, and includes all aspects of the organization, with the involvement of all employees."
4	(Socconini, 2021, 116)	"It is a powerful means to perform continuous improvements at all levels of the institution, which is today practiced by leading organizations."

Through the above, the researcher believes that continuous improvement is a process and activity through which units develop the work method in a way that suits and keeps pace with development, by training employees and forming teams to keep pace with this development.

Importance of Continuous Improvement

Continuous improvement has many important points, including:

1. Reducing errors resulting from employees in the units.
2. Working to increase employee satisfaction, as it is necessary for any unit applying continuous improvement (Salman, 2014, p. 283).
3. At the top management level, they prefer continuous improvement across all joints and levels of the unit for the sake of increasing performance and efficiency.
4. The importance for unit management also lies in the quality of human resources

through employee awareness to improve work quality (Blaga, 2020, p. 288).

Objectives of Continuous Improvement

Continuous improvement has several goals, including speed, efficiency, and accuracy. Some goals related to the research topic can be mentioned as follows:

1. Employee satisfaction with service quality.
2. Involvement of all employees in the unit and support from top management to enable a continuous improvement team at the unit level (Didia et al., 2012, p. 377).
3. Improving performance through integrated effort at the unit level (Haddas et al., 2014, p. 37).

Requirements for Applying Continuous Improvement

Many requirements must be available in any unit to apply continuous improvement, including:

1. Paying attention to basic capabilities, as they provide the foundations for many technical developments, to continuously improve work efficiency.
2. Allocating continuous improvement tools while maintaining their basic character (Otsuka & Sanobe, 2018, p. 63).
3. Anticipating improvement and bringing about changes requires identifying the expected goal and working on motivation through small experiments and self-confidence; this is the Kaizen vision (Al-Rafawi, 2023, p. 42).

Steps of Continuous Improvement:

The continuous improvement process aims to address employee needs, and providing these needs requires monitoring and follow-up. This requires evaluating information about employee observations and determining whether the unit has implemented these needs. The Plan–Do–Check–Act (PDCA) method, also known as the Shewhart cycle or Deming cycle, can be used as shown below (Sraun & Singh, 2015, p. 88; Saleh, 2017, p. 117; Aggarwal, 2020, p. 33).

1. Plan: It is the starting point in identifying the problem, as all information is collected about the process to be improved, and in light of this information, the causes of problems are analyzed, and a plan is put in place to introduce improvements
2. Do: After putting the plan, the work team implements the agreed-upon plan and

measures improvements in the process and product.

3. Check: The main activity in this step is auditing the improvement results and whether the goals set in step (1) have been implemented or not; reports are raised, and the process is documented.

4. Act: In case of step (3), if the reports were positive, this is generalized to activities, and the process continues. In case the reports have observations, they are treated, and then work continues.

The following figure represents the continuous improvement path

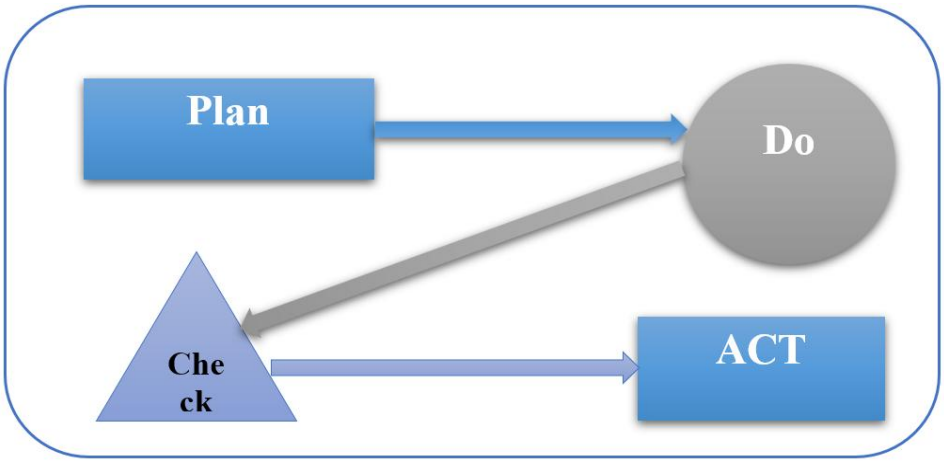


Figure 2. Deming Cycle (PDCA)

Source: Prepared by the researcher based on literature

Section Two

Second: Intelligent Automation

Introduction

Intelligent automation appeared as a result of technical progress and the increasing demand for using computers and their multiple applications under artificial intelligence systems, as intelligent automation became a necessity in our current time for speed and accuracy of work execution.

Definition of Intelligent Automation

Intelligent automation, or electronic automation, has been defined in various ways, depending on the perspectives of different researchers. Some of these definitions are presented in the following table:

Table 2. Definitions of Intelligent Automation

No.	Researcher, Year, Page No.	Definition according to each researcher's perspective
1	(Naib: 2009, 183)	"Making work automatic, with the aim of reducing manual work and speed in performance, and obtaining required results with extreme accuracy."
2	(Al-Tishouri: 2010, 110)	"Using a set of computer systems and connected networks in administrative work, provided daily and permanently in institutions of an administrative nature."
3	(Roper, Millar; 2000, 14)	"It is the intensive use of information technologies, with the aim of increasing the productivity, effectiveness, and ability of employees in bodies, entities, or organizations."
4	(Al-Salmi: 2008, 37)	"Reliance on modern electronic devices for the purpose of organizing administrative work and reducing manual work, to achieve speed and accuracy in performance."

From the above, the researcher believes that intelligent automation is a modern concept that came as a result of rapid development, to reduce waste of time and cost and dispense with paper transactions, with the aim of achieving speed and accuracy in completing transactions.

Objectives of Intelligent Automation

Intelligent automation has many goals, and the goals related to the research topic will be mentioned as follows:

1. Raising the quality and efficiency of administrative work.
2. Decision-making accuracy.
3. Improving services provided to employees (Alaa El-Din, 2008, p. 37).

Advantages of Intelligent Automation

There are many advantages to intelligent automation. The advantages related to administrative work are outlined as follows (Rizq, 2021, p. 655):

1. Performing tasks better by employees.
2. Reducing slack and negligence by cutting down unnecessary work, especially paperwork.
3. Ease of communication between top, middle, and lower management.

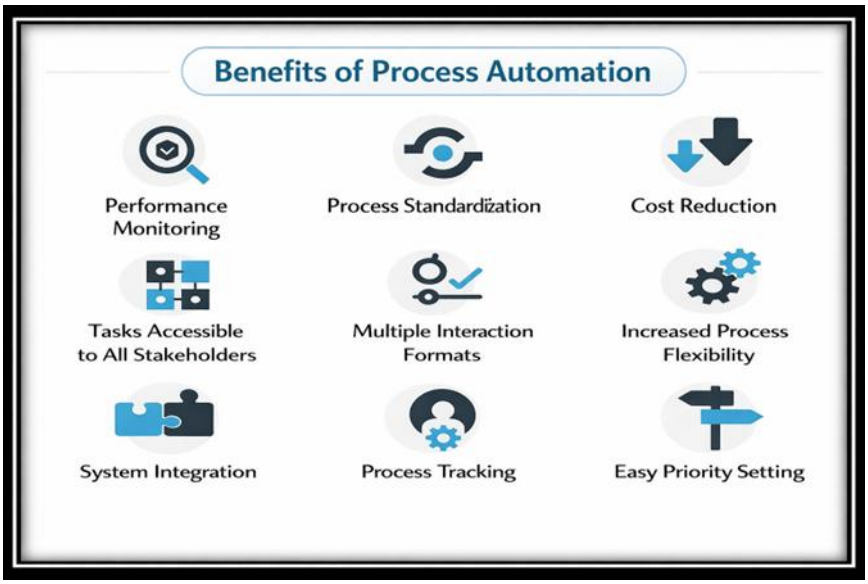


Figure 3. Advantages of Intelligent Automation

Requirements for Applying Intelligent Automation

(Al-Ghamdi: 2022, 10)

1. Organizational requirements.
2. Technical requirements.
3. Human requirements.
4. Financial requirements.

1. **Organizational Requirements:** To achieve the desired goals, the institution needs management that supports and backs change and development, because systems and intelligent automation were found to provide the legal structure for transactions and activities.
2. **Technical Requirements:** Providing smart devices as well as internal networks.
3. **Human Requirements:** The human element is considered one of the most important elements in the institution to achieve the goal. It is necessary for the institution to train and qualify cadres through holding courses and workshops by specialists to teach them the automation process.
4. **Financial Requirements:** Providing sufficient funding to purchase or correct programs, as well as funding courses and workshops.

Section Two

Third: Cost Rationalization and Administrative Decisions

Cost Rationalization

The term rationalization refers to a philosophy that emerged long ago and has gained widespread adoption in recent years. Toyota began applying this philosophy in the early 1950s under the name Toyota Production System. The recent spread of rationalization can be attributed to the various benefits it offers organizations, as well as their recognition of the limitations of traditional production systems in strengthening their competitive positions against comparable foreign goods and services, particularly in an increasingly interconnected world characterized by global trade, communication, and transportation. Rationalization aims to reduce non-value-adding activities, inventory levels, defective and damaged products, and remanufacturing costs, while increasing production capacity and improving product quality (Al-Mushaharani, 2015, p. 20).

Cost rationalization has been defined in several ways, including the following:

Table 3. Definitions of Cost Rationalization

No.	Researcher Name - Year - Page No.	Definition
1	(Haddad, 2019: 19)	The process of controlling and monitoring costs, avoiding unnecessary costs, and benefiting from economic and human resources, with the aim of increasing production efficiency.
2	Saad and Jawad: 2020, 177)	The process of good control and direction in unit resources in order to provide goods and services at the lowest costs, through unit control over its costs to discover deviations and make corrective decisions with the aim of obtaining a competitive advantage and achieving a competitive position in the market.
3	(Al-Ashri, 2021: 9)	An updated system for planning, measuring, and controlling costs, relying on a set of tools that help in identifying and eliminating waste.

The researchers believe that cost rationalization is a methodology that includes a set of methods through which the appropriate rationalization method is chosen according to the current situation of the unit. Rationalization may require only administrative rearrangement and organization without bearing any additional cost, or it may require conducting comprehensive radical changes such as introducing modern technology to all production processes, which requires an increase in costs in the medium and short term to later reduce

costs by improving the quality of processes and their outputs, thus increasing units produced and sold.

Objectives of Production Cost Rationalization

Cost rationalization aims to achieve the following objectives (Al-Obaidi, 2022, p. 43):

1. Eliminating waste and inefficiencies prevailing in the industry; therefore, rationalization involves addressing deficiencies in the production system.
2. Ensuring maximum benefit from resources through the optimal use of available resources.
3. Maximizing production by applying a logical and rational approach.
4. Maximizing efficiency with the least effort because of its impact on actual performance and industrial profitability.
5. Simplifying the marketing and distribution system to increase its efficiency and effectiveness by excluding unnecessary transport practices.
6. Establishing industrial stability, and this is done through adopting means of restructuring and reorganizing the entire industrial structure

Administrative Decisions

The administrative decision represents one of the most important legal means used by administrative authorities to achieve their goals by issuing a final legal measure that establishes, changes, prevents, or amends a specific ongoing matter (Farida, 2017, p. 32). The decision-making process is one of the most important administrative processes, as it represents the beating heart of management and the main axis in addressing problems facing the economic unit. The correctness and quality of the decision-making process depend on the method by which the decision is made. Information systems available at all administrative levels provide support and assistance for decision-making by linking data and analytical models. Thus, Amir (2023, p. 36) believes that the concept of the administrative decision represents a logical product of the decision-making process. It has also been defined as the conscious and deliberate selection of available alternatives in a specific situation (Mustafa, 2024, p. 8).

Elements of Administrative Decision Making

The administrative decision-making process includes several important and effective elements that contribute to reaching decisions and solving problems. Raheef and Al-Musawi (2023, p. 493) identified the following elements of decision-making:

1. **The Decision Maker:** The decision maker is often a person from within the economic unit and is characterized by his ability to make a decision and obligate others to implement it.

2. **The Subject of the Decision:** Decision-making is always linked to a specific problem, as the decision maker studies, analyzes, and works to solve the problem.

3. **Available Information and Data:** The abundance of relevant data and information for the decision maker facilitates his decision-making process. Information must be characterized by accuracy, clarity, realism, speed, cost, comprehensiveness, and suitability for making decisions.

4. **Appropriate Decision-Making Environment:** The environment represents the basic base for making administrative decisions, whether it is an internal or external environment. The success of decisions depends to a large degree on the environment and the organizational structure within the economic unit.

5. **Motivation:** Usually, no decision is made within economic units unless there is a motivation aimed at achieving it.

6. **Available Alternatives:** A set of alternatives is put in place to address a specific problem, and then the best alternative is chosen.

7. **Constraints:** There are many constraints the decision maker must take into account, the most important of which are risks and uncertainty about the results of the decision taken or its implementation period to ensure the safety and correctness of the decision taken and the extent of its reflection on the economic unit in the future.

Quality of Administrative Decision

Decision quality refers to the selection of the best alternative among the available alternatives that have been evaluated. Hallou (2022, p. 42) identified the following characteristics of decision quality:

1. Objectivity.

2. Correctness of information and ensuring its accuracy and suitability for the decision.

3. Involvement of experts and specialists.

4. The decision should be at the right time.

5. The decision should not violate the law.

The Role of Intelligent Automation and Continuous Improvement in Rationalizing Costs and Supporting Administrative Decisions

The rapid development in information technology led to the emergence of intelligent automation as one of the most important modern tools in supporting administrative decisions and rationalizing costs. Automation contributes to providing accurate and immediate information about processes and costs, facilitating the process of tracking procedures, and reducing human errors, which reflects positively on the quality of the administrative decision. Continuous improvement also contributes to enhancing the effectiveness of intelligent automation by reviewing procedures periodically, updating administrative processes, and addressing deficiencies, ensuring the achievement of the highest levels of efficiency. The integration between intelligent automation and continuous improvement leads to creating a dynamic work environment based on sustainable development and spending rationalization. The impact of this integration is represented in:

- Improving the quality of information used in making administrative decisions.
- Reducing time, effort, and cost in completing transactions.
- Raising institutional performance efficiency and achieving optimal use of resources.
- Enhancing transparency and accountability in administrative work.
- Supporting the achievement of government institutions' goals efficiently and effectively.

Section Three

Practical Aspect

Institutional Efficiency under Continuous Improvement and Intelligent Automation

Research Community

Clarifying the study community and its characteristics is a fundamental necessity upon which field research depends, as it allows the researcher the possibility of generalizing the study results.

In order to obtain primary data and reach the achievement of research objectives and test its hypotheses, 100 questionnaire forms were distributed to employees within the specializations related to the research topic, and 82 valid forms for statistical analysis were retrieved. The questionnaires were emptied and analyzed using the statistical program (SPSS 27). The questionnaire aims to measure the level of employee satisfaction in government institutions when applying administrative work simplification procedures in the field of

human resources, through the use of intelligent automation and continuous improvement applications. The following statistical methods were used:

- Cronbach's Alpha reliability test.
- Normal distribution test.
- Descriptive statistical indicators (frequencies, percentages, arithmetic mean, standard deviation, coefficient of variation).
- (T-test).

Demographic Analysis of the Study Sample

The following table displays the demographic characteristics of the study sample:

Table 4. Description of Sample Characteristics

Variables	Categories	Frequency	Percentage
Gender	Male	48	58.5%
	Female	34	41.5%
Total		82	100.0%
Age	Less than 25 years	5	6.1%
	From 25 to 35	21	25.6%
	From 35 to 45	28	34.1%
	45 - 55 years and more	21	25.6%
	More than 55 years	7	8.5%
Total		82	100.0%
Educational Qualification	Bachelor's	33	40.2%
	Higher Diploma	11	13.4%
	Master's	26	31.7%
	Doctorate	12	14.6%
Total		82	100.0%
Years of Experience	Less than 5 years	5	6.1%
	5 - 10	15	18.3%
	10 - 15	40	48.8%
	15 - 20	22	26.8%
Total		82	100.0%
Do you prefer having an application on your computer or phone that shows your service path, all your documents from your first day of job, vacation balance, bonus/promotion dates, and updates automatically?	Yes	70	85.4%
	No	12	14.6%
Total		82	100.0%

The frequencies and percentages indicate that males accounted for 58.5% of questionnaire participants, while females accounted for 41.5%. Regarding age, the 35–45 age group recorded the highest participation rate (34.1%), followed by the 25–35 and 45–55 age groups, each accounting for 25.6%. In terms of educational qualifications, participants holding a bachelor's degree represented the largest group (40.2%), followed by those holding a master's

degree (31.7%). Regarding work experience, the 10–15-year and 15–20-year groups recorded the highest participation rates. Finally, the analysis of the item "Do you prefer having an application on your computer or phone?" revealed an agreement rate of 85.4%.

Cronbach's Alpha Coefficient:

To measure the stability of answers using the Cronbach's Alpha test (Reliability Analysis Cronbach's Alpha), the Cronbach's Alpha coefficient measurement test was applied to each of the main axes of the questionnaire form, as shown in the following table:

Table 5. Cronbach's Alpha Coefficient

Axes	Number of Questions	Cronbach's Alpha
Continuous improvement in administrative work in government institutions	8	0.821
Applying intelligent automation in administrative work in government institutions	7	0.801
Cost rationalization	7	0.805
Quality of administrative decisions	7	0.746
The questionnaire as a whole	28	0.833

Source: Researcher's preparation based on SPSS outputs

We infer from the table above that the Cronbach's Alpha value for the questionnaire as a whole is (0.833), which is a suitable percentage for relying on the results of the questionnaire in this study. We also see that the axes of the study tool enjoy high reliability and stability. This indicates the stability of the questionnaire because the stability coefficient value is greater than 60%; therefore, answers can be relied upon and their results analyzed to achieve the research objectives and hypotheses.

Normal Distribution

The normal distribution of data was tested, and the following table shows that the value of the significance level for the study axes follows the normal distribution, where it is recorded as greater than (0.05) according to the (Kolmogorov-Smirnov) test. This indicates that the data are normally distributed.

Table 6. Normal Distribution

Axes	Kolmogorov-Smirnova		
	Number of Items	Probability Value	(Sig.)
Continuous improvement in administrative work in government institutions	8	0.200	(Greater than 5%)
Applying intelligent automation in administrative work in government institutions	7	0.188	(Greater than 5%)
Cost rationalization	7	0.074	(Greater than 5%)

Source: Researcher's preparation based on SPSS outputs.

Descriptive Statistics for Continuous Improvement Items:

Table 7. Descriptive Statistics for Continuous Improvement Items in Administrative Work

No.	Item	Arithmetic Mean	Standard Deviation	Coefficient of Variation
1	Intelligent automation reduces paper procedures in completing transactions.	3.894	0.851	21.85%
2	Intelligent automation reduces the time for completing administrative transactions.	3.994	0.587	14.70%
3	Intelligent automation contributes to limiting human errors in administrative transactions.	4.144	0.736	17.76%
4	Intelligent automation contributes to the accuracy of information provided timely.	3.793	0.695	18.32%
5	Intelligent automation works on tracking administrative transactions and workflow better.	3.903	0.755	19.34%
6	Intelligent automation improves the better use of resources.	4.044	0.725	17.93%
7	Intelligent automation reduces operational cost in administrative work.	3.873	0.803	20.73%
8	Intelligent automation enhances work transparency and administrative procedures.	3.844	0.953	24.79%
First Axis: Continuous Improvement in Administrative Work		3.936	0.763	19.39%

It is clear from the analysis of the axis data that most of the sample members' answers were positive and to a high degree on all items, where the arithmetic mean reached (3.936) with a standard deviation of (0.763) and a coefficient of variation of (19.39%). As a whole, the findings confirm that the items have beneficial effects and that continuous improvement is an essential pillar of strategy and dynamism in the current institutional context.

Descriptive Statistics for the Axis: "Applying Intelligent Automation in Administrative Work in Government Institutions"

Table 8. Descriptive Statistics for the items of "Applying Intelligent Automation in Administrative Work"

No.	Item	Mean	Std. Deviation	Coefficient of Variation
1	Continuous improvement reduces unnecessary costs.	4.092	0.718	17.55%
2	Intelligent automation contributes to reducing transaction costs.	3.953	0.751	19.00%
3	Reducing paper procedures contributes to cost rationalization.	3.943	0.785	19.91%
4	Intelligent automation limits waste in the financial aspect.	3.904	0.785	20.11%
5	Improving procedures enhances the reduction of operational costs.	4.064	0.882	21.70%
6	Intelligent automation reduces manual tasks.	3.703	0.825	22.28%
7	Intelligent automation strengthens administrative expenditure improvement.	3.773	0.824	21.84%
Second Axis: Applying Intelligent Automation in Administrative Work		3.921	0.792	20.19%

From the analysis of the axis data, which includes items on applying intelligent automation in administrative work in government institutions, it is evident that most sample members' responses were positive and to a high degree across all items. The arithmetic mean was (3.921), the standard deviation was (0.792), and the coefficient of variance was (20.19%). The findings as a whole indicate that the items have an impact. They demonstrate that creating a network of digital communication between all administrative processes through the internet makes it possible for independent interaction and coordination. This networking does not only allow for speeding up of tasks, but also enables beneficiaries to be able to monitor the progress of the task and verify the progress in real time at every stage. It validates the use of intelligent automation principles using internet networks as the operating model, in which transparency and accuracy will become the new norms, and it puts institutions at the lead of entities that are able to achieve the highest quality of performance and efficiency.

Descriptive Statistics for the Axis: "Cost Rationalization"

Table 9. Descriptive Statistics for the items of "Cost Rationalization"

No.	Item	Mean	Std. Deviation	Coefficient of Variation
1	Continuous improvement reduces unnecessary costs.	3.993	0.688	17.23%
2	Intelligent automation contributes to reducing transaction costs.	3.824	0.844	22.07%
3	Reducing paper procedures contributes to cost rationalization.	3.853	0.937	24.32%
4	Intelligent automation limits waste in the financial aspect.	3.823	0.736	19.25%
5	Improving procedures enhances the reduction of operational costs.	3.944	0.644	16.33%
6	Intelligent automation reduces manual tasks.	4.093	0.915	22.36%
7	Intelligent automation strengthens administrative expenditure improvement.	4.052	0.933	23.03%
Third Axis: Cost Rationalization		3.938	0.811	20.60%

The analysis of the cost rationalization axis data reveals that the majority of the sample members responded positively and strongly, with an arithmetic mean of (3.938), a standard deviation of (0.811), and a coefficient of variation of (20.60%). The results taken together provide evidence of a positive effect of the items. It shows that administrative decision-making is not just intuitive anymore but a challenge that demands accurate, reliable, and timely data. The shift from traditional systems to data-driven systems is a strategic requirement. In this context, the dynamic interaction between the "Continuous Improvement" methodology and "Intelligent Automation" techniques becomes a key element to ensure a good and relevant information flow, thus improving the capacity to make informed and effective administrative decisions that help rationalize costs.

Descriptive Statistics for the Axis: "Quality of Administrative Decisions"

Table 10. Descriptive Statistics for the items of "Quality of Administrative Decisions"

No.	Item	Mean	Std. Deviation	Coefficient of Variation
1	Intelligent automation improves the accuracy of administrative decisions.	4.043	0.758	18.75%
2	Continuous improvement provides better alternatives in decision-making.	3.901	0.887	22.73%
3	Management relies on information from automation for decision-making.	3.961	0.897	22.65%
4	Intelligent automation reduces chaotic decisions.	3.943	0.781	19.81%
5	Continuous improvement enhances the timing of administrative decisions.	4.003	0.784	19.59%
6	Intelligent automation contributes to decision strength and rationality.	4.013	0.915	22.80%
7	Management relies on automated systems to evaluate decision outcomes.	4.021	0.836	20.80%
Fourth Axis: Quality of Administrative Decisions		0.836	4.020	20.80%

The arithmetic mean of the Quality of Administrative Decisions axis data was (4.020), the standard deviation was (0.836), and the coefficient of variation was (20.8%). The analysis of the data shows that most respondents were positive and highly positive, with an arithmetic mean of (4.020), a standard deviation of (0.836), and a coefficient of variation of (20.8%). The results show that intelligent automation enhances the precision and credibility of administrative decisions and decreases chaotic ones, because the information it supplies is used for management. In addition, the continuous improvement process helps to provide alternative improvements and to refine the timing of administrative decisions, which in turn increases the power and rationality of these decisions.

Research Hypotheses

To verify the study hypotheses, the researcher used a precise statistical strategy to enhance result reliability. Multiple Linear Regression was employed to measure the impact of the independent variable (Continuous Improvement) through the mediating variable (Intelligent Automation) on both (Cost Rationalization) and (Enhancing Administrative Decisions).

a) First Main Hypothesis: "Continuous improvement using intelligent automation contributes to cost rationalization."

Table 11. Results of First Hypothesis Impact Analysis (Cost Rationalization)

Variables	Beta (B)	R-Square (R^2)	Alpha (α)	Calculated F	T-Test	Sig.
Continuous Improvement	0.516	0.790	0.855	32.307	5.684	0.000
Intelligent Automation	0.572					

Based on the data in Table 11, the regression results show the following:

1. The analysis shows that intelligent automation has a strong effect on cost rationalization by continuous improvement. At a 5% significance level, the calculated (F) value is (32.307), which is greater than the tabular (F) value (3.98). This clearly indicates that continuous improvement using intelligent automation plays a vital role in improving cost rationalization.

2. This effect becomes apparent in the form of a linear regression model that has a significant explanatory value. The result of the (T-Test) is statistically significant at a 5% confidence level, indicating that there is a high correlation between the implementation of continuous improvement through intelligent automation and cost rationalization.

3. The data revealed that about 79% of the variations in the cost rationalization process can be explained by the linear regression model.

4. Conclusion: The significance level is less than the standard significance level (α=0.05), so the hypothesis is accepted. By identifying and addressing slowdowns and omissions, continuous improvement and intelligent automation help rationalize costs.

5. From these results, the multiple linear regression equation is estimated to be:

Cost Rationalization = 0.855 + 0.516 (Continuous Improvement) + 0.572 (Intelligent Automation)

The equation indicates that the continuous improvement model affects cost rationalization by 51.6%, while the direct effect of intelligent automation is 57.2%. These results demonstrate the importance of these variables in developing effective systems in government organizations.

b) Second Main Hypothesis: "Continuous improvement using intelligent automation contributes to enhancing administrative decisions."

Table 12. Results of Second Hypothesis Impact Analysis (Administrative Decisions)

Variables	Beta (B)	R-Square (R^2)	Alpha (α)	Calculated F	T-Test	Sig.
Continuous Improvement	0.429	0.659	0.906	27.321	5.227	0.000
Intelligent Automation	0.471					

Based on the data in Table 12, the regression results show the following:

1. The analysis reveals a significant effect of continuous improvement through intelligent automation on enhancing administrative decisions. The calculated F-value (27.321) exceeds the tabular value (3.98), indicating its fundamental role.
2. The (T-Test) value is significant at a 5% confidence level, reflecting a strong relationship that positively impacts the enhancement of administrative decisions.
3. The R^2 coefficient explains approximately 65.9% of the changes in administrative decision enhancement.
4. Since the significance level is less than 5%, the hypothesis is accepted.
5. The estimated multiple linear regression equation is as follows:

Enhancing Administrative Decisions = 0.906 + 0.429 (Continuous Improvement) + 0.471 (Intelligent Automation)

The equation shows that continuous improvement affects decision enhancement by (42.9%), while intelligent automation affects it by (47.1%). This highlights the role of automation in linking administrative tasks via the internet, reducing human error, and increasing accuracy and transparency.

Conclusion

1. There is a fundamental significant impact of continuous improvement on cost rationalization (R^2=0.790).
2. Intelligent automation serves as a supporting and complementary variable to continuous improvement (β=0.572).
3. Enhancing the quality of administrative decisions occurs through the integration of continuous improvement and intelligent automation (R^2=0.659).

4. There is a high level of institutional acceptance for digital transformation (85.4% support among the sample).
5. The study tool possesses a high degree of stability and reliability (Cronbach's Alpha = 0.833).
6. There is a strategic link between cost rationalization and administrative decision quality.
7. A need exists for integrated institutional change management (organizational, human, technical, and financial).

Recommendations

1. Adopt a comprehensive institutional strategy for continuous improvement supported by intelligent automation.
2. Establish an integrated administrative information system for human resources units.
3. Develop human capital through continuous training in automation and data analysis.
4. Form specialized "Continuous Improvement Teams" to review procedures periodically (PDCA cycle).
5. Allocate independent budgets for intelligent automation projects.
6. Promote a culture of "Data-Driven Decision Making" through analytical dashboards.
7. Conduct expanded future studies across other government sectors.
8. Strengthen the regulatory and governance framework for digital transformation to ensure data security and privacy.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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