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The Impact of Implementing Total Quality Management on Improving the Efficiency of Electronic Automation Systems in Government Agencies

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Abstract: This research aims to determine the impact of implementing Total Quality Management (TQM) on improving the efficiency of electronic automation systems in government institutions, comparing it to electronic payment by taxpayers. It also examines the role of employees in collection departments and how collectors interact with taxpayers to facilitate electronic payment of fees and charges instead of traditional manual methods. The study sample included some general managers and their assistants, some employees in collection departments, and a sample of taxpayers to identify the reasons for non-electronic payment in a transparent manner. The research revealed that the electronic automation system is faster and more accurate, but some taxpayers refrain from paying electronically via the POS device, citing the device's 5% penalty for each cash transaction. Another reason given was that the taxpayer cannot pay the entire amount owed in one payment and instead pays it in installments (two or three installments annually) manually. Furthermore, there is an aspect that the senior management at the Baghdad Municipality may overlook: the actual manual inventory of all taxpayers in Baghdad. For example, in an area where the municipality's records show 1000 taxpayers, the actual number may be half that. Therefore, this study highlights the impact of Total Quality Management on the success of the electronic automation project.

Keywords: Artificial Emotional Intelligence, Human Resource Decision-Making, Knowledge Sharing Behavior, Transformational Leadership, Organizational Performance.

1. Introduction

In light of rapid technological advancements, Total Quality Management (TQM) has become highly influential in improving the efficiency of electronic automation systems in government institutions, as they work together to achieve a competitive advantage. Most institutions face obstacles in collecting revenues from beneficiaries [1], [2], [3]. Given the financial and economic challenges facing government institutions, improving the efficiency of municipal revenue collection has become crucial [4], [5], [6], [7]. Therefore, implementing TQM to enhance the efficiency of electronic automation systems in government institutions is essential. The optimal solution for achieving this goal lies in accuracy and speed in revenue collection and improving the taxpayer experience. Revenue collection is the lifeblood of most government institutions, and these institutions face significant challenges in collecting revenue, negatively impacting their ability to provide

essential services. One reason for weak revenue collection is the previous method of collecting revenue manually using official receipts, which led to taxpayers delaying payment. Furthermore, weak planning in some government institutions also contributed to the problem [8], [9], [10].

2. Methodology

First: The Problem Statement

This research addresses a problem faced by some government institutions in general, and revenue collection departments in particular, namely the low efficiency of revenue collection due to ineffective collection mechanisms, inefficient financial systems, and the lack of a mechanism for collecting revenues electronically via POS (Point of Sale) devices. The responsibility lies with these institutions, necessitating the development of a system to improve the efficiency of electronic automation systems in government institutions while providing clear and transparent services to taxpayers [11], [12]. The main problem statement of the study can be formulated as follows: • Lack of understanding of the impact of Total Quality Management (TQM): There is a lack of understanding of the impact of TQM on the success of projects to improve the efficiency of electronic automation systems in Iraqi government institutions [13], [14], [15], [16], [17].

- Challenges in implementing TQM: Automation in Iraq faces challenges in implementing TQM, which affects the quality of services and customer satisfaction.

The sub-problem is formulated for the Baghdad Municipality and its affiliated municipal departments, and the research attempts to answer the following questions: Q: What are the requirements for the feasibility of implementing TQM in a project to improve the efficiency of electronic automation systems in government institutions?

Q: Do government institutions have a clear plan for revenue objectives through the potential for improving the efficiency of electronic automation systems?

Q: What are the obstacles to implementing Total Quality Management (TQM) in improving the efficiency of electronic automation systems in government institutions?

Second: Motivations for the Study

The researcher's motivations for this study include understanding a specific topic within the field, studying the problem and finding solutions, personal development and skill enhancement, providing positive services to taxpayers, developing and improving critical thinking, and fulfilling degree requirements and academic needs [18], [19], [20], [21]. This study is an attempt to explore the impact of TQM on improving the efficiency of electronic automation systems in government institutions, given the challenges facing automation projects [22]. A primary motivation is the desire to improve the service provided by electronic products and enhance the efficiency of electronic automation systems in government institutions [23]. Other sub-objectives include increasing taxpayer satisfaction by improving services offered in these projects, reducing costs and improving efficiency by increasing profitability, and promoting economic development through constructive recommendations for electronic automation projects [25], [26], [27].

Third: Study Objectives

This research aims to study the impact of implementing Total Quality Management (TQM) on improving the efficiency of electronic automation systems in government institutions. The goal is to determine the efficiency of revenue collection in municipalities and analyze the factors influencing this impact [28], [29], [30]. The study also aims to achieve integration between TQM and modern technology, develop a model for improving the performance of government institutions through the application of TQM in electronic automation projects, enhance citizens' experience in dealing with government institutions by utilizing the provided electronic services, determine the level of adoption of TQM for

revenue collection in the Baghdad Municipality through electronic automation to boost institutional revenues and facilitate electronic collection, and identify the factors hindering the application of TQM standards in the electronic automation project for revenue collection via electronic payment. The study aims to [31], [32], [33]:

- Analyze the impact of TQM on the electronic automation project through an applied analytical study.
- Identify the critical factors affecting the application of TQM in the electronic automation project.
- Develop a model for applying TQM to the electronic automation project. Fourth: Study Methodology

To achieve the study's objectives, the researcher employed experimental, descriptive, and qualitative research methodologies. Data collection tools included questionnaires administered to municipal officials to gather qualitative data on their experiences and opinions regarding the impact of Total Quality Management (TQM) on the success of the electronic automation project [34], [35], [36]. Interviews were also conducted with taxpayers, and their feedback was collected. Additionally, collection documents were studied and analyzed. Data analysis methods included statistical and textual analysis [37]. A comprehensive research methodology was employed, integrating experimental, descriptive, and qualitative approaches to identify relationships and analyze phenomena among the variables, and to test the impact of TQM on the electronic automation project [38], [39], [40].

- 1- Experimental Methodology: The researcher studied the human behavior of taxpayers regarding collection.
- 2- Descriptive Methodology: The researcher collected and analyzed data to describe the current situation and identify the relationships between variables.
- 3- Qualitative Approach: The researcher relied on semi-structured interviews. The researcher analyzed the interview content for its flexibility and to explore the opinions of the research sample. The semi-structured interviews were designed based on topics prepared by the researcher, focusing on taxpayers and identifying their needs and level of satisfaction with government institutions.

Fifth: Study Population

The study population consisted of some employees of the Baghdad Municipality. The study sample included directors general of some government institutions and their deputies, some heads of collection departments working in those institutions, and a sample of taxpayers. The researcher visited taxpayers' locations and asked them questions and inquiries about the electronic payment mechanism, the challenges and difficulties facing collection departments in some institutions, and the problems faced by some taxpayers. These questions and inquiries will be presented in the conclusions and recommendations. The sample consisted of six Iraqi government institutions and departments. A random sample of senior management in municipal departments, some employees of the revenue collection department, and some taxpayers were selected. Data were collected through an experimental design to evaluate the results and benefit from their experience. Inferential and descriptive statistical methods, such as correlational and factor analysis, were used.

Sixth: The Importance of the Study

The research derives its importance from the following:

- 1- Practical Importance: The importance of the study lies in its serious attempt to improve the performance of government institutions and enhance their ability to provide services. By applying Total Quality Management (TQM) to improve the efficiency of electronic automation systems in government institutions, the study aims to enhance the quality of electronic services. It seeks to provide valuable insights on how to improve collection efficiency and boost local revenues. The research's importance lies in improving

citizens' experience in dealing with government institutions by providing more efficient electronic services, and it contributes to enhancing the economic and social development of public institutions.

3- Scientific Importance: Developing the researcher's expertise in the areas of the impact of applying Total Quality Management (TQM) on improving the efficiency of electronic automation systems in governmental institutions and organizations, encouraging the researcher to follow up on scientific issues related to quality management and its impact on automation, providing an important scientific reference for specialists and researchers in the field of TQM and its impact on electronic automation, which contributes to enhancing knowledge and expertise in this field, increasing cultural and cognitive balance to identify original references and sources for management and automation, determining the validity and accuracy of information through its analysis and indicating its validity or weakness, the researcher aims to demonstrate the benefit to governmental institutions of continuing the electronic automation project and applying the principles and elements of TQM to the research project, focusing on the quality of data rather than its quantity, and providing a vision of the application of TQM through the work of the Baghdad Municipality, represented by the fees and charges it collects and the extent of the impact of the electronic automation system on the collection of fees and charges, and the research addresses a very important topic or a crucial and fundamental step in the process of applying TQM to the electronic automation project, and the current research contributes to measuring the level of compatibility of applying TQM to the electronic automation project in the Baghdad Municipality. The electronic automation system plays a role in reducing instances of financial and administrative corruption, restoring public trust, and decreasing cases of taxpayer non-payment of fees and charges.

Methodology

The study methodology is described as an integrated research methodology, including experimental, descriptive, and qualitative methodologies, to thoroughly investigate how Total Quality Management influences the efficiency of electronic automation systems of government institutions. The experimental element concerns observing and appraising taxpayer behavior concerning revenue collection processes, especially their use of electronic payment systems rather than conventional manual means. At the same time, a descriptive type of methodology is used to analytically measure and analyse data that accurately represent the status of electronic automation and the status of TQM implementation so that relationships between important variables like service quality, efficiency, and user satisfaction can be pinpointed and analysed. In order to do so, it represents a qualitative contribution made by means of semi-structured interviews with taxpayers and public servants who perceive the electronic payment system as a management process, and organizational quality practices, which allows a broader exploration of perceptions, difficulties, and experiences related to the subject under consideration. The primary means of data collection are structured questionnaires administered to senior management and executive leadership, department heads and employees of revenue collection units, and direct engagement with taxpayers in the field to glean practice and context. Additionally, relevant administrative documents are examined to corroborate compound data triangulation. An analytical framework is created where the sum of the collected data are analysed through the use of statistical techniques, (namely, descriptive and inferential analysis) applied to the quantify elements of the survey and textual analysis of qualitative responses. This mixed-methods framework enable a comprehensive insight into how TQM principles drive automation efficiency of service delivery and revenue collection performance within government contexts.

3. Results and Discussion

Seventh: Derivation of Hypotheses

Main Hypotheses

1- There is a statistically significant relationship between Total Quality Management and the success of improving the efficiency of systems

Section Two: Theoretical Framework of the Research

First: Total Quality Management (TQM) - A Theoretical Introduction

1- The Concept of Total Quality Management (TQM)

There are several definitions of Total Quality Management (TQM). Al-Azzawi (2005: 35) defined it as the necessary procedures to meet customer requirements. Radwan (2015: 15) defined it as engaging with the customer in a way that aligns with their ideas and requirements to facilitate the delivery of the product or service. Jawda (2010: 20) interpreted it as fulfilling the customer's requirements and needs in a way that achieves their desires. Hagstrom (2009: 18) defined TQM as something that can be distinguished by its visual characteristics. The National Bureau for Economic Development (NBED) in the UK defined TQM as meeting market requirements in terms of design, good performance, and after-sales service. The American Standards Institute (ANSI) defined it as a set of characteristics and attributes related to a service or product to meet specific needs. Al-Ali (2019) defined it as Total Quality Management focusing on achieving customer satisfaction in governmental and private institutions from several aspects, the first of which is the design and development aspect, reaching production and then reaching the taste of the consumer. According to Joseph Juran's concept (Khadija, 2021: 26), it is an administrative process that the institution performs in the form of cooperative work teams to accomplish work and provide goods and services to the customer with high quality and in a stable and consistent manner. Hounob (Hamadto & Al-Nouri, 2018: 357) indicated that it means ensuring the needs and requirements of the customer before starting to design the product or provide the service. Ibrahim (445: 5) indicated the extent of the product's suitability for use, measuring the quality of the service and stating the extent of the requirements in terms of (validity, conformity, performance, reliability, appearance). Based on the above, Total Quality Management can be viewed as a philosophy that aims to achieve successes at a long-term level by focusing on customer satisfaction through the participation of all members of the institution (all administrative levels) and dedicating their efforts to achieving continuous quality of processes and services.

• The Importance of Total Quality Management (TQM)

As a general principle for all organizations, TQM has become an integral part of each department. Its importance is evident in every department, and the positive results are reflected in the services provided to customers and the fulfillment of their requirements. TQM in organizations strives to achieve the following objectives (Al-Mousawi, 2012, p. 55): developing services and reducing costs; differentiating between services by meeting customer requirements and satisfying their needs and desires; and fostering a spirit of cooperation among employees to contribute to improving customer relationships. Additionally, it considers market needs and requirements and understands the competition to enhance the organization's reputation. Among the tasks and importance of TQM (Narjis, 2020, pp. 52-53) are innovating new methods and approaches to achieve a competitive advantage and increase profitability in the event of a defect or flaw in the product or service, and addressing it; using methods to attract and retain customers; and eliminating waste through continuous process review. The importance of TQM lies in its being a methodology followed by every organization, focusing on the continuous improvement of internal processes, which are identified as part of Systematic of the Total Quality Management (TQM) system (Kelly, 2024).

5- Total Quality Management Objectives

According to Adler's theory, when we feel encouraged, we feel capable, and when we feel discouraged, we may act in incorrect ways (Adler, 2021). The objectives of Total Quality Management are part of the future strategic framework that encourages individuals working in the organization to focus on improving quality. The theory of quality objectives states that customer satisfaction will increase through operational excellence (Kelly, 2021). The application of Total Quality Management in any organization aims at several objectives: monitoring the quality level of services and goods provided, developing products and goods according to customer desires, raising morale and motivating employees, creating a work environment that encourages learning and development, good control of production processes, spreading a culture of flexibility and adaptability, reducing costs and expenses, managing time properly, and improving production profitability (Fathy, 2024). One of the objectives of Total Quality Management is likely to be the "ideal tipping points," meaning a certain level of pressure to begin implementing TQM. Individuals need to feel the need to... Change is defined by describing the essential elements of effective organizational change. These forces include deviation from the norm, a crisis, a catalyst event, strategic decisions, individual key drivers, or operational tools. Deviation refers to activities that typically occur at lower levels of the organization and happens when entrepreneurs depart from conventional work methods to solve a problem (Hashmi, 2025).

Total Quality Management (TQM) objectives can be formulated by focusing on and achieving customer satisfaction by meeting their needs and expectations. This is coupled with continuous improvement of all organizational processes. In turn, it works towards other objectives such as reducing costs, minimizing defects and errors, and increasing operational efficiency (Pandi, Rao, & Jeyathilagar, 2009, p. 419).

6- Principles of Total Quality Management

During the global economic recession of the late 1970s and early 1980s, some developed countries, including the United States, faced fierce competition from Japan. At that time, the Japanese dominated the global electronics and automotive markets because they had found an innovative way to produce high-quality goods and services. As a result, the United States began closely monitoring the quality of services. Japanese companies, in their efforts to improve products and regain market share, found their only solution in the Total Quality Management (TQM) methodology. Some established foundations and standards emphasizing continuous training and development to enhance service levels, reduce costs, and achieve job security (Abu Al-Nasr, 2015:57). Many experts in TQM have identified important principles, which can be summarized as follows (White, 2022:1):

- Customer Focus: Everything boils down to customer satisfaction. If customers are happy, it means the product improvements have been successful.
- Full Engagement of Employees: TQM focuses on the participation of employees throughout the organization.
- Integrated System: Building partial processes across the organization based on a strong TQM strategy to create larger processes aligned with the organization's goals.
- Strategic Approach: Focuses on the continuous improvement of processes within the organization, emphasizing the organization's vision, mission, and objectives.
- Continuous Improvement: Senior management must periodically and proactively address business problems within the organization, as new problems and technologies are constantly emerging.
- Fact-Based Decision-Making: Utilizing analytics and data. To guide the Total Quality Management (TQM) strategy and ensure it works for the benefit of the organization.
- Communication: Strong communication is essential for the success of the TQM strategy.

One of the seven principles of Total Quality Management (Shihab, 2015: 2) is:

- Aligning the objective with the customer's requirements and needs.
- Monitoring and measuring customer satisfaction.
- Understanding the customer's current and future needs and requirements.
- Increasing financial revenue and the organization's market share.
- Enhancing repeat business and improving opportunities.
- Increasing the number of customers in the organization.

There are characteristics and features of the principles of Total Quality Management, which are considered key principles, the most important of which are:

1- Total Quality Management is a strategic issue and requires the organization to develop a strategic plan (Al-Nuaimi & Suwaiss, 2008, p. 25).

2- Senior management support for the Total Quality Management process (Tayel, Amman: 83): Senior management's belief in the organization is one of the most important principles of Total Quality Management. This belief is demonstrated through behaviors, methodologies, priorities, and regulations when leading any organization. It also involves having a clear philosophy related to quality and providing the necessary resources related to management to serve the organization's goals. Achieving profits and satisfying internal and external customers.

3- Building a new business philosophy without delay.

The mean score for the independent variable (Citizen Focus) was 4.100, placing it among the highest independent variables. The standard deviation was 0.725, indicating significant differences among respondents. The mean score for the independent variable (Data) was 4.067, a good indicator of respondent agreement, with a standard deviation of 0.712, also indicating significant differences. The mean score for the independent variable (Human Resources) was 4.057, another good indicator of respondent agreement, with a standard deviation of 0.762, indicating significant differences. The mean score for the independent variable (Leadership Index) was 4.046, the lowest among the independent variables, despite the overall convergence of all independent variables. The standard deviation for the Leadership Index was 0.613, indicating differences among respondents, but less than among all the independent variables. The mean score for the dependent variable (system quality) was 4.154, placing it among the top dependent variables, with a standard deviation of 0.594, indicating a high degree of agreement among respondents. The mean score for the dependent variable (strategic objective) was 4.121, a good indicator of respondent agreement, with a standard deviation of 0.594, also indicating a high degree of agreement among respondents. The mean score for the dependent variable (beneficiary satisfaction) was 4.019, a good indicator of respondent agreement, with a standard deviation of 0.662, the highest among the dependent variables, indicating a high degree of agreement among respondents. The mean score for the dependent variable (financial efficiency) was 4.114, a good indicator of respondent agreement, with a standard deviation of 0.544, the lowest deviation, indicating a high degree of consistency among the evaluations.

By examining the two charts above, we observe that the first figure indicates the frequency distribution of the average total quality among the research sample. The horizontal axis represents the values of the average total quality, ranging between 2.00 and 5.00, while the vertical axis indicates the frequencies. The figure shows a leftward shift in the distribution, with frequencies concentrated in the higher categories, specifically between 4.0 and 5.0, while frequencies below 3.0 are low. This distribution aligns with previous statistical results, which showed a mean of 4.10. This confirms that respondents provide positive evaluations of the dimensions of total quality. The absence of outliers indicates the homogeneity and consistency of respondents' opinions, supporting the reliability of the data and encouraging further advanced statistical analyses in the future.

This distribution also reflects the level of awareness among the sample regarding the importance of total quality and its impact on the organization under study.

There is a strong relationship between all the study variables. This relationship is positive, with correlation coefficients ranging from 0.472 to 0.768. This confirms the integration between the dimensions of total quality management and performance outcomes. The relationship between the independent variables showed the highest correlation between human resources and the data dimension (0.747), followed by the correlation between leadership and the human resources dimension (0.741), and then the correlation between leadership and the citizen-centric dimension (0.705). These high values indicate that any change in any dimension affects the others, and any improvement in any dimension positively impacts the others. Regarding the dependent and independent variables, a strong correlation was found between beneficiary satisfaction and the leadership variable (0.690), followed by the correlation between human resources and beneficiary satisfaction (0.685) and the strategic objective variable (0.679). This indicates that leadership and human resources have a greater impact on beneficiary satisfaction compared to the dimensions of citizen focus and data. The correlation of the data dimension with the dependent variables ranged between (0.529-0.642), which may suggest that developing data without developing leadership and human resources does not yield the desired results with the same strength. As for the relationship between the dependent variables themselves, the highest correlation was recorded between beneficiary satisfaction and the strategic objective (0.768). The correlation between beneficiary satisfaction and system quality was (0.728), followed by the correlation between the strategic objective and system quality (0.722). This indicates a close relationship between performance outputs, and that improving this performance will positively impact other outputs. The correlation between financial efficiency and other indicators was found to be moderate, ranging between 0.556 and 0.689. This is a good level, but relatively low compared to other variables. Overall, all correlation coefficients are strong and reliable, confirming the validity of the study's theoretical model.

Fourth: Testing the Main Hypothesis

This is the main hypothesis of the study. It examines the relationship between the dimensions of Total Quality Management (TQM) and the dimensions of successful electronic automation. This hypothesis stems from the importance of successful automation in streamlining government efforts, enhancing transparency, and improving operational efficiency, among other things. Simultaneously, government agencies and organizations are undergoing rapid transformations in the world of automation, which inherently guarantees speed, particularly in electronic transactions, revenue collection, and ensuring timely receipt of revenues.

4. Conclusions and Recommendations

Through the analysis of data collected from respondents regarding the Baghdad Municipality and its affiliated departments, a study was conducted on the impact of Total Quality Management (TQM) on the success of the electronic automation project. A set of findings emerged demonstrating how TQM positively influences the success of electronic automation in the public sector. These results highlight the relationship between the dimensions of quality management and the dimensions of successful electronic automation in enhancing institutional performance, accelerating state revenue collection, moving away from traditional practices, and transitioning to a digital, automated, and transparent environment. The conclusions can be summarized as follows:

- 1- The application of TQM has a positive impact on the success of the electronic automation project. Statistical results indicate that adopting TQM principles

significantly improves organizational and control levels and enhances the institution's ability to achieve its objectives efficiently.

- 2- Speed in completing financial and other transactions: Implementing automation according to the principles of Total Quality Management (TQM) leads to reduced tasks and delays, improves workflow, and saves significant time and effort, reflecting an aspect of modern management.
- 3- The results confirmed statistically significant differences between pre- and post-implementation measurements. Statistical indicators showed improved performance after automation, indicating the effectiveness of the implemented procedures.
- 4- A reduction in errors and increased data accuracy: Automation reduced or eliminated errors associated with the manual system, which were caused by human factors and employee inefficiency. Automation improved data accuracy, recording, and processing, resulting in more precise and reliable data.
- 5- Implementing TQM through automation enhanced revenue collection efficiency and reduced waste in collection processes by increasing transparency and oversight, which in turn further reduced the waste of public funds.

In light of the study's findings, the researcher recommends the following:

- 1- Adopting the principles of Total Quality Management (TQM) as a strategic approach and a comprehensive, systematic administrative framework within the Baghdad Municipality, given its prominent role in improving performance and enhancing the success of electronic automation projects and digital transformation.
- 2- Developing and preparing the infrastructure by investing in upgrading technological systems, strengthening the automation process, and establishing specialized communication channels for databases.
- 3- Establishing a comprehensive, centralized information system that connects all departments within the Baghdad Municipality, facilitating coordination, data accuracy, processing speed, and decision-making.
- 4- Intensifying training courses for employees to improve their proficiency in using automation systems.

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