A Model to Improve Service Quality through Integration of E-Government and Total Quality Management: A Field Study in the Jordanian Public Sector

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Abstract
The main purpose of this study was to examine the effect of interaction between implementing total-quality management (TQM) and e-government on the quality of service in the Jordanian public sector. To achieve the objective of the study, a self-administered questionnaire was designed and distributed randomly to 70 middle and top managers working at five governmental institutions. The significance of the study stems from its attempt to clarify the importance of TQM and IT collaboration for administrative-reform programs the public sector. Specifically, the importance of this study lies in the attempt to identify the impact of the integrated relationship between the application of e-government and TQM on improving the quality of service provided by the public sector in Jordan. The results of the study revealed that the studied institutions adopted various dimensions of TQM while implementing some stages of e-government. Also the results revealed a positive correlation between adapting TQM and e-government on service quality. Finally the study uncovered the relationship and impact of the interaction between implementing TQM and e-government on quality service in the Jordanian public sector.
Keywords: e-government, total quality management, service quality, e-government in Jordan, TQM

1. Introduction
Numerous studies have addressed the issue of Total Quality Management (TQM) and its importance in the public and private sectors. As a result of the current advancement in communication and information technology, public institutions tended to apply the concept of e-government in an effort to strengthen the relationship between government institutions on one hand, and citizens and the private sector on the other hand, in an effort to provide effective and efficient services and information. Information-technology applications played a great role in supporting TQM by building the relationship between consumers and suppliers, control of operations, team building, and the transmission of information between departments. In addition, the use of information-technology applications improved business process, and the application of preventative control and monitoring (Dewhurst Martinez-Lorente, & Sánchez-Rodriguez, 2003).

2. Importance of the Study
The importance of the study stems from its attempt to clarify the importance of administrative-reform programs in the institutions of the public sector aimed at achieving administrative efficiency, and improving the level of service provided to the public. The public sector in Jordan has worked to implement a number of initiatives to achieve its goal of improving the level of service provided to citizens and business organizations. These initiatives included application of e-government, TQM, and process-reengineering management. The main objective of these initiatives was to improve the quality of service in the public sector by increasing the focus on customers' satisfaction and raising the level of empowerment of workers. The importance of this study lies in its attempt to identify the impact of the integrated relationship between the application of e-government and TQM on improving the quality of service provided by the public sector in Jordan.

3. Objectives of the Study
This study aimed to identify the application level of e-government and TQM at the surveyed government departments in Jordan. It also aimed to study the impact of applying e-government functions in the promotion of TQM and in turn, how these two impacted the advancement of service quality.

4. The Study Model
The study included a model of three variables: one independent variable that represents the extent of the application of e-government, an intermediate variable representing the dimensions of TQM, and a dependent variable representing the quality of service.
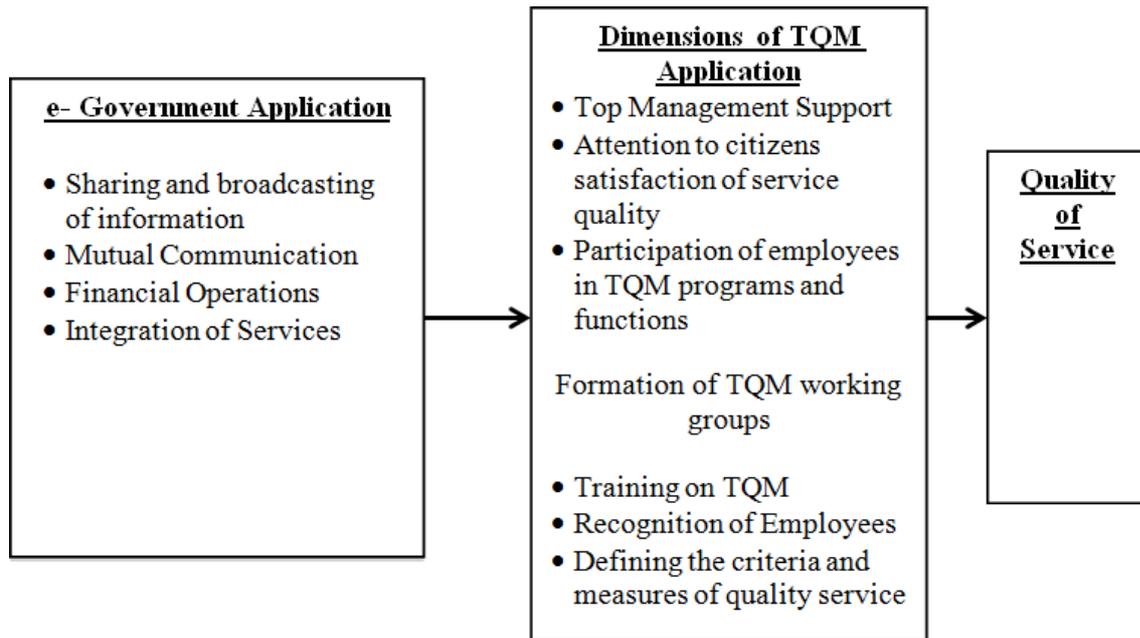
Figure 1. Model of the study

5. Hypotheses of the Study

Based on the model described above, the study has four hypotheses:

The First Hypothesis

There is no statistically significant effect of the application of e-government on the quality of service.

The Second Hypothesis

There is no statistically significant effect of the application of TQM on the quality of service.

The Third Hypothesis

There is no statistically significant effect of the application of e-government on the application of TQM.

The Fourth Hypothesis

There is no statistically significant effect of the application of TQM and the application of e-government on improving service quality.

6. The Study Methodology

This study used the descriptive analytical method along with the method of field study. The results of a Cronbach's alpha testing tool demonstrated a degree of stability in the responses of respondents, as shown in Table 1:

Table 1

Cronbach's Alpha Test Results for the Study Variables

Variables of the study	Value of Cronbach's alpha
E-government	88.94%
Quality of service	94.99%
TQM	97.14%

6.1 Sample of the Study

The study population included institutions that have embarked on the application of e-government in the Hashemite Kingdom of Jordan. To achieve the goals of this study, the researchers used a sample of five government institutions: the Senate, the Department of Land and Space, the Security Depository Center, the Jordan Institution for Standards and Metrology, and the Companies Control Department.

The researchers randomly distributed 70 copies of the study questionnaire and were able to get responses from 56 individuals. This is equivalent to 80% of the total questionnaires distributed. Table 2 outlines the characteristics of the sample surveyed.

Table 2

Frequency Distribution of Respondents

1. Job position	Repetition	Percentage
Senior management	7	12.5
Middle management	49	87.5
2. Educational qualification		
Graduate	11	19.6
Higher diploma	5	8.9
Bachelor	32	57.1
Community college	8	14.3
3. Number of years of service in the organization		
5 years or less	6	10.7
6–10 years	24	42.9
11–15 years	14	25.0
More than 15 years	12	21.4

6.2 Statistical Methodology and Approach

The researchers chose the following statistical methods for data processing:
- Frequencies, averages, and standard deviations were used to describe the characteristics of the study sample and variables
- Simple and multiple regressions were used to test the hypotheses of the study
- Sequential regression was used to test the interaction between the use of e-government and the application of TQM in improving the quality of service.

7. Operational Definitions of the Study

7.1 Quality of Service

The study relied on a number of measuring criteria to quantify the quality of service. These measuring criteria included workers trends toward the availability of the service (time and place), the extent of response, the level of service completion, empathy with the recipient of the service, accuracy, the degree of merit, tangible assets, trust and safety (Madu, Kuei, & Jacob, 1996; Sachdev & Verma, 2004).

7.2 Application of e-Government

The application level of e-government in Jordan was examined through the following subvariables:
1. **Display of Information**: This phase was characterized by limited information, and being basic and rigid (United Nations, 2003). This aspect was measured through the site's ability to offer general information.
2. **Mutual Communication**: This variable focuses on measuring the ability of citizens to request the implementation of a number of services directly, and increasing the ability of citizens to search and inquire through the e-government site (West, 2004). This phase is characterized by enabling two-way communication through e-mail (Infodev, 2002). This variable has been measured through the use of a rating scale that measures the ability of the beneficiary to communicate by e-mail, access information through databases, download forms, and connect the site to other relevant institution's sites.
3. **Financial Transactions**: This variable measures the ability to conduct financial operations for the settlement of dues between the citizen and the government. This variable requires the creation of a strong infrastructure, information confidentiality and security, and enablement of electronic payment (Baum & DiMaio, 2000).
4. **Service Integration**: This variable measures the availability of government integrated e-services via an online e-government portal. When reaching this e-government implementation stage, citizens do not have to navigate through different government sites to get services, as all government services have been packaged and integrated in one e-government portal site (Teicher, Hughes, & Dow, 2002). Achieving social integration requires linking databases among ministries and departments having an internal network (intranet), then using an external network (extranet) to achieve integration between government departments and partners from private-sector organizations and other organizations (Baum & DiMaio, 2000; Norris & Moon, 2002)

7.3 Dimensions of Total Quality Management

TQM was measured through seven dimensions: top management support for the implementation of total quality,

attention to citizens satisfaction of service quality, participation of employees in TQM programs and functions, forming TQM working groups, TQM training, recognition of employees, and defining the criteria for measuring service. These dimensions have been measured through the use of a five-level Likert-type scale. The scale was given the answer options of strongly disagree with the relative weight of one degree, the answer do not agree with the relative weight of two degrees, the answer neutral with the relative weight of three degrees, the answer agree with the relative weight of four degrees, and the answer strongly agree with the relative weight of five degrees.

8. Literature Review
8.1 Total-Quality Management
In recent years, increased pressure has driven government institutions in Jordan to implement TQM. Among the most prominent reasons are desires to improve the level of service quality provided to citizens, increase productivity, and reduce operating expenses. Consequently, institutions started working on the application of quality-improvement programs to improve the quality of service provided to customers and citizens (Lai, Weerakoon, & Cheng, 2002). TQM is a philosophical concept based on the application of a group of principles and guidelines to improve the quality of service and the product (Palo & Padhi, 2003). To ensure long-term success and improved business-process efficiency, the application of these principles must be performed fully and continuously (Rosenhoover & Kuhn, 1996). According to the Federal Quality Institute, TQM aims to provide a comprehensive implementation approach to achieve clients' needs and expectations through the use of quantitative methods to achieve continuous improvement in the organization's operations and services. Besterfield, Besterfield-Michna, Besterfield, and Besterfield-Sacre (2003) stated that the application of TQM aims to achieve a number of goals:

1. Satisfy the current and future needs of consumers.
2. Increase the competitiveness of the organization.
3. Increase the productivity of all elements of the organization.
4. Increase the organization's ability to deal with various environmental variables and challenges.
5. Achieve continuous improvement in all aspects of the organization's functions.
6. Increase the capacity of the organization to drive continuous growth to achieve the best position among competing organizations.
7. Increase the profitability of the organization.

According to Psychogios and Priporas (2007), the concept of TQM is divided into two parts: the first concentrates on techniques and tools (Hard) and the second focuses on management concepts and principles (Soft) as summarized next:

Table 3
Quality Management Concepts and Tools

TQM systems, tools and techniques (hard)	Concepts and principles related to TQM (soft)
1. Statistical process control	1. Participation of workers
2. ISO 9000 series	2. Continuous improvement
3. Pareto analysis	3. TQM training
4. Matrix analysis and diagram	4. Working teams
5. Recurring polygon	5. Top management support
6. Decision tree analysis	6. Democratic style of management
7. Critical path analysis	7. Consumer satisfaction
8. Fishbone analysis and model	8. Cultural change
	9. Empowerment

8.2 E-Government
The literature for e-government addresses three main aspects:

1. The definition of e-government and characterization
2. The levels and stages of e-government application
3. The different stages of e-government

8.2.1 E-Government Definition and Characteristics
E-government is defined as providing permanent government information and services electronically to citizens 24 hours, seven days a week (Norris & Moon, 2005). Also it is defined as the application of technology-based websites to deploy and provision government services, which represents the global trend of the public sector (Wong & Welch, 2004). E-government is divided into four dimensions (Gil-Garcia & Pardo, 2006): electronic services, electronic management, electronic commerce, and electronic democracy. The application of e-government not only involves the deployment of electronic services on a website, but goes beyond that.

Alternatively, Rahardjo, Mirchandani, and Joshi (2007) identified the functions of e-government through seven dimensions:

1. Services related to government employees by facilitating communication processes and increasing the efficiency and effectiveness of workers
2. Conducting financial exchanges with government agencies
3. Nonfinancial services provided by the government
4. Dissemination and attainment of needed information
5. Governmental meetings that aim to increase the reliability and transparency of government
6. Government resources by simplifying the deployment of government resources
7. Presidential, parliamentary and municipal elections

8.2.2 Stages of E-government Application

Some studies relevant to the subject of e-government divided the stages of e-government application to three stages (Infodev, 2002); others divided it into four (Baum and DiMaio, 2000), and still others into five phases. Regardless of how varied and different the phases are, there are similarities and overlap between the application phases in the sense that they can be integrated in two phases at one stage (Asia Oceania Electronic Marketplace Association, 2004). Following are some of the most common studies in this area. According to a World Bank study (Infodev, 2002, pp. 3–5), the application of e-government goes through three phases: publishing, interacting, and transacting. In the publishing phase, a tremendous amount of information such as legislation, regulations, and forms are provided on the e-government website. This information is directed to citizens and businesses. The second stage—interacting—allows mutual communication between government and citizens through the use of e-mail. Citizens can participate in the process of governance through interaction with decision makers. The third stage—transacting—allows the process of financial exchanges between citizens and the government in a manner similar to e-commerce in the private sector.

According to Baum and DiMaio (2000), the application of e-government goes through four levels: presence, interaction, transaction, and transformation. The presence phase is about being present on the Internet. The e-government site should include information about the organization, its goals, mission, working hours, and some of the documents citizens need. The interaction phase is characterized by providing a web page with some research capabilities, such as forms to upload, linking to other sites related to the work of the institution, and providing citizens the ability to contact various government agencies via e-mail. In the transaction phase, a citizen can implement government services completely and directly on the e-government website. The site at this stage provides a channel of communication services such as being able to fill out tax forms and having them submitted online; submitting a request to renew a license, or conducting e-procurement. In the transformation phase, the long-term objectives of having a one-stop-service shop for citizens are realized. This is achieved by enhancing the transparency of the relationship between the government, citizens, and business organizations; raising the capacity of the public to participate in the decision-making process directly with the government; and contributing to the creation of an internal network to enable workers in the various institutions to contact each other. This stage is characterized by the provision of a network between governmental institutions and among its partners from the private sector and nonprofit institutions.

According to the United Nations (2003), the phases of e-government implementation were divided into four stages: emerging presence, enhanced presence, transactional presence, and networked presence. The emerging presence stage is characterized by providing a website featuring basic and limited information. During the enhanced stage, the e-government site provides greater public policy and governance sources of current and archived information, such as policies, laws and regulation, reports, newsletters, and downloadable databases. During the interactive-presence stage, citizens can interact directly with government personnel. In this stage citizens can acquire services such as paying taxes and applying for identification cards, birth certificates, and passports online any time of the day, any day of the week. Finally, in the networked-presence stage, considered the most sophisticated of all, citizens can participate in decision making through tools such as online comment forms and innovative consultation mechanisms.

8.3 E-Government and the Application of Total Quality Management

Studies conducted by Fuller, George, and Valacich (2008) and Koh, Ryan, and Prybutok (2005) indicated that using e-government to promote the application of TQM can be accomplished through team building, the use of collective decision-support systems, and the training of personnel on TQM concepts and principles through the addition of a web-based training channel. In addition, the application of e-government facilitates continuous quality improvement by strengthening the focus on the beneficiary of the services, the efficient and effective interaction and exchange of financial transactions with government departments, and achieving coordination and integration among government institutions (von Haldenwang, 2004).

Furthermore, as e-government is based on electronic administration, it contributes to strengthening the capacity of government institutions and increasing the channels of communication between senior management

and lower management, and disseminating information among employees (Laudon & Laudon, 2004). Moreover, the application of e-government promotes continuous improvement through progress in the provision of electronic services. E-government services begin publishing information on a website, then facilitate mutual interaction between the government and the recipient of the service, and then create a unified portal site through which a person can organize and manage a collection of needs and services. This collection of services offered on the e-government portal is achieved through collaboration and integration between various governmental institutions (Breen, 2000). It was also observed that the application of e-government supports senior managers in deploying quality values among employees, communicating and sharing between senior managers and workers, increasing the ability of senior managers to monitor operations, and facilitating communication among senior managers, consumers, and suppliers (Nguyen, 2006).

9. Statistical Analysis and Hypothesis Testing

1. The Application of the Concept of e-Government

The results concerning the application of the concept of e-government are shown in Table 4. The results demonstrated that surveyed institutions apply the concept of e-government in information sharing and distribution at an average of a mean of 4.15; in mutual communication at an average of a mean of 3.76, and in the application of integrated services among various government departments at an average a mean of 3.13. As for the mean of online financial-transaction processing, it was lower at 2.40. This is because to implement this phase of e-government, there is a need to spread the culture of e-government among citizens and focus on the security of financial transactions through the Internet. The standard deviation confirms discrepancy among the responses of the study sample.

Table 4

The Mean and Standard Deviations for the Application of e-Government

Application of e-Government	Mean	Standard deviation
Sharing and broadcasting of Information	4.15	1.030
Mutual communication	3.76	1.040
Financial Operations	2.40	1.0870
Integration Services	3.13	0.948

2. The Application of TQM

The results shown in Table 5 demonstrate that the institutions surveyed pursued implementing TQM. As for the aspects through which TQM were implemented, organizations' senior-management support, and participation of employees in TQM programs all had the highest Mean value. The result reflects the fact that public-sector institutions in Jordan are seeking to apply the principles of TQM.

Table 5

The Mean and Standard Deviations for the Application of TQM

Dimensions of quality management	Mean	Standard deviation
Top-management support	4.21	0.867
Attention to citizens satisfaction of service quality	4.15	0.809
Participation of employees in TQM programs and functions	4.00	0.965
Formation of TQM working groups	3.81	1.091
Training on TQM	3.78	0.989
Employees recognition	3.71	1.178
Defining the criteria and measures of quality service	3.70	0.999

9.1 Testing the Hypotheses of the Study

H_0 1: There is no statistically significant effect of the application of e-government on the quality of service.

To test this hypothesis, a simple-regression model was used. As shown in Table 6, the results demonstrate a positive relationship between the application of e-government and the level of quality of service at 0.681. In addition, the value of the determinant coefficient (R^2) shows that the application of e-government accounted for 46.3% of the discrepancy in the variable of quality of service. Because the value of $T = 6.828$ and the significance level = .00, this null hypothesis was rejected and the alternative one was accepted. This implies a statistically significant effect of the application of e-government on the dimensions of quality of service.

Table 6

Results of the Simple Regression Model for $H_0 1$

Independent variable	R	R2	T value	Significance value
Application of e-Government	0.681	0.463	6.828	.000

H_0 2: There is no statistically significant effect of the application of TQM on the quality of service.

To test this hypothesis, the statistical multiple-regression model was used. As shown in Table 7, the results show a positive relationship between the application of overall quality and the quality of service at a value of 0.606. The value of the determinant coefficient (R^2) shows that the application of overall quality explains 36.7% of the variance in the variable of quality of service. Hence the value of $F = 3.888$ and the significance level = .002, the null hypothesis was rejected and the alternative one was accepted. This implies that there is a statistically significant effect of the application of the dimensions of the overall quality on service quality.

Table 7

Results of the Multiple Regression Model for $H_0 2$

Mediator variable	R	R2	T value	Significance value
Application of TQM	0.606	0.367	3.888	.0002

H_0 3: There is no statistically significant effect of the application of e-government on the application of TQM.

To test this hypothesis, the statistical simple-regression model was used. The results, shown in Table 8, indicate an effect of applying e-government on the various dimensions of quality analyzed in the study. The application of e-government impacted top-management support at value of $t = 3.788$ and the significance level = .000, attention to citizens satisfaction of service quality at value of $t = 17.844$ and the significance level = .000, participation of employees in TQM programs and functions at $t = 5.695$ and the significance level = .021, formation of TQM working groups at value of $t = 6.165$ and the significance level = .016, defining the criteria and measures of quality service at value of $t = 7.010$ and the significance level = .011. Moreover, the results of the study showed no impact of e-government application on TQM Training ($t = 1.961$ and the significance level = .167) and recognition of employees ($t = 0.853$ and significance level = .360).

Table 8

Results of the Simple Regression Model for H_0

Dimension of TQM Implementation	R^2	Value of T	Significance value
Top-management support	0.210	3.788	0.000
Attention to citizens satisfaction of service quality	0.252	17.844	0.000
Participation of employees in TQM programs and functions	0.097	5.695	0.021
Formation of TQM working groups	0.104	6.165	0.016
Training on TQM	0.035	1.961	0.167
Employees recognition	0.016	0.853	0.360
Defining the criteria and measures of quality service	0.115	7.010	0.011

H_0 4: There is no statistically significant effect of the application of TQM and the application of e-government on improving service quality

To test the integrated relationship between the dimensions of the application of TQM and the application of e-Government on the quality of service, the sequential-regression model was used. The result is shown in Table 9 and elaborated below:

1. The researchers found an impact of the application of TQM on the quality of service (value $F = 3.888$ and the significance level = .002).
2. After adding the variable of e-Government application into the model, the results showed that the added variable increased the interpretation coefficient by 0.279 whose value of explanatory statistical significant is $F = 36.256$ and significance level = .000. Consequently the total explanatory value reached a total of 64.6.%
3. After adding the variable of interaction between e-government application and the dimensions of TQM to the study model. The study results showed that the added variable increased the explanatory factor at value of 0.184whose statistically significance level is at $F = 6.050$ value and significance level = .000. Consequently, the overall explanatory value reached a total of 83%.

Table 9
Results of the Sequential Regression Model for H_04

Step	Independent variable	R^2	F	Significance level	Rate of Change $R2$	F	Significance level
1	The dimensions of overall quality	0.367	3.888	.002	0.3888	3.871	.002
2	E-government Application	0.646	36.256	.000	0.279	36.256	.000
3	Interaction between e-Government and the dimensions of TQM	0.830	6.050	.000	0.184	6.050	.000

10. Study Results

The results of the research study are detailed below:

1. In the application of e-government, the institutions surveyed targeted application of e-government in information sharing and distribution, mutual communication, integration of services among various government departments, and online financial-transaction processing at the lowest application level. The low level of online financial-transaction support can be justified by the weak culture of electronic financial transactions among the recipients of services due to a perception of low security and confidentiality of data, combined with the lack of well-defined regulations and legislations.

2. The institutions surveyed progressively applied TQM through top-management support, attention to citizens' satisfaction with service quality, participation of employees in TQM programs and functions, the formation of TQM working groups, TQM training, recognition of employees, and defining the criteria and measures of quality service.

3. There is a statistically significant effect of the application of e- government on the application of TQM.

4. There is an impact of the application of e-government on some application aspects of TQM: top-management support, attention to citizens' satisfaction of service quality, participation of employees in TQM programs and functions, formation of TQM working groups, and defining the criteria and measures of quality service. In contrast, the results of the study did not show any impact of the application of e-government on TQM training, and recognition of employees. The researchers justified the lack of impact of the application of e-government on TQM training by the lack of process and knowledge integration among governmental institutions. This lack of integration leads to the limited dissemination of knowledge on the management and implementation of overall quality. This limit is also aggravated by the fact that in Jordan the application of e-government is not complete yet and is still at its early stages. The researchers believe that the lack of impact of e-government application on the TQM dimension related to the recognition of employees is justified by the fact that employee recognition is largely impacted by other factors such as leadership, reward, and compensation systems.

5. There is a statistically significant impact of the interaction of e-Government and TQM on the quality of service in the public sector of Jordan.

11. Recommendations

In light of the findings of the study, the researchers developed a number of recommendations that can be used as a set of useful guidelines by decision makers:

1. Continue to promote the employment of information technology in government institutions in Jordan, as this contributes to the advancement of TQM applications and principles.

2. Ensure continuous training of government personnel in Jordan on information-technology solutions and application through courses and seminars that demonstrate the relationship and impact of technology and information-system solutions on TQM.

3. It is necessary to achieve complete integration among government departments and institutions to enable sharing of knowledge and knowledge-driven decision making. This is especially important in the area of manpower training on TQM and quality improvement.

4. Great emphasis should be placed on the importance of systems analysis in a manner that enables the application of software solutions that fit and advance institutions' functions and processes.

5. It is very important to expand the culture of e-government among government employees and beneficiaries alike, as e-government adaptation impacts increasing the quality of government

services.

6. It is essential to expand the culture of TQM among public-sector institutions to improve the quality of services provided.
7. Government institutions should leverage the experience gained in the private sector in the field of TQM and gain some insights from its experience.
8. Encourage further research on the subject that includes all Jordanian government institutions, as this study focused only on five governmental institutions.

Based on the results of this study, in the future, the researchers can look into the impact and role of TQM implementations in advancing the level and stage of e-government implementations within organizations especially the public sector.

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