The impact of ISO 9001 on Geographic Information Systems' Procedures: An empirical study in Jeddah municipality

Dr. Iqbal S. Alsaleh [1] and Heba M. Ahmed [2]

[1,2] Management Information Systems, Econ & Admin Faculty, King Abdul Aziz University, Jeddah, Kingdom of Saudi Arabia

Email: ialsaleh26@hotmail.com/ ealsaleh@kau.edu.sa [1]& heba_alalimi@yahoo.com [2]

Abstract:

The international organization for Standardization, (ISO) 9001 is a globally renowned and recognized standard for quality management systems, for all processes within any 'system of organization' and its component entities.

This research critically analyses the impact of ISO 9001:2008 implementation, on the performance/effectiveness of the operations at Centre for Geographic Information Systems (GIS Centre) in Jeddah Municipality. This study is focused on GIS because it is an effective tool utilized in planning and decision-making for municipal services to citizens.

A descriptive, analytical method has been utilized to achieve the objectives of the research. Questionnaires were distributed to the staff of the GIS Centre at Jeddah Municipality, in addition, to a telephone interview that was conducted with the Director General of the GIS.

The results suggest that there is a valid relationship between the implementation of ISO 9001:2008, in the improvement of the internal processes.

Key Words: Geographic Information Systems (GIS), ISO 900, TQM model, Decision support systems, Sustainable competitive advantage, IS service quality, Information quality, System quality.

1.0 Introduction

Total Quality Management is a holistic approach that can help an organization achieve a sustainable level of success; it views continuous improvement as an integral 1.0 Introduction
component of the care organizational processes, and not as a short-term initiative. It aims to optimize the use of energies and capabilities in order to achieve the highest level of performance and improve the quality of services. The effectiveness of the ISO 9001:2008 system can be critically analysed through the implementation of its standards in a given organization. The direct organizational benefits associated with TQM implementation, include the optimization of processes and the development of guidelines that each

employee should follow. Thus, the company monitor and regulate tasks entrusted to the employees, by an issuance of the necessary documents/policies through the various stages of the work.

In the contemporary business environment, where the demographic, economic/ social challenges have enhanced along with the exponential growth in the demand for basic services, it has become necessary to apply quality management principles in public sector strategies. The TQM approach also enhances the strategic decision-making process, through which the long-term development goals of the organization can be achieved. Due to this comprehensive impact of the quality management approach on the operational activities of eth organizations, the relevance of TQM in the public sector has increased substantially in the current scenario.

With the Kingdom's pursuit of global competitive advantage, in the core service sector, the organizations are motivated to keep up with this trend and seek to achieve these standards, as in the case of Jeddah Municipality.

The Municipality of Jeddah serves the region by facilitating various utility services for the communities and stakeholders. One such service involves the Geographic Information System (GIS), which occupies great importance in the provision of services to residents by the Municipality of Jeddah. The GIS Centre plays an important role in the provision of services and solutions to support e-government systems, as it is responsible for all projects related to geographic information systems and mapping within the Jeddah Municipality.

Many strategic decisions need to be made by the municipality, in order to achieve the development objectives of the city and also to enhance the level of satisfaction among the residents regarding system information. A variety of GIS-based collaborative decision support systems and procedures have been developed, which strive to increase the public involvement, in the community planning and decision-making processes (Boroushaki, 2009; Malczewski, 2009). Due to the significance of the GIS Centre, the interest and focus of the organization is predominantly to improve and upgrade systems, in order to raise the level of satisfaction. The satisfaction criteria are based on the principle of quality, which is achieved through the institutionalization of the TQM principles in eth organizational culture and internal processes.

Organizations facilitate progress optimizing the time and effort (Mayo, *et al.,* 2012) needed to achieve the adequate results for all procedure and to raise the satisfaction levels of the internal system users. This initiative would positively reflect on the services provided by the GIS Centre in Jeddah Municipality.

The GIS Centre implemented the quality system ISO 9001:2008, in order to achieve its strategic performance driven objectives. At the initial stage of the system implementation, the disparity between the current situation and the requirements of the International Standard ISO 9001:2008, were critically analysed and highlighted. It restructured geographic information systems and established a quality system, which enabled the centre to get the international certificate ISO 9001:2008. This initiative has achieved many strategic results for the centre, such as thread work procedures, standardization, adjusting levels of quality of data, adjusting the exchange of data, traceability, dealing with activities as processes and operations as activities which reduces the time required for continuous improvement processes, in turn resulting in internal user satisfaction when using the system.

The quality system ISO9001:2008 focuses on enhancing the documenting procedures, to make them easier to implement and to adequately monitor of what is done, "We must remember that we can't improve what we can't control, and we can't control what we can't measure" (Mayo *et al.* 2012). Quality system ISO9001:2008 also focus on the integration of procedures within the system as one part, rather than separate components.

2.0 Background of the study:

Information Systems are can be identified as one of the most important resources of an organization, which significantly influence the performance of the company. The effectiveness of the information systems on the organizational operations and overall performance is also dependent on the type of the company.

Past researchers observed that numerous organizations by adopting information systems, were able to enhance the organizational performance and reduce the process time (Hitt, Wu & Zhou, 2002; Melville, Krsemer & Gurbaxani, 2004; Ravichandran & Lertwongsatien, 2005; Nwarikpa, 2014; Wang, Chen & Benitez-Amado, 2015). They also noted that the necessity for these systems is not only limited to organizations that aim at profit, but extends to service organizations that seek to improve their services quality standards and achieve a sustainable competitive advantage. It enables the service organizations to take the right decisions in a time efficient manner, and also bolster the effectiveness of these decisions. Information systems bolster the decision-making process, by providing a framework, to track the movement of information within an organization and utilize it strategically (Salman, 2006). The increasing influence of the information systems on the operational activities; caused the organizations to improve the performances through the implementation of these systems. One of the organizational efforts is an adoption of quality systems, and integrating them into the organizational culture. A study by Hayoli (2006) similarly highlights the significance of management information systems, as an important tool for organizations to achieve sustainable success. Innovation in operational performance and competitive advantage reflects successful strategies by management, achieved through the implementation of the information systems.

The study shows a relationship between the implementation of the information systems and the capability of the organization to increase the levels of innovativeness, in order to develop a competitive advantage.

The study also considers the significance of measuring the effectiveness of the organizational systems: It seeks to develop and improve the system and to increase awareness and understanding of their importance and role in achieving competitive advantage for organizations (Hayali, 2006). The above studies influenced the objectives of this research, which is based on the critical analysis of the impact of the application of ISO 9001:2008 on GIS in Jeddah Municipality.

A significant amount of attention should be allocated to the role of information systems in strategic competition decisions. Also, to the importance of developing, protecting and securing the security of the system; as well as to the importance of increasing awareness and understanding among the staff of the usage of the system in achieving competitive advantages. In addition, the importance of training and development of the skills of trainees in using the multiple reports and forms produced by these systems should be taken into account (Ismail, 2006), and linked with ISO 9001:2008 standards. This study seeks to ascertain the impact of applying these procedures to geographic information system (GIS) in Jeddah municipality.

Kim *et al.* (2012) studied the relationship between quality management practices and creativity in industrial and service organizations, which held a certificate of ISO 9001. Eight factors in quality management were studied, and five criteria of creativity were identified to study quality management practices. One of the creativity criteria can be identified as the operations, divided in terms of degree and kind, into radical operations and gradual types. The authors state that adopting quality practices makes the organization more flexible and responsive to customer requirements, reduces the time and cost of new development and helps the organization satisfy client's requirements. Thus, the organization can develop a sustainable growth model, by enhancing the efficiency of the operations and satisfying the customers.

The research also analyses the responsibility of leadership to create a conducive environment, in which quality management can be implemented. Without the presence of strong management, the benefits of quality management may be reduced; as this factor is considered as a driving force for quality management.

Moreover, the leading administrator has a positive role in defining the responsibilities and power of the individuals in the organization, influencing suppliers' rules, and hence quality of materials, and in focusing on customer satisfaction, which affects employees' focus on designing products and services.

Then, the study touches the positive role of training for staff on the quality of information and reports, together with their role in participating in the design of products and services. It then moves to the role of employee relationships by team-working to improve the quality of information, reports, and operation management.

Then, it explains the positive role of quality management in operations management concerning products and services, showing how Creativity management changes both processes and products, radically and gradually.

In short, quality management is positively linked with innovation in processes and products. The study ascertains that quality management has a direct positive impact on the performance of the organization. It is linked with both radical and gradual and operations. It also shows that information and knowledge helps the organization to establish an educational base, facilitating innovation and creativity to solve problems in an innovative way, increase progressive learning, reduce disparity in performance, support the sharing of knowledge, creative thinking and progressive innovation, and hence achieve competitive advantage.

Overall, the authors' perception can be summarized as:

- Any enhancement in IS service quality simultaneously improves the organizational performance. So, higher priority should be given to IS service quality, information quality, and system quality.
- More training must be provided to IS staff in order to develop better skills and attitudes toward services orientation (Goral *et al*., 2010).

As Tan *et al*. (2012) stated that the primary objective of information systems is the use of computers to support the decision-making process, which is based on the collection and analysis of high-quality customer-centric data. The design of information technology requires high-quality organization systems with an emphasis on the problems of construction, adaptation, and integration, in order to achieve the smooth flow of information. Then study discusses the quality of the information system in the light of ISO 9001:2000, which can be utilized to achieve a method of effective procedure management, leads to optimization of organizational processes.

The study discusses competitiveness and impact of the globalization phenomenon in the organizations. Several studies such as Castka *et al*., 2014; Handayani *et al*., 2015; Koivupalo *et al*., 2015; and Molina-Azorin *et al*., 2015 have been conducted in this area and identified the reasons for the application of a quality management system, including:

1. Clear documentation of procedures improves the consistency of output.
2. Quality measurement provides reliable information for senior management on whether the procedures are going in the right way or not.

Advantages of the system include:

- ✓ Taking the right actions to guarantee the procedures and to reduce the error rate.
- ✓ Reducing imbalances.
- ✓ Detecting errors and correcting them at the lowest cost.
- ✓ Documenting procedures and making them easier for new employees to understand and follow to increase market share, income and sales.
- ✓ Cost reduction as a result of reducing defective products.

These benefits are only realized when they effectively become an essential part of quality management. The study highlights ISO 9001, as one of the most effective and ideal quality management systems. Through ISO 9001 many organizations have been able to achieve competitive advantage and increased market share/spread.

The recent studies provide further confirm the positive impact of quality systems such as ISO 9001, to the quality standards of the system procedures and operations.

3.0 Research Objectives and Hypotheses

The main aim of this study is to answer the question: What is the impact of ISO 9001 on the procedure performance of GIS and user satisfaction?

Studies carried out in the past have highlighted the significance of information systems in the overall success of organizations (Hitt, Wu & Zhou, 2002; Shang & Seddon, 2002; Heels, 2002; Chang et al., 2008; Pilla & Braderick, 2015). The success of these systems, however, depends on the knowledge and usage capabilities of employees. Organizations emphasize the importance of system usage because it plays an important role in strategic decision-making and the achievement of the core competitive advantages. Therefore, they must focus on increasing the usability/knowledge of quality standards in the workplace environment. Another crucial factor that contributes to the system effectiveness is the role of the directing members of the organization. This initiative can be achieved through the enhanced understating of the directing members regarding the positive impact of ISO 9001:2008 information systems standards, of operational activities such as: input and output and clarity of applied procedures, clarity of powers and chain of command. This research focuses on the most important factors that have affected Jeddah Municipality in the application of ISO 9001:2008 and the impact of this policy on the procedures at the Centre.

Based on the previous clarification, the research objectives are:

- To find out the impact of ISO9001:2008 on data quality.
- To find out the impact of ISO9001:2008 on integrating procedure.
- To find out the impact of ISO9001:2008 on the reduction of process time.
- To find out the impact of ISO9001:2008 in the internal users' satisfaction.

Based on these objectives, the following hypotheses are proposed:

1. There is a relationship between ISO 9001 and data quality.
2. There is a relationship between ISO 9001 and procedures integration.
3. There is a relationship between ISO 9001 and reduced process time.
4. There is a relationship between ISO 9001 and the satisfaction of internal users.

4.0 Research Setting and Context

4.1 Jeddah Municipality

Capitalizing on its unique position as the "Gateway to the Two Holy Mosques", Jeddah aspires to be a world-class Islamic cultural centre, as well as a global commercial and tourist destination. Jeddah enjoys a distinctive environmental and humanitarian character, within the context of sustainable urban development.

Jeddah Municipality initially planned to take advantage of GIS through the General Directorate of Urban Planning. In the year, 1999 the Information and Development unit was established, as one of the departments of the Agency for Reconstruction Projects. The department is responsible for geographic information systems, and its functions include the establishment of rules for digital mapping and GIS development, and developing applications to serve various departments of the Secretariat.

After the decision on establishment of the GIS Centre, by His Excellency the Secretary No. 11213 / D dated 20/02/1427 AH, all the departments concerned were interlinked. The centre thus, became

responsible for all existing and future business and projects of the Secretariat directly connected with geographic information systems (http://www.jeddah.gov.sa).

GIS is a computer-based system for the collection, maintenance, storage, processing analysis and output of spatial information and metadata for specific targets. This helps in planning and decision-making concerning urban planning and expansion in housing and other areas. The system can enter and process geographic information (maps, aerial photographs, visual space), descriptive data (names, tables) , and processed data (refined from error) conduct spatial and statistical analysis and display output on a computer screen or paper in the form of maps, reports, and graphs, and other formats.

The goals of the GIS Centre are:

- To become a pioneer in the field of geographic information technology systems in Saudi Arabia.
- To regionalize and internationalize the level by building and developing a system for the geographic integrated information, maps, and manages the level of the province.
- To link all related departments of Jeddah Municipality within the network and to provide the latest and most comprehensive information and maps to raise the efficiency and effectiveness of administrative and regulatory in these departments (Quality Guide, 2013; GIS Vision and Ploicy, 2013). .

4.2 Implementing ISO 9001:2008 in GIS Centre

The scope of QMS includes the provision of geographical data and information of high quality for the Jeddah Municipality; this is the field of the work in GIS Centre. This must be done by creating a set of geographic databases in accordance with the requirements of the Secretariat, and the implementation of its core responsibilities, which are focused on various municipal services.

Geographic databases contain digital maps of diverse scales. Geographic coverage and the center's work, depends on the partial and complete coverage of Jeddah, by satellite photographers of different capacity (SPOT - Xonos - etc.); in order to achieve the following tasks:

- Building geographic applications using geographic information systems to support the relevant departments of the Municipality.
- Designing, building and updating database for all geographic base maps, and drawings digital TV.
- Digitizing paper maps and using them in geographic applications.
- Rating layers of digital mapping and geographic information entered into databases of geographic information and creating descriptive information for all classes.
- Collecting and entering data and information from different sources, such as engineering drawings, reports and other sources of information.
- Training staff in various departments of the Secretariat on the GIS.
- Rehabilitation and development of manpower in line with the Status of GIS.

4.3 Quality system of internal policy

The quality system was developed to enhance the policy and internal quality attributes. The goals and objectives of the quality system are to use the GIS Centre in Jeddah Municipality to meet the requirements of international standards such as ISO 9001:2008.

The policy ensures commitment to the highest quality standards for the production of maps and geographic data. In addition to that, programming geographic applications are provided by the centre to meet the needs of customers.

Some of the important points of the policy are as follows:

- Publication and clarification of the objectives of the policy to all engineers and staff by the Director General or the Director of Quality.
- Providing staff, engineers, work mechanisms and the policy to achieve the highest levels of these procedures and to improve the working environment of the centre.
- The responsibility for achieving and maintaining the required level of quality assurance rests with the General Manager of the centre while the follow-up routine of Quality Supervision is the responsibility of the Department of Quality Assurance**.**

5.0 Research Methodology

This research has been designed to analyse the impact of implementing ISO9001:2008, on the operational performance of the geographical information system. The specific analysis would be conducted regarding the implementation in the GIS centre of Jeddah Municipality.

5.1 The Questionnaire

Since the research was applied on the GIS Centre of Jeddah Municipality, the survey focused on the employees of the GIS centre in Jeddah Municipality. The General Manager of the centre agreed to participate proactively in the survey and facilitate the processes such as distribution of the questionnaires to the employees and the collection of the relevant responses.

The questionnaire utilized for data collection was divided into two core parts. The first one part was based on the demographic information (age, qualification and experience) of the respondents. The second part was related to the research hypotheses and covered four components, given as:

First axis: included eight items related to data quality.

Second axis: included six items related to procedures integration.

Third axis: included nine items related to reducing the processing time.

Fourth axis: included six items related to internal user satisfaction.

Responses were based on a five-point Likert Scale as shown in Table 1

5.2 Interview

The researcher also conducted a telephone interview with the General Director of the GIS Centre to discuss the rationale for the application of ISO 9001:2008 quality system.

6.0 Data analysis procedures

The data gathered by the questionnaire was analysed quantitatively using IBM SPSS statistic (version 20), in order to test the hypotheses and draw conclusions and implications.

Statistical techniques employed include:

1. Frequencies
2. Reliability testing (Cronbach's Alpha).
3. One-Sample T Test.
4. Means and standard deviations.

7.0 Ethical considerations

The questionnaire was accompanied by information about the researcher and the purpose of the research project. Respondents were assured that the responses to each item would be used solely for the academic purposes. The questionnaire only attained limited level personal information from each participant and the respondents' names were not included. Respondents were assured of confidentiality and anonymity and also that their professional careers would not be influenced by the participation in the research activity.

8.0 Results

8.1 Validity and Reliability

Reliability for each scale and for the whole instrument was tested using Cronbach's alpha, as shown in the table below:

The reliability coefficients for each scale and for the instrument as a whole were very high and indicating high reliability of the overall questionnaire.

8.2 Respondents' Demographic Data

The first part of the questionnaire, collected demographic the information, such as: age, qualification and experience, as shown below:

Eleven of the sample (26.2%) were aged between 20-30years, 30 of them (71.4%) were between 30-40years, and 1 individual (2.4%) was aged between 40-50 years.

As shown in Figure 2, 1 individual (2.4%) was qualified to High School level. 36 (85.7%) had a Bachelor's degree. 13 of the sample (4.8%) had a Master's degree, (2.4%) had a Doctorate and 4.8% had other qualifications, e.g. diplomas.

As shown in Figure 3, 6 of the sample (14.3%) had less than 5 years' experience, while 20 (47.6%) had experience between 5-10 years, 31% had between 11-15 years, and 3 individuals (7.1%.) had more than 15 years' experience.

Based on the demographic information, the researcher found that:

1. All items of the questionnaire showed no significant difference among age group, (sig. =0.623)>0.05.
2. All items of the questionnaire showed no significant difference among the qualification groups, (sig. =0.208)>0.05.
3. All items of the questionnaire showed no significant difference among experience groups (sig. =0.955)>0.05.

8.3 Hypotheses Testing

The Pearson Correlation Coefficient was used to test the internal validity of the items of Data Quality scale

The table shows positive correlations between the items of the data quality scale and the scale total, showing acceptable scale validity.

Table 4 shows the internal validity of items of the item of the Procedures Integration scale:

The table shows positive correlations between the items and the total score of the scale, confirming the scale validity.

The Pearson Correlation Coefficients for the items of the scale and Reduction of Time for process improvement are shown in Table 5.

The table shows positive correlations between the items and the total score for the scale, demonstrating acceptable validity.

The Pearson Correlation Coefficients for the items of the User Satisfaction scale are shown in Table 6.

The table shows positive correlations between the items of the scale and the scale total, showing acceptable validity

As a test of structural consistency, Correlation coefficients were calculated between the scores for each scale of the questionnaire and the overall score for the questionnaire (see Table 7).

The table shows strong positive correlations between the scores for each scale of the study and the overall score for the questionnaire, which shows the consistency of the structural dimensions of the study.

The researcher used a Liker scale in the questionnires to measure the respondents answers, Table 8 shows the weight of the scale

H1: There is relationship between implementing ISO 9001:2008 and data quality

To test this hypothesis, one sample T-test and the mean were used. The test was carried out at **the significance level α= 0.05**

There is no significant difference between the Data Quality mean score (4.2440) and test value (0.004<0.05). Thus means we can accept the hypothesis, that there is a relationship between ISO 9001 and data quality.

The mean score shows which of the items of the scale are preferred as more important in relation to Data Quality (Table 9).

It can be seen from the ranking for Data Quality items, that each employee has the right to access the data required to perform his work and the mean of this factor is (4.54). The second factor that influences the data quality is that the required data is available permanently since the mean of this factor is (4.42). The third factor is ease of access to the required data since the mean of this factor is (4.40). The fourth factor that influences data quality is that data gives the information needed to provide services, since the mean of this factor is (4.35). The fifth factor that influences data quality is that data give the information needed to provide decision making since the mean of this factor is (4.28). The sixth and seventh factors that influence data quality are that data are permanently updated and that the data are clearly classified, since the means for both these factors were (4.23). The eighth factor influencing data quality is that the required data is accurate and conforms to standard, since the mean of this factor is (3.54).

H2: There is a Relationship between ISO 9001 and Procedures Integration

To test this hypothesis, the one sample T-test approach and the mean were used. The result showed that at the significance level α= 0.05, since the significance level <0.05, there is no significant difference between the mean score for Procedure Integration (4.37) and the test value (4.00), which means there is a relationship between ISO 9001 and Procedures Integration, so the hypothesis is supported.

Table 10 shows the relative strength of agreement towards each item of the Procedures Integration scale

In the previous table the factors that influence 'Procedure Integration' are arranged in descending order based on the degree of approval as follows: The first factor which has a high level of influence is the documentation and clarity of the procedures in the GIS Centre, as the mean of this factor is 4.52. The second factor that influential factor is based on the sequential and consecutive nature of the procedures in the GIS Centre are, with the mean of this factor is 4.47. The third factor that influences the integration initiative; is the inability to make a procedure, for which there isn't a right to do so; the mean of this factor is 4.45. The fourth factor that influences procedures integration is based on the responsibility of each employee for a specific task, since the mean of this factor is 4.33. The fifth factor that influences procedures integration is that a researcher cannot make a certain procedure without finishing the previous one since the mean of this factor is 4.28. The sixth factor that influences procedures integration is that there is no overlap on procedures and tasks since the mean of this factor is 4.16.

H3: There is a relationship between ISO 9001 and the reduction of time for process improvement

The researcher tested the hypothesis, using the one sample T-test approach and the mean. At the significance level α= 0.05, since the significant =0.000<0.05, then this is means there is a relationship between ISO 9001 and the shortening of time for process improvement, so the hypothesis is supported.

In the previous table, the factors that influence the reduction of time for process improvement are arranged in a descending order based on the degree of approval: The first factor that influences shortening of time for process improvement is learning from past errors and redundancy, since the mean of this factor is 4.42. The second one is Easy knowledge of errors since the mean of this factor is 4.40. The third factor is ease of controlling errors, since the mean of this factor is 4.33. The fourth one is ease of calculating the time for correction procedure, since the mean of this factor is 4.30. The fifth factor is ease of documenting error and the correction procedure since the mean of this factor is 4.31. The sixth one its being easy to know the

cause of error since the mean of this factor is 4.28. The seventh factor its being easy to take the action of error correction, since the mean of this factor is 4.26. The eighth factor is ease of evaluation of the error rate, since the mean of this factor is 4.21. The last factor that influences shortening of time for process improvement is ease of determining the effect of error on the part of the workflow, since the mean of this factor is 4.19.

H4: There is a relationship between ISO 9001 and the Satisfaction of Internal users.

The one sample T-test and the mean were used at the significance level $\alpha = 0.05$, there is no significant difference between the scale mean and 4 (the test value) ($P = 0.000 < 0.05$) which means there is a relationship between ISO 9001 and the satisfaction of internal users, so the hypothesis is supported.

From the previous table, the most significant factors that influence the internal user satisfaction, are arranged in a descending order based on the degree of approval: The first factor that influences internal user satisfaction is the user satisfaction with using the GIS system, since the mean of this factor is 4.40. The joint second factors are Center's objectives, and policies are clear and declared & it is Easy to access the data and information necessary to do my job since the mean of these factors is 4.35. The fourth one is the procedures of work are flexible and smooth since the mean of this factor is 4.33. The next one is a clear mechanism for monitoring and evaluating performance, since the mean of this factor is 4.21. The last factor that influences internal user satisfaction is that the researcher has sufficient authority to make the decision if the situation required since the mean of this factor is 4.16.

9.0 Discussion and Conclusion

The findings of this research show a clear relationship between implementation of ISO 9001:2008 and the data quality. The most important factor is that specific rights of each employee are provided, which can be accessed for his work. This ensures the clarity of rights and responsibilities. This is consistent with the work of Mayo *et al*. (2012) and ensures the security of the system. According to Ismail, (2006) organizations must focus on the importance of protection of their systems, plan for it and implement adequately. Determination of the rights of each employee has been achieved, as advocated in the study of Kim *et al*. (2012), based on innovation in service delivery, design, and user satisfaction.

The General Director pointed out a keen concern with the level of services provided by the Centre and the importance of geographic information systems. The service quality demands would increase proportionally to the exponential advances in eth field of technology. On this basis and according to the strategy of the Secretariat of Jeddah, the Centre applied the ISO 9001 quality system. As there was an issue associated with the lack of procedure integration, which caused dissatisfaction among the internal user. This dilemma also resulted in the loss of time and effort, due to which the Centre sought to alleviate the issue, through the implementation of ISO 9001: 2008.

Among the core factors affecting the quality of the data, is the factor associated with the ability of the researcher to find permanent, easily-accessed and necessary information to evaluate the service. This facilitates raising the level of services and decision-making through the data. Decision-making is an objective of any information system (Tan *et al.,* 2012), as stated in a previous study on the subject area. These systems can substantially improve the operational activities of the company, hence providing benefits such as enhanced quality of services, sustainable competitive advantage and increased effectiveness/efficiency of the decision making process (Selman, 2006).

Other factors that affect the quality standards of the data can be identified as the innovation and continual updating, the data validity and conformity to standards. This is consistent with what was indicated by the study of Kim *et al*. (2012).

The results of this study also show a relationship between the application of the standards of ISO 9001:2008 and integration of procedures. One of the most important factors is that the procedures must be clear and documented. Pride's study (2012) also supports documentation to provide a knowledge base within the organization, which helps achieve greater levels of innovation and creativity in the organization, as noted by Kim *et al*. (2012).

The next factor, about authority, whereby an employee cannot do any procedure he is not entitled to do, is compatible with the study of May *et al*., (2012). Also, each employee is responsible for certain tasks, and cannot perform one task without completing the previous one. This means there is no interference between the tasks or procedures performed, consistent with what is advocated by Kim *et al*. (2012), which facilitates innovation in service delivery and design, and achieves user satisfaction.

In conclusion, it can be said that the improvement in information systems and a focus on development should be given the necessary importance. In this respect, the application of the principles of quality has become a strategic decision in the light of globalization and the growing interest in services. This will be useful to organizations and their performance, improve the level of services and increase their quality of output, and so achieve the organization's competitive advantage, consistent with the findings of this and previous studies.

10.0 Limitation

The limitations of this research were the narrow time to test the hypotheses and the absence of an example of implementation of QMS (ISO 9001:2008) in any other municipality, due to which it was not possible to test or validate this study on the practical application of QMS in other similar organizations. To compare the findings and dissemination of such information, the researcher proposes to do more research in other municipalities in Saudi Arabia in the future.

Despite these limitations, this study contributes to being the first research in Saudi Arabia to study one of the efforts of the Jeddah Municipality in improving the level of its services, compatible with the trend of the kingdom forwards global engagement and openness to the world and the consequent need for organizations to adopt the principles of quality. In this respect the application of ISO standards on procedures for GIS, which are among the most important systems in Jeddah Municipality, has demonstrated success in enhancing data quality, procedure integration, ease of improvement, and user satisfaction.

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Appendcies:

Table 1: Relative Weight of Likert Measure

Scales	Weight
Strongly agree	5
Agree	4
Neutral	3
Disagree	2
Strongly disagree	1

Table 2: Questionnaire Reliability (Cronbach alpha coefficient)

Scale	Numbers of items	Cronbach's Alpha
First axis: Data Quality	8	.784
Second axis: Procedural integration	6	.770
Third axis: Time reduction	9	.872
Fourth axis: User satisfaction	6	.774
For all study: Whole questionnaire	29	.936

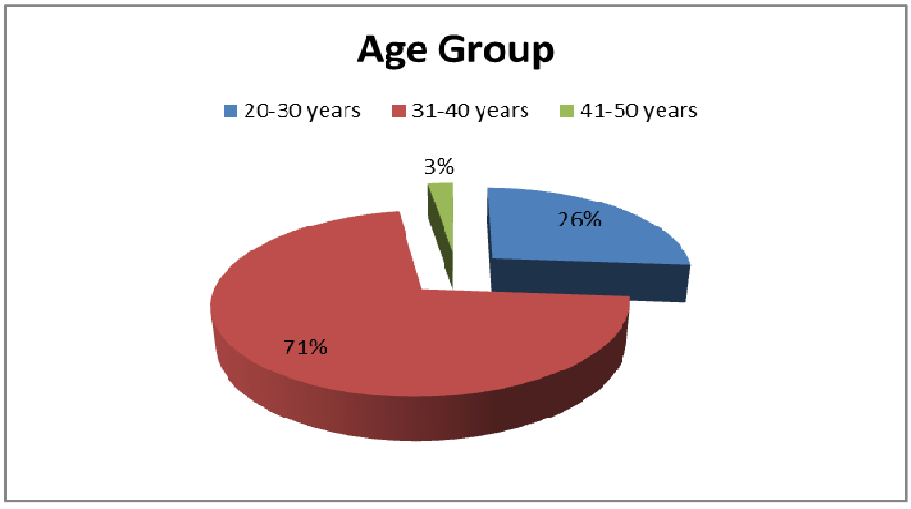

Figure 1: Age

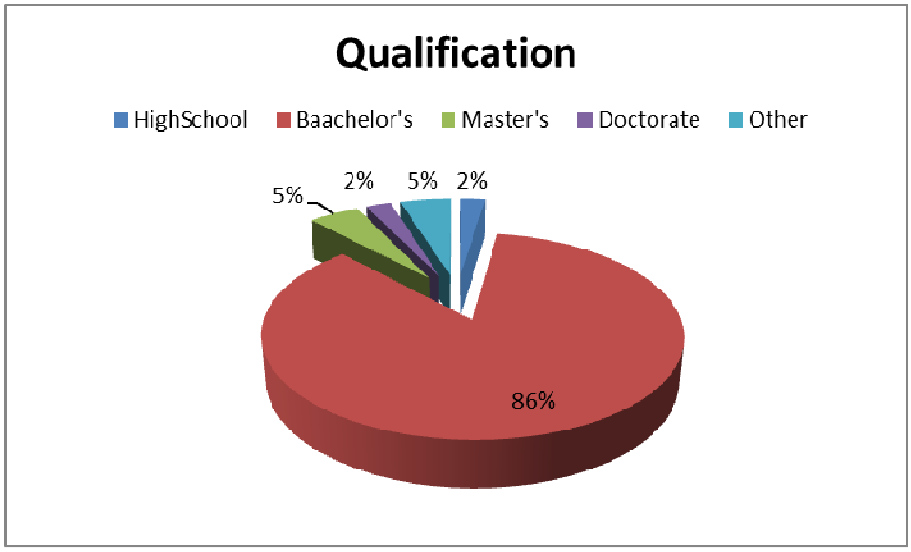

Figure 2: Qualification

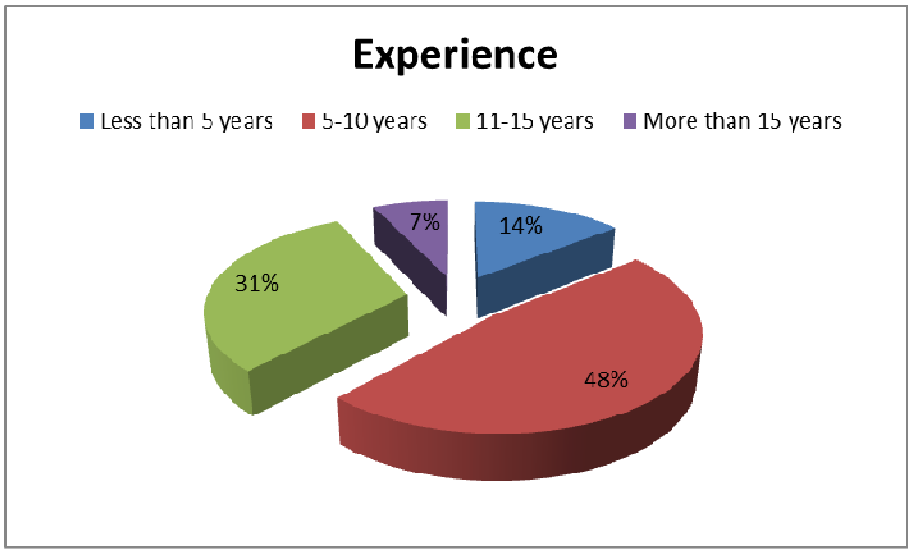

Figure 3: Experience

Table 3: Pearson Correlation Coefficients for the Internal Validity of items of the First Scale (Data Quality)

Items	Correlation
The required data is available permanently.	**.686
The required data is permanently updated.	**.708
The required data is accurate and conform to standard.	**.716
The required data is clearly classified.	**.746
Easy to access the required data.	**.655
The required data which gives the information is needed to provide the services	**.638
The required data which gives the information is needed to provide decision making.	**.735
There are specific rights of each employee to access the data required by his work only.	**.255

****correlation is significant at 0.01 level**

Table 4: Pearson Correlation Coefficients for the Internal Validity of items of the second scale (Procedural Integration)

Phrase	Correlation
The procedures in GIS Centre are clearly documented.	**.659
The procedures in GIS Centre are sequential and consecutive.	**.801
I can't make a certain procedure without finishing the previous one	**.704
The researcher can't make a procedure that he doesn't have rights to do.	**.628
Each employee is responsible for a specific task.	**.650
There is no overlap on procedures and tasks.	.**.673

****correlation is significant at0.01 level**

Table 5: Pearson correlation coefficients for the internal validity of items of the third scale (Reduction of Time)

Phrase	Correlation
Easy to control errors	**.659
Easy to knowledge of errors	**.675
Easy to know the cause of error	**.775
Easy to evaluate the error rate	**.694
Easy to determine the effect of error on the parts of the workflow	**.681
Easy to take the action of error correction	**.669
Easy to document the error and the correction procedures	**.674
Easy to calculate the time for correction procedure	**.811
To get benefit from past errors and not redundancy	**.699

****correlation is significant at 0.01 level**

Table 6: Pearson Correlation Coefficients for the Internal Validity of items of the fourth scale (User satisfaction)

Phrase	Correlation
The procedures of work are flexible and smooth	**.515
I have sufficient authority to make the decision if the situation requires.	**.550
Easy to access the data and information necessary to do the job.	**.620
Center's objectives and policies are clear and declared.	**.598
There is a clear mechanism in the centre to monitor and evaluate the performance.	**.553
I'm satisfied with using the GIS system.	*.352

****correlation is significant at0.01 level**

Table 7: Structural Consistency for the Dimensions of the Study

Axis	Correlation
Data Quality	**.856
Procedures Integration	**.856
Time reduction	**.941
User Satisfaction	**.905

Table 8: Relative weight of Likert measure

Direction of sample	Weight
Strongly agree	4.2 – 5
Agree	3.4 - 4.19
Neutral	2.6 – 3.39
Disagree	1.8 – 2.59
Strongly disagree	1 - 1.79

Table 9: Ranking of responses for the items of the first scale (Data Quality)

Items	Mean	Standard Deviation	Direction	Importance
The required data are available permanently	**4.4286**	**.66783**	**Strongly agree**	2
The required data are permanently updated	**4.238**	**.75900**	**Strongly agree**	6
The required data are accurate and conform to standard	**3.542**	**1.45**	**Agree**	8
The required data clearly classified	**4.238**	**.75900**	**Strongly agree**	6
Easy to access the required data	**4.404**	**73450**	**Strongly agree**	3
The required data give the information needed to provide services	**4.357**	**.72655**	**Strongly agree**	4
The required data give the information needed to provide decision making	**4.285**	**.70834**	**Strongly agree**	5
There are specific rights of each employee to access the data required by his work only	**4.547**	**.50376**	**Strongly agree**	1

Table 10: Ranking of Responses for the Items of second scale (Procedures Integration)

Phrase	Mean	Standard Deviation	Direction	Importance
The procedures in GIS centre are clear and documented	**4.523**	**.55163**	Strongly agree	1
The procedures in GIS centre are sequential and consecutive	**4.476**	**.67130**	Strongly agree	2
I can't make a certain procedure without finishing the previous one.	**4.285**	**.77145**	Strongly agree	5
I can't make a procedure that don't have rights to	**4.452**	**.67000**	Strongly agree	3
Each employee is responsible for a specific task.	**4.333**	**.75439**	Strongly agree	4
There is no overlap on procedures and tasks.	**4.166**	**.76243**	Agree	6

Table 11: Responses of Sample for the Question of the third Item

Phrase	Mean	Standard Deviation	Direction	Importance
Easy to control errors	4.333	.61154	Strongly agree	3
Easy knowledge of errors	4.404	.54368	Strongly agree	2
Easy to know the cause of error	4.285	.67302	Strongly agree	6
Easy to evaluate the error rate	4.214	.64527	Strongly agree	8
Easy to determine the effect of error on the part of the workflow	4.190	.70670	Agree	9
Easy to take action of error correction	4.2619	.58683	Strongly agree	7
Easy to document the error and the correction procedure	4.309	.60438	Strongly agree	5
Easy to calculate the time for correction procedure	4.3095	.78050	Strongly agree	4
Benefit from past errors and redundancy	4.428	.80070	Strongly agree	1

Table 12: Responses of Sample for the Question of fourth Item

Phrase	Mean	Standard deviation	Direction	Importance
The procedures of work are flexible and smooth	4.333	.75439	Strongly agree	**4**
The researcher has sufficient authority to make the decision if situation required	4.166	.76243	agree	**6**
Easy to access the data and information necessary to do the job	4.357	.75938	Strongly agree	**2**
Center's objectives and policies are clear and declared	4.357	.61768	Strongly agree	**2**
There is a clear mechanism in the centre to monitor and evaluate the performance	4.214	.78198	Strongly agree	**5**
The researcher's satisfaction with using the GIS system	4.404	.62701	Strongly agree	**1**