

# Developing ISO 9001:2000 System: Applied Study on the Faculty of Computers and Information Technology

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**Abstract—** Applying ISO 9001:2000 in organization by using manual way faced many problems through the implementation process and beyond such as heavy loads of paperwork for management and documentations, unnecessary testing and documentation procedures and the need for a good communications system. This paper develops a web based-system by analyzing the manual system of applying ISO 9001:2000 in Faculty of Computers and Information Technology in King Abdulaziz University. The developed software facilitate applying ISO 9001:2000 in the organization by supporting all the basic processes, and it avoids the difficulties encountered in the manual way and provides more control in the documentation processes.

**Keywords-** ISO 9002:2000; TQM; database

## I. INTRODUCTION

Currently, the education institution is situated at competitive environment. This type of environment motivates the organization to offer the best services that satisfy their customers. So that, many of the organizations turned to implement ISO standards as a foundation of quality management system, but it faces a number of different barriers, such as conflicts of perception and awareness, misunderstandings of the essence of an ISO standards and the methodology applied, the weakness of standard operating procedures, heavy loads of paperwork for management and documentations, the possibility of over bureaucratic, unnecessary testing and documentation procedures, the need for good communications system through the implementation of a series of ISO Standards [1]. The researchers suggest building an appropriate system to facilitate the implementation of ISO 9001:2000 in organizations, and avoid the problems commonly found in the manual systems, in addition to gain the benefits of e-systems, and networks.

This system has the following characteristics:

- The system can be used by one or more users and each one has the powers in accordance with his/her responsibilities.
- Managers can choose and control the Total Quality Management TQM members, and assign the powers for each one.

- TQM members can follow up with the meetings, and decisions.
- Unit managers can document all related information to their unit such as description, goals, procedures, instruction, forms, etc.
- Managers can approve the documents and display it in the TQM manual.
- Auditors can follow up with the auditing, and document the results.
- Quality managers can follow up with the auditing results, and can handle the corrective action.
- Employees can browse through all documents that are related to their powers.
- Quality managers can manage the training files.
- Employees can control requests and handle them.
- Documents can be store in different format, and it can be displayed by multiple criteria. Also, it displayed with all related information like the title, the writer, the updating date, the document type, and the case of document, such as new document-updated document-canceled document.

## II. STANDARDS-BASED QUALITY MANAGEMENT

The ISO 9000 family of standards can be applied to all organizations regardless of type, size and product provided. Mukherjee shows that "ISO 9000 standard defines the formal quality management system necessary to assure that the technical, administrative and human factors affecting the quality of an organization's product or services under control." [2]. Evans also has a closed view to ISO 9000 as following "ISO 9000 defines quality system standards, based on the premise that certain generic characteristics of management practices can be standardization, and that a well-designed, will-implanted, and carefully managed quality system provides confidence that the outputs will meet customer expectations and requirements" [3]. ISO 9000 is a unified standard found to eliminate the difference and conflicting meaning within

countries and even within an industry, and it become a requirement for international competitiveness [3]. Hind believes that ISO 9000 represents a strong foundation for TQM, he explains this by depending on the main three factors which impact on TQM: customer, management, and process the last factor is the essential of ISO 9000 [4]. There are many writers who share Hind view and look to ISO 9000 as a route to TQM [5].

### III. SYSTEM DEVELOPMENT

ISO 9001:2000 software helps the education organization to apply ISO 9001: 2000 system through all the fourth phases in Deming circle (Plan, Do, Check, Act) and it offers different assistant tools.

#### A. Planning phase

- The general manager forms the TQM team.
- The TQM manager arranges the meeting schedule.
- The TQM manager uploads the decisions which were issued by the meeting.
- The unit manager documents all information related to his/her unit like description, policies, goals, procedures, instructions, and forms and so on.
- The general manager approves and publishes the documents in the TQM manual.
- The general manager closes the documentation process when the TQM manual finished.
- The TQM manager prepares the training files which can be in any format – video, text, and slides – and uploads it in the server, so that it can be browsing by the employees.

#### B. Doing phase

- The employees start using the documents.
- The unit managers insert the external documents into the system.

#### C. Action phase

- The employee informs the TQM manager about the conflict between what was written in the TQM manual and what is actually happening by sending a mismatch case.
- The TQM manager browses and handles the mismatch cases.
- The TQM manager sets the auditing schedule.
- The auditor documents every auditing after finished.

#### D. Corrective phase

- The unit manager sends a request to TQM manager to make a corrective action.
- The TQM manager processes the corrective actions requests.
- The employee browses the corrective actions.

However, dealing with the company which releases the certificate is not part of the system.

Fig. 1 illustrates user requirements represented by use case diagram. As it clear there are six users with different requirements depends on their powers, all employees can browse training files, TQM manual which contains the procedures, instructions and forms. Also they can browse the auditing schedule, and manage requests by adding new request or browsing requests. Any member in TQM team can do what the employee do, additional to browse the meeting schedule.

The unit manager, the manager and the auditor can do what the TQM member do. The unit manager also can handle the coming requests from employees, and manage documents, corrective & preventive action, and browse the auditing result and set the solution to correct any unsatisfactory auditing.

The manager also can manage units, employees, TQM manual, TQM member, approve documents and publish it. The auditor can also manage auditing documents. The TQM manager can do what unit manager can do in additional to manage auditing schedule, training files and meeting schedule. Also, he/she can close the auditing and handle the corrective & preventive action.

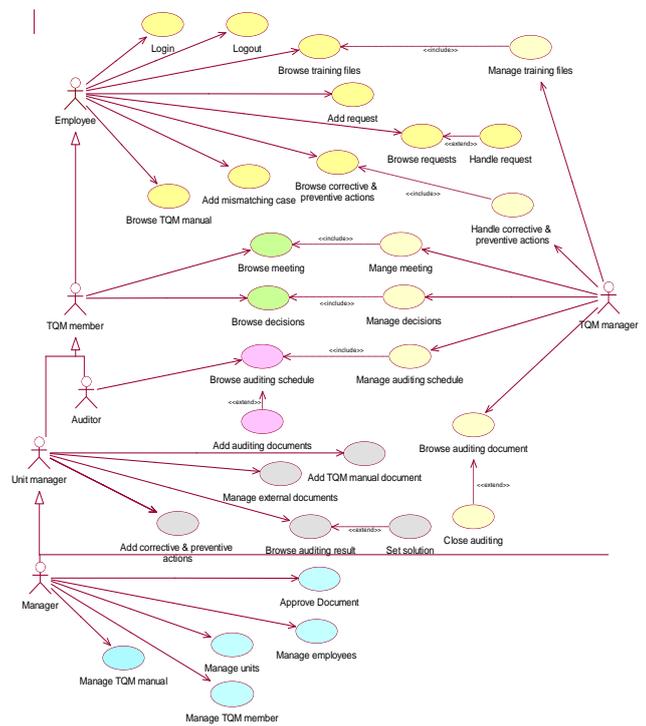


Figure 1. ISO 9001:2000 system marked as UML use cases

### IV. DATABASE DESIGN

ISO system database was designed (Fig. 2) by using object data type to represent each component in the manual system such as employee, unit, document, TQM manual, meeting, training file, auditing and corrective action. Also, it was designed depends on view which is looking to ISO system as a

set of actions related with special documents. We used different relationships between classes, and some relationships support the inheritance concept, like one between Employee class and Person class. Also, there are the aggregation relationships, like one between TQM manual class and Part class.

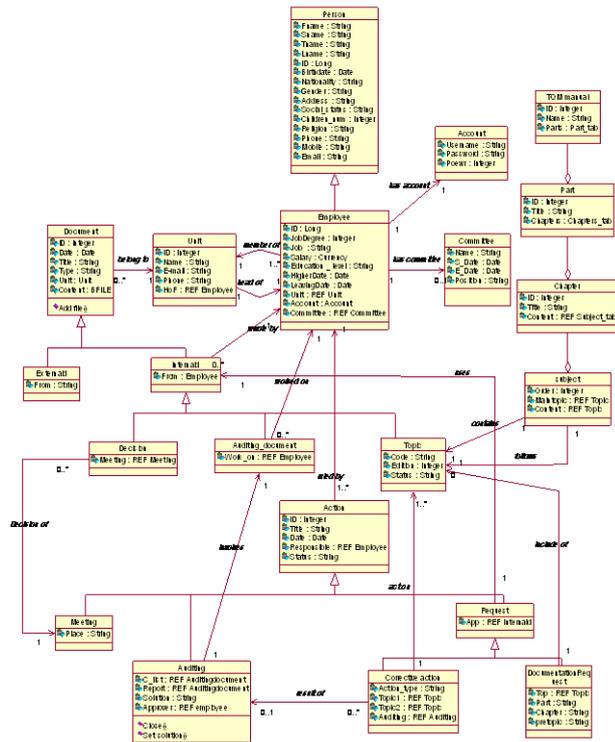


Figure 2. ISO 9001:2000 system's database marked as class diagram

A. Screen Design

ISO system was designed to serve all users in the organization by offering six main pages. Each one serves a specific type of users, and each user can work with task related with his/her job and powers, Fig. 3 shows the hierarchical build of the main pages in the ISO system.

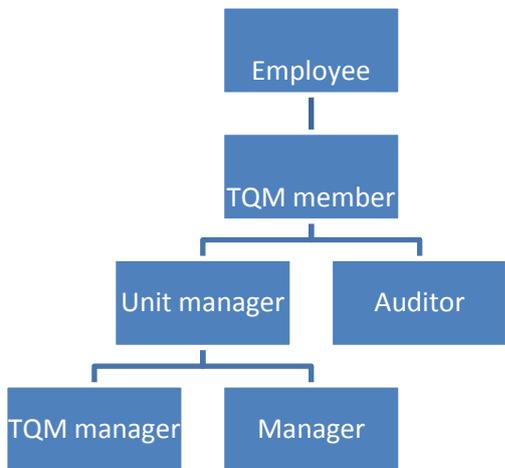


Figure 3. Hierarchical Building of the Main Pages for the Different Users

The first page in the system is the authentication page, this page verifies the identity of the user and leads him to the proper main page, and it looks as shown in Fig. 4.

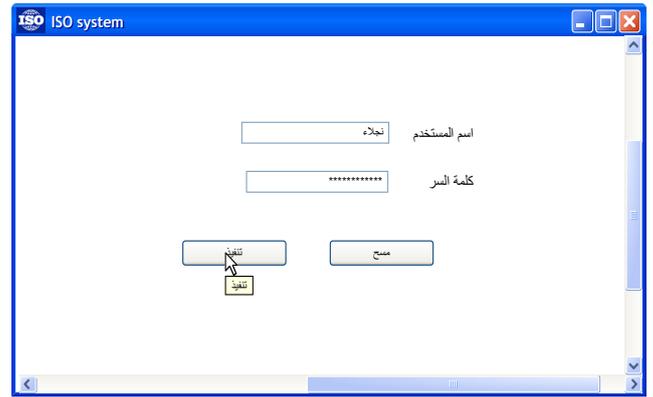


Figure 4. Authentication page

The employee represents the first layer in the previous hierarchal build in Fig. 3, and he/she can access limited basic tasks. The TQM member represents the second layer and he/she can access all basic tasks, in addition to browse the meetings and the decisions. The auditor and the unit manager are in the same level in the previous hierarchal build in Fig. 3, and they can access the same tasks as the TQM member, but auditor can work more with auditing by browsing the auditing schedule and uploading its documents as shown in Fig. 5.



Figure 5. Auditor's main page

The unit manager can work more with TQM manual and documents, in addition to the corrective actions as shown in Fig. 6.



Figure 6. Unit manager's main page

The TQM manager and the general manager are in the same level, and they have the same tasks as the unit manager. The TQM manager has more control on training, meeting, auditing and correcting actions as shows in Fig. 7.



Figure 7. TQM manager's main page

The general manager has more control on TQM manual, units and employees as shown in Fig. 8.



Figure 8. Manager's main page

## V. RESULTS

The following screens is snapshot of a running manager account, it illustrates the basic process on the database (insert new record, view all or specific record, delete and update specific record).

- When the general manager clicks on an "add unit link" from the main menu, he/she gets the following screen as shown in Fig. 9.



Figure 9. Insert a new unit

- When the general manager clicks on a "view units link" from main menu, he/she gets the following screen, where he/she can view all units or a specific unit depends on choosing search criteria as shown in Fig. 10.



Figure 10. Display all units

- When the general manager clicks on a "delete link", a confirm message pops up, and if he/she clicks on an "ok button" the selected row will be delete as shown in Fig. 11.

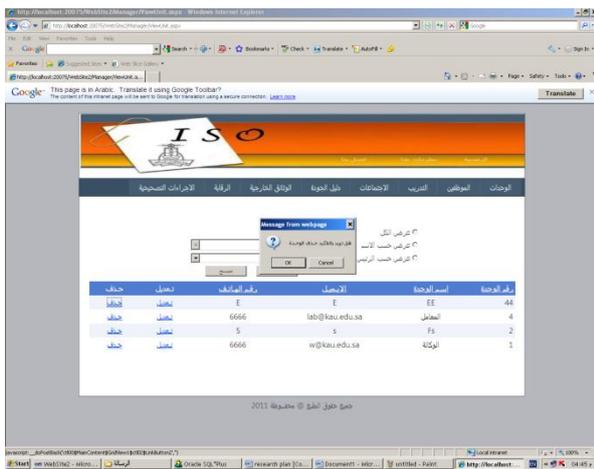


Figure 11. Delete a unit

- When the general manager clicks on an "update link", he/she gets a new screen with a changeable data as shown in Fig. 12.



Figure 12. Update unit's data

## VI. CONCLUSION

Our objective in this thesis is to develop a new model for ISO 9001:2000 System. We studied the actual manual ISO system in Faculty of Computing and Information Technology, extract the analysis and design diagrams by using UML, create Database, and make a sample interface to manipulate the data through it.

This model supports all the basic processes to implement ISO in the organization, avoids the difficulties encountered in the manual way such as heavy load of the paper work, and provides more control in the documentation processes.

Finally, we recommend developing and applying ISO 9001:2000 system in the organization.

The proposed model still needs more experiments by applying it on different types of organization. Also we recommend applying the model on other version of ISO system.

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