

# **Software Quality Assurance -SQA- Practices in Palestinian Government**

Nael T. Elyezjy  
The Islamic University of Gaza  
Department of Postgraduate Studies  
Faculty of Information Technology  
Gaza, Palestine

## **ABSTRACT**

Software Engineering is a backbone of applying engineering principles in order to obtain software, which will run reliably and effectively. The global software industry suffer from the cost of software errors, not only to the procedures of the software but also to their customers and end users of software. The lack of quality of software produce a high cost of software products. Since in the mid-twentieth century, the development of software has grown exponentially, and many system technology in this days depend on it such that embedding system, Medical devices, flight reservation systems, and critical system. So software quality assurance (SQA) plays a key role in software development process, Software quality assurance methods include testing, inspection, formal method etc. And in the recent year, the governmental e-services has grown rapidly, many ministries and governmental institutes present their e-services on the web; and many turned over to computerized systems. The purpose of this paper is to measure the degree of applying software quality assurance practices in Palestinian government in order to identify areas of improvement to increase the efficiency development of it, and identify the weakness to enhance it. The focus of this paper is on measuring the testing and quality assurance procedure in Palestinian government, we deploy online survey to many ministries in Palestinian government. The survey focused on five major aspects of software quality assurance, namely SQA planning and infrastructure, testing methodologies and techniques, automated testing tools, software testing metrics, testing standards, and software testing training and education.

Based on the survey results, we found current practices in software quality assurance in government sector needs more development and interest from the country.

## **General Terms**

Software Engineering, Software Quality Assurance.

## **Keywords**

Software engineering, Software testing, Software quality assurance, SQA, survey

## **1. INTRODUCTION**

Software development is a human activity, many of development process and quality assurance methods used to produce a high quality, consistence, and bug free software in least cost. [1] as an approach to optimize the cost, SQA can be decrease the cost and increase benefit in the economic sense. SQA is an important factor in the software development life cycle. Each phases in software process should include quality

assurance. Inspection and testing are used to detect and prevent defects in software[2]. The main goal of SQA is to identify the objectives and the output expected and criteria for validation of the outputs and to provides the framework necessary to ensure a consistent approach to SQA throughout the project life cycle, so both software quality assurance and software engineering methods can be used to increase the effectiveness of both management and the software developers.

In the last a few years, the Palestinian government begins to develop many applications in different field to serve their requirements, this increase the needs to develop a professional software. This paper measure the position that IT sector management must play an integral role in making SQA activities and software engineering an effective part of their organization, and it addresses what management's commitment should be and the benefits of making such a commitment[3].

## **2. PAPER ORGANZIATION**

In our paper we have carried out to study the applying of SQA in Palestinian government. In this paper first introduction is given then in 3. Background , 4. Contribution, 5. Survey Methodology, 6. Data processing and analysis, 7. Suggestions and then 8. Conclusion.

## **3. BACKGROUND**

In this days, software industry playing a main role of building a green economies of most countries, many national infrastructure build based on computerized system, most electrical product include embedded systems. nowadays software used in many broad range of applications related to military, surveillance, health care, and environmental monitoring and most industrial factoring is completely computerized. Therefore, producing and maintaining software cost-effectively is essential for the functioning of national and international economies [4]. The general view of software testing is that the activity of finding bugs, everyone wants software quality, project manager look at it as delivering a good software to a customer, and developer wants to produce product and getting things done fast, and user know it as stable and reliable system. Many software quality engineers developed software quality assurance plans. However, It describe the Quality Assurance (QA) organization and audit, monitoring and evaluation activities for the Project, the test plan is one of the quality control tools of the quality assurance plan [5].

#### 4. CONTRIBUTION

In this paper, we present an analysis of use SQA in IT sector in Palestinian government. It does not focus in special aspects of software quality assurance but cover several domains of software development (software standard, software testing, SQA planning)

#### 5. SURVEY METHODOLOGY

In this paper we are using online survey centralize about software quality assurance, this strategy has generally reduced the number of missing questionnaires. The sample of this survey was based on IT sectors in Palestinian government. The questionnaire were addressed to people at top management level such as IT department directors, senior software engineers, and developers[6].

In our survey we focused on the main concepts in software quality assurance and some practices that should be used in software development. In this survey we build a good questionnaire to cover all SQA practices and concepts.

#### 6. DATA PROCESSING AND ANALYSIS

Before analyzing the outcome of this survey, each set of questionnaire received was checked for completeness, and conformity.

the questionnaire objectively measure the degree of adoption and implementation of fundamental of SQA in the software development and industry in the Palestinian government.

Our questionnaire was built using google documents, sent to 30 IT developers and 21 questionnaires were filled.

The questionnaire take into account the following topics:

Types of software's produced.

Main fundamentals of SQA

SQA Planning mechanisms

Software testing mechanisms

The questionnaire was published to 5 ministries which concerns in software development , these ministries are as show in table 1:

Ministry name	Count	%
Ministry of Finance	3	14%
Ministry of Telecom and Information Technology	4	19%
Ministry of Health	6	29%
Ministry of Interior	5	24%
General Personal Council "Diwan"	3	14%

**Table1: Respondents to the questionnaire by ministries**

The sample covered the number of employees work in each ministry, and the result found that: 81 % of ministry have more than 10 of employee in IT sector, 14% between 3-5 employee and 5% only one employee.

Then the sample covered the different job description of employees. The result founded as show in table 2.

Job Description	Count	%
Developer	16	76%
System analyst	1	5%
SQA engineers	0	0%
database administrator	4	19%
Software tester	0	0%

**Table 2: Respondents by job description**

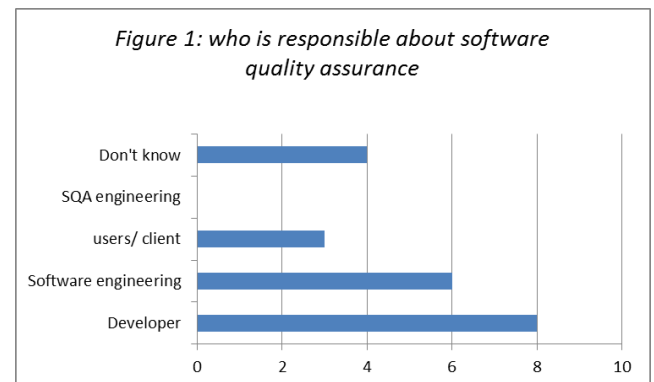
This table clearly indicate that the majority of respondents developer, they was occupied the higher percentage in job description nearly 76%.

As our main interest are in software quality assurance, mainly focus on the studding SQA in the college, we found only 43% of employees have studied it and 57% not.

Another interesting finding was 13 out of 21 not followed any quality stander in there software product, and 33% of them used a specific organization model and only 5% used ISO 25000, and 0% used ISO 9126 in there quality model.

Although the widely believed from employees that software quality assurance will be improved their software product, we found 52% of employees don't know if they satisfied in the quality models in their products, and 19% was very dissatisfied, and only 29% was satisfied in their quality models used for their products.

As expected, "big bang" was the most responsible of software quality assurance in his ministry was developer as show in figure 1.



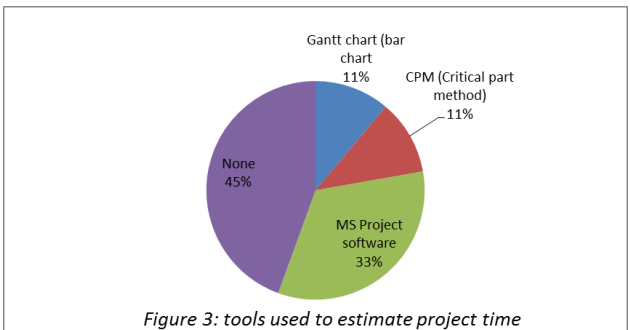
And as show in figure1, there is no any SQA engineer in ministries. Although 57% of employees agree that the quality management system is very necessary in software product, and 33% of them answered strongly agree, and only 10% disagree and 0% strongly disagree.

Another interesting finding was 76% of employees don't have a software quality assurance plan in there software products, as shown in figure2.



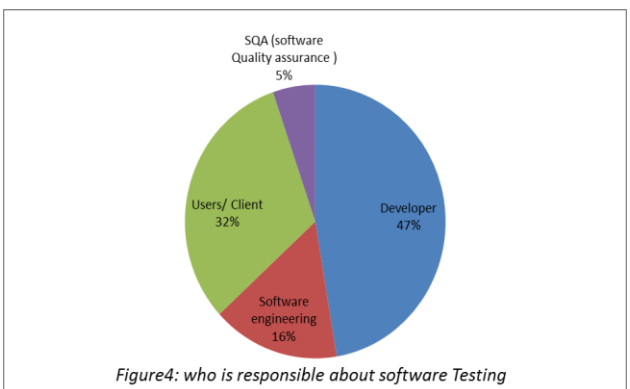
As obvious in figure 2, most of ministries in Palestinian government don't have SQA plan in its software product.

in our survey we questionnaire about the techniques used to manage the project time, the result was founded as shown in figure 3.



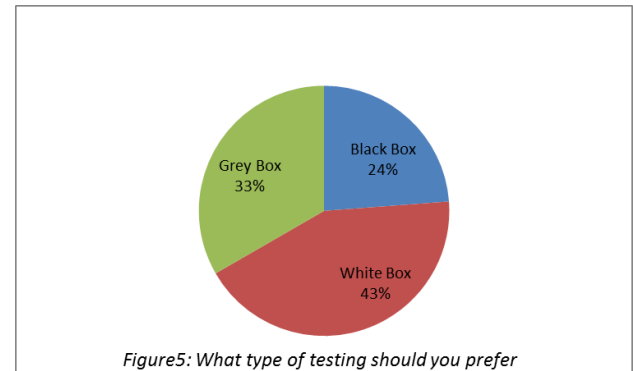
As shown in figure 3, nearly 38% of employees don't used any tools to manage the project time, 29% using MS Project, 10% were used CPM (Critical part method) , and 10% from the employees used Gantt chart tools. As we note from this result most of employees in different ministry not used any tools to manage the project time.

Another section of our survey focus on the investigated the extent of a adoption of software testing methodologies and techniques in ministries to improve the quality of their software product [8]. As expected, "big bang" was the most responsible was answered 43% of responsibility about software testing done by developers, and 14% on software engineering, and 29% of responsible was answered that users/client have responsible on software testing and only 5% was answered SQA as show in figure 4.



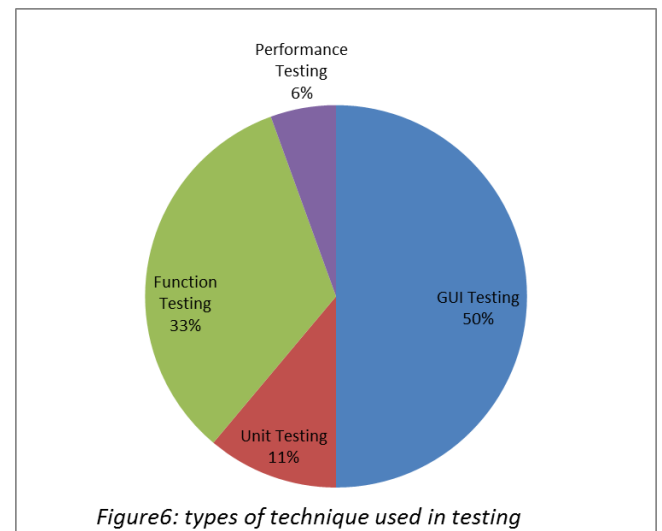
Another surprise found in our analysis was only 43% of employees used methodologies in software testing and others not used any methodology.

The three popular methodologies included test case selection, static and dynamic analysis. In term of selecting test cases, white box were more common than black box testing 43% responses for white box versus 33% for black box while only 24% grey box as show in figure 5.



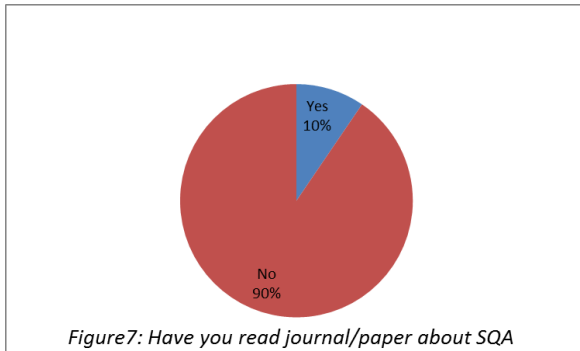
There were 11 out of 21 respondents applying the testing in different phase of software life cycle, and others no. but more than 90% of them don't have a stander in software testing.

The most of respondents used GUI testing in their workspace approximately 43%, and 29% used functional test and 10% used unit test and only 5% used performance test as show in figure 6.



90% of respondents answered they don't have a standard in software testing and only 10% answered they have it.

Finally in our questionnaire we asked if the employee reading journals and papers in SQA to develop his skills the answer was found in figure 7.



As we show in figure 7, only 24% of employees have reading in SQA journals and papers.

As we show from the analysis of our questionnaire we have been found that the most responsible rests with the developers, where they do developing, testing and may management to the software life cycle.

## 7. SUGGESTIONS

In this paper, we findings from a survey on SQA activities are presented, the survey bears out the initial hypotheses that SQA is still in its infancy in Palestinian government IT sector.

Due to the leakage of resources, we suggest to start the improvement by making a good plan to start improve the productivity of software engineers.

We suggest employment number of SQA engineers in different ministries, and government provide different courses and training for software engineering and software quality assurance, this training should focus on the most suitable process models and development techniques.

The other practice that should be taken into account is to adopt software quality assurance practices in the software projects in the government sector.

Establishing workshops and conferences that discuss software quality assurance practices is a good approach that will improve the knowledge and experience of software process.

## 8. CONCLUSION

This study shows that the principles of software quality assurance practices are implemented in Palestinian government with varying degrees. In our paper we used electronic questionnaire to gather statistics about software quality assurance practices, The results of the questioner prove that the government sector needs more development to improve software productions.

Finally we suggested an improvement approach to be taken in consideration to improve software quality in government sector.

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