INDUSTRY PERCEPTION OF THE SOFTWARE INSPECTION PROCESS : NIGERIA SOFTWARE INDUSTRY AS A CASE STUDY

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ABSTRACT

Software inspection has been well incorporated into the software development process of software development organizations across the developed countries in the world. A critical observation of the counterpart organizations in developing countries especially Africa shows that this software quality assurance is highly compromised in their software development process. A survey was conducted to feel the pulse of the software professionals in Nigeria on their perceptions of the software inspection as a software quality assurance activity, via a structured questionnaire research instrument. A total of 75 questionnaires were administered and only 68 were returned. 65 out of the returned were found to be useful. Briefly, the results show that software inspection is highly neglected as a step in their software development process either because they are not aware of the process or they feel it is a waste of time since they have good programmers who can turn out codes in just few days. The implication of these results is that bugs that may be painful may be hidden in the software artifacts being produced by the professionals.

Keywords: Software, Software Inspections, Software Industry, Perception, Nigeria

1.   INTRODUCTION

One of the most effective ways to promote quality and productivity in software development is the use of software inspections as a step in the software development process [14,15,16]. The primary purpose of a software inspection is to identify defects existing within software work products developed throughout the

development process (e.g., user requirements specifications, design documents, code). It is not only used to correct the defect, but also to evaluate and improve the development process itself. Software inspection is a peer review in which a small group of software developers (usually between 3 to 8) examine another software developer's work [14,16].

As part of the effort to determine the extent to which software inspection as a step in software quality assurance is embraced and included in the software development process of the software development houses in Nigeria, a questionnaire was designed and administered to software developers in some software development houses within our reach in Ibadan and Lagos. Lagos happens to be one of the largest Nigerian commercial centres with majority of software houses sited in the centre [3,13].

A total of 75 questionnaires were administered and only 68 were returned. 65 out of the returned were found to be useful. Three others were either incompletely filled or were found to contain doubtful information. We made sure that only organizations having software development as one of their business areas were contacted for the questionnaire survey. The respondents were systems analysts, designers or programmers who have been in the software development business for at least five years. The data collected were analyzed using Statistical Package for Social Sciences (SPSS) version 12.0. Descriptive statistics such as frequency and simple percentages were used for the interpretation of the data collected. Next, we present the results from the industry survey.

The rest of this paper is as follows. In section 2, we present an overview of software inspection process, while the structure of our questionnaire research instrument is discussed in section 3. In section 4, results from the survey are presented. Discussion of the results are discussed in section 5 and section 6 concludes the paper with some recommendations.

2. AN OVERVIEW OF SOFTWARE INSPECTION

Software quality is the user's perception of how software works. Inspection is one of the methods for ascertaining the quality of software systems throughout the system development lifecycle. Software inspection is an industry-proven type of peer review for detecting and removing defects as early as possible in the software development lifecycle, then reducing rework [7,9,18]. It is actually regarded as an industry's best practice for delivering high-quality software [17]. Prior studies indicate that inspections can detect as little as 20% [6] to as much as 93% [8] of the total number of defects in an artifact (requirement document, design document or code document) [12].

Starting from the landmark work of Fagan in 1976 to the modern global practice in software inspection, software inspections is made up of six major steps: **planning, overview, preparation, inspection meeting, rework and follow up** [8]. Activities involved in each of these steps have been widely reported in the literatures, for examples, [9,11].

Laitenberger [11] in his survey of software inspection technologies asserts that "One prevalent reason for the use of inspection technology in software projects is the

inevitability of defects. Even with the best development technologies in place, defects cannot be completely avoided. This stems from the fact that software development is a human-based activity, and, thus, prone to defects. A defect can be characterized as any product anomaly, that is, any deviation from the required quality properties that needs to be tracked and resolved".

In terms of industry acceptance, many works in the literatures establish that software inspection has been duly incorporated into the software development process of software houses especially in the western nations of the world. For instance, [9] reports that software inspections have been adopted for many years by industrial organisations because of their impact on product quality and cost of non-quality. The work of Porter *et al*.,[14] at Lucent Technologies Naperville, USA, Nachiappan *et al*.,[12] at Nortel Networks, Research Triangular Park, NC, USA , and Basili *et al*., [4] at Software Engineering laboratory at NASA suggest that software inspection is widely accepted at industry level.

Chatzigeorgiou and Antoniadis [5] in their article reports that *The number of software organizations that have incorporated formal reviews in their development process is constantly increasing and the belief that efficient inspections cannot only detect defects but also reduce cycle time, increases process visibility, improves programmers' capability and lower costs is spreading.* Tyran [16] and Harjumaa *et al.,* [10] also reports that inspections have gained wide acceptance as a development tactic and can take up to 15 percent of the time allotted to a software project.

Considering the important roles played by software inspection in ascertaining the quality of software products, we thereby conducted a survey on the perception of and level of adoption of software inspection by the emerging software development houses in Nigeria.

3.   RESEARCH INSTRUMENT

A close – ended structured questionnaire was designed for capturing the data used in this survey. The questionnaire is divided into two sections with a total of ten (10) cogent questions. Information on the biography of the respondents were sought for in section A while the perceptions of the respondents on software inspection as part of the software quality assurance measure were stated in section B. Question numbers 1 to 4 in Table 1 form the section A while question numbers 5 to 10 were in section B. A total of 75 questionnaires were administered and only 68 were returned. 65 out of the returned were found to be useful.

4. RESULTS

Figs. 1.1 to 1.10 show the pie charts of the results obtained from the survey study.
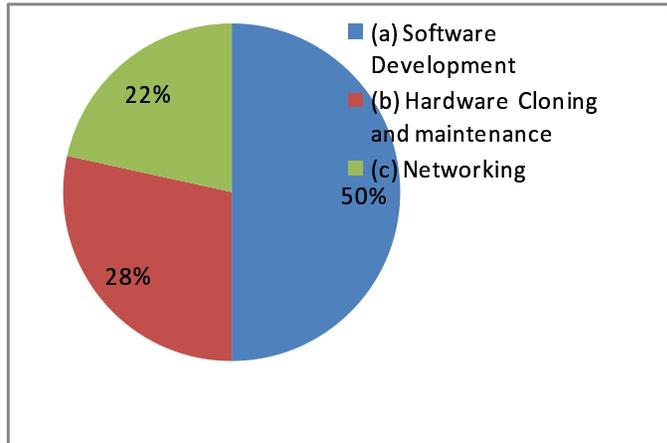

Fig. 1.1 Major Business concern

Fig. 1.1 shows that 50% of the software professionals surveyed were into software development. Others engaged in hardware cloning and networking in addition to software development.

Fig. 1.2 Number of years of operation

From Fig. 1.2, 49% of the professionals surveyed have been in the software

development business for about 5 years while 32 % said they have been in the industry for between 6 to 10 years. Only a few of them (3%) said they have been in the business for more than 15 years.

Fig. 1.3 Number of software developers employed

Fig. 1.3 shows that 46% of the software developers surveyed said between 6 to 10 professionals were employed by their organizations, while 42% said about 5 professionals were employed by their own organizations.
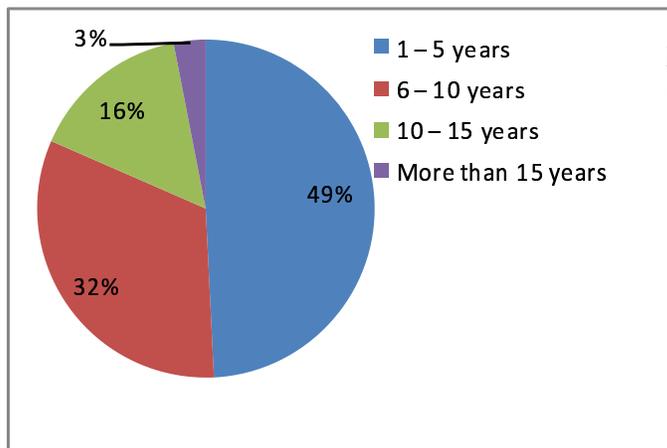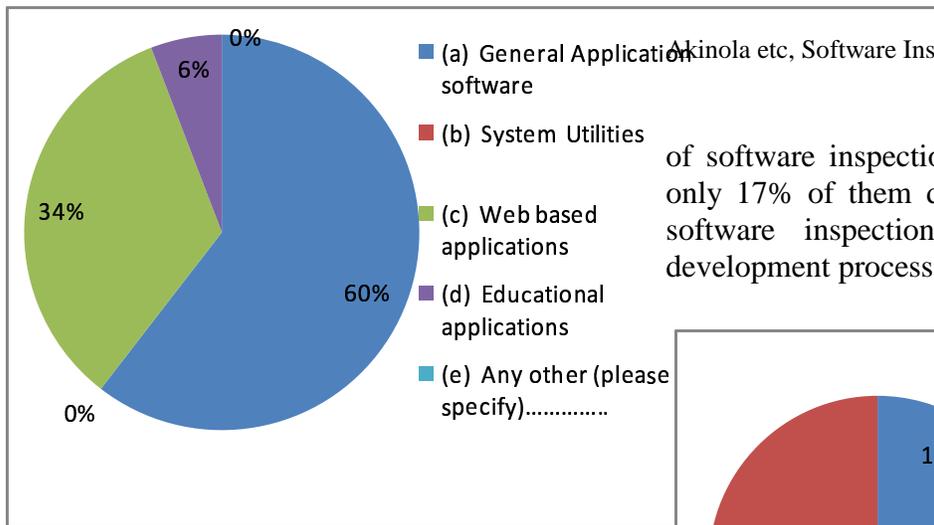
Fig. 1.4   Types of software produced (Tick as many)

of software inspection, Fig. 1.6 shows that only 17% of them did actually incorporate software inspection into their software development process.

Fig. 1.4 shows that majority (60%) of the software professionals surveyed are into the development of general application software, followed by web applications (34%).
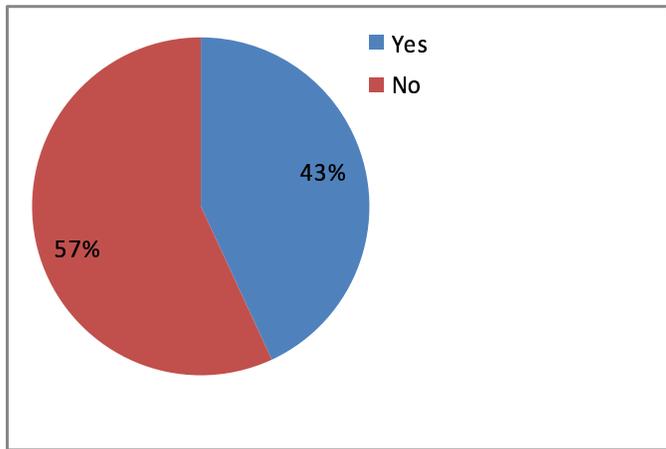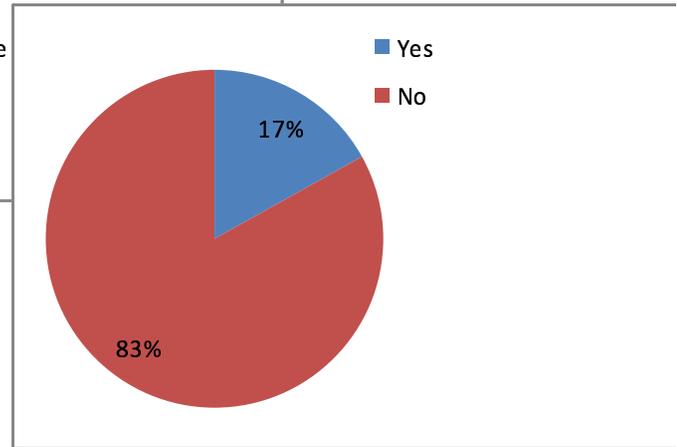

Fig. 1.6 Real incorporation of software inspection in the organization's software development process

Fig. 1.5 Awareness of software inspection as a major part of software development process

More than half (57%) of the professionals surveyed claimed that they were not aware of software inspection as a major part of software development process (Fig. 1.5). Out of the 43% that claimed the awareness
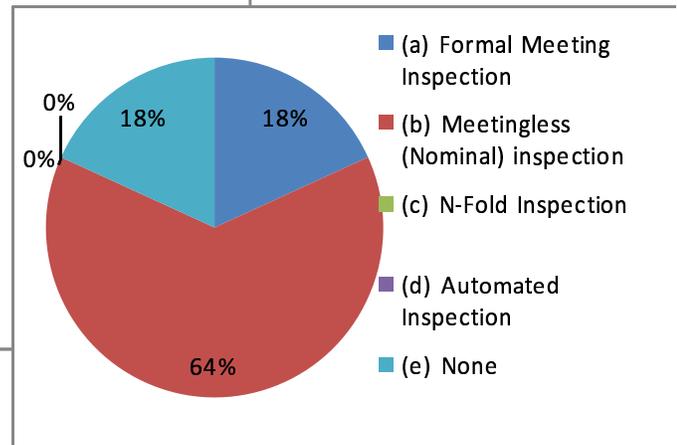

Fig. 1.7 Inspection Method(s) adopted

Fig. 1.7 shows that meetingless (nominal) inspection method, where there is no interaction of inspectors on the software artifact is usually adopted by the fewer
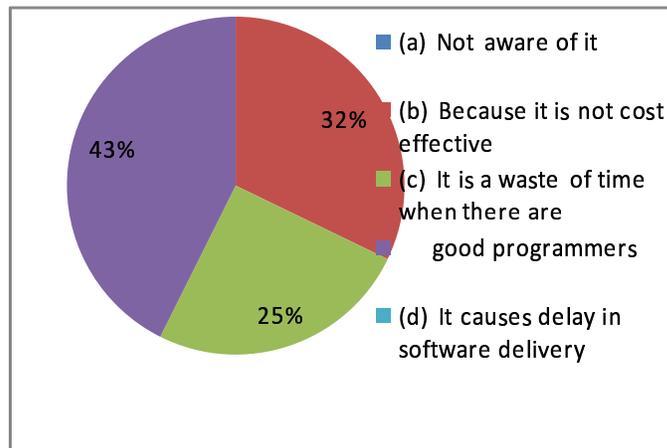
practitioners for their inspection exercise (64%).

Fig. 1.8 Why inspection is not incorporated

From Fig. 1.8, 43% of the practitioners were of the opinion that if there are good programmers on ground, there is no need of inspection. 32% said that software inspection step will amount to additional overhead cost for the organization, while 25% believed it is just a waste of time, *"when there are deadlines waiting there for you"*.
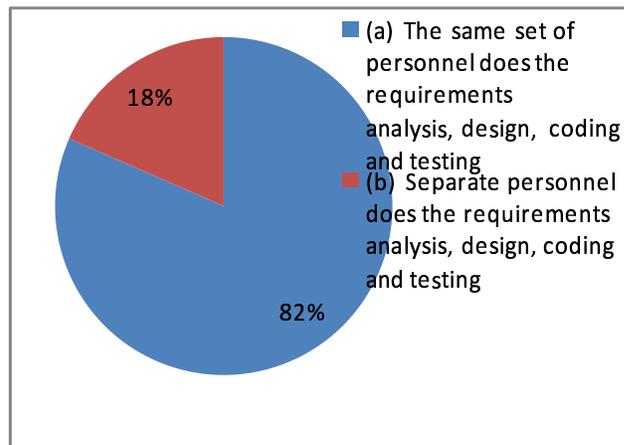

Fig. 1.9 How the software process is carried out

Fig. 1.9 shows that in most (82%) of the software houses surveyed, the same set of personnel does the software development process altogether. There were no clear demarcations of roles among the professionals.
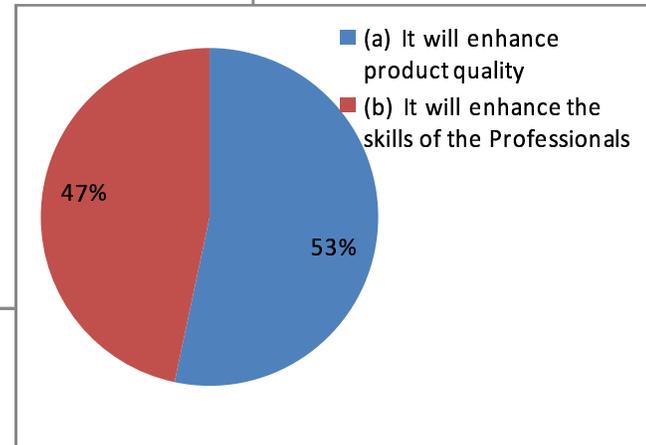

Fig. 1.10 Why Software Inspection should be incorporated into software development process

Fig. 1.10 shows that the software professionals surveyed agreed to the fact that software inspection is necessary in the development of software because it will enhance productivity (53%) as well as skills (47%) of professionals.

5. DISCUSSION

Major results from this study show that most of the software houses covered in the survey are about 5 years old (49.2%) and are into general application software development (80%). The applications they develop are normally targeted to business organizations and possibly educational packages. 44.6% of them are into web application developments, targeted mainly towards the banking sector of the economy.

Only 43.1% of the organizations surveyed said that they were aware of the software inspection process as part of the major steps to achieve quality in software products; and 16.9% out of the 28 organizations that said they were aware of the process actually incorporate it into their software development process. A critical examination of the results shows that only 2 (3.1%) said they are using the formal meeting inspection method. Further verbal interrogations from these respondents revealed that they actually held regular inspection meetings on their software artifacts (design and code documents) with about 5 professionals.

7 (10.8%) said they use the meetingless inspection method. When they were asked how they do this, they said that the individual programmers will study his/her designs and codes, but may call a colleague to also cross-examine the document for him/her. In order to cross-examine this claim, further results from the study reveals that in most of the organizations covered in the survey, the same set of personnel (81.5%) does all the phases of the software development process (requirements analysis, design, coding and testing).

However, all the software organizations surveyed agree to the fact that the incorporation of software inspection technique will enhance their product quality, professional skills as well as decreasing development costs.

Results from this survey show that majority of the software houses in the country are either not aware of the quality assurance technique or think that *it is just a waste of time.* Their major emphasis is always on "good programmers who can turn out code in just few days". The result also shows that there is no clear delineation of roles for the

software professionals in most of the organizations surveyed. The same set of people does analysis, design, coding and testing on software projects being handled in most of the organizations. This is because most of these organizations have a few number of professionals employed.

Although, a few organizations are beginning to designate some staffers as "testers", they are very few and not many resources are committed to their activities within the organizations. As a matter of fact, some organizations only deploy interns as testers.

Akinkunmi *et al* (2004) had suggested that Nigerian software industry compromises several aspects of the software process, with attendant effect on the quality of the output. The result of this research confirms that position with respect to software inspection.

4.   CONCLUSION

Software inspection is an essential constituent of the software quality assurance process. The fact that the software industry in Nigeria does not fully embrace industry-academic collaboration research calls for urgent attention. The industry is characterized with process compromise (not following the process of software development diligently), resistance to measurement and resistance to academic collaborations. To get information on their software projects is not easy. However, we attributed all these problems to the fact the industry is just coming into lime light, and that everybody wants to penetrate the market fast in the country. The result of which might lead to 'software crisis' and low quality turn out for the software products. The industry needs to address this issue urgently.

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