

## Component Based Software Engineering Challenges and Quality Improvement in Developing Countries.

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### ABSTRACT

Software costs, time to market and quality product are three main key factors which are affecting the software industry. Different techniques are made up by the researchers to improve the quality of software with lower cost and time to market. One of them is development of software using Component Based Software Engineering (CBSE). CBSE suggested building software using existing reusable components, as an alternative of building software from scrape. The main objective of CBSE is to write just once and reuses numeral times with no or negligible variation. CBSE is facing lot of issues that impacts on the quality of component. These issues decrease the software value in market. The basic purpose of this research is to identify and quantify the issues which affect the quality of components. These issues are identified from the research already done by the researcher. Hierarchy of the most effected issues is provided on the basis of this research. The basic evaluation of these issues is to facilitate the IT professionals for the selection of best component on the basis of reformed software quality. Evaluation of these issues provides strong knowledge about component reusability, reliability, upgradeability, complexity, time saving, cost saving and software quality improvement.

**Keywords:** *Component Based Software Engineering, CBSE, Component Based Development, CBD, Customer demands, Customer satisfaction and quality issues, software quality.*

### 1. INTRODUCTION

Software costs, quality and time to market of the product are most essential factors affecting the software industry. A variety of tools and techniques are made by the researchers to get better delivering quality software systems with lesser cost and shorter time to market. One such approach for software development is Component Base Development (CBD). CBD suggests the construction of software systems using presented reusable components, as an alternative of writing from scratch. The core objective of CBD is to writes just one time and use several time with slight alteration [1].

CBSE offers a large range of functionality throughout the development of a software system [5]. It is clear that CBD and CBSE are extremely most important segments in software development. CBSE is familiar innovative, this technique is not modernized, but considerably changed. Component-based services can be used without programming expertise to construct the applications. Component can be automatic bring up to date through Internet [3].

CBD is an innovator approach, which is fine away from the programming related paradigms. Similarly, civil engineering has recognized standards for the construction of bridges by using previously developed parts. Software engineers define and describe the way to announce on time quality achievement of complex software systems [4].

The Common Object Request Broker Architecture (CORBA) is an open standard for application. It handles the information of components, and gives the permission of different applications to exchange information with one

another in spite of dissimilar locations and designers. An object request broker (ORB) provides the fundamental mechanism clearly. Requirements can be made through the ORB without regard to the service position or execution. Objects publish their interfaces using the Interface Definition Language (IDL) [2]. Reusability takes appearance in software development and provides innovative thoughts [6].

In this research we also deliberated the CBSE Challenges. The basic evaluation of these issues enables the IT experts to select the best component. This technique facilitates the IT expert to transform the unpredictable nature of software quality characteristic into well predictable. Evaluation of these issues are also offer the strong knowledge about reusability of components, consistency, upgradeability, software complexity, time saving, cost saving and software quality improvement. Issues are identified and quantified which affect the quality of components. These issues are acknowledged from the research previously done by the researchers.

### 2. APPROACH

The research was accompanied in software industry of Pakistan by surveying software solutions providing organizations. The tool of research was questionnaire that encompasses approximately 10 questions about software quality (SQ) decreasing factors. These factors are identified from research Journal, article, conference and other research papers which already been done by different researchers on factors affecting SQ and questionnaire was prepared according to these factors. The main objective of questionnaire was to investigate and measure the immersion of SQ reduction issues.

The managers, Software engineers and software quality related persons were the respondents of this questionnaire. The respondents respond according to their experience and practice about compromising factors of software quality according to different scenarios.

### 3. FINDINGS

The survey was designed to find the severity of the software quality reduction factors. These factors are acknowledged after literature review of the research previously published by the different researchers; that possibly decreases the worth of software products in the organization of developing countries. The survey was conducted out on the basis of questionnaire that comprise of two parts (A & B) having information about the respondent and software quality falling factors.

The part A of questionnaire was about respondent's name, gender, age, organizations name, description in organization and experience. The part B of questionnaire consists on factors that distress the Software quality. Social networks, newsgroup and technical societies are used for the distribution of questionnaire to complete the survey. The respondent was project managers, software engineers, IT executives and SQA Engineers. Hierarchy of factors which affects software quality in emerging countries is presented on the basis of quantitative analysis of survey results. Investigation of each factor is explained briefly in section 3.2.

#### 3.1 RESPONSES

Questionnaire forms were sent to the people related to the software quality and 67% responses were received from the respondent which is depicted in figure 1.

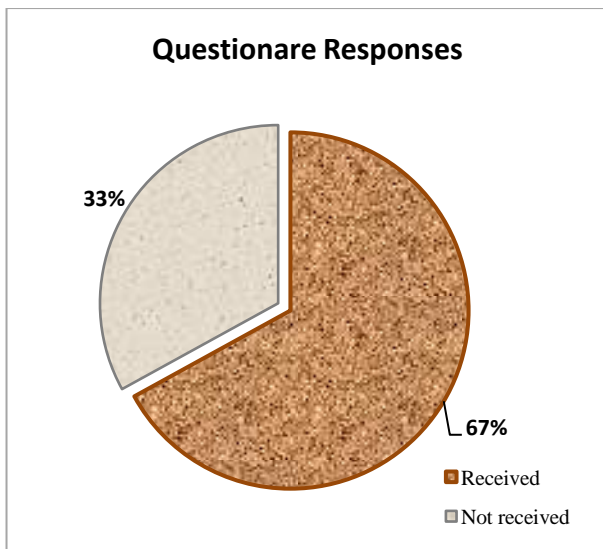


Figure 1: Questionnaire Responses

#### 3.2 COMPREHENSIVE RESULTS

Issues wise comprehensive results are calculated during this research are given below in this figure.

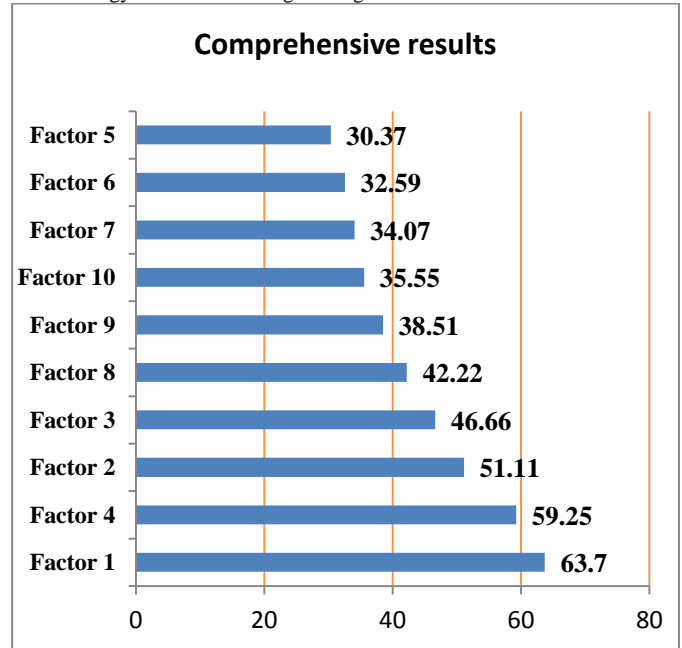


Figure 2: Comprehensive results

This figure demonstrates the entire severity of independently factor with reverence to gain separately outcome hierarchy of issues with respect to severity which affect software quality. The results show that (factor 1) having 63.7 severity points which affects greater to the software quality, it has maximum severity points and maximum influencing factor among the other factors. The (factor 5) which have 30.37 severity points influence lesser on software quality, it is lowermost severity point and less influencing factor than others.

#### 3.3 FACTORS MASS

The component certification (factor 1) originated on the topmost with overall 15% affect; Requirement managing and component assortment (factor 4) comes at 2<sup>nd</sup> among other factor with 13% affect.

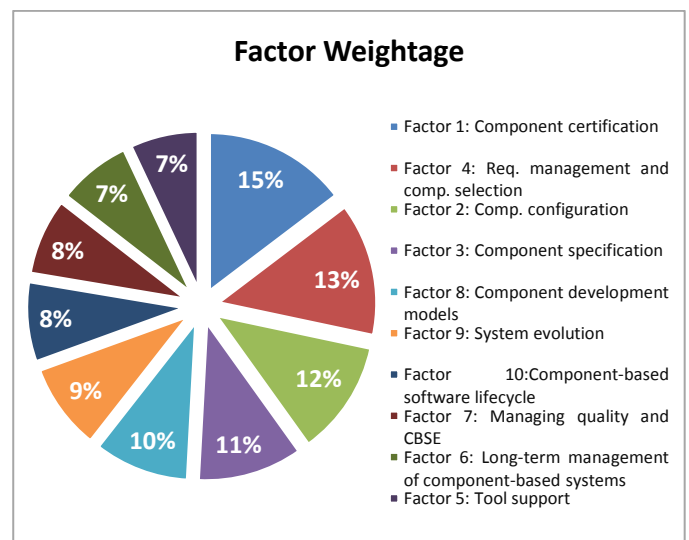


Figure 3: Factor weightage

Component configuration (factor 2) comes at 3<sup>rd</sup> with 12% affect, the component specification (factor 3) comes at fourth with 11% affect, the component development model (factor 8) comes at fifth with 10% affect, the system evolution (factor 9) comes at sixth position with 9% affect, the component base software life cycle (factor10) comes at seventh with 8% affect & 35.55 severity points, the Managing quality and CBSE (factor 7) comes at eight with 8% affect & 34.07 severity points, the long term management of component based system (factor 6) comes at nine with 7% affect & 32.59 severity points, the tool support (factor 5) affect a smaller amount than other factors described above with 7% affect & 30.37 severity points.

#### 4. CONCLUSION

Component-based software development is a new trend in software development and reuse already developed components instead of developing everything from the very beginning each time. Use of CBD brings many advantages: faster development, lower costs of the development, better usability. CBSE is facing still many challenges. The development team can produce quality products in developing countries with keep in mind the affects and severity of factors which reduces product quality. They should focus on the issues with respect to severity points and take protective measures to produce quality software. A list of factors with respect to severity points are presented in this research which effects software quality. Maintenance cost, time and resources can be reduced by taking precautionary measures at initial phases of development as well as failure chances of the software can be minimized by quality improvement.

#### REFERENCES

[1] Asif, I. K., N. Qayyum and U. A. Khan "An Improved Model for Component Based Software Development. Software Engineering", 2(4), 2012. PP.138-146.

- [2] Iqbal, D. K., P. K. Suri and E. A. Verma "Characterization and Architecture of Component Based Models", International Journal Advanced Computer Science and Applications. Vol.1 (6), 2010, pp.66-70.
- [3] Ivica, "Component-Based Software Engineering New Challenges in Software Development". Journal of Computing and Information Technol. Vol.11 (3), 2003, pp 151-161.
- [4] Murat, G "A study on component based software engineering. Master's Thesis in Computer Engineering Atılım University", 2005.
- [5] Iqbal, S., M. Khalid and M. N. A. Khan. 2013. A Distinctive Suite of Performance Metrics for Software Design, International Journal of Software Engineering & Its Applications. 7(5):197-208.
- [6] Bist, A. S., P. Tayal and Chanyal. 2012. Software reusability: A Survey. International Journal of Engineering and Technology Research. 1(1): 16- 23.

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