



## RESEARCH ARTICLE

### A COMPARATIVE STUDY ON INTERNAL & EXTERNAL QUALITY FOR SOFTWARE PROJECT

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#### ABSTRACT

Quality is indispensable term in any thing. Software quality is a combination of internal quality & external quality and these two terms are identified with each other. In the event that the internal quality is great then there is probably in external quality. In any item, client fulfillment is principle criteria for nature of an item. External properties rely on internal properties. The internal and external both quality are vital for any product. A product have both internal & external quality characteristics. This paper consolidates the review on internal & external quality of software. It is furthermore used to manage the internal quality characteristics and external quality characteristics.

## INTRODUCTION

There are an extensive variety of implications of quality. A definition by Dr. Tom DeMarco says "a product's quality is a function of how much it changes the world for the better." Another is "A compelling software process connected in a way that makes a helpful item that gives quantifiable incentive to the individuals who create it and the individuals who utilize it." To achieve high-quality software, four activities must occur: proven software engineering process and practice, solid project management, comprehensive quality control, and the presence of a quality assurance infrastructure (Pressman, 2014). There are two kinds of quality. The table 1.1 given below shown that two kinds of quality. As per ISO 9126, there are six software quality characteristics: functionality, reliability, usability, efficiency, portability and maintainability and these are part into number of sub characteristics. These quality characteristics isolated into two interesting terms: external quality and internal quality. There is cozy connection between these two terms. External quality is the health for inspiration driving the product where inside quality is about the arrangement of the product. External quality mean every one of the properties of the item that clients can commitment and recognize: functionality, reliability, usability, efficiency, flexibility, simplicity, and so forth. The product must be reliable to use.

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It should be simple. A product should be efficient and flexible to use. So that all are the external quality of any product. At another side, Internal quality mean each one of the properties of the product as saw by the specialists that are appealing with a particular true objective to energize the path toward making a decent: maintainability, portability, reusability, testability, etc. These are the internal quality characteristics. That are done at developer side. For fulfill the customer's requirement, these both quality characteristics are necessary. The given table 1.2 demonstrate the distinction between external quality and internal quality. From that one can analyze these two terms. These two terms are different from each other, but there is a close connection between them. A definition in which divides software into two pieces: internal and external quality characteristics. External quality characteristics are those parts of a product that face its users, where internal quality characteristics are those that do not. Client satisfaction begins from Compliant item, Good quality and Delivery inside spending arrangement and timetable.

#### LITERATURE SURVEY

There are many terms are identified with any item. One can not state that one term is more essential than another in any item. That all term identified with any item are fundamental for that. In this paper, quality is considered. The inner and outer nature of any item should need to consider. External quality influences a client straightforwardly where internal quality is at designer side and it doesn't influences customer specifically.

**Table 1.1 Two kinds of quality**

<i>Quality of Design</i>	<i>Quality of Conformance</i>
Specified for designer	Specifications are during manufacturing
It concerned with necessities, determination and framework of system.	It concerned with execution

**Table 1.2 Difference between external quality and internal quality**

<i>External Quality</i>	<i>Internal Quality</i>
Known as functional quality.	Known as structural quality
Determines the fulfillment of stakeholder requirements.	Determines your ability to move forward on a project.
It reflects how well it complies with a given design.	It refers to how it meets non functional necessities
It affects clients directly.	It affects clients indirectly.
It's the wellness for motivation behind the product.	It's about the outline of the product.
It can be measured through feature tests, QA and customer feedback [https://www.madetech.com/blog/internal-vs-external-quality-of-software].	It can be measured through predefined standards and unit tests [https://www.madetech.com/blog/internal-vs-external-quality-of-software].

This paper gives a near review on these both term. There are diverse techniques are utilized to assess the attributes of internal and external quality.

## PROBLEM DEFINITION

Internal quality and External quality, these are specifically associated with the product item. There must be a harmony between these two terms for getting effective item. These both are essential for any item, in light of the fact that an item needs consumer loyalty and this originates from a decent quality of that. So a designer must need to consider this. From this paper it will give clear thought regarding that.

## RELATED WORK

The way of any thing has effect on customer's satisfaction. Both internal and external quality characteristics are associated with each other. In this section, there are methods for evaluating these both terms.

### A. Internal and External quality estimation

In that paper, it's about inner and outer quality measurement and it's comparison. In that software metrics are profoundly associated with external quality characteristics (Dimitris, 2008). They gives the overview on internal and external quality estimations. Software metrics are used that measure internal product characteristics, without conferring with the users (Dimitris, 2008). External estimations are quick measures of outside thing quality qualities by investigating the end-customers. As software metrics may be measured subsequently, different estimation mechanical assemblies have starting at now been executed.

### B. ATHENA

In the approach, it is to accomplish software estimation and metrics. In that presenting the "ATHENA". It is a parametrizable programming instrument situated towards the estimation of software quality characteristics (Tsalidis *et al.*, 1992). It is a metric-free and language-free metrics

environment, which provides completely automated measurements and therefore, the collection of raw data was effortless, as it is required in any enterprise that collects developer oriented measurements (Dimitris, 2008). ATHENA can bolster Pascal, ADA and C and offers the likelihood of measuring an arrangement of piece measurements (Tsalidis *et al.*, 1992). ATHENA has numerous capacities, for example, dialect autonomy, adaptability, report era, and so on.

### C. Software Quality Strategic Drivers

In that paper, it is a survey that says the strategic drivers which are used for the internal and external quality. That addresses eleven issues related quality and displays it, which it calls strategic drivers (Ronan Fitzpatrick, 2001). At that point, utilizing the Software Quality Star, constructs another reasonable model where each strategic quality driver is characterized and clarified. This paper has exhibited the Software Quality-Strategic Driver Model (SQ - SDM) and has clarified the distinctive drivers that effect the procurer and maker of programming items.

### D. EMISQ Method

Another is a review on the EMISQ Method. That says Internal software quality, e.g. the quality of code, has extraordinary effect on the overall quality of software (Plösch *et al.*, 2007). EMISQ remains for "Evaluation Method for Internal Software Quality" and is a methodology for systematically assessing the internal software quality. This paper has the emphasis on the appraisal of internal quality of software by methods for static code examination, joined by an specialist judgement of the static code investigation comes about. The EMISQ assessment display comprises of eight primary exercises that are isolated up into 5 to 10 sub-exercises. That activities are set up motivation behind assessment, Identify sorts of item, Specify quality model, select metrics, Produce assessment arrange, Take estimations and archive comes about, Assure inward reuse of results. The EMISQ method is supported by the tool SPQR (Software Product Quality Reporter) (Plösch *et al.*, 2007).

## RESULTS

Software quality is vital to software accomplishment. That is, frustration in things may realize real cash related hardship. Extraordinary internal structure is depended upon to give incredible external quality. From these all papers that I have concentrated, it is about software quality either on internal quality or on external quality. That is an overview on various distinctive subjects about the internal and external quality attributes. From that papers, it is a summery and gives strategies, assessment, estimations systems, drivers, and so forth. ATHENA is critical apparatus for estimation the quality of software. At another side EMISQ technique is for measuring the inner software quality. The Strategic drivers that impact on producer and procurer of software products (Ronan, 2001). So with the assistance of these all engineer can make exceptionally decent item.

### Conclusion

Software quality is the degree to which software possesses a desired combination of attributes. Software metrics can offer a

decent first sign for external quality and that are exceedingly associated with external quality attributes. With the help of software metrics developers can measure the quality characteristics. Another is the EMISQ technique and SPQR device is utilized for an internal software quality. ATHENA is software tool for measurement tool used to measure characteristics of software quality. In any item, inside and outer quality attributes are imperative and need to deal with that both. Designers need to notice that for changing any one characteristic, that don't have a terrible effect on another This paper abridge information about the interior and outside software quality and this will accommodating for the individuals who need to make examine in this zone. From this review, the conclusion is that engineer need to deal with all the inside and outer quality attributes with the assistance of software measurements and ATHENA is likewise imperative apparatus for that.

### Future Scope

From this study paper, one can perceive about the techniques for measuring sorts of quality. In future, this work will be exceptionally helpful to numerous. We will make new thoughts regarding that, on the grounds that a quality is an evergreen term in software engineering.

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