

# Assessing Quality of Mobile Applications Based on a Hybrid MCDM Approach

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## ABSTRACT

With the expansion in the quantity of cell phone utilization, mobile applications are developing significantly in today's high-tech environment. With this high demand, the quality of mobile applications is turning into a major issue. The organizations are still finding a way to develop quality applications. The number of quality models has already been proposed for assessing the quality of a mobile application but none of them provide a holistic view towards quality assurance. The present research work proposes an empirical evaluation of the SQM-MApp quality model using a hybrid multi-criteria decision-making approach named ELimination Et Choix Traduisant la REalité (ELimination and Choice Expressing REality) (ELECTRE-TRI) method and step-wise weight assessment ratio analysis (SWARA) method for ranking and determining weights of chosen quality factors respectively. The proposed approach specifically is for the mobile applications that are from the gaming domain. Also, validation of the proposed approach is performed by assessing the quality of gaming applications.

## KEYWORDS

Mobile Applications, Multi-Criteria Decision-Making (MCDM), Quality Assurance, Quality Factors

## INTRODUCTION

A standout amongst the most energizing improvements in registering innovations in recent years is the quick advances in mobile computing and the colossal development in the fame of mobile applications focusing on advanced mobile phones, tablets, and notepads, etc. With the regularly expanding mobile equipment abilities of such gadgets, mobile programming applications are ending up with constant changes. A mobile application implies to a sort of product application, which is structured and created for cell phones. Such an application might be of two sorts: hybrid applications and native applications (Luntovskyy, 2018; Ma et al., 2018). The native applications are built specifically for a particular operating system while, hybrid applications are the ones where websites are packaged in the native wrapper at the core.

With the ceaseless advancing specialized world, mobile applications have turned out to be unavoidable. Mobile applications rose because of the all-inclusive utilize and the prominence of numerous handheld devices, for example, tablets and advanced mobile phones (Falaki et al., 2010). Mobile applications are accessible in different assortments from customary communication services to voice communication over the web, gaming applications and considerably more. Presently we are in the time where numerous applications have been structured and created, which are making the life

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of the general population less demanding in some or another way. Number of mobile applications can also be changed according to the requirements of the user as they are open source i.e. one can customize it accordingly.

Also, mobile applications must manage the attributes such as high responsiveness, low memory utilization, and low power utilization for being used by the users in an efficient manner. To maintain the efficiency and usage various portable stages are available given by Android and iOS. It is exceedingly attractive for software designers to have their applications running on all prevalent portable stages. But the fact is that while the different portable stages are practically identical in abilities, are altogether different in the programming language and the application programming interface used. It is fairly costly and tedious to port mobile applications starting with one stage then onto the next.

It is a field that has turned out to be very alluring for software engineers. With the expanding number of utilization quality of these applications among the general population has turned into a noteworthy issue (Scalabrino et al., 2019). In computerized segments, these applications are developing significantly, and designers are discovering hard to get profit by their work as a plentiful number of uses giving same functionalities are accessible in the market yet just a few are there that remains on the quality measures. These applications have stringent quality prerequisites and factors which help to characterize the quality traits of the applications. Most normal properties considered for the quality measurement are the convenience, security, dependability, practicality i.e., maintenance and performance (Abran, 2010; Aggarwal et al., 2018, 2018b, 2019a; Nitze and Schmietendorf, 2015; Spielberg, 2009). The hardware and the environment in which the mobile applications work is one of the essential requirements for its success.

In this way, mobile applications must be developed by incorporating the suitable methodology that includes marketing, business and technical angles (Ahmad et al., 2018). Designers must not neglect the essentials of portable applications as it specifically influences the notoriety of the organization and engineers building up the mobile applications. From the quality perspective, number of quality models has been proposed previously for assuring quality of mobile applications (Aggarwal et al., 2018a; Dehraj et al., 2018). But none of them provides the quality assurance in a holistic manner. One of the quality models proposed named as SQM-MApp i.e. software quality model for mobile applications (Aggarwal et al., 2019). The model incorporates an autonomic capability as a new quality factor for assessing the quality of a mobile application with all the other factors based on ISO 25010:2011 quality model. In this, the model has been proposed theoretically, no empirical evaluation has been provided for assessing quality of the mobile applications.

The paper proposes an empirical approach to evaluate the quality model SQM-MApp proposed by Aggarwal et al. (2019) for mobile applications in gaming domain. Based on the research work done previously authors have taken total nine quality factors for assessing the quality of mobile applications. Out of which only eight quality factors are taken for the present empirical evaluation of the quality of mobile applications. For the empirical evaluation a hybrid multi criteria decision-making approach is used named as EElimination Et Choix Traduisant la REalité (ELimination and Choice Expressing REality) (ELECTRE-TRI) outranking method and step-wise weight assessment ratio analysis (SWARA) method for ranking and weight determination of the selected quality factors for mobile application respectively.

## **LITERATURE REVIEW**

With the developing needs in everyday work activities, there is a need for effectively characterized quality models' for mobile applications that estimates the quality of such portable applications. The measurements for the estimation of quality incorporated various software characteristics. An ample number of quality models have been as of now proposed to assess and test the quality of mobile applications running on various platforms.

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