Analysis of Software Quality Needs in Mobile-based Game Software

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Abstract

The game is composed of rules with interesting scenarios as well as audio-visuals for entertaining users. With the development of mobile devices, games have also emerged on mobile devices. Thus it takes a quality model that every game developer expects. The characteristics of mobile game software are more unique than gaming software in general, especially in terms of mobility and portability. The quality of a mobile game can be seen from the aspects measured and tested according to the metrics for the quality needs of the mobile game. To determine the quality needs of the software, the characteristics of the software are used so that it becomes the basis for the formation of quality needs that are by the case used. The quality needs for mobile-based games are obtained from the characteristics of mobile-based applications and mobile-based games. Evaluation of the proposed quality needs will be used as a reference to measure the quality of a mobile game.

Keywords: Software Quality, Quality Needs, Games, Mobile Games

Introduction

A game is a system that has a collection of artificial rules that involve players with the aim of entertaining. *The* game contains scenarios composed of a collection of interesting audio and visuals so that users can enjoy the game provided by the game. *Game* quality can be viewed from the player's performance using the appropriate quality metrics. With the characteristics of the game that can be said to be more unique than software in general, the measurement will be more specific. The characteristics of the quality of *the game* can be described in a factor called *playability*

Playability is a collection of properties that describe events when a player interacts with a *game*. According to Fabricatore et al playability is a *core* part of *the game,* because *playability* can be used as a reference to discuss *game* development and management. *Playability* can be used as one of the bases for measuring the quality of a game, because it involves *User Experience, Control, Usability,* and other things. For this reason, a quality model can be built that is used specifically to measure the quality of the *game* based on existing characteristics, for example, the *playability quality model*.

The Playability Model is a quality model built by Sanchez that is used to measure and assess *the Player Experience* (PX). The Playability Model was further modified into a *Playability* Quality *Model* by Sanchez, et al in 2009 which was adjusted to the Quality In Use quality factor of *ISO 9124 Part 4: Quality In Use Metrics* and ISO 25010 are specific to game software based on the *playability* criteria of the *game* in general. The model was built as one of the alternative models that can be used to measure the quality of *the game*. The proposed metrics are already specific to the needs and characteristics of *the game's playability*. It's just that until now, there has been no evaluation of games with *mobile* types.

A mobile game is a type of software that is a *mobile application.* The characters of mobile games are more unique when compared to other types of *games* such as *PC Games, Game Consoles,* and others, such as *Portability* and *Accessibility*. To measure the needs of *mobile games*, it is necessary to use a more specific quality model so that quality measurement is more focused and optimal. Several previous researchers have presented models to express the characteristics of *mobile games*. However, the proposed model only shows its needs, not to the point of doing calculations that can show the quality value of mobile *games*. With the limited quality models available for use in measuring the quality of *mobile games*, this study updated the quality model based on the *Playability Quality Model* with the development of models and metrics proposed by the *International Organization of Standards* (ISO) which is the latest on ISO/IEC 25010 and *ISO/IEC 25022*: *Measurement of Quality In Use*.

Based on these problems, in this study, an analysis of the quality needs of *mobile games* was carried out to propose quality models and metrics that are the result of the development of models that exist to be used specifically on the measurement of the quality of mobile *games*.

Literature Studies and Previous Research

According to Eui Jun Jeoung, et al *Mobile* Games have different characteristics when compared to other games, such as *PC* Games, *Arcade Games,* and others when viewed from several aspects which include *Portability*, *Accessibility*, *Simplicity,* and *Networkability*. *Heuristic Playability* for *Mobile Games* was designed by Korhonen, et al which is used to assist in evaluating the specific needs and aspects of a mobile-based game. M*obile* games are more complex than other types of *games*. Korhonen stated the needs of mobile game characteristics in 3 categories, namely *Game Usability*, *Mobility,* and *Gameplay*. *Game Usability* includes game controls and interfaces as players interact with the game. *Mobility* focuses on things related to gaming mobility. *The gameplay* deals with the issues that arise when players interact with the mechanics and story of the game.

Ponnada & Kannan have evaluated the heuristic playability offered by Korhonen, so it can be stated that the Heuristic *Playability* for *Mobile Games* has shown a result that is good to use as a

reference when working on building metrics to determine the characteristics of mobile *games*.

According to their type, *mobile games* are mobile software or *Mobile Applications*. A m*obile application* has characteristics that are not the same as other types of applications, some things make this type of *mobile* even more special. According to Salmon, the characteristics of mobile *applications* can be seen from several aspects, such as usage patterns or habits, form factors, and reliability needs. *Usage Pattern* includes *sort duration* activities and *focuses activities*. *Form Factor* or form covers more of the user's areas of convenience, such as appearance, layout, sound, way of access, and others. The most important characteristic of *a mobile application* is the fast *Startup Time*, it does not take much time when using or running applications.

Nayebi, et al state that the criteria or characteristics of the *Mobile Application* are easy to learn, problem-solving assistance, emotional aspects, control efficiency, minimal use memory, and operational completeness. Hussain stated that overall the important parts of the quality characteristics of *mobile applications* are the *factors of Effectiveness, Efficiency,* and *Satisfaction*, which include completeness, accuracy, ease To be study, security, and more.

Characteristics of the Mobile Application

Mobile applications are software that runs on *mobile* platforms such as *PDAs, Mobile phones, Tablet PCs,* and *smartphones*. *Mobile* applications have characteristics that are not the same as other types of applications, some things make this type of *mobile* even more special. Usually what distinguishes is the limitations of the *mobile* device itself, such as screen size, how to access it, the power of resources, and others. These things show that the characteristics of *mobile* applications can be studied further for use in certain needs.

Table 1. Summary of **the characteristics** of *mobile* applications according to some researchers

Research	Characteristic
Salmon (2005)	The content displayed is by the screen size
	The layout of the appearance is displayed well
	Application Runs with a short time
	The application should run focused on the goal
	The convenience of sound and visual use
	The convenience of Access /Control Methods
	The use of sufficient energy resources as a support running of the application
	The application does not use much memory
	Errors/errors that appear can be handled
	Stable user satisfaction when using the application
Nayebi et al (2012)	Easy to learn

	Using a short time
	Task completeness
	User-friendly use
	Layout according to screen size
	Gesture orientation is well available
	Functions that are displayed as responsive
	Simple application
	The size of the application is not large
	Good screen display resolution
Hussain et al (2008)	Easy to use
	Easy to learn
	Simple App (uncomplicated)
	The size is not big
	Accuracy of work
	Little or no error
	Job Success
	Fast response time
	Task Completeness
	Has a helpful function
	Safety in the use of the application is guaranteed
	Satisfactory interface

Table 1 is a summary of the characteristics of mobile applications presented by several researchers, such as Salmon, Nayebi, et al and Hussain et al.

Characteristics of Mobile Games

Mobile games are defined as *games* played on mobile platform-based devices

that are expected to increase *entertainment* in mobile device users*.* Mobile devices that use *mobile games* such as *Smartphones*, PDAs, *Tablet PCs,* and *Portable Game Consoles. Mobile* games are very dependent on the device that is home, if the device implemented is a device with a monochrome screen, then *the existing games* are limited in the form of *monochrome.* An example of a *mobile game* that was very popular in the 1990s was Tetris.

Table 2. Summary of the **characteristics** of *mobile games* **according to some researchers**

Research	Characteristic
Jeong et al (2009)	Can be used anywhere and anytime
	Easy to use
	Easy to understand
	Can access the app easily
	Uncomplicated game
	Does not take much time
	The specific purpose of use
	Supports network connectivity
Korhonen et al (2009)	Audio-Visual Representation that supports Games
	The screen layout is efficient and comfortable to look at
	Players understand the terminology of the game
	Game controls are convenient
	Players can't create errors
	The game can be unlocked quickly
	Games can accommodate the surrounding environment
	Players get rewards
	The game gives clear goals or helps players to create
	Goal
	Challenges, Strategy, and Speed are balanced
	First Experience plays a very exhilarating
	Game Story can support gameplay
	No loops or boring things
	Games can support different ways of playing

Table 2 is a summary of the characteristics of *mobile* applications presented by several researchers, such as Jeoung, and Korhonen, et al.

Analysis of the results of proposed quality needs for *mobile games*

To develop a *Playability Quality Model* that is specific to use in mobile games, an analysis is first carried out on the needs and characteristics of mobile *games*. Not many researchers have traced the needs or characteristics of *mobile games* specifically. In general*,* the issues regarding *games* are *Story/Scenario*, Gameplay, *Graphic Interface*, Functionality, Game *Usability,* and *Game Mechanics*.

Similar to what was conveyed in the previous chapter, the heuristics compiled by Korhonen et al to see the characteristics of *mobile games*, which are categorized into 3 factors, namely *Game Usability*, *Gameplay,* and *Mobility*. Another opinion on some important aspects of *mobile games*, namely *Portability*, *accessibility*, *Simplicity,* and *Networkability* put forward by Jeoung et al*.*

For the characteristics of a mobile application according to Salmon, a good *mobile* application should have characteristics that include *Usage Pattern, Form Factor,* and *Reliable Requirements*. Another opinion expressed by Nayebi, et al the characteristics of the *mobile* application are easy to learn, problem-solving assistance, emotional aspects, control efficiency, minimal use of memory, and operational completeness. Similarly, Hussain et al stated that overall the important parts of the quality characteristics of *mobile* applications are effectiveness*, efficiency,* and *satisfaction* factors.

Based on the characteristics of mobile *games* and *mobile* applications presented by several researchers, an analysis of these characteristics was carried out for extraction to produce a collection of quality needs which became the basis for building quality models and determining the quality metrics to be used. Table 1 and Table 2 are the results of the analysis and proposed quality needs for *mobile games* based on Korhonen et al, Jeong et al, Salmon, Nayebi, et al, and Hussain et al.

Table 3. Proposed quality needs **for *mobile games* in general**

No.	*Mobile Game* **Quality** Needs **in General**
1	*The game* gives clear goals and players can achieve *goals* (1, 2, 5)
2	The Player did not encounter any errors in the game (1, 2, 3, 4)
3	*Games* are easy for Players to understand (2, 4, 5)
4	*Games* have manuals (help features) (1, 2, 4, 5)
5	*The game* gives a response that matches the player's action (1, 2, 3, 5)
6	Challenges, strategies, and balanced game steps (1, 2, 3, 4)
7	Fun gaming experience (1, 2, 4, 5)
8	Players get the corresponding *rewards* (1, 3)
9	Interesting *game* story/scenarios (1, 2)
10	Players can express themselves (1)
11	No boring game loops (1)

Ket : (1) Korhonen [6] || (2) Jeoung [4]|| (3) Salmre [8] || (4) Nayebi [9] || (5) Hussain [10]

Table 3 contains proposed quality needs for *mobile* games that are generally also owned by other types of games. While in Table 4 shows the quality needs for mobile games that are specifically intended for the quality needs of *mobile-type games*.

Table 4. Proposed quality needs **for *mobile games* specifically**

No.	**Specific Mobile *Game* Quality** Needs

1	*Games* can be played with fast time (2, 4, 5)
2	Controlling is consistent and follows the standard (1, 2, 3, 5)
3	The screen layout is already convenient to view (1, 2, 3, 4)
4	Audio is convenient and supports *games* well (1, 2, 3, 4, 5)
5	*Mobile* devices and *game interfaces* are suitable and appropriate (1, 2, 3, 4)
6	*Game controls* are appropriate and flexible (2, 3, 4, 5)
7	*Games* can accommodate the surrounding environment (2, 3, 4, 5)
8	*The game* supports multiple ways of playing (1)
9	Players are not affected / by effects related to safety and health (1, 3)

Ket : (1) Korhonen [6] || (2) Jeoung [4] || (3) Salmre [8] || (4) Nayebi [9] || (5) Hussain [10]

Proposed quality needs for mobile games

The results of the analysis of criteria or characteristics of mobile *games* discussed earlier have been summarized in a collection of *mobile game* quality needs to be mapped to the quality factor of 25010 with visible results in Table 5 below.

Table 5. Results of quality need analysis for *mobile games*

No	Mobile Game Quality Needs
1	The game gives clear goals and players can achieve goals
2	Players did not encounter any errors in the game
3	The game can be played with a fast time
4	The game is easy for Players to understand
5	The game has a manual (help feature)
6	Controls are consistent and follow standards
7	The game provides a response that matches the player's action
8	Challenges, strategies, and balanced game steps
9	The screen layout is already convenient for view
10	Audio is convenient and supports games well
11	Mobile devices and game interfaces are suitable and appropriate
12	Fun gaming experience
13	Players get the appropriate rewards
14	Interesting game story/scenario
15	Players can express themselves
16	No boring game loops
17	Game controls are compliant and flexible
18	Games can accommodate the surrounding environment
19	The game supports several ways to play
20	Players are not affected / by effects related to safety and health

Table 5 is a list of proposed quality needs for mobile games based on the results of the analysis of the characteristics of mobile applications and mobile *games* in the previous section.

As an evaluation need, these quality needs can be used as a reference or basis for measuring the quality of mobile-based game software. Measurements can be made further using quality metrics provided by quality models that have been proposed by many other researchers.

Conclusions and Suggestions

Based on the research that has been done, it is concluded that determining the quality of software can be defined or obtained from the needs of software quality based on the characteristics of the software. So that the need for software quality for mobile games can be formed based on the characteristics of mobile-based software and mobile-based games.

For the following research to come, the proposed quality needs can be used as reference material to determine and measure the quality of game software mobile on case studies and certain genres.

REFERENCE

Indra, F., Juliana, J., Hubner, I., & Sitorus, N. B. (2022). Development Of Gastronomic Tourism Potential In Pontianak West Kalimantan. *Journal of Information Systems and Management (JISMA)*, *1*(5), 28-42.

Jasin, M. (2022). How The Role of online and viral marketing and competitiveness ability on business performance of SMEs. *Journal of Information Systems and Management (JISMA)*, *1*(2), 28-35.

Effendi, M. R., & Saputra, J. (2022). Design and Build an Employee Leave Application System. *Journal of Information Systems and Management (JISMA)*, *1*(4), 42-5
Education. *Journal of Information Systems and Management (JISMA)*, *1*(5), 7-11.

Jasin, M. (2022). The Role of Social Media Marketing and Electronic Word of Mouth on Brand Image and Purchase Intention of SMEs Product. *Journal of Information Systems and Management (JISMA)*, *1*(4), 54-62.

Novitasari, D. (2022). Hospital Quality Service and Patient Satisfaction: How The Role of Service Excellent and Service Quality?. *Journal of Information Systems and Management (JISMA)*, *1*(1), 29-36.

Novitasari, D. (2022). SMEs E-commerce Buying Intention: How the Effect of Perceived Value, Service Quality, Online Customer Review, Digital Marketing, and Influencer Marketing. *Journal of Information Systems and Management (JISMA)*, *1*(5), 61-69.

Patmawati, S., Dewi, V. M., & Asbari, M. (2023). THE EFFECT OF SHORT-TERM AND LONG-TERM LEARNING IN QUALITY MANAGEMENT AND INNOVATION. *Journal of Information Systems and Management (JISMA)*, *2*(1), 21-26.
Purwanto, A. (2022). WHAT IS THE ROLE OF CUSTOMER BEHAVIOR FOR ELECTRONIC E-COMMERCE AND MODERN MARKET VISIT INTENTION? *Journal of Information Systems and Management (JISMA)*, *1*(6), 46-5

Hermansyah, R., & Asbari, M. (2022). Edifying In The Industrial Revolution 4.0 With The Role Of Islamic