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Evaluating the Effectiveness of Mobile JKN Application in Indonesia: A User-Centric Approach Using the ISO 25010 Quality Model

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Abstract. This study aims to assess the effectiveness of the Mobile JKN application, a digital product developed by BPJS Kesehatan for the Indonesian National Health Insurance (JKN) program participants. The evaluation employs the ISO 25010 quality model standard, utilizing a quantitative approach involving questionnaires distributed to BPJS Kesehatan participants across Indonesia. The study investigates the influence of various factors derived from the ISO 25010 product quality model characteristics, including functional suitability, reliability, performance efficiency, usability, and security, as well as application performance from related research, on the perceived effectiveness of the Mobile JKN application. Data were collected through online questionnaires and analyzed using the SEM-PLS approach with SmartPLS 4.0, involving 758 respondents from various regions of Indonesia. The findings indicate that performance efficiency, security, and usability significantly and positively influence the perceived effectiveness of the Mobile JKN application, with performance efficiency having the strongest impact. This research aims to provide recommendations for enhancing the effectiveness of the Mobile JKN application, considering its complex business processes, and contribute to the improvement of digital healthcare services in Indonesia.

Keywords: ISO 25010 Quality Model, Mobile JKN Application, Effectiveness.

1. Introduction

The presence of information technology is increasingly essential for companies and organizations to automate operational business processes, improve service quality and enhance customer convenience. Effective implementation of information technology is crucial for meeting business needs and achieving organizational goals and visions. The objective of implementing technology in companies, organizations, and government agencies is to create a value chain that supports all aspects of business operations, enhances effectiveness, efficiency, and productivity, while minimizing risks and operational costs (Indrayani, 2012).

In Indonesia, the healthcare sector is a critical area where public services need to be efficient and accessible to all members of society. The government has mandated equitable healthcare services to improve public welfare, reduce societal burdens, and enhance living standards as per Law number 25 of 2009. There is a growing demand for the government to be more efficient, effective, and transparent in providing public services. To address this, the government has implemented e-Government initiatives to optimize service delivery through the use of information technology, aiming to improve effectiveness, efficiency, transparency, and accountability in government administration (Aprianty, 2016). Mobile JKN is a digitalization product of the BPJS Kesehatan business process for JKN participants to assist potential participants in registering for the JKN program, helping participants update participant data such as changes in treatment class, making changes in first-level health facilities, obtaining billing information without having to visit locations, registering queues to health facilities, and various other membership administrative activities in the form of digital transformation. In addition to the digitalization of business processes with membership administration, BPJS Kesehatan continues to make efforts to simplify access to health services through digital innovation.

Despite the implementation of the Mobile JKN application by BPJS Kesehatan, there are recurring issues and complaints regarding its effectiveness and user experience. Common problems include slow response times, application inaccessibility, difficulties in account creation, and outdated patient information (Adam Adi Pamungkas, 2022). Additionally, a survey by Litbang Kompas in August 2022 revealed that many JKN participants found the digital services provided by BPJS Kesehatan to be user-unfriendly, with perceptions varying significantly across different socioeconomic, age, and education categories (Arita Nugraheni, 2022). These persistent issues highlight a significant research gap: the need to comprehensively evaluate the Mobile JKN application from the user's perspective to identify areas for improvement and enhance its effectiveness.

This study aims to address this research gap by evaluating the Mobile JKN application using the ISO 25010 quality model. The objective is to assess the factors influencing the application's effectiveness and provide actionable insights for its enhancement.

2. Literature Review and Hypothesis Model

2.1. Application Performance

According to Molyneaux (2014), a well-performing application is one that allows end-users to carry out their assigned tasks without delays or undue interruptions. Users should never encounter a blank screen upon login and should be able to perform tasks as intended. Performance evaluation of applications is divided into two orientations are service 1) orientation a. Availability: The amount of time the application is available to end-users, enabling them to utilize it effectively without significant response delays. b. Response time: The duration required for the application to respond to user requests. 2.Efficiency orientation a. Throughput: The rate of occurrence of application-oriented events. A good example is the number of hits on the application within a specified period. b. Utilization: The number of resources utilized by the application, including factors such as how much network bandwidth is consumed by application traffic, or the amount of memory used on web server farms when 1,000 visitors are active.

2.2. ISO 25010 Quality Model

International Organization for Standardization (ISO), namely the ISO-25010 Software Quality Model. ISO-25010 is a model established to measure the quality of software used by an organization or individual (Nistala et al., 2019). ISO 25010:2011 is an international standard guideline used for software evaluation released by the Canadian Standards Association in 2011. Despite being established in 2011, the relevance and validity of this model have led to its continued use in most research (Wahyuningrum & Mustofa, 2017). Many quality models have been developed and introduced in an effort to measure software quality (Wahyuningrum & Mustofa, 2017). Despite the evolution of software quality models, various models have been introduced, such as those by McCall (1977), Boehm (1978), Dromey (1995), the FURPS Model, the ISO-9126 Software Quality Model (2001), and the latest standard followed by the industry is the ISO-25010 Software Quality Model. The evolution of software quality expands from year to year with the growth of technology and software. Therefore, evolving in measuring software quality becomes a challenge, especially in determining the best quality model to be used (Sekaran & Bougie, 2016). Within ISO 25010, there are two models used to measure system quality: Quality in Use Model: The Quality in Use Model relates to the output parameters when the application is used by the user. This model can be used to examine the relationship between humans (users) and computer systems, including the computer systems and applications (software) being used, consisting of:

a. Effectiveness: This characteristic of the software application involves accuracy and completeness, ensuring that the application is effective in achieving goals for users. Effectiveness can also be interpreted as the measurement of success in achieving predetermined goals (Ristanti, 2023).

Product Quality Model: The Product Quality Model is a model for measuring the quality of applications (software) to meet the needs of the organization. The Product Quality Model consists of characteristics for measuring the implementation of software applications. Explanation of the characteristics in the Product Quality Model consists of:

a. Functional Suitability: This characteristic evaluates the application's ability to provide functions that meet user needs. In this context, evaluation will review the completeness of the software to provide necessary functions, providing correct and appropriate outputs for user contexts (Rahman et al., 2021).

b. Reliability is a characteristic to assess the quality of the application in terms of whether it can function under specific conditions and periods. Software should be able to function even in the presence of minor hardware or software errors. Through this, recovery evaluation refers to the software's ability to recover all activities before the error occurred (Haoues et al., 2017).

c. Performance Efficiency is a characteristic to measure the responsive and efficient performance of the application in responding to user actions. The JKN mobile application often encounters time behavior issues and requires a long time to process data due to the large volume of data typically processed by the system (Anugrah et al., 2018).

d. Usability is a characteristic to measure the interface and user-friendly operation, minimizing user errors. Usability evaluation is the user's interpretation that the software can meet their needs, is easy to learn and operate, can protect users from errors, provides a good experience, and can be used for various purposes (Peters & Aggrey, 2020),

e. Security is the software's ability to manage access confidentiality according to its rights, prevent data modifications, manage user authentication, and identify accountability for changes (Anugrah et al., 2018). The previous study titled "The Influence between GIS Quality and User Satisfaction towards Individual Work Performance: A Proposed Conceptual Framework" conducted by (Rahman et al., 2021) evaluated applications by proposing a conceptual framework to identify the influence between GIS quality using variables such as functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability, user satisfaction with GIS application, and then investigating the effect of user satisfaction on individual work performance with variables such as task performance and adaptive performance. In essence, this proposed framework is expected to help explain measurable and considerable aspects to enhance GIS quality, user satisfaction, and individual work

performance in any organization (Rahman et al., 2021).

2.3. Hypothesis Model

The study hypothesis is from Fig 1 below is the reference used in the research model is as follows:
H1: Application Performance (AP) has a significant positive impact on Effectiveness (EF)
H2 : Functional Suitability (FS) has a significant positive impact on Effectiveness (EF)
H3: Performance Efficiency (PE)) has a positive impact on Effectiveness (EF)
H4: Reliability (R) has a positive impact positive impact on Effectiveness (EF)
H5: Security has has a positive impact positive impact on Effectiveness (EF)
H6: Usability (U) has a positive impact positive impact on Effectiveness (EF)

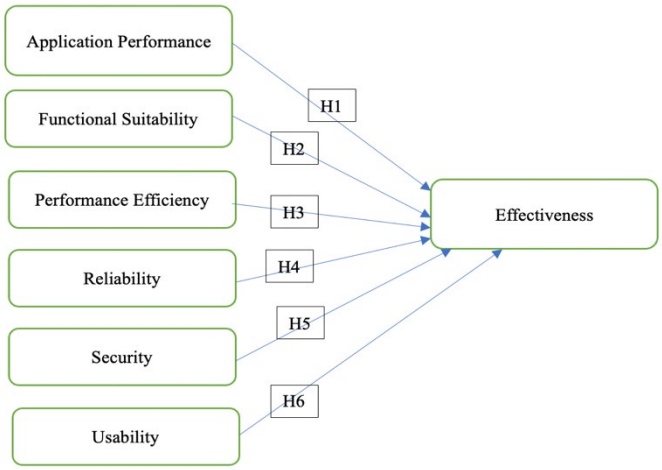

Fig. 1: Study Hypotesis Model.

3. Research Methodology

The ISO 25010 quality model was chosen for this study as it provides a comprehensive framework for evaluating software quality from a user perspective, aligning with the research objective of assessing the effectiveness of the Mobile JKN application from a user-centric approach.This paper used a quantitative approach, by using questions with formal standards and answers to online questionnaires and surveys that were previously distributed to respondents using online survey tools, specifically Microsoft Forms, as the main method for collecting data. The survey was distributed widely across the entire province of Indonesia. This research employs Likert scale in the form of multiple-choice questions where the assessment of answers utilizes weighting. According to Sugiyono (2019), Likert scale is utilized to measure individuals' or a group of individuals' attitudes, opinions, and perceptions towards existing social phenomena. With the Likert scale, the variables to be measured are elaborated into variable indicators (Sugiyono, 2019) Each element in the survey will be assessed using a Likert scale, ranging from 1 (indicating strong disagreement) to 5 (indicating strong agreement). The Likert scale is designed to measure how much respondents strongly agree with this statement. By has scale, it is expected that there will be many choices able to provide respondents with a clearer understanding of the points outlook for this research. The table 1 shows the variable about the variable used. To obtain the data for analysis, the data collection technique employed in this research is primary data. The researcher utilizes a method through a questionnaire, by distributing the questionnaire to JKN participants with several questions to respondents via an online questionnaire link on Microsoft Forms. This questionnaire will be distributed to respondents who are participants of BPJS Kesehatan such as Health Facility Employees, Civil Servants, State-Owned Enterprise Employees, Private Employees. The population is a generalization area consisting of objects/subjects with specific qualities and

characteristics that are defined. The sample is a portion of the population's total number and characteristics. (Sugiyono, 2019) The sample in this research is individuals, namely Users of the Mobile JKN Application, which is recorded in the bi.bpjshealth.go.id application with a total of 25.252.791 users. In this study, the sample size is determined using the formula for the sample size based on the Solvin formula as follows: n = N/(1+N(e^2)) Where: n: sample size N: population size e: error tolerance limit (0.05) The sample calculation according to Slovin is as follows: n = N/(1+N(e^2)) n = 25.252.791/(1+25.252.791(0.05²)) n = 399.9 n = 400 Therefore, the sample used in this research is a minimum of 400 users of the JKN mobile application, but from the results obtained, the total respondents are 758 users.

3.1. Research Instrument

This paper used a quantitative approach, by using questions with formal standards and answers to online questionnaires and surveys that were previously distributed to respondents using online survey tools, specifically Microsoft Forms, as the main method for collecting data. The survey was distributed widely across the entire province of Indonesia. This research employs likert scale in the form of multiple-choice questions where the assessment of answers utilizes weighting. According to Sugiyono (2019), likert scale is utilized to measure individuals' or a group of individuals' attitudes, opinions, and perceptions towards existing social phenomena. With the Likert scale, the variables to be measured are elaborated into variable indicators (Sugiyono, 2019) Each element in the survey will be assessed using a likert scale, ranging from 1 (indicating strong disagreement) to 5 (indicating strong agreement). The Likert scale is designed to measure how much respondents strongly agree with this statement. By has scale, it is expected that there will be many choices able to provide respondents with a clearer understanding of the points outlook for this research. The table 1 shows the variable about the variable used.

Table 1: Research Variable

Variable	Dimension	Indicator	code	Reference
Functional Suitability	Functional Appropriateness	I consider the information and data available in the mobile application to be adequate.	FS1	ISO 25010
	Functional Correctness	I feel that the JKN mobile app menu buttons can be used and work well	FS2	
		I feel that overall, the JKN mobile phone's menu functions work well.	FS3	
	Functional Completeness	I feel that the information and data available in the mobile application are comprehensive	FS4	
		The JKN Mobile application very useful	FS5	
Performance efficiency	Time behavior	I feel that the JKN Mobile app is responsive when displaying information.	PE1	ISO 25010
		I feel that the JKN Mobile app responds quickly when updating user information	PE2	
		I don't seem to notice any delays or delays when accessing information or updating data in the JKN Mobile app	PE3	

Variable	Dimension	Indicator	code	Reference
		(e.g., long loading indicator, failure to access menu).		
	Capacity dan Resource Utilization	I have never experienced performance issues related to the Mobile JKN app? (e.g., slow response, auto-close app, etc.)	PE4	
	Capacity	I believe that the Mobile JKN application is compatible with my mobile phone	PE5	
Usability	Appropriateness Recognizability	I think the way to use Mobile JKN is easy to remember.	US1	ISO 25010
	Learnability	I find the JKN mobile application easy to use.	US2	
	Operability	I seem to quickly understand when there are additional features in the JKN Mobile app.	US3	
	User Interface Aesthetics	JKN mobile application has an attractive appearance, well organized and without excess (user Friendly)	US4	
	Accessibility	I think JKN Mobile app is easily accessible	US5	
Reliability	*Maturity*	I feel that the JKN mobile app can be used at any time.	RE1	ISO 25010
	Fault Tolerance	I have never experienced any JKN mobile app crash/lag/lag/failure while using it.	RE2	
	Operability	I find that the JKN mobile application can be easily used on any operating systems such as IOS, Android.	RE3	
	Recoverability	I think if an error occurs in the JKN Mobile application, the app can work normally as usual.	RE4	
		Overall, I find the JKN Mobile application to be always reliable	RE5	
Security	Confidentiality	I think JKN Mobile application provides good control and data security. .	SC1	ISO 25010
	Integrity	I think JKN mobile app is a trustworthy mobile app	SC2	
	Non-Repudiation	I believe that JKN mobile application ensures that only authorized users can view or update	SC3	

Variable	Dimension	Indicator	code	Reference
	Accountability	I believe that JKN mobile app has a strong authentication mechanism to ensure that only authorized users can access the application	SC4	
	Authenticity	I believe that the JKN mobile app only provides access to authorized users (there is a login menu).	SC5	
Effectiveness		I believe that using the Mobile JKN application saves money as data changes previously made at the BPJS Kesehatan office are easier through the application.	EF1	ISO 25010
		I have never had any difficulty using the features included in the JKN mobile application.	EF2	
		I think the JKN mobile application makes updated data easier.	EF3	
		I think that using the Mobile JKN app saves time because data changes previously made in the BPJS Kesehatan office are more convenient only through the application	EF4	
		I feel that the JKN mobile app can be used anywhere	EF5	
Application performance	Availability	I believe that the JKN mobile application is accessible and remains available for use in certain situations or conditions.	AP1	Molyneaux (2014)
	Response time	I think that JKN Mobile responds well when I enter the menu and it doesn't take much time.	AP2	
	Throughput	I think that JKN mobile application is responsive in providing results or reactions to user actions.	AP3	
	Utilization	I feel like the JKN mobile app doesn't use many internet data plans	AP4	
		I think that the JKN mobile app has a good level of reliability and application performance when using various internet connections (e.g. Wi-Fi, 4G, 3G).	AP5	

3.2. Population and Sample

To obtain the data for analysis, the data collection technique employed in this research is primary data. The researcher utilizes a method through a questionnaire, by distributing the questionnaire to JKN participants with several questions to respondents via an online questionnaire link on Microsoft Forms. This questionnaire will be distributed to respondents who are participants of BPJS Kesehatan such as Health Facility Employees, Civil Servants, State-Owned Enterprise Employees, Private Employees. The population is a generalization area consisting of objects/subjects with specific qualities and characteristics that are defined. The sample is a portion of the population's total number and characteristics. (Sugiyono, 2019) The sample in this research is individuals, namely Users of the Mobile JKN Application, which is recorded in the bi.bpjshealth.go.id application with a total of 25.252.791 users. In this study, the sample size is determined using the formula for the sample size based on the Solvin formula as follows: n = N/(1+N(e^2)) Where: n: sample size N: population size e: error tolerance limit (0.05) The sample calculation according to Slovin is as follows: n = N/(1+N(e^2)) n = 25.252.791/(1+25.252.791(0.05²)) n = 399.9 n = 400 Therefore, the sample used in this research is a minimum of 400 users of the JKN mobile application, but from the results obtained, the total respondents are 758 users. The data analysis method consists of two models: the measurement model or also known as the outer model, and the structural model or also known as the inner model. The measurement model is an SEM approach used to analyze the relationship between latent variables and operational variables, where there are two forms of measurement model testing: Validity Test and Reliability Test. Validity Test is conducted to achieve the feasibility of a questionnaire. This data validity is obtained through distributing questionnaires to respondents. Reliability testing aims to determine the extent of consistency of the measuring instrument used, so that if the measuring instrument is reused to study the same object with the same technique, even at different times, the results obtained will be the same (Artha et al., 2022).

3.3. Data Analysis Technique

The data analysis method consists of two models: the measurement model or also known as the outer model, and the structural model or also known as the inner model. The measurement model is an SEM approach used to analyze the relationship between latent variables and operational variables, where there are two forms of measurement model testing: Validity Test and Reliability Test. Validity Test is conducted to achieve the feasibility of a questionnaire. This data validity is obtained through distributing questionnaires to respondents. Reliability testing aims to determine the extent of consistency of the measuring instrument used, so that if the measuring instrument is reused to study the same object with the same technique, even at different times, the results obtained will be the same (Artha et al., 2022).

4. Results and Discussion

4.1. Respondent Characteristics

The dominant province in this study is East Java, with 100 respondents or 13%, followed by Central Java with 96 respondents or 13%, and Sumatra with 91 respondents or 10%. The figure below illustrates the respondent characteristics based on their province of origin. The age distribution of the respondents is as follows: 51% (387 respondents) are aged 25–34 years, 28% (214 respondents) are aged 35–44 years, 9% (68 respondents) are aged 45–54 years, 9% (66 respondents) are aged 17–24 years, and 3% (23 respondents) are aged over 55 years. Half of the respondents are private employees (440 respondents or 58%), followed by civil servants (125 respondents or 16%).

Table 2: Research Variable

Characteristic	Category	Frequency	Percentage
Province	East Java	100	13%
	Central Java	96	13%
	Sumatra	91	10%
	Other Provinces	518	64%
Age	17-24 years	66	9%
	25-34 years	387	51%
	35-44 years	214	28%
	45-54 years	68	9%
	55+ years	23	3%
Gender	Male	249	33%
	Female	509	67%
Occupation	Private Employees	440	58%

4.2. Validity and Reliability Test

4.2.1. Convergent Validity

Convergent validity was tested for each question item. An indicator is considered valid if it has Outer Loadings >0.6. Additionally, loading factors with values from 0.50 to 0.60 are considered sufficient (Chin in Ghozali, 2014). The results of the convergent validity test showed that all outer loading values for each indicator are above 0.6, indicating that all indicators can be considered valid.

Table 3: The Result of Convergent Validity

Question	Variable	Estimate	Result
AP1	AP	0.894	Valid
AP2	AP	0.932	Valid
AP3	AP	0.919	Valid
AP4	AP	0.849	Valid
AP5	AP	0.887	Valid
EF1	EF	0.842	Valid
EF2	EF	0.896	Valid
EF 3	EF	0.891	Valid
EF4	EF	0.846	Valid
EF5	EF	0.842	Valid
FS1	FS	0.928	Valid
FS2	FS	0.946	Valid
FS3	FS	0.929	Valid
FS4	FS	0.943	Valid
FS5	FS	0.901	Valid
PE1	PE	0.909	Valid
PE2	PE	0.915	Valid
PE3	PE	0.881	Valid
PE4	PE	0.855	Valid
PE5	PE	0,872	Valid

Question	Variable	Estimate	Result
RE1	RE	0.849	Valid
RE2	RE	0.808	Valid
RE3	RE	0.902	Valid
RE4	RE	0.899	Valid
RE5	RE	0.909	Valid
SC1	SC	0.926	Valid
SC2	SC	0.933	Valid
SC3	SC	0.926	Valid
SC4	SC	0.922	Valid
SC5	SC	0.888	Valid
US1	US	0.929	Valid
US2	US	0.956	Valid
US3	US	0.955	Valid
US4	US	0.937	Valid
US5	US	0,937	Valid

4.2.2. Discriminant Validity

The results of the discriminant validity test above indicate that each indicator has the highest loading value on its respective construct variable and has smaller loading values compared to other construct variables. This indicates that each indicator is appropriate in forming its construct variable.

Table 4: The Result of Convergent Validity

	AP	EF	FS	PE	RE	SC	US
AP	0.900						
EF	0.747	0.870					
FS	0.863	0.770	0.930				
PE	0.826	0.870	0.787	0.887			
RE	0.900	0.774	0.843	0.858	0.900		
SC	0.793	0.793	0.819	0.807	0.833	0.919	
US	0.869	0.772	0.930	0.780	0.839	0.813	0.943

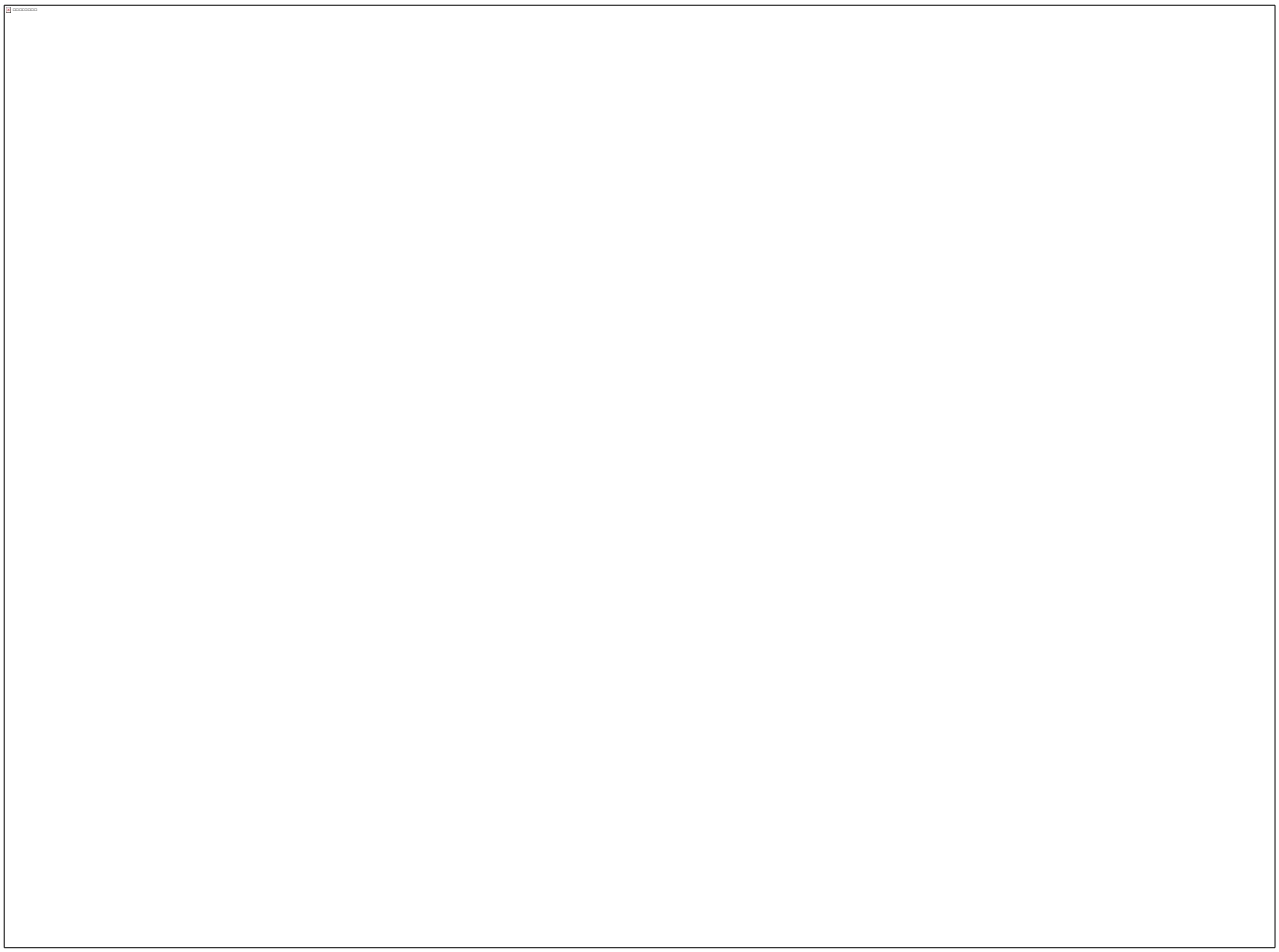

Fig. 2 :Data Analysis Model Using Smartpls 4.0

4.2.3. Average Extracted Variance (AVE)

Table 5 : The Result of Average Extracted Variance (AVE) test

	Average variance extracted (AVE)
AP	0.804
EF	0.748
FS	0.864
PE	0.787
RE	0.764
SC	0.845
US	0.889

From Table 4, the AVE testing results indicate that the square root of Average Extracted Variance (AVE) for each construct is highest more than 0.5. Based on these AVE values, it can be concluded that the constructs in the model meet the validity criteria.

4.2.4. Composite Reliability dan Cronbach's alpha

Table 6: The Result of Composite Reliability dan Cronbach's alpha

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
AP	0.939	0.941	0.953
EF	0.916	0.916	0.937
FS	0.961	0.961	0.970
PE	0.932	0.937	0.948
RE	0.923	0.929	0.942
SC	0.954	0.954	0.965
US	0.969	0.969	0.976

The results from Table 5 show that the testing outcomes for Composite Reliability and Cronbach's alpha indicate values highest more than 0.6. This means all latent variables are reliable. Consequently, it can be stated that the research questionnaire utilized is dependable or consistent. The Adjusted R-Square values for each endogenous variable, namely the EF variable, is 0.791, indicating that the exogenous variables in the model can explain 79.1% of the variance in the EF variable, while the remainder is explained by other variables not included in the research model.

4.3. Inner Model

4.3.1. Adjusted R Square Value (Goodness of Fit).

Table 7 : The Result of Composite Reliability dan Cronbach's alpha

	R-square	R-square adjusted
EF	0.792	0.791

The result of Adjusted R-Square values for each endogenous variable, namely the EF variable, is 0.791, indicating that the exogenous variables in the model can explain 79.1% of the variance in the EF variable, while the remainder is explained by other variables not included in the research model.

4.3.2. Hipotesis Test

Table 8: The Hipotesis Test

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AP -> EF	-0.125	-0.118	0.073	1.709	0.088
FS -> EF	0.073	0.080	0.075	0.979	0.328
PE -> EF	0.668	0.661	0.053	12.566	0.000
RE -> EF	-0.073	-0.069	0.085	0.858	0.391
SC -> EF	0.201	0.188	0.065	3.063	0.002
US -> EF	0.190	0.190	0.070	2.708	0.007

H1: *Application Performance* (*AP*) has a positive impact to Effectiveness. (*EF*).
The hypothesis testing results showed from table 7 that the beta coefficient for AP in relation to EF is -0.125, with a P-value of 0.088 (higher than the alpha value of 0.05). This means that, at the five percent significance level A*pplication Performance* (*AP*) is not significant in relation to Effectiveness. (*EF*). This study is contrast from previous research that Application performance is a critical determinant of user satisfaction. High-performing applications that load quickly, respond promptly, and run smoothly are likely to lead to higher user satisfaction. User satisfaction, in turn, is a key component of perceived effectiveness. When users find an application easy and pleasant to use, they are more likely to consider it effective for their needs. Studies have shown that slow or unresponsive applications can lead to user

frustration, reduced engagement, and ultimately lower effectiveness (Shneiderman, 2016).

H2 : *Functional Suitability (FS)* has a significant positive impact on *Effectiveness (EF)*

The hypothesis testing results showed from table 7 that the beta coefficient for FS in relation to EF is 0.073, with a P-value of 0.328 (greater than the alpha value of 0.05). This means that, at the five percent significance level, *Functional Suitability (FS)* is not significant in relation to Effectiveness. (*EF*). This study it is not in accordance with The previous study that findings highlight that while functional suitability is crucial, it alone does not guarantee overall effectiveness (Rodríguez et al., 2016). Other quality attributes must also be considered to ensure comprehensive software quality. This study underscores the multifaceted nature of software quality assessment, advocating for a holistic approach in evaluating software products.

H3: *Performance Efficiency (PE)* has a positive impact on *Effectiveness (EF).*

The hypothesis testing results showed from table 7 that the beta coefficient for PE in relation to EF is 0.668, with a P-value of 0.000 (less than the alpha value of 0.05). This indicates that the relationship between PE and EF is positive, and at the five percent significance level, Performance Efficiency (PE) is significant in relation to Effectiveness (EF). One notable study found that improving performance efficiency in healthcare systems led to enhanced service delivery and patient outcomes, emphasizing the critical role of efficiency in achieving system effectiveness (Arah et al., 2003) from that previous research in healthcare systems demonstrated that improving performance efficiency led to enhanced service delivery and patient outcomes. Studies on performance management systems in organizations revealed that efficiency improvements directly contributed to overall system effectiveness. Additionally, research on human resource information systems showed that performance efficiency significantly influences organizational effectiveness. These findings collectively highlight the critical role of performance efficiency in enhancing system effectiveness across various sectors.

H4: *Reliability (R)* has a positive impact positive impact on *Effectiveness (EF).*

The hypothesis testing results showed from table 7 that the beta coefficient for RE in relation to EF is -0.073, with a P-value of 0.391 (greater than the alpha value of 0.05). This means that, at the five percent significance level, Reliability (R) is not significant in relation to Effectiveness (EF). The results suggest that while reliability is an important attribute of software applications, it does not significantly influence overall system effectiveness. This finding contrasts with earlier studies (Ghani, et al., 2022) the study was conducted in Malaysia, found that the reliability of the banking system significantly influenced digital banking effectiveness. The findings indicated that alongside perceived usefulness, reliability was a critical factor in determining the effectiveness of digital banking services during the pandemic highlighting the need to reassess the weight given to reliability in relation to effectiveness.

H5: Security (SC) has a positive impact positive impact on Effectiveness (EF)

From Table 7 the hypothesis testing results showed that the beta coefficient for SC in relation to EF is 0.201, with a P-value of 0.002 (less than the alpha value of 0.05). This indicates that the relationship between SC and EF is positive, and at the five percent significance level, Security (SC) is significant in relation to Effectiveness (EF). This study provides compelling evidence that application security (SC) is a significant factor in determining system effectiveness (EF). This indicates that higher levels of application security contribute positively to the overall effectiveness of a system. These findings underscore the critical importance of incorporating robust security measures into application design and development. Ensuring the security of an application not only protects against potential threats but also enhances user confidence and trust, which in turn improves the system's overall effectiveness. The positive beta coefficient suggests that enhancing application security leads to improved system effectiveness. These findings are consistent with previous research (Chi et al., 2017) which has shown that secure applications not only protect against threats but also enhance user trust and satisfaction, thereby increasing effectiveness. The significant P-value confirms that this relationship is not due to random chance.

H6: Usability (U) has a positive impact positive impact on Effectiveness (EF)

From Table 7 , the hypothesis testing results showed that the beta coefficient for US in relation to EF is 0.190, with a P-value of 0.007 (less than the alpha value of 0.05). This indicates that the relationship between US and EF is positive, and at the five percent significance level, Usability (U) is significant in relation to Effectiveness (EF). The positive beta coefficient suggests that improvements in usability are associated with increased system effectiveness. This finding aligns with previous research (Ferreira et al., 2020) reinforcing the notion that user-friendly design enhances system performance and user satisfaction.

5. Conclusion

The study's findings shed light on the significant factors influencing the effectiveness of the Mobile JKN application, as perceived by its users. While performance efficiency, security, and usability emerged as crucial determinants, factors such as application performance, functional suitability, and reliability did not exhibit a significant impact on effectiveness. These results underscore the multi-faceted nature of software quality evaluation and the importance of adopting a holistic approach that considers various quality attributes.

Based on the findings, several recommendations can be made to enhance the effectiveness of the Mobile JKN application. BPJS Kesehatan should prioritize optimizing code performance, reducing load times, and ensuring smooth application functionality under different conditions. Regular monitoring of performance metrics and implementation of improvements based on user feedback and performance data is essential. Furthermore, robust security measures should be incorporated during the design and development phases, with regular updates to security protocols and vulnerability assessments to protect against potential threats. Enhancing security will not only safeguard data but also build user trust and satisfaction, thereby improving overall effectiveness. This study contributes to the understanding of mobile application effectiveness in the healthcare domain by evaluating the influence of various quality attributes derived from the ISO 25010 model. The findings emphasize the importance of a holistic approach to software quality evaluation, considering multiple quality attributes to enhance overall effectiveness. Potential Limitations and Future Research

This study acknowledges several potential limitations. Firstly, the user feedback and data collection might be limited by sample size and demographic diversity, potentially affecting the generalizability of the findings. Future research could address this by incorporating a larger and more diverse sample. Secondly, technological constraints such as variations in device performance and internet connectivity could influence user experiences with the Mobile JKN application. Future studies should consider these factors and explore technical solutions to mitigate their impact. Lastly, the dynamic nature of technology means that continuous updates and improvements to the application could alter user experiences over time. Ongoing research is necessary to keep the evaluation current and relevant.

By addressing these limitations, future research can build on the findings of this study to further enhance the effectiveness and user experience of the Mobile JKN application, contributing to the overall improvement of digital healthcare services in Indonesia.

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