**MEASUREMENT SOFTWARE QUALITY OF**

**APLIKASI PENDATAAN PENDIDIKAN DASAR**

**USED THE ISO / IEC 9126 COMPONENT**

**Febria Sri Handayani1,**

**Prihambodo Hendro Saksono, ST., M.Sc., Ph.D.2 , Afriyudi, M.Kom3**

Software Engineering, Computer Knowledge, The Bina Darma University

Street General Ahmad Yani No.12 Palembang

e-mail: febrish77@gmail.com 1

Software Engineering, Computer Knowledge, The Bina Darma University

Street General Ahmad Yani No.12 Palembang

e-mail : p.h.saksono@mail.binadarma.ac.id 2 , afriyudi@mail.binadarma.ac.id 3

***Keywords:*** *functionality, usability, operability, reliability, efficiency, portability, quality model of ISO/IEC 9126*

**Abstract.** Application software “Aplikasi Pendataan Pendidikan Dasar“ was one of the applications that was drafted to help the data collection activity in the school. This application was provided by Directorate General Basic education of the National Ministry Education free to data process and administrative information of the school. The analysis of the software quality product that was presented in this thesis referred in the external software quality behavior of “Aplikasi Pendataan Pendidikan Dasar” was based on the desktop that was operated by the user in the Junior Secondary School at Palembang City. The grating and the analysis of the software quality used the ISO /IEC 9126 quality model component. Data collection was carried out as the supporting material of the grating activity software quality is based on ISO/IEC 9126 quality model standard in the Functionality, Usability, Operability, Reliability, Efficiency and Portability. Results of the analysis of the quality of this software could be it was hoped made one of the supporting guides of the increase in the quality and efficient use of the software “Aplikasi Pendataan Pendidikan Dasar” for administration of the school.

1. **INTRODUCTION**

In the field of the software engineering, the quality factor was one of the important assessments for continuation of the development project of software. Various sorts of the software product that were produced gave many choices and the price that really beneficial from the side of the user (the user). However from however many choices just a few that gave priority to the problem of the grating of the quality of software

Dunn and Ullman (1982, in Roger Pressman 2002) stated that the "quality Guarantee" of "software was the mapping" of the "managerial rule as well as discipline" of the "design" of the "quality guarantee into technological and managerial space applicable from the software engineering".

The analysis and the grating in the software engineering still be classed as more really compared with the grating in discipline of other knowledge. This was caused by the shortage of knowledge about what will be measured and how the technique was best for evaluated each result of the grating that was gathered. The perspective about the quality of software as results of the grating that was done then evidently still caused many differences from the aspect of the method and the assessment limitation of the quality of software.

Software “Aplikasi Pendataan Pendidikan Dasar” that more often was acknowledged as the “Dikdas” application the version of the school desktop that will be discussed in this research was software that was provided specially and free by the Ministry of Education and Culture through Directorate General Basic Education for the allocation of the period 2012. This application was introduce for all the stage of basic education in Indonesia, beginning with the level of the Primary School, SMP, SMA/SMK government school and Private Enterprise. Especially for the level of the Junior Secondary School (the Junior High School) in the Palembang City territory, the socialization was carried out in May 2012, in the Youth education Service office and sport of Palembang City. This application operation was meant to carry out administrative data collection of the school, beginning with the school data, the educator's data and the educational power, as well as participants data educated.

1. **RESEARCH METHODS**

During this project, we used the following research methods:

* Literature study

A literature study involves reviewing readily available scientific papers related to the research area. We conducted literature study in the areas of Quality, Software Quality Models and Product Software.

* Conducting survey

This method had several parts:

1. Designing a questionnaire required for executing structure interviews.
2. Personal interview with respondent.
3. Score calculation of questionnaire
4. Analysis of the survey.

 In this report, I used five between six ISO 9126 characteristics and the sub-characteristics that were matched with the real situation. Five of these characteristics referred in the external treatment of software of the user. This also in accordance with the reference of the research journal beforehand.

1. **PRODUCT SOFTWARE**

The ISO/IEC 9126 gave the definition about software, that is:

***Software product*** *is the set of computer programs, procedures, and possibly associated documentation and data.*

According to Xu Lai and Sjaak Brinkkemper in Gregor Panovski research thesis (2008):

***Product Software*** *is defined as a packaged configuration of software components or a software-based service, with auxiliary materials, which is released for and traded in a specific market*.

1. **SOFTWARE QUALITY**

 The quality research of software (software quality) was the hereditary research in the history of knowledge of the software engineering (software engineering). The study was begun from concerning in the object that will be measured (the process or the product), how could software be measured, how the gauge point of view and how determined the grating parameter of the quality of software.

 Roger Pressman (2002:223) in his book defined the quality of software as specification participation of the design (conformation) towards the functional requirement that was documented explicitly, and the implicit characteristics that were hoped for all software that was developed professionally.

****

Figure 1 : Software Quality Measurement

1. **SOFTWARE QUALITY MODEL**

 Several forms of the quality model of software that once introduce among them McCall (McCall et al, 1997), Boehm (Boehm et al, 1978), FURPS (Grady and Caswell, 1987), Dromey (Dromey, 1996) and the ISO 9126 (the ISO/IEC Is 9126, 1991). Where from the five quality models of only ISO quality models 9126 that finally had been agreed to together internationally to be used as the analysis reference of the quality of software because several characteristics of the quality model that was introduced beforehand have been included in the characteristics of the ISO quality model/IEC 9126.

1. **APPLICATION SOFTWARE OF APLIKASI PENDATAAN PENDIDIKAN DASAR (THE APPLICATION OF DATA COLLECTION DIKDAS) THE VERSION OF THE SCHOOL DESKTOP**

Application software Aplikasi Pendataan Pendidikan Dasar distributed and introduced by the Ministry of Education and Culture (KemDikBud) the Republic of Indonesia for the allocation of Aplikasi Pendataan Pendidikan Dasar all over Indonesia. The procurement of this application was one of the efforts to develop the potential for the world of education in the information technology field and facilitate the administrative activity of the school on the whole good administration of the student, the educator and the educational power, as well as administration of means and the infrastructure of the school.

 This Aplikasi Pendataan Pendidikan Dasar system was designed to be able to be used in various platforms system any operation (Windows, Linux, Unix, Apple, et cetera). The application of this data collection enabled the good school in an online manner or offline to do input the data from the form and sent him in an online manner and through file. Application software Aplikasi Pendataan Pendidikan Dasar this took the form of the application of the database that could be applied with the type of standalone installation that was used for the computer that not connected in the network of the computer. For the sending file that has in input in the application was carried out in the online condition that connected in the network of the computer between the school computer and the computer server (good that in the Office education, the young man and Palembang City sport or Directorate General's office in Jakarta), inside already including the application of the database and several fitur the Aplikasi Pendataan Pendidikan Dasar that eventually can be chosen personally by the user.

1. **ISO / IEC 9126**

 International Organization for Standardization (the ISO)/International Electro technical Commission (IEC) 9126 were the first time introduced during 1991, was published during 2001 in Geneva, Switzerland. The ISO/IEC 9126 was the international standard that was used to evaluate the quality of software. The basic aim of this standard was to overcome several perception rays from a development project of software, the ray that was meant to cover the change in the priority after the commencement of the project or did not have the definition that was clear about the understanding of the aim of the development project of software.

 The ISO/IEC 9126-1 quality models of software had six characteristics of the main quality, that is:



Figure 2 : External and Internal Metrics of ISO/IEC 9126

 From six characteristics of the quality model of software in the ISO/IEC 9126, the researcher only used 2 (two) the characteristics with the priority in the interests/the highest requirement together with 3 (three) the other characteristics were based on the research beforehand that was carried out by Dipl. Ing. Gregor Panovski could be among them depicted in the table along with;

Table 1 : Characteristics and Sub-characteristics of ISO/IEC 9126

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Characteristics** | **Sub Characteristics** | **Atribute** | **Source** |
| ISO/IEC 9126QualityModel | Functionality | Suitability | The availability of facilities to rectify the mistake put the data | Gregor Panovski (2008) |
| The existence of the type file other that was made supporting means of putting the data. | Panovski (2008)&Ariawan(2007) |
| Accuracy | The existence of compatibility between the data that was put and the data that was kept | Panovski (2008)&Ariawan(2007) |
| Usability | Understand-ability | The understanding layout by the user | Panovski (2008)&Ariawan(2007) |
| Learnability | User's Handbook (User Manual Book) | Panovski (2008)&Ariawan(2007) |
| Operability  | Software operation by the users | Panovski (2008)&Ariawan(2007) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Characteristics** | **Sub Characteristics** | **Atribute** | **Source** |
| ISO/IEC 9126QualityModel | Reliability | Recover-ability | The existence of the operational mistake warning software | Panovski (2008)&Ariawan(2007) |
| The ease of the Identification of the cause of the failure/the software mistake. |
| The ease of the improvement of the mistake put the data in software. |
| Efficiency | Time Behavior | Time that was needed for the execution of the function/operational the software system (activated the application, and closed the application). | Panovski (2008)&Ariawan(2007) |
| Resource Utilization | The availability of the requirement for the specification of hardware.  | Panovski (2008)&Ariawan(2007) |
| Portability | Install ability | The ease of the fitting/the software installation. | Panovski (2008)&Ariawan(2007) |
| Replace ability | Upgrade software (the ease and the availability of the source) | Panovski (2008) |

1. **THE FRAMEWORK OF THE RESEARCH**

**Implementation**

**Application**

**THE GRATING**

**SOFTWARE QUALITY**

THE RESULTS ANALYSIS OF THE QUALITY SOFTWARE APPLICATION APLIKASI PENDATAAN PENDIDIKAN DASAR

**ISO/IEC 9126 Quality Model**

***FUNCTIONALITY***

* ***Suitability***
* ***Accuracy***

***USABILITY***

* ***Understability***
* ***Learnability***
* ***Operability***

***EFFICIENCY***

* ***Time Behavior***
* ***Resource Utilization***

***RELIABILITY***

* ***Recoverability***

***PORTABILITY***

* ***Instal ability***
* ***Replace ability***
1. the Frequency of the software response to the mistake input the data by the user who caused the invalid's data.
2. Software enabled the user to carry out the correction towards the mistake that was acknowledged by software
3. The understanding layout software through the use tools/tab the page of the module.
4. The Use of the guidebook for the user of software**.**
5. Software Operation by the users.

Figure 3: The framework of the research

1. **MEASUREMENT SOFTWARE QUALITY OF APLIKASI PENDATAAN PENDIDIKAN DASAR**

There are 6 steps in measurement quality, that is :

1. The determination of the quality model and the quality criterion of software.
2. The determination of the question that in accordance with the quality criterion of software.
3. The determination of the score of the choice of the answer for each question in the questionnaire.
4. The calculation of the total score of each question from all over the respondent.
5. Counted the number of highest scores from each one item the respondent's answer.
6. The determination of the interpretation produced by the calculation of the score.

 The calculation of the frequency and the percentage of the answer from the respondent then could be counted by us used steps in the distribution of the frequency used SPSS 16,0.

 Was based on results survey, then was obtained by the distribution of the frequency of the questionnaire answer from the respondent as follows:

Table 2: The frequency distribution of the respondent’s answer

|  |  |
| --- | --- |
| **Metric** | **Frequency** |
| **A. *Functionality*** | **STS****(%)** | **TS****(%)** | **S****(%)** | **SS****(%)** |
| **1.** | ***Suitabilty*** |
|  | * 1. Did this software provide various aids for you rectified the mistake that happened?
 | 1(7,7) | 6(46,2) | 4(30,8) | 2(15,4) |
|  | * 1. According to you, these aids facilitated you to rectify the mistake that happened?
 | 1(7,7) | 3(23,1) | 7(53,8) | 2(15,4) |
|  | * 1. All the data that was kept in the Application could be converted in the different format application?
 | 0(0) | 2(15,4) | 10(76,9) | 1(7,7) |
|  | * 1. You often experienced the difficulty in the process of the data conversion in this Application in the different format application?
 | 1(7,7) | 0(0) | 7(53,8) | 5(38,5) |
| **2.** | ***Accuracy*** |  |
|  | * 1. Often happened inappropriate between the data that was put and the data that was kept in this Application?
 | 3(23,1) | 3(23,1) | 2(15,4) | 5(38,5) |

|  |  |
| --- | --- |
| **Metric** | **Frequency** |
| **B. *Usability*** | **STS****(%)** | **TS****(%)** | **S****(%)** | **SS****(%)** |
| **1.** | ***Understandability*** |
|  | * 1. According to you, the preview in this Application software was easy to be understood?
 | 0(0) | 3(23,1) | 7(53,8) | 3(23,1) |
|  | * 1. According to you, the function from each switch and tab the page of this Application was easy to be understood?
 | 1(7,7) | 2(15,4) | 9(69,2) | 1(7,7) |
| **2.** | ***Learnability*** |  |
|  | * 1. According to you, the use escort of this Application was complete?
 | 0(0) | 9(69,2) | 3(23,1) | 1(7,7) |
|  | * 1. According to you, the use escort of this software found it easy to be studied?
 | 1(7,7) | 12(92,3) | 0(0) | 0(0) |
|  | * 1. According to you, the use escort of this application helped you in using this software?
 | 0(0) | 0(0) | 7(53,8) | 6(46,2) |
| **3.** | ***Operability*** |  |  |  |  |
|  | 1. In the use of this Application, you often experienced the difficulty?
 | 0(0) | 2(15,4) | 7(53,8) | 4(30,8) |
|  | 1. According to you, this application was easy to be used although you did not have the background of the expertise in the computer field?
 | 0(0) | 7(53,8) | 6(46,2) | 0(0) |

|  |  |
| --- | --- |
| **Metric** | **Frequency** |
| **C. *Reliability*** | **STS****(%)** | **TS****(%)** | **S****(%)** | **SS****(%)** |
| **1.** | ***Recoverability*** |
|  | * 1. Did this software always give the warning every time the mistake happened put the data?
 | 0(0) | 1(7,7) | 8(61,5) | 4(30,8) |
|  | * 1. According to you, when software experienced the failure, the main cause of the failure or the mistake could be identified easily?
 | 1(7,7) | 6(46,2) | 5(38,5) | 1(7,7) |
|  | * 1. According to you, you could edit data easily when carrying out the mistake put the data?
 | 1(7,7) | 6(46,2) | 3(23,1) | 3(23,1) |
| **D. *Efficiency*** |  |
| **1.** | ***Time Behavior*** |  |
|  | * 1. How many was time that was needed to activate this Application old?
 | 0(0) | 0(0) | 5(38,5) | 8(61,5) |
|  | * 1. How many was time that was needed to close this Application?
 | 0(0) | 1(7,7) | 4(30,8) | 8(61,5) |
| **2.** | ***Resource Utilization*** |  |  |  |  |
|  | * 1. Software that was used by you needed the specification of computer hardware that was difficult to be filled?
 | 1(7,7) | 6(46,2) | 4(30,8) | 2(15,4) |
|  | * 1. Software that was used by you needed the specification of software (the system) that had difficulty being filled?
 | 3(23,1) | 0(0) | 10(76,9) | 0(0) |

|  |  |
| --- | --- |
| **Metric** | **Frequency** |
| **E. *Portability*** | **STS****(%)** | **TS****(%)** | **S****(%)** | **SS****(%)** |
| **1.** | ***Install ability*** |
|  | * 1. Software that was used could in the pair easily in your computer?
 | 0(0) | 0(0) | 10(76,9) | 3(23,1) |
| **2.** | ***Replace ability*** |  |
|  | * 1. According to you, version reform of this application was easy to be carried out?
 | 1(7,7) | 4(30,8) | 6(46,2) | 2(15,4) |
|  | * 1. The source for version reform of this application was easy to access?
 | 0(0) | 3(23,1) | 8(61,5) | 2(15,4) |
|  | * 1. The application file of the new version that just was easy to be obtained/download?
 | 0(0) | 2(15,4) | 8(61,5) | 3(23,1) |

From the result, we can saw that :

1. Totally 6 respondent (46.2%) did not agree that this application gave various aids to rectify the mistake put data. but 7 respondents (53.8%) said agreed that facilities or these aids facilitated them did put the data in this application, although possibly aids that were meant to be not too complete.
2. Totally 10 respondents (76.9%) agreed that this application had supporting means of taking the form of the other file type to put the data. But 7 respondents (53.8%) said agreed that they often experienced the difficulty of carrying out the process of the conversion (the export/the import) data in this application the other format.
3. Totally 5 respondents (38.5%) said really agreed that they often experienced the existence of the difference between the data that was put and the data that was kept. But 3 respondents (23.1%) stated that they rarely experienced this difference. This happened because of the existence the difference of knowledge and the expertise in the process of the data storage in this application.
4. Totally 7 respondents (53.85%) said agreed that software layout was easy to be understood. Totally 9 respondents (69.23%) said that the function from each switch or tab the page in software layout also was easy to be understood.
5. Although totally 9 respondents (69.2%) said did not agree if the use escort of this application was complete, but 7 respondents (53.8%) said agreed that the use escort of this application really helped and 12 respondents (92.3%) said agreed that the use escort of this application found it easy to be studied.
6. Totally 7 respondents (53.8%) agreed that they were enough to experience the difficulty in the use of this application was caused was not yet used to it. But 7 respondents (53.8%) also said did not agree if this application it was said was easy to be used although not having the background of the expertise in the computer field.
7. The majority 8 respondents (61.5%) said agreed that this application always gave the warning every time the mistake happened put the data. Totally 6 respondents (46.2%) could not know the main cause of the application failure could be identified easily and they could not improve the data was put easily when carrying out the mistake put the data.
8. Totally 8 respondents (61.5%) estimated time to activate and close this application between range 0-3 minutes. This also depended on the quality of the hardware specification that was used to each school.
9. Totally 6 respondents (46.2%) did not agree if fulfillment efforts of the requirement hardware specification for this application were difficult to be filled, because respectively the school had the hardware specification on the minimal requirement for the application.
10. Totally 10 respondents (76.9%) agreed that the application of this data collection of basic education could be install easily in each Personal Computer (PC) and Notebook that was had by the school side.
11. Totally 6 respondents (46.2%) agreed that version reform of the application was easy to be carried out. 8 respondents (61.5%) said agreed that the source of application reform was easy to be accessed, so also with efforts to get file the application of the new version then was easy to be carried out by 8 respondents (61.5%).
12. **CONCLUSION**

**BIBLIOGRAPHY**

[1] Al-Qutaish, Rafa E. 2010. “*Quality Models in Software Engineering Literature: An Analytical and Comparative Study*”, Journal of American Science, June 2010. (online), ([http://www.jofamericanscience.org/journals/am-sci/am0603/22\_2208\_ Qutaish\_am0603\_166\_175.pdf](http://www.jofamericanscience.org/journals/am-sci/am0603/22_2208_%20Qutaish_am0603_166_175.pdf).

[2] Ariawan, Yudi. 2007. *Analisis Penerapan Software Engineering Quality Assurance (SQA), Studi Kasus : Indonesia*. (online),

 (http://garuda.kemdikbud.go.id/jurnal/detil/id/0:197648/q/iso%209126/offset/0/limit/1, diakses 17 Mei 2012). Jakarta: FASILKOM UI JAKARTA.

[3] Fransisca L., Ledis C., Nicole L., dan Amar Ramdane C. 2003. *Quality Characteristics for Software Architecture*. Journal of Object Technology Vol.2 No. 2, March-April 2003. Publish by ETH Zurich, Chair of Software Engineering. Zurich.

[4] Jung, Ho-Won., Kim, Seung-Gweon., dan Chung, Chang-Shin. 2004. *Measuring Software Product Quality : A Survey of ISO/IEC 9126*. Publish by IEEE Computer Society. [www.computer.org/publication/dlib](http://www.computer.org/publication/dlib). Korea.

[5] Maryono dan Septiyantono, Tri. 2008 “*Kualitas Subyektif Sipus V3 dan Informasi keluarannya Sebagai Pendukung Keputusan*”, Berkala Ilmu Perpustakaan dan Informasi Vol. IV Nomor 2, 2008. (online),

 <http://eprints.rclis.org/bitstream/10760/13112/The_Subjective_Quality_of_Sipus_V3_Software_and_its_Information_Output_as_a_Support_for_Decision_making.pdf>

[6] Panovski, G. 2008. “*Product Software Quality”*. Master’s Thesis. Eindhoven University. The Netherland, (Online),

 [http://www.cs.ru.nl/ ~marko/onderwijs/](http://www.cs.ru.nl/%20~marko/onderwijs/)masterscripties/GregorPanovskiThesis.pdf

[7] Pressman, Roger, S. 1997. *Software Engineering : A Practitioner’s Approach*. Terjemahan oleh LN Harnaningrum. 2002. Yogyakarta:Andi.

[8] Satria W., Romi. 2006. *Teknik Pengukuran Kualitas Perangkat Lunak*. (online), <http://romisatriawahono.net/2006/06/05/teknik-pengukuran-kualitas-perangkat-lunak/>

[9] Satria W., Romi. 2007. *Industri Software Lokal : Kualitas dan Peluang*. Makalah disajikan dalam Seminar Nasional *The Development of Software Project in Indonesia*, STT PLN, Jakarta, 12 Maret 2007.

[10] Zeiss B., Vega D., Schieferdecker I., Neukirchen H., dan Grabowski J., 2007. “*Applying the ISO 9126 Quality Model to Test Spesifications-Exceplified for TTCN-3 Test Spesifications*”. Software Engineering 2007 (SE2007). Lecture Notes in Informatics (LNI). 105, Kollen Verlag, Bonn.