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SOFTWARE QUALITY ASSESSMENT ON TWO DIMENSIONAL VECTOR PROCESSOR DOMAIN SOFTWARE

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ABSTRACT

Among the alternatives software for software users is the open source software. However, now the number of open source software offers the same functional and overlapping with the lack of criteria that are objective makes the selection of specific software to be difficult for users of the two-dimensional vector processing software, especially designers. Quality assessment software uses a model of quality is one way out to find out how software quality abut two-dimensional vector processing software. Quality models used to assess software in this research is the model of ISO / IEC 9126 as a model of international standard in the assessment of software quality. For the result of the assessment of software quality in the software domain two-dimensional vector processing software on the characteristics of external quality assessment and quality in use is 0.7296 to scale [0.1] and the category is medium.

Keyword : Software Quality, Two-dimensional Vector Processing Software, ISO Model, Quality in Use

1. INTRODUCTION

Software quality is the degree to which a system, component, or process to meet user needs or expectations of users [1]. Armand Vallin Feigenbaum explained the point of view of the quality that "Quality is the user's decision, not the decision part of a technician, not a marketing decision, nor is it part of management decisions. It is based on the actual experience of users with products and services, measured against the requirements, expressed or not expressed, consciously or merely perceived, technically operational or entirely subjective, and always represent a moving target in a competitive market [2]. "

1.1 Software Measurement

Measurement in software engineering has many relationships by providing a numerical value calculations on the attributes of a software product or software process [3]. Measurement software can be used by comparing the measurement values with other software or with a standard that has been approved and is applicable throughout the organization so that, to obtain a conclusion regarding about the software quality. For the measurement there are two ways that can be used are:

1. Making the general predictions about the system.
   By measuring the characteristics of the system components and then combining these measurements, the general estimates can be obtained from several attributes of the system as the number of errors in the system.
2. Identify the components of the anomaly.
   Measurements can identify the individual components whose characteristics deviate from some norm. Like measuring components to find characteristics that have the highest complexity, and assume these characteristics tend to have more mistakes, focus on this component during the examination process [3].

1.2 Software Metrics

Metric is a measurement scale and the method used for measurement [4]. So in this study will be used metric for measurement terms. According to Ian Sommervile, product metrics are metrics that focus to the characteristics of the software itself [3]. The relationship of the characteristics and attributes of software quality can vary depending on the process of development, the technology and the type of system software itself. Product metrics can be divided into two classes, namely:

1. *Dynamic metrics*
   Metrics are obtained by measurements made when the program is executed. Dynamic metrics help to assess the efficiency and reliability of the software. Dynamic metric is usually quite closely related to software quality attributes. Easy enough to measure the time required for the execution of certain functions and to assess the time required to start the system. This is directly related to the efficiency

of the system. Similarly, the amount of system failure and type of failure can be determined and is directly related to the reliability of the software

2. *Static metrics*
   Static metric obtained by measurements made in the representation of the design of such systems, programs or documentation. Static metrics help assess complexity, understandability and maintainability of software systems. Static metrics, on the other hand, has a direct relationship with quality attributes. A large number of these metrics have been proposed, and many experiments have been tried to reduce and validate the relationship between these metrics with complexity, understandability and maintainability [3].

1.3 Two Dimensional Vector Processor

Vector image or vector graphics are digital images based on mathematical equations. Vector images consist of merging the coordinates of the point into a line or curve to then become an object, so that the image is not be broken even if enlarged or reduced. Vector images generally have a smaller size when compared with a bitmap image. Some of them vector image format SVG, EPS, and CDR. One of the software used to design with vector-based images are two-dimensional Inkscape, a two dimension open source vector processing software. Software open source software in addition to licensed free, also has a broad scope of users, because for using open source software is cost savings, software time to market fast and high quality software [5].

1.4 Software Quality Assessment Model

One of software quality assessment models that can be used is model of ISO / IEC 9126. Model ISO / IEC 9126 used in this study is revised and improved from previous models such as ISO / IEC 9126 (1991). Model ISO / IEC 9126 consists into two main parts: the first internal quality, external quality and the second is the quality in use. Relations between the inside of this model is to have a relationship that is sequential in which the quality of products has contributed in improving quality in use on the software, as well as the evaluation of the attributes in quality in use can provide leverage to improve the quality of a software product, while the evaluation of a product device software will produce the effect of improving the quality of software processes. Diagram illustrating the model of the ISO / IEC 9126 contained in Figure 1 [6].



Figure 1. Quality model diagram ISO/IEC 9126

1.5 Software Quality Assessment Method

The method of measurement used to measure the value of software quality is the external quality metrics and quality in use models that exist in ISO / IEC 9126. Chart of quality in use contained in Figure
2.



Figure 2. Quality in use diagram ISO/IEC 9126

2. ANALYSIS

2.1 Analysis of Two Dimensional Vector Processing Software

Two dimensional vector processing software criteria has that is not much different criteria because users have the same core goals in spite of the various features provided from any vendor that is how the process or designing a vector-based graphics in the form of two-dimensional. The software Inkscape that in the current analysis focused on software with functionality that is needed by the user. As for some of the criteria contained in the software processing two-dimensional vector includes:

1. The ability to create and manipulate objects of SVG
   In creating and manipulating objects, completeness and accuracy of the software to process SVG need to be considered.
2. Filtering
   Filtering is an effect that consists of a series of graphics operations that are applied to the source of the graphics to generate graphics that have been modified, the results of the filter effect is given to the graphical target instead of the original graphic source.
3. Layering
   Layer is a type of object groups in SVG documents. Show like slices are stacked or

images that can be stacked, arranged, added and removed.

4. Extension
.Extension feature is related to the ability of the software to interact with the software or systems from ouside.

2.2 Analysis of Software Quality Characteristics At Two Dimensional Vector Processor Domain Software

Mapping of criterion two dimensional vector processor domain software in order to determine the relationship of the model quality assessment with the software that is being analyzed and obtained information on the characteristics and sub-characteristics of software quality. Where appropriate to be used as a basis for assessing the quality of the software , In addition the number of criteria related to software quality characteristics determine how much dominance against software quality criteria in this study. Here is the result of mapping the form linkages between the two dimensional vector processor domain software with ISO / IEC 9126:

Table 1. Correlation Software Criteria With External Quality Software Model ISO / IEC 9126

Quality characteristic	Qualiy sub-characteristic	Software criteria					
		create and manipulate objects of SVG	*Filtering*	*Layering*	*Extension*	*Rendering*	Interfacea
Functionality	*Suitability*	✓	✓	✓	✓	✓	✓
	Accuracy	✓	✓			✓	✓
	Interoperability				✓		
	Security						
Reliability	*Maturity*	✓	✓			✓	✓
	Fault Tolerance	✓	✓		✓	✓	
	Recoverability	✓	✓		✓	✓	
Usability	*Understandability*	✓	✓	✓	✓		✓
	Learnability	✓	✓	✓	✓		✓
	Operability	✓	✓	✓	✓		✓
	Attractiveness		✓		✓		✓
Efficiency	*Time Behaviour*	✓	✓	✓	✓	✓	✓
	Resource Utilization	✓	✓	✓	✓	✓	✓
Maintainability	*Analyzability*						
	Changeability	✓			✓		
	Stability						
	Testability						
Portability	*Adaptability*	✓	✓	✓	✓	✓	✓
	Installability						
	Co-existence						
	Replaceability						

2.3 Analysis of Software Quality Metrics In two Dimensional Vector Processor Domain Software

Analysis of sub-characteristic software quality characteristics in two dimensional vector processor domain software in order to determine the appropriate calculation method in measuring the quality of each sub-characteristics associated predominantly with two dimensional vector processor software. In measuring software, used specific metrics as a way to obtain quantitative values that result will be converted into a qualitative value of software measurement results as a benchmark of how the quality of the software itself. External metrics are used in the model ISO 9126 can be seen in Table 2 below:

Table I2. Correlation between ISO/IEC 9126 Metric With Quality Characteristic

Quality characteristic	Qualiy sub-characteristic	Extternal metrics
Functionality	*Suitability*	*Functional implementation completeness*
	Accuracy	*Computational Accuracy*
	Interoperability	*Data exchangeability (User's success attempt based)*
Reliability	*Maturity*	*Mean time between failures (MTBF)*
	Fault Tolerance	*Breakdown avoidance*
	Recoverability	*Availability*
Usability	*Understandability*	*Completeness of description*
	Learnability	*Ease of function learning*
	Operability	*Operational consistency in use*
	Attractiveness	*Attractive interaction*
Efficiency	*Time Behaviour*	*Response time*
	Resource Utilization	*Ratio memory error/time*
Maintainability	*Changeability*	*Parameterised modifiability*
Adaptability	*Porting user friendliness*	*Adaptability*

2.4 Analysis Software Measurement

To determine the quality of the software, in viewpoint as end-users and software as a specific product needs to be done through metrics calculation in accordance with the criteria of the software. The calculation result will generate value metrics with different scales depending on the calculation method of the metric itself. Phase steps done in quality measurement using the weighting is in Figure 3.

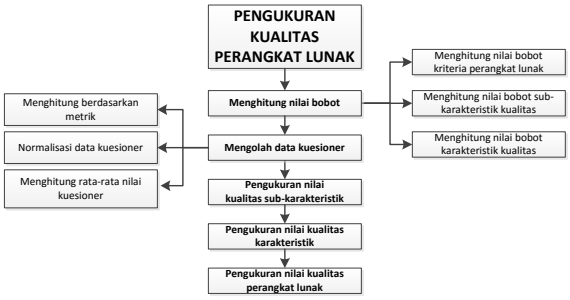


Figure 3. Phase Software Quality Measurement

1. Perform calculations to obtain weighting criteria software
2. Perform calculations to get the weight of sub-quality characteristics
3. Perform calculations to obtain weighting characteristics quality
4. Perform calculations using metrics in accordance with sub-quality characteristics
5. Normalized value metrics calculation results in a questionnaire in order to have scale and can be measured
6. Perform calculations questionnaire to get the average value of each sub-characteristics
7. To measure the value of quality sub-characteristics of the external quality using weighted summation method (WSum)
8. To measure the value of the quality characteristics of the external quality and quality in use using the weighted summation (WSum)
9. The calculation of the value of total quality of the software using a weighted summation (WSum).

2.4.1 Rank Order Centroid (ROC)

Rank order centroid (ROC) is a method used by providing a number of component weights ranked by the interests of those components [12]. This method takes an interest in the rank of each component as input and convert it into weights for each components. This rule explains that "one more important component of component 2, which is more important than the component 3" and next to the n-th component. In mathematical formulas can be described as follows:

if

$$C_{o1} \geq C_{o2} \geq C_{o3} \geq \ldots \geq C_{on}$$

then

$$W_1 \geq W_2 \geq W_3 \geq \ldots \geq W_n$$

Next, if n is the number of components, then

$$W_1 = \frac{1+\frac{1}{2}+\frac{1}{3}+\cdots+1/j}{n}$$

$$W_2 = \frac{0+\frac{1}{2}+\frac{1}{3}+\cdots+1/j}{n}$$

$$W_3 = \frac{0+0+\frac{1}{3}+\cdots+1/j}{n}$$

$$W_i = \frac{0+\cdots+1/j}{n} \quad [17]$$

[8]

Conversion based on this formula:

$$w_i = (1/n)\sum_{j=i}^{n}\frac{1}{j}, \quad i = 1, \ldots, n. \qquad (1)$$

Where:

n = numbers of component

wi = weight for-*i* component [7]

2.4.1 *Weighted Summation* (WSum)

Weighted summation is a method of compensation, which can be used to calculate the value of the metric with a low score can be compensated with the criteria with a high score in order to obtain a clear qualitative comparison value. This method is a special form of Muti Attribute Value Theory (MAVT) and is also called a linear additive model [9]. The formula of this method is as follows:

$$score(a_j) = \sum_{i=1}^{N} w_i v_{ij} \qquad (2)$$

$$score(c_i) = \sum_{i}^{N} wi.vi$$

$$score\ (c_i) = w_1v_i + w_2v_2 + \ldots.. w_nv_n \text{ (i) [9]}$$

Where :

N : numbers of sub-characteristic

v_i : Quality value (X) on i sub-characteristic

score c_i : characteristic quality value c_i ($0 \leq$ score $c_i \leq 1$)

w_i : characteristic c_i weight

Results of this calculation are the values the quality of each stage there ranging from sub-characteristics until the final quality assessment software.

2.5 Formation of Two Dimensional Vector Processor Domain Software Quality

To scale the final assessment on the quality of the software used three quality categories, namely:

-Superior

-Medium

-Lower

Where the explanation as follows:

Superior level, is a software product must have a conformity to specification requirements that have been determined at least 80%. This means getting value for the range of 100 to 80, on a scale of 0 to 100.

Medium level, is a software product must agree at least 50% of the specification of requirements that have been determined. This means the values obtained range from 80 to 50 on a scale of 0 to 100.

Lower lever, software products have compatibility only from the range of 50 to 0, which represents poor quality.

The level of quality can be described in the following figure:

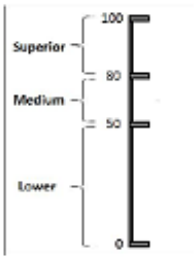


Figure 4. Quality level software [10]

For adjustment scale with the quality level of this research, the conversion is done on a scale of 0 to 100 to 0 to 1.

3. IMPLEMENTATION

3.1 Weight Calculation

3.1.1 Software Weight Calculation

To determine the value of the weight on the criterion of software seen on the level of importance of these criteria is based on the number of links with the sub-characteristic of external quality characteristics that exist in the quality assessment model. Weight value using ROC calculation is as follows:

Table II3. Software Criteria Weight

Software criteria *n*=6	Criteria weight
Create and manipulate objects of SVG	$\frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.408$
Filtering	$\frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.241$
Extension	$\frac{0+0+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.158$
User interface	$\frac{0+0+0+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.104$
Rendering	$\frac{0+0+0+0+\frac{1}{5}+\frac{1}{6}}{6} = 0.061$
Layering	$\frac{0+0+0+0+0+\frac{1}{6}}{6} = 0.028$

3.1.2 Software Quality Sub-characteristics Weight Calculation

To determine the value of the weight on the criterion of software seen on the level of importance of these criteria is based on the number of links with the sub-criteria of external quality characteristics that exist in the quality assessment model has didapatakan weight value using ROC calculation is as follows:

Table 4. Quality Sub-characteristics Weighting

Quality characteristic	**Quality sub-characteristics**	**Sub-characteristics weight**
Functionality	*Suitability*	$\frac{1+\frac{1}{2}+\frac{1}{3}}{3} = 0.61$
n = 3	*Accuracy*	$\frac{0+\frac{1}{2}+\frac{1}{3}}{3} = 0.277$
	Interoperability	$\frac{0+0+\frac{1}{3}}{3} = 0.11$
Reliability *n* = 3	*Maturity*	$\frac{1+\frac{1}{2}+\frac{1}{3}}{3} = 0.61$
	Fault Tolerance	$\frac{0+\frac{1}{2}+\frac{1}{3}}{3} = 0.277$
	Recoverability	$\frac{0+0+\frac{1}{3}}{3} = 0.11$
Usability *n* = 4	*Understandability*	$\frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{4} = 0.52$
	Learnability	$\frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{4} = 0.27$
	Operability	$\frac{0+0+\frac{1}{3}+\frac{1}{4}}{4} = 0.145$
	Attractiveness	$\frac{0+0+0+\frac{1}{4}}{4} = 0.062$
Efficiency *n* = 2	*Time Behaviour*	$\frac{1+\frac{1}{2}}{2} = 0.75$
	Resource Utilization	$\frac{0+\frac{1}{2}}{2} = 0.25$
Maintainability *n* = 1	*Changeability*	1
Portability *n* = 1	*Adaptability*	1

3.1.3 Software Quality Characteristics Weight Calculation

To determine the value of the weight on the characteristics determined by the level of importance of quality characteristics that can be seen from the number of sub-quality characteristics of each quality characteristic. Weight value using ROC calculation is as follows:

Tabel 5. Pembobotan Karakteristik Kualitas

Quality characteristic n=6	**Characteristics weight**
Functionality	$\frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.408$
Usability	$\frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.241$
Reliability	$\frac{0+0+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.158$
Efficiency	$\frac{0+0+0+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.103$
Portability	$\frac{0+0+0+0+\frac{1}{5}+\frac{1}{6}}{6} = 0.061$
Maintainability	$\frac{0+0+0+0+0+\frac{1}{6}}{6} = 0.028$

3.2 Calculation Questionnaire Value Using Metrics

3.2.1 Calculation Questionnaire Value Using External Metrics

At this stage, the calculations using metrics on external quality model of ISO / IEC 9126. Sub-quality characteristics will be calculated at this stage is a sub-characteristics that have relevance to the software, the total number of sub-characteristics used for quality assessment tools two dimensional vector processor domain software is a total of 14 sub-quality characteristics. The data is the data obtained from the results of the questionnaires by 30 respondents. One of the sub-calculations on suitability characteristics are as follows:

Suitability

Because the metrics used for the calculation of suitability is *Functional implementation completeness* then using the following formula:

X = 1-A/B (3)

Range answers on the questionnaire form of the number of functions (A) with a value from 0 to 18. Value B directly can be obtained from the maximum limit value of the range of options given that 18 other words B is a supreme value. It will directly generate value with scale [0,1]. So that normalization is not necessary anymore as an adjustment scale.

Minimum value case A=0, B=18

X = 1-A/B

X = 1-0/18

X = 1

Maximum value case A=18, B=18

X = 1-A/B

X = 1-18/18

X = 0

The minimum value range A = 0 produces metric value X = 1 and the maximum value of A = 18 generates metric value X = 0. With the condition value closer to 1.0 the better fit to the range [0,1].

Here are the results of calculations using the following metrics are averaged by the number of 30 respondents in the sub-quality characteristics.

Table 6. Numbers of Quality sub-characteristic metric value

Quality sub-characteristics	Numbers value using metric
Suitability	24.89
Accuracy	5.20
Interoperability	20
Maturity	19.19
Fault Tolerance	23.90
Recoverability	16.28
Understandability	15.44
Learnability	10.80
Operability	25.06
Attractiveness	22.70
Time Behaviour	9.40
Resource Utilization	6.80
Changeability	8.70
Adaptability	2.95

3.2.2 Calculation Questionnaire Value Using Quality in Use

At this stage, the calculations using quality in use metrics model of ISO / IEC 9126. Criteria for the software that will be calculated at this stage is criteria software that has been linked to the quality characteristics of software quality in use is satisfaction, the overall number of criteria software used for the assessment of software quality two-dimensional vector processors are software amounted to 6 criteria.

One calculation criteria SVG create and manipulate objects is as follows:

Create and manipulate objects SVGMetrik

which is used to create and manipulate objects assessment SVG is to assess the level of user satisfaction on criteria such software. Because the metrics used for the calculation of satisfaction *Satisfaction questionnaire* was then using the following equation:

X = ∑(Ai)/n (4)

The level of satisfaction with the response range of criteria to create and manipulate objects SVG (A) with a value from 0 to 10. Value B directly can be obtained from the maximum limit value of the range of options given that 10 other words B is a supreme value. For a number of respondents (n) is 30. In order to obtain a value corresponding to a rating scale that is [0,1], the first to be normalized by dividing the value of a questionnaire with 10 in the followingformula:

$$\tilde{x} = \frac{x - l}{u - l} \quad (5)$$

where:

$\tilde{x}$ = Value on [0,1] scale

x = Vlaue that will be normaized

l = Minimum Value that will be normalized

u = Maximum Value that will be normalized [13]

then:

X = A/B

- Minimum value case A=0, B=10

X = A/B

X = 0/10

X = 0

- Maximum value case A=10, B=10

X = A/B

X = 10/10

X = 1

The minimum value range A = 0 produces metric value X = 0 and a maximum value of A = 10

generates metric value X = 1. With the condition value closer to 1.0 the better fit to the range [0,1] Here are the results of calculations using the following metrics are averaged by the number of 30 respondents in the sub-quality characteristics.

Table 7. Number of criteria value using metric

Software riteria	Metrics value
Create and manipulate objects of SVG	22.8
Filtering	19.4
Layering	21.6
Extension	22
Rendering	21.9
User interface	24.2

3.3 Measurement Two Dimensional Vector Processor Domain Software Quality Value

3.3.1 Measurement Software Quality Value Using External Metric

1. Measurement Sub-characteristic Software Quality

Prior to the measurement, it is necessary to know value of one metric overall number of sub-characteristics of all respondents and then divided by the number of respondents then the resultis value of quality. For the calculation of the metric value of the total number of 30 respondents is by adding up all the value obtained in every sub-quality characteristics. One of the sub-calculations on suitability characteristics are as follows:

Suitability

To get the average value or the value of the quality of the suitability of sub-characteristics used mean the following formula:

$$\mathbf{X}= \frac{\sum \boldsymbol{Xi}}{\boldsymbol{N}} \quad (6)$$

for suitability sub-characteristics have been obtained amount is 24.89 metric value of 30 respondents then,

$$\mathbf{X}= \frac{\sum \boldsymbol{Xi}}{\boldsymbol{N}}$$

X= 24.89/30

X = 0.83

So the value of the quality of the suitability of sub-characteristics was 0.83 for the scale of assessment [0,1].

2. External Quality Characteristic Measurement

Prior to measurement, need to first know the value of quality sub-characteristics of all respondents and also the weights of each sub-characteristics by the method of calculation of the quality characteristics Weighted summation (WSum) by multiplying the value of quality sub-characteristics with respective weight values respectively and the results are summed for each group quality characteristic. One of the characteristics of the calculation of the functionality is as follows:

Quality Functionality

To get the value of the quality of the quality of the characteristics of functionality used *Weighted Summation* sebagai as follows:

$$Q_{functionality} = W_{suitability} \cdot V_{suitability} + W_{accuracy} \cdot V_{accuracy} + W_{Interoperability} \cdot V_{Interoperability}$$
$$= 0.61 \; x \; 0.83 + 0.28 \; x \; 0.83 + 0.11 \; x \; 0.67$$
$$= 0.5061 + 0.2290 + 0.0733$$
$$= \mathbf{0.8084}$$

3.3.2 Measurement Software Quality Value Using Quality in Use

Prior to measurement, need to first know the value amount of the overall level of satisfaction on each criterion of all respondents and then divided by the number of respondents so value of quality will be known. For the calculation of the metric value of the total number of 30 respondents is by adding up all the value obtained each criteria. One calculation criteria create and manipulate objects on SVG is as follows:

Create and manipulate SVG object

To get the value of quality criteria create and manipulate SVG object further value is the total number of 30 respondents value divided by the number of respondents to obtain the average value. It will directly generate value with scale [0,1]. So that normalization is not necessary anymore as an adjustment scale.

The data has been obtained on the criterion of the software to create and manipulate SVG objects is as follows:

$\sum$**(A30)** = 22.8

n = 30

then,

X = $\sum$**(Ai)/n**

X = 22.8/30

X = **0.76**

So the value of metrics on the criteria the software to create and manipulate objects SVG associated with satisfaction was 0.76 on a scale of assessment [0,1].

3.4 Two Dimensional Vector processor Domain Software Quality Assesment

3.4.1 External Quality Assessment On Two Dimensional Vector processor Domain Software

1. External Sub-characteristic Quality Assessment

Results of assessment on the external quality sub-characteristics represent how the software has seen based on the quality of each sub-characteristics. One of the main judgment on the suitability of sub-characteristics are as follows:

Suitability

Suitability for a quality value in two dimensional vector software obtained fairly good value for scale is 0.83 [0.1], while the qualitative assessment scale values obtained at 83 so that the sub-

characteristics included in the category superior suitability. This indicates that the software processing two-dimensional vector having a functional suitability of the vector processor is good enough for a user standpoint. Results of the assessment on the sub-external characteristics as follows:

Table 8. Sub-characteristic quality value

Quality sub-characteristics	Sub-characteristics quality value
Suitability	0.83
Accuracy	0.83
Interoperability	0.67
Maturity	0.64
Fault Tolerance	0.80
Recoverability	0.54
Understandability	0.51
Learnability	0.64
Operability	0.84
Attractiveness	0.76
Time Behaviour	0.69
Resource Utilization	0.77
Changeability	0.67
Adaptability	0.90

As for the level of dominance based on the quality characteristics of the sub-grouping every quality characteristics obtained from the weight of each component are as follows:

Table 9. Dominance sub-characteristic quality

Quality Characteristic	Quality sub-characteristics	Dominance presentation
Functionality	*Suitability*	61,3%
	Accuracy	27,7%
	Interoperability	11%
Reliability	*Maturity*	61,3%
	Fault Tolerance	27,7%
	Recoverability	11%
Usability	*Understandability*	52,3%
	Learnability	27%
	Operability	14,5%
	Attractiveness	6,2%
Efficiency	*Time Behaviour*	75%
	Resource Utilization	25%
Maintainability	*Changeability*	100%
Portability	*Adaptability*	100%

2. External Quality Characteristic Assessment

Results of the assessment external quality characteristics represent how the software has seen quality based on the each characteristics. One assessment on the characteristics of functionality is as follows:

Functionality

To value quality processing software functionality on a two-dimensional vector obtained fairly good value is 0.8084 to scale [0,1], while the scale of assessment values obtained are 80.83 so characteristic of functionality included in the category of medium. This indicates that the vector processing software has a functional two-dimensional vector processor is good enough for a user standpoint.

Results of the assessment on external characteristic as follows:

Table 10. External Quality Characteritic Asesment Value

Quality Characteristic	Quality Value
Functionality	0.8084
Reliability	0.6729
Usability	0.6060
Efficiency	0.7083
Maintainability	0.6692
Portability	0.9016

As for the level of dominance based on quality characteristics obtained from the weight of each component is as follows:

Table 11. External Quality Characteristic Assessment Dominance

Quality Characteristic	Dominance presentation
Functionality	40,8%
Reliability	24,1%
Usability	15,8%
Efficiency	10,4%
Maintainability	6,1%
Portability	2,8%

For the overall quality of the software based on external quality, processing software to obtain two-dimensional vector value calculation of a total of 0.7296 on a scale [0,1], and if converted into qualitative assessment scale it will get the value of 72.96. This means that the two-dimensioanal vector processing software included into the category of medium.

3.4.2 Quality Assessment on quality in use

Results of the assessment on the quality characteristics of quality in use represents how software quality in satisfaction levels from the perspective of the user. One of the assessment criteria SVG create and manipulate objects is as follows:

Create and manipulate SVG object

Quality value on create and manipulate SVG objects in two-dimensional vector processing software of the satisfaction obtained fairly good value for scale is 0.76 [0.1], while the qualitative assessment scale value obtained is 76 so the criteria to create and manipulate objects to the satisfaction SVG included in the category of medium. This indicates that the judge is quite satisfied with the functionality to create and manipulate SVG objects in the two-dimensional vector processing software. To the level of quality value based on the criteria of quality metrics can be seen in the following table:

Table 12. Quality in use assessment quality value

Software Criteria	Criteria quality value
Create and manipulate objects of SVG	0.76
Filtering	0.65
Layering	0.72
Extension	0.73
Rendering	0.73
User interface	0.81

As for the level of dominance based on the criteria of quality by grouping satisfaction obtained from the weight of each component are as follows:

Table 13. Criteria dominance assesment

Software Criteria	Criteria dominacne presentation
Create and manipulate objects of SVG	40,8%
Filtering	24,1%
Layering	2,8%
Extension	15,8%
Rendering	6,1%
User interface	10,4%

Quality in use value were obtained from the calculation in two-dimensional vector processor software is 0.7296 to scale [0,1] that represents the user satisfaction of the overall software. For qualitative assessment scale is 72.96 two-dimensional vector processor software has the quality of quality in use from the user's side included into the category of medium.

4. FINISHING

4.1 Conclusion

Dapata some of the conclusions drawn are as follows:

1. Users easy to find references about the sofware quality on two-dimensional vector processor Inkscape that is non commercial with quality levels that have been tested are included in the category of medium

2. The results of the assessment of user satisfaction levels to two-dimensional vector procesor software Inkscape, has gained value by category of medium quality and processing software indicates that Inkscape already has a good enough quality to meet the needs and in accordance with user expectations.

3. Obtained the value of quality to each sub-level characteristics and quality characteristics based on the measurement of the value of quality.

4. As input information for developers obtained information that the functionality of the software filtering criteria is still necessary to improve the functionality because the obtained value of the lowest user satisfaction. Moreover although the characteristics of reliability, maintainability and usability is said to be enough, but it still has value to the range that is still lacking, so need for further improvement in the quality characteristics.

5. Obtained a model framework for assessing the quality of the two-dimensional vector processor Inkscape using quality assessment model ISO / IEC 9126.**4.2**

4.2 Suggestion

Some suggestions in this study are:

1. Selection of assessment models should actually appropriate to the software domain is preferred, so that the results of the assessment is not only a model for the assessment of general secaara software. And the value of quality is well targeted and appropriately.
2. Perform quality assessment software with similar domain using the same quality models that can be seen in comparison to each other.
3. The process of collecting the data using questionnaires better done in advance with the validity of the sampling method appropriate to the study with a wider range of respondents so that research can increasingly represent a representation of a

user assessment software.
4. Not only test from the point of view of software as a product and the end user only, but expanded by adding users and developer and maintener in future.

DAFTAR PUSTAKA

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