

## Perceived Usefulness Analysis and User Satisfaction in The Development of Learning Management System Design

**Adrianus Hernowo W.P**

Fakultas Teknologi dan Informatika,  
Universitas Dinamika,  
Jl. Raya Kedung Baruk No.98, Kedung Baruk,  
Kec. Rungkut, Kota Surabaya, Jawa Timur, Indonesia  
[18410100009@dinamika.ac.id](mailto:18410100009@dinamika.ac.id)

**Ayouvi Poerna Wardhanie**

Fakultas Teknologi dan Informatika,  
Universitas Dinamika,  
Jl. Raya Kedung Baruk No.98, Kedung Baruk,  
Kec. Rungkut, Kota Surabaya, Jawa Timur,  
Indonesia  
[ayouvi@dinamika.ac.id](mailto:ayouvi@dinamika.ac.id)

**Candraningrat**

Fakultas Ekonomi dan Bisnis,  
Universitas Dinamika,  
Jl. Raya Kedung Baruk No.98, Kedung Baruk,  
Kec. Rungkut, Kota Surabaya, Jawa Timur,  
Indonesia  
[candraningrat@dinamika.ac.id](mailto:candraningrat@dinamika.ac.id)

### ABSTRACT

*MyBrilian is part of the technology in the form of a website learning management system (LMS) owned by Dinamika University which can be a place for lecture activities. This study was conducted to analyze the suitability of MyBrilian in terms of perceived benefits that create user satisfaction for users so that it can be a reference if an educational institution will make an LMS in the future. This study uses the PLS-SEM method as an analytical method using the Warp PLS 7.0 application. The difference with MyBrilian's previous research is that there are learning methods that still use hybrid learning, while MyBrilian is now using the LMS learning concept for which there is no further research. The results of the prototype test showed that the respondents agreed to use the MyBrilian prototype.*

**Keywords:** *learning management system; perceived usefulness; user satisfaction; user interface; user experience.*

## INTRODUCTION

The development of technology and information has had a major influence on various fields of life, especially education [1]. Currently, students can attend lectures in any place and in any situation because increasing quality human resources has an important role in achieving a goal [2]. The learning process is defined as the distance learning method or commonly referred to as Electronic Learning (E-learning), which is to shorten learning time and makes study costs more economical [3]. Although later learning can be done with PTM, the E-learning learning method can still be used because the E-learning method is a flexible learning method and can be adapted to circumstances. Learning Management System (LMS) which is part of E-learning is expected to help increase student learning success [4].

An organization or educational institution must continuously add new ways or breakthroughs in terms of interacting with its users [5]. One of the technical universities in Surabaya that has implemented LMS is Dinamika University, which is named MyBrilian. The survey results collected as many as 33 respondents with a minimum of 30 respondents to conduct preliminary research consisting of 12 students and 21 students from 2018 to 2019 at Dinamika University, it is known that as many as 72.7% (24 people) use MyBrilian as a lecture formality such as collecting assignments or downloading materials and then being followed by the second rank, taking quizzes given by the lecturer, and in the last rank, which is to send messages to lecturers, this is deemed not to be in accordance with the purpose of the LMS, which is to be used as a learning platform [6]. MyBrilian has various features such as my courses, messages, calendar, and others that can provide perceived usefulness in PBM but have not been used. E-learning can open up knowledge pathways that instill a culture of curiosity and inquiry in students and graduates which is essential for lifelong learning [7].

The biggest challenge in an organization is to be able to design something new and innovative [8]. From the survey results, this study aims to determine the success of MyBrilian as an LMS belonging to Dinamika University in terms of perceived usefulness which creates user satisfaction for users, namely Dinamika University students so that it can be a reference when educational institutions will make LMS in the future. The variables tested in this study are website display, navigation, and content presentation based on research [9], and there are also variables LMS, perceived usefulness, user satisfaction [7]. User satisfaction felt by users, can have an impact on frequent access to the website. Perceived usefulness [10] is a variable that defines the extent to which a technology user believes that using a particular technology will improve his or her job performance. This research is focused on students as MyBrilian users [7].

### **Formulation of The Problem**

How to analyze MyBrilian LMS in terms of perceived usefulness that creates user satisfaction for users, namely University students.

### **Writing Purpose**

The purpose of this study is to determine the level of perceived usefulness that causes MyBrilian user satisfaction to users, namely Dinamika University students, and can be a reference if an educational institution will make an LMS in the future.

## **LITERATURE REVIEW**

### **Website Display**

When a user views a website, the first thing that can be seen is the visual appearance. To get an attractive appearance, the website must be well designed and in designing it need to pay attention to things such as balance, contrast, consistency, empty space, color, typography, shape, and layout. The appearance of the website has several indicators such as attractive images, relevant graphics, easy-to-understand icons, and appropriate color assignments [11][12].

### **Navigation**

Navigation is the flow used in the application created. With navigation, of course, users will find it easier to find what they want. The journal explained that navigation has a certain structure that can be adapted to needs [13]. It is known that navigation can be directly related to perceived usefulness with several indicators the flow of the website is clear, the buttons work, there is SEO, and the page you are looking for is easy to find [9][14].

### **Content**

The message to be conveyed to the user is called content. The process of delivering messages must also have criteria and conditions namely, the delivery of information through content must be clearly conveyed and meet the needs of visitors regarding the information sought while providing impact [15]. Content is one of the variables that affect the perceived usefulness with several indicators of actual information, factual information, interesting information, easy-to-understand picture explanations [9][16].

### **Learning Management System**

As part of E-learning learning, Learning Management System (LMS) is a software application or web-based technology that is used to plan, implement, and assess certain learning processes [17].

Whereas a learning Management System is a system that allows an institution to develop electronic learning materials for its students [4]. Some indicators, that can lead to perceived usefulness, namely the existence of website interactions, features as needed, integration with other platforms, and job reports [7][18][4].

### **Perceived Usefulness**

Confidence in technology so as to provide good usability is the definition of perceived usefulness. Perceived usefulness is a variable to measure a person's level of belief that the use of information technology will improve performance and work. Perceived usefulness as a moderating variable, of course, can moderate the independent variable on the dependent variable from the journal that has been studied [10]. Resulted in several indicators, namely increasing the productivity of E-learning, controlling E-learning better, increasing the effectiveness of E-learning, being more concentrated in E-learning [7].

### **User Satisfaction**

User satisfaction is the approval of the information system and its output [19]. Perceived usefulness is the main determinant of user satisfaction, which in turn predicts intention to continue using [9]. It is strengthened which explains that consumer user satisfaction for a product will affect subsequent behavior patterns [20]. In several research journals, user satisfaction has several indicators, namely satisfaction with the effectiveness of E-learning learning, satisfaction with the performance of E-learning learning, having a sense of pride in using the E-learning platform, having the motivation to use the E-learning platform, satisfaction with the services of the E-learning platform [7][21][22].

### **Hypothesis**

In this study, an analysis of the perceived usefulness of the MyBrilian application will be carried out so that it affects student user satisfaction. In order to find out the benefits of the application, this research refers to the journal which provides detailed information about aspects that can be felt by the user so as to produce satisfaction in the LMS [7][9]. The following are the details of this research hypothesis:

Hypothesis 1: Display ( $X_1$ ) has a direct effect on perceived usefulness (Y)

Hypothesis 2: Navigation ( $X_2$ ) has a direct effect on perceived usefulness (Y)

Hypothesis 3: Content ( $X_3$ ) has a direct effect on perceived usefulness (Y)

Hypothesis 4: LMS ( $X_4$ ) has a direct effect on perceived usefulness (Y)

Hypothesis 5: Perceived usefulness (Y) has a direct effect on user satisfaction (Z)

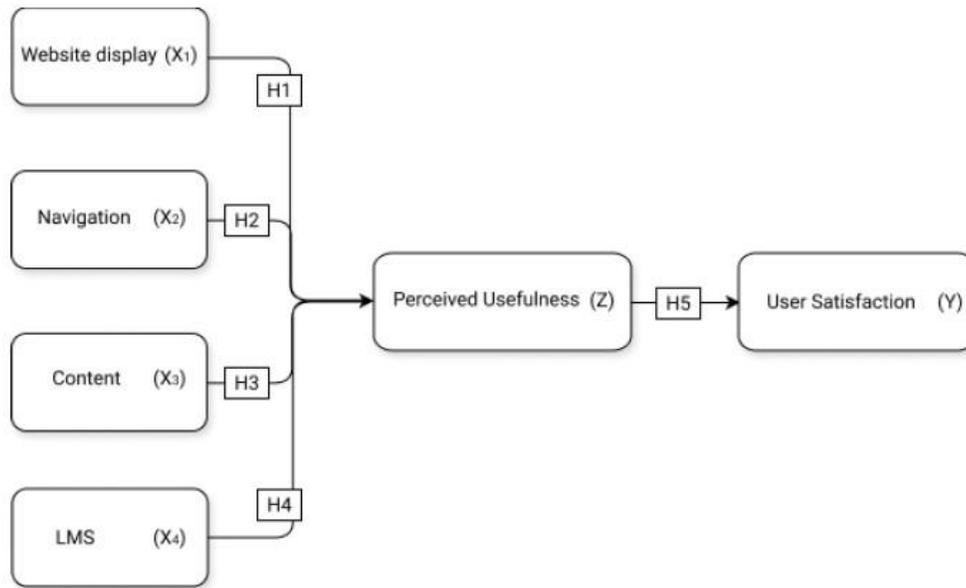


Figure 1. Conceptual Framework

**RESEARCH METHODS**

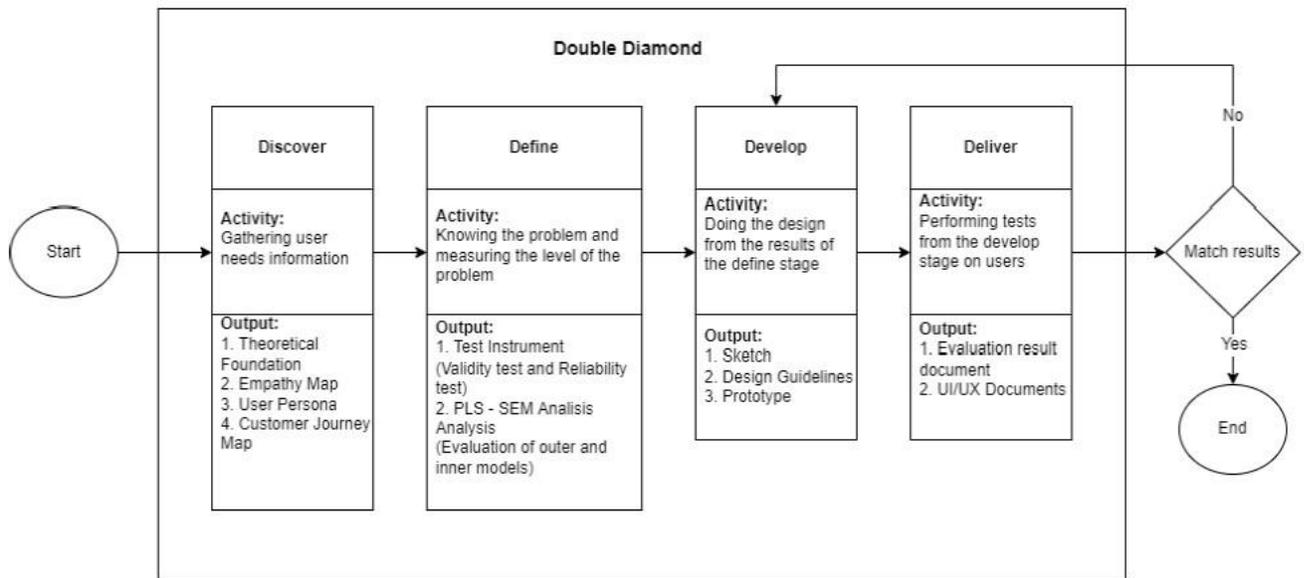


Figure 2. Research Design

**Research Design**

The figure 2. above explains how the research design will be carried out from the beginning to the end of the research.

## Research Limitations

Based on the formulation of the problem above, the limitations of the problem in the final project are as follows:

1. The research method will use PLS-SEM.
2. The object of research is MyBrilian as an LMS at the Dinamika University.
3. The research subjects are MyBrilian users, active students in odd semesters 21.1
4. There are 6 research variables, namely display website, navigation, content, learning management system, perceived usefulness, and user satisfaction.
5. The number of respondents studied for the PLS-SEM analysis was 160 people.

## Variable Identification

**Table 1. Research Variables and Indicators**

Variable	Indicator
Visual display (X1)	Interesting pictures
	Relevant graphics
	Easy to understand icons
	Appropriate color
Navigation (X2)	The website usage flow is clear
	Button works
	The existence of search engine optimization (SEO)
	The page you are looking for is easy to find
Content (X3)	Actual information
	factual information
	Interesting information
	Easy-to-understand image explanations
LMS (X4)	There is website interaction
	Features as needed
	Integration with other platforms
	There is a job report
Perceived Usefulness (Z)	Increase E-learning learning productivity
	Controlling E-learning learning better
	Improve learning effectiveness
	E-learning
User Satisfaction (Y)	Satisfied with the effectiveness of E-learning
	Satisfied with the performance of E-learning
	Have a sense of pride in using the E-learning platform
	Have the motivation to use the E-learning platform
	Satisfied with E-learning platform services

In table 1. the details of the research variables and indicators are the details of the Independent Variable (X), Dependent Variable (Y), Intervening Variable (Z).

### Population, Sample, & Data Collection Techniques

At this stage, it explains the sample calculation to be carried out, which is as follows:

**Table 2. Total Student Population**

Study Program	Number of Students
S1 Information System	619
S1 Computer System	141
DIII Information System	80
S1 Visual Communication Design	284
S1 Product Design	60
DIV Film And Television Production	96
S1 Management	119
S1 Accounting	30
DIII Office Administration	8
<b>Total</b>	<b>1.439</b>

The first thing that needs to be done is to find the percentage of the information in table 2 for each study program so that it can calculate the sample for each study program that produces table 3.

$$\text{Percentage study program} = \left( \frac{\text{population study program}}{\text{population total}} \right) * 100$$

The formula for calculating the percentage of the population of study program

$$\text{Sampel each study program} = n * \text{percentage each study program}$$

The formula for calculating the sample each of study program

From the two formulas, it is known that the sample needed in this study is:

**Table 3. Number of Student Samples**

Study Program	Number of Students
S1 Information System	69
S1 Computer System	16
DIII Information System	8
S1 Visual Communication Design	32
S1 Product Design	7
DIV Film And Television Production	11
S1 Management	13
S1 Accounting	3
DIII Office Administration	1
<b>Total</b>	<b>160</b>

## RESULTS

### Outer Model

#### *Convergent Validity*

In table 4. factor loading it can be seen that the validity of the indicator in factor loading has been accepted because the value is above the standard, namely 0.40 to 0.70.

**Table 4. Factor Loading**

	X1	X2	X3	X4	Z	Y	Standart	Description
X1.1	0.671						0.40 - 0.70	Acceptable
X1.2	0.715							Acceptable
X1.3	0.775							Acceptable
X1.4	0.723							Acceptable
X2.1		0.727						Acceptable
X2.2		0.744						Acceptable
X2.3		0.716						Acceptable
X2.4		0.706						Acceptable
X3.1			0.654					Acceptable
X3.2			0.724					Acceptable
X3.3			0.796					Acceptable
X3.4			0.690					Acceptable
X4.1				0.650				Acceptable
X4.2				0.753				Acceptable
X4.3				0.734				Acceptable
X4.4				0.712				Acceptable
Z1.1					0.790			Acceptable
Z1.2					0.685			Acceptable
Z1.3					0.664			Acceptable
Z1.4					0.736			Acceptable
Y1.1						0.743	Acceptable	
Y1.2						0.731	Acceptable	
Y1.3						0.782	Acceptable	
Y1.4						0.780	Acceptable	
Y1.5						0.764	Acceptable	

In table 5. The Ave test used to determine the achievement of the validity requirements for calculating the discriminant has been accepted.

**Table 5. Ave Test**

Variable	Value	Standart	Description
X1	0.521	Minimum 0.5	Acceptable
X2	0.524		Acceptable
X3	0.515		Acceptable
X4	0.509		Acceptable
Z	0.519		Acceptable
Y	0.578		Acceptable

*Discriminant Validity*

Discriminant validity test in table 6. discriminant validity test used to test how far the latent construct is really different from other constructs can be accepted by all.

**Table 6. Discriminant Validity Test**

	<b>X1</b>	<b>X2</b>	<b>X3</b>	<b>X4</b>	<b>Z</b>	<b>Y</b>	<b>Standart</b>	<b>Description</b>
<b>X1.1</b>	0.671	-0.046	-0.229	-0.101	0.230	-0.112	Greater than any other value	Acceptable
<b>X1.2</b>	0.715	-0.038	0.120	-0.044	-0.209	0.167		Acceptable
<b>X1.3</b>	0.775	0.171	0.043	-0.107	-0.019	-0.035		Acceptable
<b>X1.4</b>	0.723	-0.103	0.047	0.251	0.013	-0.023		Acceptable
<b>X2.1</b>	0.250	0.727	-0.123	0.012	0.059	-0.051		Acceptable
<b>X2.2</b>	0.146	0.744	-0.146	0.026	-0.057	-0.042		Acceptable
<b>X2.3</b>	-0.425	0.716	0.714	-0.002	-0.023	0.021		Acceptable
<b>X2.4</b>	0.020	0.706	0.103	0.038	0.023	0.075		Acceptable
<b>X3.1</b>	-0.148	0.220	0.654	-0.199	0.062	0.191		Acceptable
<b>X3.2</b>	-0.020	-0.035	0.724	0.192	-0.117	-0.093		Acceptable
<b>X3.3</b>	0.098	-0.211	0.796	-0.015	0.076	0.022		Acceptable
<b>X3.4</b>	0.048	0.071	0.690	0.005	-0.023	-0.109		Acceptable
<b>X4.1</b>	-0.005	-0.137	-0.093	0.650	-0.345	-0.134		Acceptable
<b>X4.2</b>	-0.118	0.175	-0.015	0.753	-0.088	-0.080		Acceptable
<b>X4.3</b>	0.154	-0.044	0.160	0.734	-0.031	0.145		Acceptable
<b>X4.4</b>	-0.030	-0.015	-0.064	0.712	-0.191	0.057		Acceptable
<b>Z1.1</b>	0.163	-0.177	-0.070	-0.135	0.790	0.018		Acceptable
<b>Z1.2</b>	-0.002	-0.022	-0.261	0.064	0.685	0.048		Acceptable
<b>Z1.3</b>	-0.250	0.354	0.152	0.093	0.664	-0.106		Acceptable
<b>Z1.4</b>	0.052	0.108	0.181	0.001	0.736	0.032		Acceptable
<b>Y1.1</b>	0.064	-0.055	-0.146	0.242	-0.158	0.743	Acceptable	
<b>Y1.2</b>	-0.052	0.235	-0.080	-0.102	-0.125	0.731	Acceptable	
<b>Y1.3</b>	-0.001	0.026	0.085	-0.180	-0.018	0.782	Acceptable	
<b>Y1.4</b>	0.149	-0.319	0.027	-0.021	0.280	0.780	Acceptable	
<b>Y1.5</b>	-0.163	0.128	0.104	0.068	0.005	0.764	Acceptable	

*Unidimensionalitas Model*

The test is in table 7. the composite reliability test and table 8. Cronbach's alpha test shows that the unidimensionality test can be said to be fit or valid and can relate to variables and supporting indicators.

**Table 7. Composite Reliability Test**

Variable	Value	Standart	Description
X1	0.813	Minimum 0.7	Fit
X2	0.815		Fit
X3	0.809		Fit
X4	0.805		Fit
Z	0.811		Fit
Y	0.873		Fit

**Table 8. Cronbach's Alpha Test**

Variable	Value	Standart	Description
X1	0.692	Minimum 0.5	Fit
X2	0.696		Fit
X3	0.684		Fit
X4	0.677		Fit
Z	0.689		Fit
Y	0.817		Fit

**Inner Model**

*Fit Model Test*

It is known from table 9. model fit test that the combined performance of the outer model and inner model is very good and acceptable.

**Table 9. Fit Model Test**

Index	Value	Standart	Description
GOF	0.378	Small $\geq 0.1$ , Medium $\geq 0.25$ , Large $\geq 0.36$	Acceptable

*R<sup>2</sup> Test*

In table 10. R<sup>2</sup> test it is known that perceived usefulness is influenced by the display, navigation, content, and LMS by 43.8%. While the user satisfaction variable can be influenced by the perceived usefulness of 10.4%.

**Table 10. R<sup>2</sup> Test**

Variable	Value
Perceived Usefulness (Z)	0.438
User Satisfaction (Y)	0.104

DISCUSSION

Table 11. Direct Effects

Criteria	Variable	X1	X2	X3	X4	Z	Y
<i>Path Coefficient</i>	X1	-	-	-	-	-	-
	X2	-	-	-	-	-	-
	X3	-	-	-	-	-	-
	X4	-	-	-	-	-	-
	Z	0.260	0.184	0.198	0.131	-	-
	Y	-	-	-	-	0.323	-
<i>p-values</i>	X1	-	-	-	-	-	-
	X2	-	-	-	-	-	-
	X3	-	-	-	-	-	-
	X4	-	-	-	-	-	-
	Z	<0.001	0.008	0.005	0.046	-	-
	Y	-	-	-	-	<0.001	-

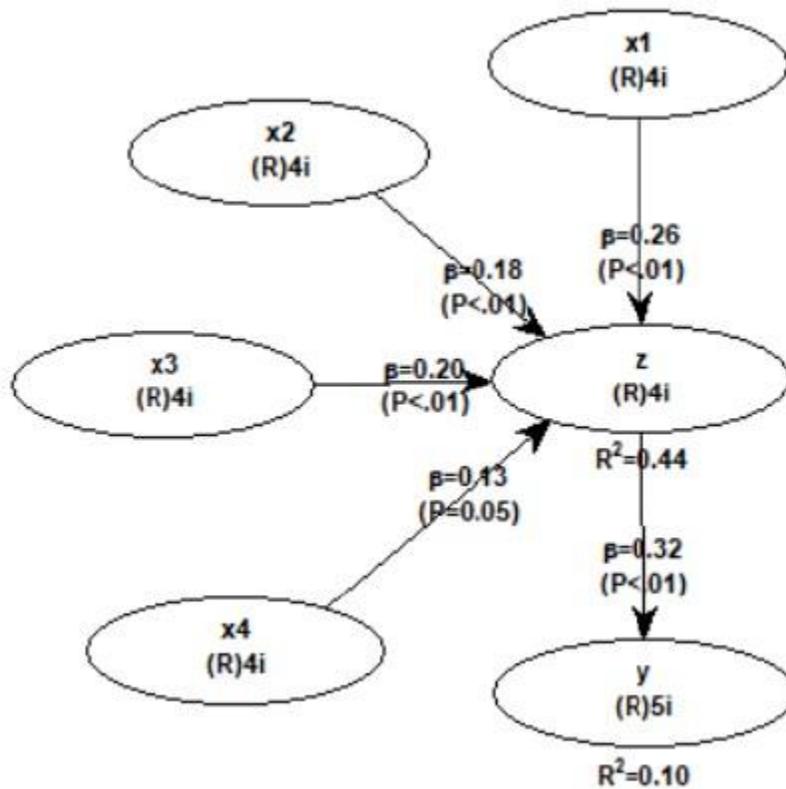


Figure 3. Effect Size

**H1: The display of the website has a significant effect on the user's perceived usefulness of the MyBrilian website**

From the results of the study, it was found that the most decisive indicator of the display variable, namely the easy-to-understand icon (X1.3) was 0.775 while the indicator that needed to be improved was an attractive image (X1.1) of 0.671 as the indicator with the lowest value. Thus it can be concluded that the website display variables regarding the images available on MyBrilian need to be fixed again.

**H2: Website navigation has a significant effect on users' perceived usefulness of the MyBrilian website**

From the results of the study, the most decisive indicator of the navigation variable is the button that functions properly (X2.2) of 0.744 while the indicator that needs to be improved is that the page you are looking for is easy to find (X2.4) of 0.706 as the indicator with the lowest value. Thus, it can be concluded that the navigation variables regarding the available pages on MyBrilian need to be fixed again so that they are easy to find.

**H3: Website content has a significant effect on users' perceived usefulness of the MyBrilian website**

From the research results, the most decisive indicator of the content variable is interesting information (X3.3) of 0.796 while the indicator that needs to be improved is actual information (X3.1) of 0.654 as the indicator with the lowest value. Thus, it can be concluded that the content variable regarding the actual information on MyBrilian needs to be corrected again.

**H4: The website LMS system has a significant effect on the perceived usefulness of users of the MyBrilian website**

From the results of the study, the most decisive indicator of the LMS variable is features that meet the needs (X4.2) of 0.796 while the indicator that needs to be improved is website interaction (X4.1) of 0.650 as the indicator with the lowest value. Thus, it can be concluded that the LMS variable regarding website interactions on MyBrilian needs to be corrected again.

**H5: The usability functionality of the website has a significant effect on user satisfaction of the MyBrilian website**

From the research results, the most decisive indicator of the perceived usefulness variable is that it can increase productivity (Z1) by 0.790 while the indicator that needs to be improved is increasing the effectiveness of E-learning (Z3) by 0.664 as the indicator with the lowest value. Thus, it can be concluded that regarding the perceived usefulness variable with indicators of the effectiveness of E-learning learning using MyBrilian, it needs to be improved again.

## CONCLUSION

From the results of the study, it is known that the analysis in terms of perceived usefulness can lead to user satisfaction. The perceived usefulness variable which is influenced by web appearance has the most decisive indicator, namely, the icon is easy to understand. The navigation variable that affects perceived usefulness with the most decisive indicator is the button that functions properly. The content variable that affects perceived usefulness with the most decisive indicator is interesting information. Then the LMS variable affects perceived usefulness with the most decisive indicator, namely features that are needed. And the perceived usefulness variable affects user satisfaction with the most decisive indicator, namely the MyBrilian E-learning application, which can increase learning productivity.

## SUGGESION

Suggestions for further research are to add other variables such as ease of use and timeliness to be able to increase the influence factor of user satisfaction. In addition to this, suggestions can also be made to design the LMS application which is based on a website and android so that users can easily access it either through smartphones, PCs, or other devices.

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