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## Analysis Of The Factors Net Benefits Of Flight Simulation Online System

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### Abstract

Flight simulation games are one of the many new technologies that have emerged due to the development of digital games and current gamification technologies. Flight simulation games released by several developers are currently still standalone and cannot be connected to each other. An online flight simulation system has been developed to be able to link and connect between flight simulation game developers, so that users can connect with each other and make the simulation more real. The present online flight simulation system can make flight simulator games into more serious games, but it still has a issues, such as people who rarely utilize the system. The purpose of this research is to find out and identify the factors of net benefits using flight simulation online system by using modification of the DeLone and McLean and UTAUT2 models conducting PLS-SEM analysis. Respondents in this study were users who had used the system with a total of 366 respondents. The results of this study show that System Quality, Service Quality, Effort Expectancy and Social Influence do not have a significant impact on System Use, then Information Quality and Perceived Enjoyment have a positive and significant impact on System Use, then Service Quality does not have a significant impact on User Satisfaction, then Information Quality and System Quality has a positive and significant impact on User Satisfaction, then System Use and User Satisfaction have a positive and significant impact on Net Benefits.

Keyword: *Flight Simulation Online System, Gamification, Net Benefits*

### INTRODUCTION

Currently, technological advancements have impacted a wide range of industries. One such industry that is expanding is the development of digital games like flight simulator games[1]. The widespread use of flight simulator games in academic and professional settings has resulted from their current use as more than just a pastime. Flight

simulator games are currently still standalone, which means they are still restricted to the game system itself and still require a variety of additional applications to be able to connect between users [2]. There is a system that can connect between any flight simulator games, namely a flight simulation online system, any flight simulator game from any developers can be connected by this system. The online flight simulation system enables players of flight simulator games to connect, communicate, and participate in true-to-life aviation operations. These systems are similar, but they also each have distinctive characteristics and focuses. These systems offer a variety of features and services to virtual aviation enthusiasts to improve their experience with flight simulation games. In the virtual aviation community, they provide networking opportunities, realistic air traffic control, training programs, and a sense of belonging. Users may have a variety of options depending on their preferences and interests thanks to each system's unique features, user base, and coverage areas [3]. Using the flight simulation online system still brings up several issues, like system's technical issues, learning curve, lack of active participation, lack of training and mentoring, user conduct and compliance, platform updates, and improvements cannot be separated from it because it is a technology system [4]. Researchers are attempting to determine whether there are any benefits to using the flight simulation online system despite all these issues.

Information technology system must be able to provide net benefits. Net benefits is the impact that occurs in using the system, starting from the individual who uses it, or in a wider scope. Net benefits can also be said to be benefits derived from the use of technological systems. A research model conducted by DeLone and McLean regarding the measurement of net benefits in an information system, in which researchers say that Information Quality, System Quality, Service Quality, Intention to Use, Use, and User Satisfaction are variables that affect net benefits [5]. Furthermore, another research model with the name "Unified Theory of Acceptance and Use of Technology" states that the use of technology systems is inseparable from Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions [6]. This research model can be used as a model to see the factors that influence the use of a system and the factors that affect the benefits of using information technology systems.

Therefore, this research aims to identify factors influencing net benefits in the use of flight simulation online system. This research model was carried out by collaborating between DeLone and McLean's models and the Unified Theory of Acceptance and Use of Technology to determine the factors that influence net benefits.

## RESEARCH METHOD

### Research Model and Hypothesis

Based on the background and factors that we have outlined before, the research model used by the author is divided into nine variables that will assist in the determination of the net benefits flight simulation online system. These variables are divided into push, pull, and mooring variables following the principles of the DeLone and McLean and UTAUT2 [15] models to explain net benefits through information quality, service quality, system quality, social influence, effort expectancy, perceived enjoyment, system use, and user satisfaction.

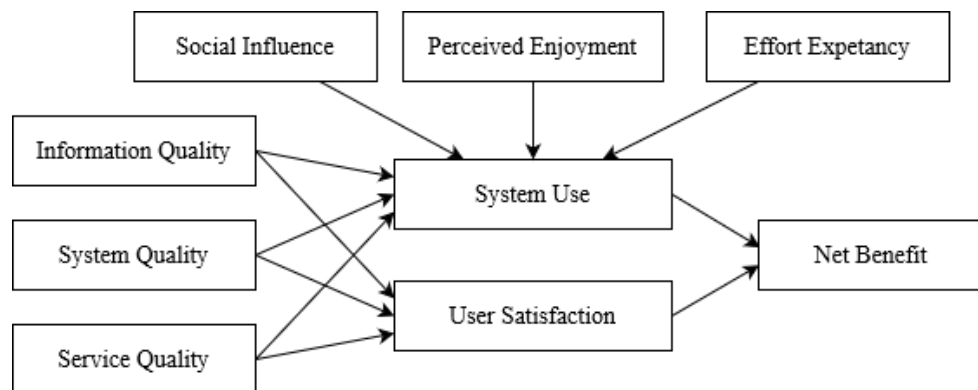


Figure 1. Research Model

Based on the author's analysis of past studies and current net benefits research, the following hypotheses have been formulated:

- H1: Information Quality influence System Use
- H2: System Quality influence System Use
- H3: Service Quality influence System Use
- H4: Social Influence influence System Use
- H5: Perceived Enjoyment influence System Use
- H6: Effort Expectancy influence System Use
- H7: Information Quality influence User Satisfaction
- H8: System Quality influence User Satisfaction
- H9: Service Quality influence User Satisfaction
- H10: System Use influence Net Benefits
- H11: User Satisfaction influence Net Benefits

### Survey Design

An online survey used in this research, targeting people who use a flight simulation

online system. The questionnaires are distributed through social media and community answered by 366 respondents. The respondents answered the questionnaire with a personal self-administered type. The questionnaire consists of two sections, with the demographic profile of the respondents in the first. Then the items measuring the variables, namely information quality, service quality, system quality, social influence, effort expectancy, perceived enjoyment, system use, user satisfaction, and net benefits.

### Analysts Method

Partial Least Squares Structural Equation Modeling (PLS-SEM) is a statistical technique used to analyze complex relationships among latent (unobserved) variables in a structural equation modeling framework [16]. This study used SmartPLS 3 as statistical processing program with a confidence level of 95%, a margin of error of 5%, and a maximum proportion of variance (p) of 0.5. The analysis procedure consisted of descriptive statistics, validity and reliability tests. Finally, regression analysis is conducted in hypothesis testing.

## HASIL DAN PEMBAHASAN

### Demographic Profile

Demographic survey collects data about the basic characteristics of the surveyed respondents. The demographic analysis findings indicate that 41% of respondents have used the system in the last three months and 59% have used it for longer than three months. This value indicates that the respondents in this study are users of the online flight simulation system even though they have not used the system for a long time, so that it can be continued for further analysis regarding the use of the system by the respondents.

### Validity and Reliability Testing

Validity and reliability testing are two important aspects of assessing the quality and accuracy of measurement tools. The validity and reliability analysis findings indicate that the items developed are reliable and valid, presented in Table 1. Values of Cronbach's Alpha and Composite Reliability for all the variables are greater than or equal to 0.7 and the value of Average Variance Extracted (AVE) for all the variables is greater than or equal to 0.5 is indicated that data is Valid and Reliable.

Table 1. Validity and Reliability Analysis

Variables	No. of Items	Average Variance Extracted	Cronbach's Alpha	Composite Reliability
Information Quality	5	0,556	0,735	0,738
System Quality	4	0,579	0,757	0,764
Service Quality	4	0,606	0,839	0,861
Social Influence	4	0,609	0,787	0,804
Effort Expectancy	3	0,643	0,723	0,725
Perceived Enjoyment	3	0,635	0,716	0,737
System Use	3	0,635	0,714	0,714
User Satisfaction	3	0,632	0,709	0,721
Net Benefits	5	0,573	0,813	0,819

### Hypothesis Testing

Linear regression analysis is used to test the hypotheses developed in the study. The summary of the model used in the study shows that the R-square value to know proportion of the variance in the dependent variable that is predictable from the independent variables included in the model. The R-square value of net benefits indicates that 47% of these variables are influenced by System Use and Net Benefits, and the remaining 53% are influenced by other constructs outside the model. System Use

The summary of the model used in this study is presented, which reveals that R-square value of 0.470. This indicates that 47% of the user flight simulation online system is explained by the independent variables, namely information quality, service quality, system quality, social influence, effort expectancy, perceived enjoyment, system use, user satisfaction, and net benefits. Other factors explain the remaining 53% of the system use. System usage is influenced 26% by information quality, service quality, system quality, social influence, effort expectations, perceived enjoyment, while User Satisfaction is influenced 39% by information quality, service quality and system quality.

Table 2. R-square Values

Variables	R Square
Net Benefits	0,470
System Use	0,263
User Satisfaction	0,399

Then the analysis will be carried out by using bootstrapping on the SmartPLS application with a total of 1,000 subsamples and was run with complete bootstrapping. This bootstrapping will also produce T-Statistic and P-Values values to determine whether the variable has a significant effect. The result of bootstrapping is presented in Table. Based on Path Coefficient Value Table show Information Quality (Beta = 0.162, p-value < 0.05), Perceived Enjoyment (Beta = 0.367, p-value < 0.05), have a significant effect on System Use, Information Quality (Beta = 0.330, p-value < 0.05), System Quality (Beta = 0.198, p-value < 0.05), have a significant effect on User Satisfaction, System Use (Beta = 0.218, p-value < 0.05), User Satisfaction (Beta = 0.580, p-value < 0.05), have a significant effect on Net Benefits. Therefore, the hypotheses H1, H5, H7, H8, H10, and H11 are substantiated. Hence it does not have a significant impact on System Use and User Satisfaction. Thus H2, H3, H4, H6, H9 are not supported.

Table 3. Path Coefficient Value

Variables	$\beta$	T Statistics	P Values	Result
Information Quality -> System Use	0,162	3,143	0,002	Significant
System Quality -> System Use	-0,037	0,576	0,565	nsignificant
Service Quality -> System Use	0,083	1,577	0,115	nsignificant
Social Influence -> System Use	0,088	1,720	0,086	nsignificant
Perceived Enjoyment -> System Use	0,367	4,090	0,000	Significant
Effort Expectancy -> System Use	0,038	0,511	0,610	nsignificant
Information Quality -> User Satisfaction	0,330	3,140	0,002	Significant
System Quality -> User Satisfaction	0,198	2,783	0,006	Significant
Service Quality -> User Satisfaction	-0,018	0,231	0,818	nsignificant
System Use -> Net Benefits	0,218	4,377	0,000	Significant
User Satisfaction -> Net Benefits	0,580	8,592	0,000	Significant

Based on the accepted hypothesis, it can theoretically be implied that system use and user satisfaction significantly influence net benefits flight simulation online system. Perceived Enjoyment significant on Net Benefits in games led by Wang & Lee (2020) and Wang & Lee (2020). Social is insignificant on System Use in games led by Mosiane & Brown (2020). System Use and User Satisfaction is significant for Net Benefits led by Petter et al., (2008) and Wheeler (2022). Service Quality has insignificant in this research, this a new finding that does not follow the result of previous study in gamification which Game Based Learning have a linear relationship to the quality of the system in game led by Mosiane & Brown (2020) and Cohard (2019).

## CONCLUSION

The results of this study show that System Quality, Service Quality, Effort Expectancy and Social Influence do not have a significant impact on System Use, then Information Quality and Perceived Enjoyment have a positive and significant impact on System Use, then Service Quality does not have a significant impact on User Satisfaction, then Information Quality and System Quality has a positive and significant impact on User Satisfaction, then System Use and User Satisfaction have a positive and significant impact on Net Benefits. Based on the variables that affect the Net Benefits, the Flight Simulation Online System should (1) provide accurate and pertinent information based on the requirements of its users (2) make sure the provided realism simulator does not rob you of fun and happiness (3) users will be more likely to use a system that is quick, good, and always accessible. Future study on net benefits using flight simulation online systems could focus on exploring the specific outcomes and advantages that users derive from their user in such systems. These research directions can provide insights into the net benefits of using flight simulation online systems, both from individual user perspectives and from the broader aviation industry standpoint. By studying the specific outcomes and advantages that users derive from these systems, researchers can contribute to the understanding and optimization of virtual aviation training and simulation practices.

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