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Enterprise Resource Planning Contribution to User Satisfaction and Performance.

Indrianawati Usman[a*], Nira Hariyatie Hartani[b], Aldim Irfani Vikri[c], [a,c]Faculty of Economic and Business of Airlangga University Surabaya, Indonesia, [b]Faculty of Business and Information Science, UCSI University Kuala Lumpur, Malaysia, Email: [a*]Indrianawati-u@feb.unair.ac.id

Currently the company's dependence on the use of information technology is increasing rapidly. Many companies utilise Enterprise Resource Planning (ERP) in supporting their business processes. The purpose of this research is to investigate the impact of ERP implementation on user satisfaction and performance. This study uses explanatory quantitative research. Analysing the effect of ERP system implementation, which consists of system quality, information quality and service quality to the user satisfaction and performance. Empirical data is collected using a survey questionnaire distributed to 120 users of a defence technology company. Data analyse was done using a Partial Least square structural model. The results of the research concluded that system quality and service quality have a significant effect on ERP system user satisfaction. While information quality has no significant effect on user satisfaction, but has a direct effect to user performance. User's satisfaction has a significant effect on user performance. The results of this study indicate that the user satisfaction is an important factor that determines performance achievements. So companies should pay more attention to system quality and service quality in implementing information systems, in order to increase user satisfaction which can ultimately improve performance.

Key words: *Implementation of Information System, User Satisfaction, Employee Performance.*

Background

In a dynamic competitive environment, companies need adequate information system support to improve their performance. In anticipating and maintaining quite high competition, companies need an information system that is able to create, capture and produce information for internal and external parties to become more effective. Enterprise Resource Planning (ERP) is an organisation information system that can improve the operational process and raise performance achievement (Saade & Nijher, 2016). The development of integrated information systems throughout the company that is quite popular is Enterprise Resource Planning (ERP). Enterprise Resource Planning (ERP) is a system that supports all of the company's ongoing operational activities. ERP systems are divided into several types. First is to utilise ready-made ERP software such as a Content Management System (CMS). The second is an ERP system made by a company using IT personnel, and this has been implemented in several services and manufacturing companies (Matende & Ogao, 2013).

This research is conducted in a company which engaged in a defence technology, especially in the field of avionics for fighter or military aircraft, aircraft radar data processing, weapons control systems and other defence application software. The vision of the company is to become a trusted defence industry provider. The mission is to develop avionics equipment, radar data processing, and defence mission systems. The company implementing the information system base on ERP is called SIMFONI. All employees in the company have officially use SIMFONI since 2016 until now. SIMFONI functions are to manage the flow of budget requests and to manage staffing affairs of the companies. The SIMFONI application has several modules in it, including the accounting management, inventory and warehouse management, human resource management, and production control modules.

Research Background

The implementation of this information system, caused significant changes to the company's business processes, thus requiring companies to continue to oversee each process of these changes to provide substantial benefits and performance results. Implementation of the SIMFONI application in the company still has limitations because SIMFONI is a structured system in the strict sense, where a user must follow the processes contained in the SIMFONI application that users cannot innovate in operating the system. Also, problems arise due to the concept of technological infrastructure, which is deemed inappropriate, resulting in delays when uploading data to the application system. Another issue often found is the occurrence of human errors made by employees at the time of account selection to data input errors, because they are still accustomed to using the old system. The implementation of the SIMFONI application in the company is relatively new. Therefore there are still some problems found in the environment and it is necessary to evaluate the implementation of the system, to see whether the system implemented is valid and whether it can have a positive impact on users of the company. The company made a large financial investment to build this information system.

Therefore, the company also assesses the benefits obtained from this information system compared to the benefits obtained for improving its performance. ERP information system user satisfaction is one of the parameters that is widely used to assess the successful implementation of ERP information systems in an organisation. While the performance of ERP information system users is a critical factor in developing individual potential effectively and efficiently, due to better policies or programs for human resources within an organisation, and is very beneficial for overall organisational growth.(Almajali, Masa'deh, & Tarhini, 2016).

An information system is a collection or series of formal procedures in data collection, which is processed into information and distributed to users of information. Specifically the information system is a combination of information technology and the activities of people who use technology to support operations and management. The purpose of the information system is to produce information and will be processed into a useful source for users as a decision support. Information will be useful for users if they meet the following three pillars (1) right to the person or relevant (relevance), (2) timely (timeliness), and (3) accurate or accuracy. The information system will have greater benefits for decision makers if it is presented in an integrated manner. Enterprise Resource Planning (ERP) is one solution for all business and management needs of the company. ERP applications usually consist of modules such as marketing and sales, field operations, production, inventory control, procurement, distribution, human resources, finance, and accounting. Communication flow across unit organisation and inter functional departments in the organisation can be supported by the existence and efficiency of ERP (Bharathi, 2012; Doom, Milis, Poelmans, & Bloemen, 2010).

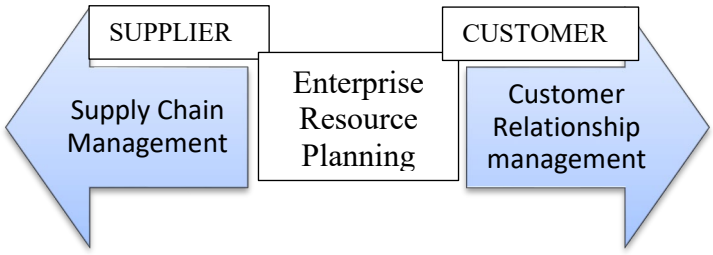

Figure 1. General Diagram of Company Information System

Several ERP systems have been created within the company to facilitate the company's activities. ERP system applications in the company are obtained by buying, but there are also those made by the company or commonly called in-house app development. The following are the advantages and disadvantages of buying and building your ERP system. The first type, buying an ERP has several advantages such as prices are relatively cheaper, faster implementation. This type has been implemented by many similar companies and the applications are sold in tested, mature and stable conditions. Whereas the disadvantages are the

prices are usually calculated per-user, so if the company build many modules then they will be more expensive. The company must follow the business processes contained in the system. This type does not always match company needs and cannot be modified, therefore it cannot be used immediately, or may require an extended processing time. The second type, In-House Application Development has several advantage and disadvantage as well. The advantages are that the price is cheaper if making a larger number of modules, the information system will be met with business processes. Another advantage is the application system can be processed and modified immediately if there are any changes in terms of policies or systems in the company. The disadvantages are, will be more expensive if the company only makes a small number of modules or if the after sales support is effective.

Conceptual framework and Hypothesis formulation

DeLone and McLean (2016) have identified six parameters or variables used in evaluating an information system. These are; system quality, information quality, usage, user satisfaction, personal impact, and organisational impact. In a recent study DeLone and McLean (2016), added new variables, namely service quality, intention to use, and net impacts that function to evaluate the implementation of information systems. This study will analyse the relationship among variables taken from DeLone and McLean (2016). However this research did not include intention to use; because in this study the private company all users were required to use the company's ERP application SIMFONI. There are three independent variables, namely the quality of the system, information quality, and service quality. The variable that is affected or the dependent variable is the performance of its employees, while user satisfaction is an intervening variable that theoretically affect between independent and dependent variables. Three components of the ERP information system implementation have been identified, which are system quality, information quality and service quality. Figure-2 below shows the model of the research.

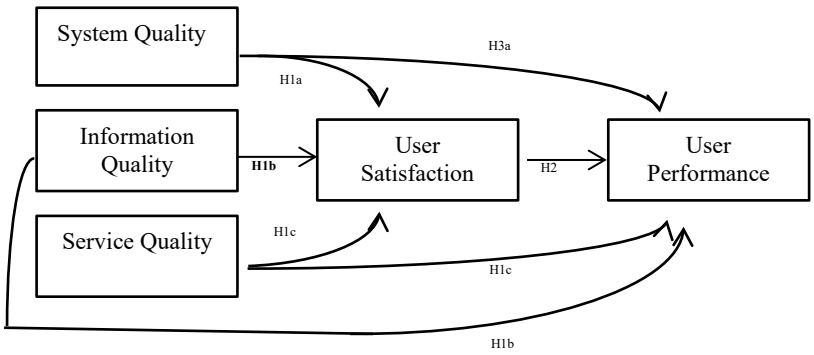

Figure-2: Research Model

Research on the effect of information systems on individual impact and organisation conduct show that information quality, system quality, service quality, and user satisfaction affect organisational performance (Abrego, Sanchez, and Medina, 2017). Stefanovic, Marjanovic, Delić, Culibrk and Lalic (2016), conclude that all quality dimensions information quality and service quality had a positive impact on the intention to use, and that only service quality had a significant effect on user satisfaction. These studies do not examine intention to use, because the model is conducted in a private business. In this case it is mandatory for every employee to use the system, SIMFONI. The business is still in the beginning stage of using ERP and the system is made by the company's IT personnel.

H1a. The higher the system quality the greater effect of user satisfaction
H1b. The higher the information quality the greater effect of user satisfaction
H1c. The higher the service quality the greater effect of user satisfaction

One of the important aspects to consider is the firm's size in enterprise resource planning. According to Hassab, Elnaby and Hwang (2013), defining performance during implementation of the functions is required. Iranto (2015) describes the individual performance as the user's opinion of the specific application system used in improving their performance within the organisation. So it can be concluded that the use of an information system on individual users (individual impact) is defined ,as the level of someone's trust using a particular system can improve its performance. Furthermore, research conducted by Davis et al., explains that there are six components used to measure individual performance, which consists of completing on time, improving performance, increasing productivity, increasing effectiveness at work, ease in carrying out tasks, and have used in doing the work.

H2. The higher the user satisfaction the higher effect to the user performance

ERP system implementation is very importance and has many benefits for organisations (Tarhini, Ammar, Tarhini, & Masa'deh, 2015). This study will examine the factors of ERP application information systems developed by a company called SIMFONI, for user performance. This research also discusses the influence of the user satisfaction of the system on individual performance. The model and framework development is structured by adopting a journal from (Hassab Elnaby & Hwang, 2013) and research developed by (Iranto, 2015), which adopts the theory from De Lone & McLean.

H3a. The higher the system quality the higher the user performance
H3b: The higher the information quality the higher the user performance
H3c: The higher the service quality the higher the user performance

Research Method

Based on the research background and the research objective this research uses a quantitative explanatory research approach. To test the hypotheses of the model, a survey questioner was

distributed to 120 information users of the company that implemented ERP built by the company called SIMFONI. The sampling technique is a non-probability sample. The respondents consist of employees who are using the information system from all departments, directorate of finance, corporate directorate, directorate of operations, directorate of technology and marketing directorate. Data is collected by distributing the questionnaire to respondents. The answer options consist of 5 (five) Likert scales of 'strongly disagree', 'disagree', 'doubtful', 'agree', and 'strongly agree'.

Definitions and Measurement of Variables

The independent or exogenous variable in this study is the component in the implementation of Enterprise Resource Planning information system which consist of 3 component as variables. First is the quality of the system, with 6 (six) indicators used in this study, namely ease of use, ease of study, speed of access, system reliability, flexibility, and security. Second is the quality of information, which have 5 (five) indicators, namely accuracy, completeness, format/form, timeliness, relevance. The third is the quality of service, with 3 (three) indicators, the speed of response, technical capability, and empathy from the ERP information system developer. The intervening variable is user satisfaction. To measure this variable, the researcher refers to 3 (three) indicators, namely efficiency, effectiveness, user satisfaction. The dependent variable is user or employee performance, with 4 (four) indicators namely, completing on time, increasing productivity, increasing effectiveness at work, ease in carrying out tasks.

A reflective model approach is used to test the outer model. A validity test which includes convergent validity is used to measure the magnitude of the correlation between the indicator and its construct, and the discriminant validity for comparing each construct with the correlation between other constructs in the predetermined model. A reliability test is used to show the accuracy, consistency, and accuracy of a measuring instrument, based on two assessments, namely the value of composite reliability and the value of Cronbach's alpha. Testing the inner model or structural model, is a model that connects between latent variables using the calculation of variance inflation factor / VIF, and R Square or R^2. The data is analysed by the inferential statistical analysis with the PLS (Partial Least Square) method. Researchers chose to use PLS as an alternative to SEM using SmartPLS v3.2.8 software, to facilitate the data testing process. Hypothesis testing using the bootstrapping method is contained in the SmartPLS software version 3.2.8.

Results and Discussion

Respondent of this research are employees from many directorates of the company who use an ERP information system built by company. A total 120 employees obtain and respond to the questioner.

The respondents profile in detail are provide in Table-1.

Table-1: Characteristics and Respondents profile

	Category	Frequency	Percentage
Directorate	Finance	12	10%
	Corporate	25	20,8%
	Operation	50	41,7%
	Technology	18	15%
	Marketing	15	12,5%
Age	< 21 Years	9	7,5%
	21 – 30 Years	42	35%
	31 – 40 Years	36	30%
	41 – 50 Years	26	21,7%
	> 51 Years	7	5,8%
Sex	Man	90	75%
	Woman	30	25%
Computer Usage Time	< 1 Hour/Day	6	5%
	2 – 5 Hour/Day	30	25%
	6 – 10 Hour/Day	70	55%
	> 10 Hour/Day	14	5%
Application Usage Experience	< 6 Month	20	16,7%
	1 Year – 2 Year	34	28,3%
	> 2 Year	66	55%

Outer Model Evaluation

A. Test Validity

At the test stage, the validity is divided into 2 (two) test evaluations. The first is convergent testing. The assessment in concurrent validity testing based on two measures, namely the value of Loading Factor and Average Variance Extracted (AVE).

Table-2: Loading Factor Value Test Results

	User Satisfaction	Employee Performance	System Quality	Information Quality	Service Quality
User.Satisf.1	0,838				
User.Satisf.2	0,914				
User.Satisf.3	0,830				
Perform.1		0,791			
Perform.2		0,782			
Perform.3		0,879			
Perform.4		0,859			
Syst.Qu.1			0,661		
Syst.Qu.2			0,869		
Syst.Qu.3			0,820		

Syst.Qu.4			0,843		
Syst.Qu.5			0,549		
Syst.Qu.6			0,544		
Inf.Qu.1				0,684	
Inf.Qu.2				0,792	
Inf.Qu.3				0,803	
Inf.Qu.4				0,867	
Inf.Qu.5				0,792	
Serv.Qu.1					0,827
Serv.Qu.2					0,841
Serv.Qu.3					0,867

Table 4.8 above shows that all indicators have a value of more than 0.5 (> 0.5) which means that overall of the indicator is said to be valid.

Table-3: Average Variance Extracted (AVE) Test Results

	Average Variance Extracted (AVE)
User Satisfaction	0,742
Employee Performance	0,687
Information Quality	0,624
Service Quality	0,715
System Quality	0,529

Table-3 shows that all AVE values have values above 0.5 (> 0.5) on each construct variable, which means a valid result is achieved on each construct variable.

The next stage is discriminant validity testing, which is the cross-loading test stage.

Table 4: Cross Loading test result

	User Satisfaction	Employee Performance	System Quality	Information Quality	Service Quality
User.Satisf.1	0,838	0,499	0,396	0,430	0,469
User.Satisf.2	0,914	0,578	0,384	0,444	0,477
User.Satisf.3	0,830	0,510	0,351	0,386	0,634
Perform.1	0,470	0,791	0,332	0,469	0,361
Perform.2	0,416	0,782	0,274	0,494	0,402
Perform.3	0,523	0,879	0,202	0,437	0,319
Perform.4	0,613	0,859	0,369	0,462	0,381
Syst.Qu.1	0,245	0,210	0,661	0,294	0,258
Syst.Qu.2	0,421	0,379	0,869	0,544	0,280

Syst.Qu.3	0,319	0,193	0,820	0,476	0,241
Syst.Qu.4	0,390	0,329	0,843	0,503	0,343
Syst.Qu.5	0,213	0,167	0,549	0,270	0,216
Syst.Qu.6	0,242	0,191	0,544	0,356	0,190
Inf.Qu.1	0,262	0,373	0,399	0,684	0,398
Inf.Qu.2	0,449	0,485	0,649	0,792	0,452
Inf.Qu.3	0,375	0,460	0,389	0,803	0,413
Inf.Qu.4	0,411	0,445	0,391	0,867	0,390
Inf.Qu.5	0,396	0,433	0,439	0,792	0,390
Serv.Qu.1	0,544	0,429	0,337	0,508	0,827
Serv.Qu.2	0,481	0,345	0,262	0,443	0,841
Serv.Qu.3	0,528	0,333	0,295	0,353	0,867

The cross-loading value of each indicator for each construct variable has a higher value than the other indicators.

B. Reliability Test

Testing reliability uses two methods, testing the value of composite reliability and Cronbach's alpha. It is indicated reliable if both have values above 0.7. The following results are from both tests.

Table-5: Composite Reliability and Cronbach's Alpha Test Results

	Variable	Results
Composite Reliability	User Satisfaction (Y)	0,896
	Employee Performance (Z)	0,898
	System Quality(X_1)	0,867
	Information Quality(X_2)	0,892
	Service Quality(X_3)	0,883
Cronbach's Alpha	User Satisfaction(Y)	0,825
	Employee Performance(Z)	0,848
	System Quality(X_1)	0,816
	Information Quality(X_2)	0,848
	Service Quality(X_3)	0,801

Based on table 8, the results of the two tests both composite reliability and Cronbach's alpha overall have values above 0.7, so that it meets the requirements to say that the data is reliable to use.

Inner Model Evaluation

Testing the inner model in PLS is evaluated using the calculation of variance inflation factor / VIF, and R-Square or R^2.

A. *Variance Inflation Factor / VIF*

Standard values commonly used to indicate the presence of multicollinearity are VIF values and should not be greater than 10 (> 10). It can be interpreted that VIF is smaller than 10, so there is no multicollinearity.

Table 6: Variance Inflation Factor/VIF Test Results

Variable	VIF Results
System Quality → User Satisfaction	1,517
Information Quality → User Satisfaction	1,810
Service Quality → User Satisfaction	1,374
User Satisfaction → Employee Performance	1,790
System Quality → Employee Performance	1,584
Information Quality → Employee Performance	1,839
Service Quality → Employee Performance	1,788

The test shows that all value of relationships between variables are below 10, which indicates that the equation between the independent variables and the dependent variable does not have multicollinearity.

B. *R-Square / R2*

R-Square values are presenting in the range of 0 to 1. The more the R-square value approaches, the number 1 is better.

Table 7: R-Square Test Results

	R-Square
User Satisfaction	0,441
Employee Performance	0,470

Table-7 shows that the R-square value for the User Satisfaction is 44.1% and 47% four employee performance variables are influenced by the system quality, information quality and service variables quality.

Hypothesis Test

In this research, hypothesis testing is done by processing data through the bootstrapping method on the SmartPLS 3.2.8 application. The results of data processing through the bootstrapping process can be seen in the table below.

Table 8: Hypothesis Test Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Syst.Qu → User.Satisf	0,193	0,203	0,082	2,351	0,019
Inf.Qu→ User.Satisf	0,126	0,131	0,114	1,107	0,269
Serv.Qu→ User.Satisf	0,481	0,472	0,087	5,530	0,000
User.Satisf → User.Perf.	0,473	0,473	0,119	3,973	0,000
Syst.Qu → User.Perf.	-0,060	-0,056	0,089	0,683	0,495
Inf.Qu → User.Perf.	0,377	0,379	0,119	3,159	0,002
Serv.Qu → User.Perf.	-0,024	-0,026	0,098	0,243	0,808

Hypothesis testing results as seen in table-8 show that H1a: The higher the system quality the greater effect of user satisfaction is supported; H1b: The higher the Information quality the greater effect of user satisfaction is not supported; H1c: The higher the Service quality the greater effect of user satisfaction is supported; H2: The higher the user satisfaction the higher effect to the user performance is supported; H2: The higher the user satisfaction the higher effect to the user performance is supported; H3a: The higher the system quality the higher the user performance is not supported; H3b: The higher the information quality the higher the user performance is supported; and H3c: The higher the service quality the higher the user performance is not supported. The result of this research indicates that four hypothesis are supported and three hypothesis are not supported.

Discussion and managerial implications

System Quality on User Satisfaction

The results of the evaluation of the outer model and inner model show that all indicators are valid and can be used as indicators of hypothesis testing. Furthermore, the results of testing the hypothesis between System Quality and User Satisfaction variables are that the System Quality has a significant effect on the user satisfaction. These results prove that respondents are satisfied with the System Quality on the application of SIMFONI at the company. It also indicates that the existing system SIMFONI application has a good Quality System, which is easy to use, easy to learn, can be accessed quickly, is a reliable system and has flexibility, and is also safe. The SIMFONI application must give more attention in the system quality in order to increase user satisfaction.

Information Quality on User satisfaction

The results of the evaluation of the outer model and inner model show that all indicators are valid and can be used as indicators of hypothesis testing. Furthermore, the results of testing the hypothesis between the Information Quality and User Satisfaction is that the Information Quality variable does not significantly influence the User satisfaction variable. These results prove that the role of Information Quality on the application SIMFONI, does not strongly

influence user satisfaction. In other words, the information quality is not the factor that can increase user satisfaction. But it doesn't mean that the information quality is not important. SIMFONI application must remain concerned with information quality, because information quality is one of the three component which determine the success of information system implementation in the organisation. Information quality is very important for the higher level management especially in decision support.

Service Quality on User satisfaction

The results of the evaluation of the outer model and inner model show that all indicators are valid and can be used as indicators of hypothesis testing. Furthermore, the results of hypothesis testing between Service Quality and User Satisfaction are that Service Quality variables have a significant effect on user satisfaction. These results indicate that service quality is an importance variable in determining user satisfaction. SIMFONI application must maintain the quality of service, especially for users or employee who use the application in their daily work.

User Satisfaction on Employee Performance

The results of the evaluation of the outer model and inner model show that all indicators are valid and can be used as indicators of hypothesis testing. Furthermore, the results of hypothesis testing between User Satisfaction and Employee Performance are that User Satisfaction has a significant effect on user or employee performance. These results prove that user satisfaction in using the SIMPONI application must be maintained, because a sense of comfort and security in completing their work is very important in order to increase their performance, and the company performance as well.

System Quality on Employee Performance

The results of the evaluation of the outer model and inner model show that all indicators are valid and can be used as indicators of hypothesis testing. Furthermore, the results of testing the hypothesis have a direct effect of System Quality to user or employee performance are not significantly influence by user or employee performance. These results prove that System Quality in the application of SIMFONI application in the company does not have an impact directly on employee performance, but must be mediated by user satisfaction to increase productivity and effectiveness of the employee.

Information Quality on Employee Performance

The results of the evaluation of the outer model and inner model show that all indicators are valid and can be used as indicators of hypothesis testing. Furthermore, the results of testing the hypothesis between the Information Quality and User or employee performance are significant. These results prove that even though Information Quality does not affect the user satisfaction, this variable has a significant positive impact on employee performance. It also proves that information quality is an importance factor that must be maintained by the company, especially

the information system developer to raise productivity and effectiveness of users and the company.

Service Quality on Employee Performance

The results of the evaluation of the outer model and inner model show that all indicators are valid and can be used as indicators of hypothesis testing. Furthermore, the results of hypothesis testing between Service Quality and user or employee performance show that they have no significant effect on Employee Performance. These results prove that the Service Quality provided by the developers of the SIMFONI application at the company is not the most important role in increasing employee performance. But the SIMPONI developers must still be concerned with the service quality, because this factor has a significant effect on user satisfaction.

Conclusion

Enterprise resource planning is an importance vehicle to increase the success of the business processs of the company. Based on the results that have been obtained from 120 respondents the System Quality and Service Quality has a significant effect on the User Satisfaction ERP information system so that it has a direct impact on Employee Performance at the company PT. Infoglobal. Information Quality does not have a significant effect on user satisfaction, but it has a direct effect on Employee Performance in PT. Infoglobal. Direction for further research is to be able to use or add other variables to test the impact of information system implementation. This can be done on other objects that have different information systems, such as making comparisons between one information system applications with additional information system applications, with various methods of research.

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