Comparison Study of Performance Analysis of Information System Using The Methods of *End-User Computing Satisfaction* and It Balance Score Card

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Abstract – Evaluation of information system performance is needed to get an overview of the ease of end-users in utilizing a new technology. This study aims to evaluate the performance of information systems in a state-owned company (PT PLN Madya Langsa) based on an end-user perspective that is separated into two categories: employees and managers. The level of employee satisfaction (primary user) is measured using EUCS (aspect of: content, accuracy, format, ease of use, timeliness, and satisfaction). The manager's satisfaction level (secondary user) is measured by using IT BSC (aspect of: company contribution, user, operational excellence, and future orientation). The evaluation on the primary user showed that it was low at 25.6%, moderate at 56.64% and high at 18%. The percentage of user satisfaction with the information systems is 72.9% of the results expected by users. Meanwhile, evaluation on the secondary user obtained the following results: low at 10.5%, moderate 84.2% and high at 5.3%. The percentage of user satisfaction with the information system was 92.8% of the results that is expected by users. This study also discusses why there are differences in the percentage of primary user satisfaction compare to the secondary user and provides suggestions how to improve the level of satisfaction of the end users in the future.

Keyword : *End-user computing satisfaction*, *end user satisfaction, evaluation of information system, IT Balanced Scorecard*.

1. Introduction

The State-Owned Company Limited Liability Company (PT PLN) of the City of Langsa aims to make electricity as a moderate to improve the quality of people's lives so that PT PLN is proactive in running the electricity business and other related fields. As the carrier of business and social functions), PT PLN always strives to create the best service process (fast, easy, quality). For this reason, PT PLN adopts information system infrastructure to be implemented in their organization. Since 2012, the information system at PT PLN has become uniform, standard, integrated, centralized and web-based, more organized and transparent.

Management information system (MIS) is an information system that provides information oriented to management interests that reported based on the transaction process and the organization's operations. The Decision Support System and Executive Information System can assist in decision making and planning as well as assessment of the executive manager. MIS as an organized approach can be used as a company resource that provides fast, precise and accurate. MIS is also used to plan information that facilitates the management process. Information systems that are highly needed by an organization both business and non-business, have the main roles; supporting business operations, supporting managerial decision making, increasing company profits, reducing business costs, increasing efficiency, reducing error rates, increasing security and relationships with consumers and many others [1].

Integrated Customer Service Application (AP2T) integrates all PLN business administration business processes with the company's revenue management and supervision system (P2APST), Enterprise Resource Planning (ERP) systems, prepaid electricity systems, non-electricity billing systems, 123 Contact centers and other features which makes the PLN service easier, faster and more certain.

The user of this system is divided into two levels, namely the primary user and secondary users based on age, educational background, and of work experience. Operational employees need data and information to carry out their duties and responsibilities and make decisions. [2]. Primary users are consisted of operational employees/operators. Secondary users are the managers of the company/organization. To measure the level of satisfaction of the end user in the primary user category, the EUCS method is used, while to measure the level of satisfaction of the secondary user, the BSC IT method is used. This is because IT BSC involves more measurements that tend to be more suitable for managers (decision makers).

2. Methods of Research

Reliable research requires a strong scientific foundation. Previous studies were the basis for the development of

current research. A study for primary users was conducted by Ilias, et al. [3] who analyzed the Computerized Accounting System (CAS) at the Ministry of Finance, East Malaysia. The results of the study show that ease of use, content, and accuracy have a significant effect on system user satisfaction. In other words, CAS is needed to provide results in the form of output or accurate content. The evaluation of IS was also carried out by Dastgir and Motezaie towards financial institutions in Iran [4]. Roses [5] analyzes end user satisfaction with Enterprise Resource Planning in the context of Transnational Banks. The results of the Datstgir and Roses research concluded that the satisfaction of the end user towards the system is quite high, this can be the basis for future decision making.

Furthermore, research was also conducted by Lawson et all [6] to determine e-government on the G2C website operated by CVSO; a special service for veterans in America. In the management development journal [7], Chavan discussed the implementation of the BSC in organizations in Australia. Both researchers concluded that IT BSC is very helpful in knowing the development, performance, and constraints faced by the end user of an information system.

2.1 End User Computing Satisfaction (EUCS)

Doll and Torkzadeh (1988) defined end-user satisfaction as "an affective attitude towards a specific computer application by someone who interacts with the application directly." Doll and Torkzadeh (1988) conducted a survey of 618 respondents to examine user satisfaction by modifying instruments and factor analysis. His research produced 12 items of instruments measuring user satisfaction on the quality of the system and information, which was obtained from the end user of the information system. The twelve items produced are divided into five components, namely content, accuracy, format, ease of use, and timeliness. Doll and Torkzadeh (1988) have proven the validity and reliability of these instruments. [8]

The five components in EUCS can be grouped into two broad categories, namely (1) satisfaction of information (content and accuracy) and (2) system satisfaction (format, ease of use, actuality/timeliness).

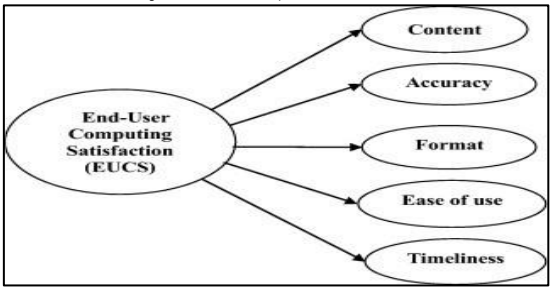

Figure 1. Model of End-User Computing Satisfaction

The End-User Computing Satisfaction component developed by Doll and Torzkzadeh can be described as follows.

a. Content: this component measures the user's satisfaction with the content or content of an information system. The more complete the content, the higher the level of satisfaction felt by the end user on the system they are applying. The contents of the system can be functions or modules and information generated by a system.
b. Accuracy: user satisfaction is measured by looking at the accuracy of the system. Accuracy is judged by how much or often a system produces an incorrect output or error that is usually obtained from data processing. The higher the accuracy, the higher the level of satisfaction of the end user.
c. Format: the format component measures the satisfaction of the end user in terms of appearance and aesthetics or beauty of the system interface they apply. Format, in addition to being judged in terms of beauty, is also viewed from the ease of display is accessed by end users which leads to user effectiveness.
d. Ease of Use: the size is whether the system is enough to make it easy for users to use every feature available for data entry, data processing to information retrieval according to user needs.
e. Actuality/timeliness: this component reviews the satisfaction felt by users of information generated by the system with high actuality. This system is also called a real time system, where each request submitted by the user for processing data can be processed and displayed output quickly and precisely.

2.2 IT Balanced Scorecard (IT BSC)

Balanced Scorecard (BSC) is a performance management system that enables business strategy based on measurement and follow-up. The BSC was initially pioneered by Robert S. Kaplan and David P. Norton at the enterprise level. However, in its development, it was very easy to use the BSC into information technology, both in departments and projects related to information technology. IT BSC is a popular tool because of its concept which is widely supported by international consulting groups such as Gartner, IDC, etc. As a result, many real-life applications are developed and supported by software tools. According to research conducted by the IT Governance Institute (www.itgi.org) in "Measuring and demonstrating the value of IT" it was demonstrated that 30% of IT managers use BSC IT devices as instruments to measure and manage the performance of IT investments, projects and IT departments [8].

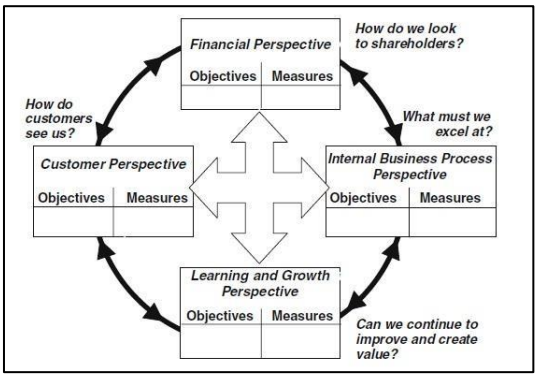

Figure 2. Balanced Scorecard Kaplan and Norton

The focus of the four BSC perspectives needs to be translated as seen in Figure 2.7 Orientation Perspective Users represent users (internal or external) evaluating IT. The Operational Excellence Perspective represents the IT processes that occur to develop and deliver applications. The Future Orientation Perspective represents the human resources and technology needed for the continuity of IT. Perspective Business contributions represent business values created by IT investments.

3. Evaluation of Information System

3.1 EUCS Evaluation

EUCS analysis is the best way to measure end-user satisfaction in a Computer-Based Information System because it does not only involve primary users, they use the output of the system for decision making but also secondary

users who are responsible for using software applications especially in data entry or preparing output reports but does not use the output directly in his work.

Tabel 1. Status of Orientasi End-User Computing Satisfaction

Component of EUCS	Frequency	Percentage (%)
1. Content		
-Low	11	28
-Moderate	24	62
-High	4	10
2. Accuracy		
-Low	9	23
-Moderate	27	69
-High	3	8
3. Format		
-Low	11	28
-Moderate	26	67
-High	2	5
4. Ease of Use		
-Low	12	31
-Moderate	23	59
-High	4	10
5. Timeliness		
-Low	9	23
-Moderate	28	72
-High	2	5
6. Satisfaction		
-Low	11	28
-Moderate	23	59
-High	5	13
Total Tinjauan Kepuasan EUCS		
-Low	10	26
-Moderate	22	56
-High	7	18

3.2. IT BSC Evaluation

IT BSC is the best way to measure business and non-business performance because it does not only review from one side but from four perspectives or orientations. The four main orientations highlighted through the Information Technology of the Balanced Scorecard are:

a. Company Contribution Orientation
b. End User Orientation
c. Operational Excellence Orientation
d. Future Orientation

In IT BSC, the four perspectives become an inseparable entity, also a performance indicator that complements and has a causal relationship. Based on the analysis that has been done, the results can be summarized in the following table.

Tabel 2. Status of IT Balanced Scorecard Orientation

IT BSC Orientation	Tahun		Persentase (%)	Kenaikan
	2011	2012		
a. Income Orientation	421,276,899,514	453,198,072,333	31,921,172,819	7.58
b. End User Orientation				
a. Low			21	
b. Moderate			58	
c. High			21	
c. Operational Excellence Orientation				
a. Low			10,5	
b. Moderate			79	
c. High			10,5	
d. Future Orientation				
a. Low			5,3	
b. Moderate			89,4	
c. High			5,3	

4. Comparison of the Result

Comparisons can be made by looking back at the variables and orientation of each method of assessment. By entering all of the data in the table below, the comparison can be seen as follows.

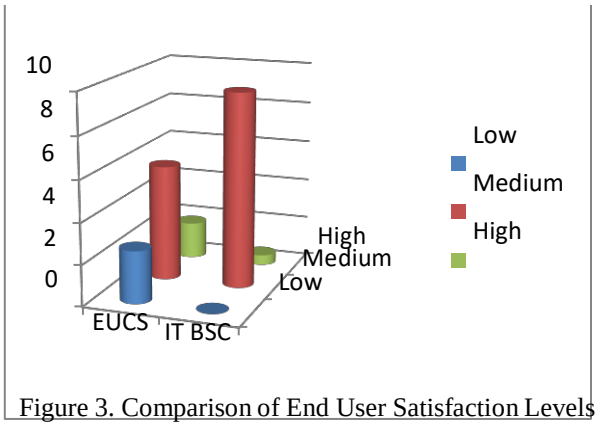

Figure 3. Comparison of End User Satisfaction Levels of Information Systems at PT PLN in Langsa City in terms of EUCS Variables and BSC IT Orientation

From the graph in the picture above, it can be seen that the comparison between the EUCS variable and BSC IT Orientation is used to assess the performance of the Information System at PT PLN in Langsa City. To remind again, that EUCS is used to assess the performance of Information Systems in terms of the perceptions of the staff/employees to the level below the supervisor, namely the operator. They are the ones who are tasked with entering and processing data as well as making output reports but not using them directly. For staff/employees of this level, the Information System they applied has a low satisfaction level of 25.6%, moderate satisfaction 56.64% and high satisfaction of 18%. With this, it can be concluded that for them, the system is quite good but still requires improvements in some EUCS variables (as discussed earlier).

Sufficient contrast results can be seen from the data generated from the analysis of end-user satisfaction with the system in terms of staff/employees at manager level, assistant managers, supervisors and experts. There is no low level of satisfaction (can be seen in the graph above), while the level of satisfaction is dominating which is equal to 94.7% and 5% have a high level of satisfaction. For staff/employees whose level is above this operator, the existing information system has an impact on both decision making and policy. From the interview, it was even mentioned that the new system had made all inputs, processes and outputs easier and safer. Company assets can be arranged in a good system and in the financial field. The level of financial security is higher because the process of transactions in the form of cash is no longer used but transfers, in other words increase revenue security. Overall, the new system has made a change for the better.

5. Conclusion

Based on the description presented in the previous chapters and answering the problem formulation conclusion can be drawn as follows.

1. EUCS: Variable Performance Content: content from Information Systems has provided what staff/employees need to support their performance. It is shown in the large percent of moderate and high satisfaction rates for the system, which are 62% and 10% respectively. However, companies must also take into account the percentage of dissatisfaction with the content of the Information System, which is 28%. Variable Performance Accuracy: the level of user satisfaction on system accuracy is good, 69% have moderate satisfaction, 8% have a high level of satisfaction and 23% have a low level of satisfaction. Variable Performance Format: end users are satisfied with the display between systems. This can be seen from the percentage of respondents who have a moderate and high satisfaction level of 67% and 5%. However, there is also a low satisfaction level of 28%. Variable Performance Ease of Use: as many as 59% of users have a moderate level of satisfaction with user convenience variables, as many as 31% even consider the system still difficult to use. Timeliness Variable Performance: the system has provided quite high actuality and has an impact on the level of moderate and high satisfaction of the respondents which is as much as 72% and 5%. However, there are 23% who have low satisfaction with the system. Overall the system: for staff/employees of this level have a low satisfaction level of 25.6 percent, moderate satisfaction of 56.64% and high satisfaction of 18%. Thus, the existing system is quite good.
2. IT BSC: Company Contribution Orientation: Company Contribution Orientation in this study includes the growth of the company's business income, where there was an increase of 7.58% from 2012 to 2011 and significant results from the calculation of income from each month (January to with July) in 2013. Orientation of User Satisfaction: at 21% and 58% of staff/employees consider the Information System to have successively high and moderate levels of satisfaction (if added to 79%) which is greater than those who feel dissatisfied (21%). Operational Excellence Orientation: information systems that have a level of reliability are quite good, where as many as 10.5% are moderate operational advantages, and 79% are moderate. Only 10.5 percent stated that operational excellence was low. Future Orientation: Future Orientation has a moderate value of 89.4%, this can certainly be increased to closer to 100%. Overall system: There is no low level of satisfaction, while the level of satisfaction is dominating which is equal to 94.7% and 5% have a high level of satisfaction. For staff/employees whose level is above this operator, the existing information system has had a good impact on decision-making and policy and has been good enough.

Based on the conclusions that the author has described, there are several things that can be a concern and consideration for PT PLN Langsa in the hope of future improvements. Some of these things are:

1. PT PLN Langsa needs to improve the reliability of Information Systems especially in terms of content where more complete and varied content needs to be provided in accordance with staff/employee needs. Then in terms of ease of use of information systems, it needs

to be improved so that the system can be more easily used. Another way is to provide more intense training considering this system is a very new system.

2. In Future Orientation, more training and seminars need to be provided for staff/ employees in the IT field, especially the Information System they use.
3. As shown by the results of the comparison between satisfaction with the system, it was found that the staff/employees of the supervisor level up had sufficient satisfaction with the existing system, but on the contrary the operators still found a low level of satisfaction. Thus the performance of end-user satisfaction must be improved, namely by improving the system to be better in the future.

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