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Effectiveness of Implementing Enterprise Resource Planning

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Abstract: Service level delivery PT. XYZ average 90% which is still below the target of total orders that must be fulfilled by 100%. PT. XYZ has determined the development of operational systems, one of which is the use of Information Systems based on Enterprise Resource Planning (ERP). Based on this phenomenon, the authors are interested in examining whether there is a relationship and influence regarding the implementation of ERP that has been run by the company and its impact. The location of the research was conducted at PT. XYZ which is located in Surya Cipta Industrial Estate, Karawang, West Java, Indonesia. In this study there are 2 (two) variables, namely: IT Implementation and Company Performance. The sampling category in this study includes non-probability sampling using purposive sampling technique. In this study, the authors use the SEM-AMOS analysis method with a total of 230 samples. From this study it can be concluded that ERP implementation has a positive effect on CP. Each increase in one unit of ERP implementation can increase CP. Then the "Low Cost Strategy" indicator on the "Strategic (Strategic benefit of ERP)" dimension has the most influence on ERP, besides that PT. XYZ needs to develop "On Time Delivery" in the "Operational Performance" dimension in order to produce even better corporate performance. In order for the ERP implementation that has been set to run optimally, it is necessary to retrain every employee. It aims so that every employee understands the use of ERP more efficiently and effectively. In order for CP to be achieved according to the target, it is necessary to set targets by paying attention to operational processes and optimizing the use of ERP. Research needs to be done by re-testing on different industrial groups.

Keywords: Enterprise Resource Planning, Corporate Performance, Structure Equation Model, AMOS

I. INTRODUCTION

Starting with the existence of business competition in the era of globalization and seeing a market that tends to be unstable. Many companies strive to have a high and good advantage in terms of quality as well as price. Therefore, companies are required to continue to innovate in meeting the needs and demands of their consumers. For example, in the motorcycle industry, apart from focusing on selling motorcycle units, the industry must also focus on its after-sales network, in this case the availability of genuine spare parts for the motorcycle.

Basically, the demand and fulfillment of market needs must be balanced. For this reason, Supply Chain Management (SCM) is needed to balance these two things. SCM is an activity in coordinating all processes or activities that begin with raw materials and end with customer satisfaction. The part of SCM consists of suppliers, manufacturers, distributors and wholesalers who send products or services to final consumers [1]. In accordance with the principle SCM runs when there is coordination, integration and collaboration through information, demand and production planning, capacity changes, marketing strategies, product development, application of new technologies, purchasing planning, delivery, and everything that has an impact on purchasing, production and distribution planning [2].

In today's era of globalization, the flow of information is very fast. The development of science and technology is very influential on the progress of the company. Electronic business methods allow companies to link all information and activities internally and externally to the company so that data processing systems are more efficient and flexible, work more systematically and integrated with suppliers and distributors, and better meet customer needs and expectations. Information systems are required to support rapidly changing business conditions. One of the ways to improve company performance is the application of information technology in company activities that can increase excellence and competitiveness. In order to realize information reliability, companies can implement an information system that can integrate all activities and functions within the company[3].

PT. XYZ is a company engaged in the two and three wheeled motor vehicle industry. In running its business PT. XYZ not only manufactures two wheeled and three wheeled vehicles, but also manufactures and provides genuine spare parts for its production vehicles from manufacturing, distribution and retail.Average delivery service level is 90%, which is still below the target for total orders that must be fulfilled by 100%. Judging from the above conditions, it is necessary to synchronize the SCM process from suppliers, manufactures, warehouses to dealers that must be done. So that the impact on the next stage is able to provide a better service level. Fulfillment of orders that are not optimal will result in the completeness of spare parts at each Dealer not being optimal.

To deal with the above phenomenon, PT. XYZ has determined the development of operational systems, one of which is the use of Information Systems based on Enterprise Resource Planning (ERP). With the use of this ERP, it is expected to maximize the total delivery of spare parts. integration and collaboration internally and with suppliers become more efficient, increase bargaining power, form a value chain that is able to encourage the realization of competitive advantage so that it has an impact on improving the company's performance on an ongoing basis.Based on that phenomenon, the authors are interested in further researching whether there is a relationship and influence regarding the ERP implementation that has been run by the company and its impact, in the thesis entitled "Effectiveness of Implementing Enterprise Resource Planning".

II. STUDY AND LITERATURE

1. Enterprise Resource Planning (ERP)

Given the important role of information in supporting supply chain performance, managers must understand how information is collected and analyzed. Enterprise Resource Planning (ERP) is an integrated information system that can accommodate specific information system needs for different departments in a company. ERP Consists of various modules that are provided for various needs in a company, from modules for finance to modules for distribution processes. In this modern era, ERP systems are becoming popular among large companies. ERP implementation has now become a trend in the business world because most large companies that implement ERP also require their partners and subsidiaries to use ERP from the same vendor, so the use of ERP is increasingly widespread.

ERP system's ability to handle all activities within the organization, bringing a new work culture and integration within the organization.Taking over the routine tasks of personnel from operator level to functional managers, thus providing the company's human resources with the opportunity to concentrate on handling critical issues and having long-term impacts. ERP systems also have a significant cost efficiency impact with continuous integration and monitoring of organizational performance.

In practice, ERP implementation projects often fail because the benefits provided by ERP to companies cannot be felt, this can happen because the company does not move completely to the new system and the difficulty of the company culture to adapt to the new system. The main problem that must be faced by companies to implement ERP is that it is quite expensive and its implementation has high complexity. The installation of ERP modules must be tailored to the needs analysis of the organization or company itself. The data input process also requires high accuracy and takes a long time to complete. There are two types of ERP systems that are generally used, namely paid ERP systems and free or open source ERP systems. Currently, various ERP systems are circulating in the market, commercial ERP systems include SAP, Baan, Oracle, IFS, Peoplesoft and J.D. Edwards, while the popular open source ERP systems today are Compiere, Adempiere, WebErp.

[6] defines information technology (IT) as tools, both hardware and software, which are used to determine the existence of information and analyze this information to make the best decisions for the supply chain. [6]term IT as the eyes and ears, even part of the brain, of management in a supply chain that captures and analyzes the information needed for decision making.

Manufacturing companies that have to manage complex production activities on a daily basis will place more emphasis on the availability of IT to help with analysis and planning. So it is necessary to implement information technology for competitive advantage in company operations in the era of globalization.

One part of IT in today's companies and supply chain networks is Enterprise Resource Planning (ERP). ERP is a major advancement in IT that has changed the way various departments within organizations manage data and information. Historically, each department or function within the organization had its own system to manage the data and information they needed. ERP is a software package that seeks to integrate all departments.

The use of an ERP system can also reduce time and total operating costs because ERP provides the information needed to facilitate decision making and organizational activities[7]. Successful ERP implementation will result in significant impacts and benefits for the organization. These implications can be evaluated from different points of view. One perspective shows the benefits of an ERP system on an organization and its effect on other areas or other IT systems such as the Supply Chain Management (SCM) system that is integrated with it [8].

Companies that apply ERP the most are companies engaged in manufacturing. This research has also been studied in India by several researchers, among others. [9]in their research, researchers found that the level of sales was able to moderate the effect of ERP implementation on company performance.

Meanwhile, the research conducted by [10] produced a hypothesis that the benefits of ERP include three dimensions, namely operational benefits, tactical benefits, and strategic benefits. These three dimensions are things that are felt directly by managers, customers, suppliers, distributors, and other companies and all of these dimensions are important in building effective company performance.

2. Corporate Performance

Corporate Performance (CP) is the company's ability to handle challenges, customer satisfaction, order fulfillment, product innovation, inventory costs, market penetration, product costs, quality costs, profitability, productivity, response to consumer requests, timely delivery [11]; Referring to previous research, the company's performance variables include: Time to market measure, Delivery dependability, Quality factor, Cost Factor, Profitability [12]; Average return on investment, Average profit, Profit Growth, Average return on sales [11]; Financial criteria (Return of Investment, Sales profit margin, Growth ROI), and Market criteria (Sales growth, Market share growth, Overall competitiveness concern) [13] Financial & Stewardship, Customer Service, Internal Business Operations, Employe & Organization, Innovation [12]; Financial Performance, Operational Performance, Market Based Performance [13]. Based on the theoretical basis above, the authors measure the company's performance variables using the dimensions of financial performance, operational performance and market-based performance.

III. RESULTS METHODS

The research location was conducted at PT. XYZ which is located in Surya Cipta Industrial Estate, Karawang, West Java, Indonesia.In this study there are 2 (two) variables, namely: IT Implementation and Company Performance.The population is a collection of individuals with predetermined qualities and characteristics. The sample is part of the population whose characteristics will be studied and represents the population. The population in this study were employees of PT. XYZ and Principal who are at the level of Supervisor, Assistant Manager, Manager, General Manager and Board of Directors with a total population of 300 people.

The sampling category in this study includes non-probability sampling using purposive sampling technique. Where in determining the sample is based on subjective considerations or judgments and does not use probability theory and the sample is people who are related and or involved in SCM activities.In this study, the authors used the analysis method with SEM-AMOS. SEM is a set of techniques that allows testing of several endogenous variables with several exogenous variables simultaneously [21]. The use of SEM allows researchers to examine the relationships between complex variables to obtain a comprehensive picture of the entire model.

According to Hair et al in [3] that the minimum sample required for analysis with the Structural Equation Model (SEM) is 100 samples. However, according to the literature that analysis with covariant-based SEM (Covarian Based-SEM, CB-SEM) the recommended number of samples ranges from 200 - 800 samples [20]. The research sample size for model submission using SEM is between 100-200 samples or depending on the number of estimated parameters, namely the number of indicators multiplied by 5 to 10. In this study there are 22 indicators. Thus the minimum number of samples required is 230 samples

The data analysis tool that researchers used in this study was Structural Equation Modeling (SEM) with the AMOS application. Structural Equation Model (SEM) is a multivariate statistical technique that combines factor analysis with regression analysis. SEM analysis aims to examine all the relationships between complex variables to obtain a comprehensive picture of the entire model. The variables in question consist of latent variables and observation variables. Latent variable is a variable formed from several proxies which are formulated as observed variables. Observed variables are observed and measured variables that can be used to form a new variable (surrogate variable or latent variable).

The next step is to calculate the load and assess the statistical significance of each indicator. If it is proven insignificant, then the indicator should be discarded or changed to fit for the latent variable [8]. To apply SEM, the data must be normally distributed. Normality data can be knowen by comparing the z-score value with the critical ratio value (c.r.) of the data obtained. Z-score is the result of subtracting the average value of the raw data which is then divided by the standard deviation. The confidence level that is often used in SEM analysis is 99% (significance level = 0.1). At this level of significance, the z value obtained from the z table is ± 2.58. The data is normally distributed if the value of c.r. of these data is between -2.58 to +2.58.

IV. RESULTS AND DISCUSSION

Questionnaires that have been distributed, all returned and completely filled in so that data is obtained from 337 valid respondents which can be processed for further analysis. Table 4.1 describes that the results of the questionnaire obtained data on the composition of respondents by gender consisting of 58% male and 42% female. From the age of the respondents, it shows that the majority of respondents aged 35 years are 22%, then aged 30 to <35 years are 24%, 25 to <30 years are 33%, 20 to <25 years are 22% and < 20 year by 0%. Characteristics by position indicate that the majority of respondents who filled out the questionnaire had positions at Staff level by 67%, then at Supervisor level by 19%, at Manager level by 14%, at Director level by 0% and at Director by 0.87%. Based on the period of service, it shows that most of the respondents have a

service period of < 5 years as much as 45%, then 6 to 10 years by 44%, 11 to 15 years by 10%, and 15 years by 1%.

Output Regression Weight of variable implementation ERP shows that the probability value of all indicators and dimensions of ERP1, ERP2 and ERP3 is 0.001 (***). Then all indicators and dimensions are declared valid.It can be seen that the loading standardized estimate of indicators ERP11 (0.710), ERP12 (0.723), ERP13 (0.901), ERP14 (1,000) on the dimensions of ERP1 and indicators ERP21 (0.714), ERP22 (0.717), ERP23 (0.858), ERP24 (0.704) against ERP2 dimensions and indicators ERP31 (0.651), ERP32 (0.785), ERP33 (0.678), ERP34 (0.756) to ERP3 dimensions. Dimensions of ERP1 (0.866), ERP2 (1.035), ERP3 (0.903) on the ERP variable. Standardized estimate outputs are all above 0.5. So hereby shows that all these indicators and dimensions can explain ERP Implementation Variables [10]

Output Regression Weight of variable corporate performance shows that the probability value of all indicators and dimensions is 0.001 (***). With this, all indicators and dimensions are declared valid.

It can be seen that the value of the standardized estimate indicator CP11 (1.782), CP12 (1.668), CP13 (1.826), CP14 (1.776), CP15 (1.715) to the dimensions of CP1 and indicators CP21 (2.700), CP22 (2.620), CP23 (2.640), CP24 (2.897) to the CP2 dimension and indicators CP31 (3.725), CP32 (3.780) to the CP3 dimension. Dimensions CP1 (0.789), CP2 (0.978), CP3 (1.066) to the CP variable. In the Standardized Regression Weight, all loading factor values (estimates) are above 0.5. This shows that all indicators and dimensions can explain the CP variable [10].

Analysis of multivariate normality in AMOS 24 was carried out using the critical ratio (c.r.) criteria of Multivariate on kurtosi. If the value of cr is in the range between ± 2.58, it means that the data is normally distributed in a multivariate manner [10]. The results of the normality test (Appendix 2) show that the c.r value for multivariate is -1.418 > 2.58. This means that all (multivariate) data are normally distributed.

Table 3.Goodness of Fit Test Result

GOODNESS OF FIT	CUTT-OFF VALUE	RESULTS AFTER MODEL MODIFICATION	STATUS
CMIN/DF	≤ 2,00	1.37	*Good Fit*
GFI	≥ 0,90	0.911	*Good Fit*
AGFI	≥ 0,90	0.889	*Marginal Fit*
NFI	≥ 0,90	0.96	*Good Fit*
RFI	≥ 0,90	0.932	*Good Fit*
IFI	≥ 0,90	0.908	*Good Fit*
TLI	≥ 0,90	0.847	*Marginal Fit*
CFI	≥ 0,90	0.901	*Good Fit*
RMSEA	≤ 0,08	0.044	*Good Fit*

Goodness of Fit (GFI) test results obtained a value of 0.911 and AGFI (Adjusted Goodness of Fit Index) of 0.889. The GFI and AGFI numbers range from 0 to 1, with guidelines the closer to 1 the model will be better at explaining the existing data. So with this number which is close to 1, it shows that the model can be considered fit.

The RMR test aims to calculate the residual or the difference between the sample covariance and the covariance estimate. The RMR test results obtained a value of 0.082. The smaller the RMR result, the better it indicates the closer the sample number is to the estimate. So with the acquisition of a very small RMR number close to 0, it shows that the model can be considered fit.

Incremental Fit Indices is a test comparing a certain model with a null model (baseline model), which is a model that has the assumption that all indicators are not correlated with one another. The NFI, CFI, IFI and TLI measuring instruments have a range of values between 0 to 1, where generally above 0.9 indicates the model is fit. NFI obtained a value of 0.960. CFI obtained a value of 0.901. IFI obtained a value of 0.908 and TLI obtained a value of 0.847. By obtaining a high number close to 1 and even some above 0.9, thus from the size of the incremental fit indices the model can be considered fit.

In Parsimony Fit Indices is a test that compares a complex model with a simple model. The model is considered fit if the PRATIO, PNFI, PCFI numbers are between the ranges of value for the saturated model and the independence model. PRATIO obtained a value of 0.924, PNFI = 0.910, PCFI = 0.808. from these results, the model is considered fit because it is between the value range 0 to 1. RMSEA is obtained 0.044 below 0.08 so it can be considered the model is still fit.

If one of the Goodness of Fit (GOF) criteria has been met, the model can be considered feasible (Widarjono, 2015). Overall Goodness of Fit can be assessed based on a minimum of 5 (five) criteria that are met (Ghozali, 2017). According to Latan, 2012 citing Hair et al, 2010 said that the use of 4-5 GOF criteria is considered sufficient to assess the feasibility of a model, provided that each of the GOF criteria, namely Absolute Fit Indices, Incremental Fit Indices and Parsimony Fit Indices are represented [21]. So it can be concluded that the whole model can be considered feasible and can be continued with hypothesis testing to find out how much influence between variables in the model.In the complete structural model that has been declared fit, then a hypothesis test is carried out so that the loading data is obtained as shown in Figure 2 below.

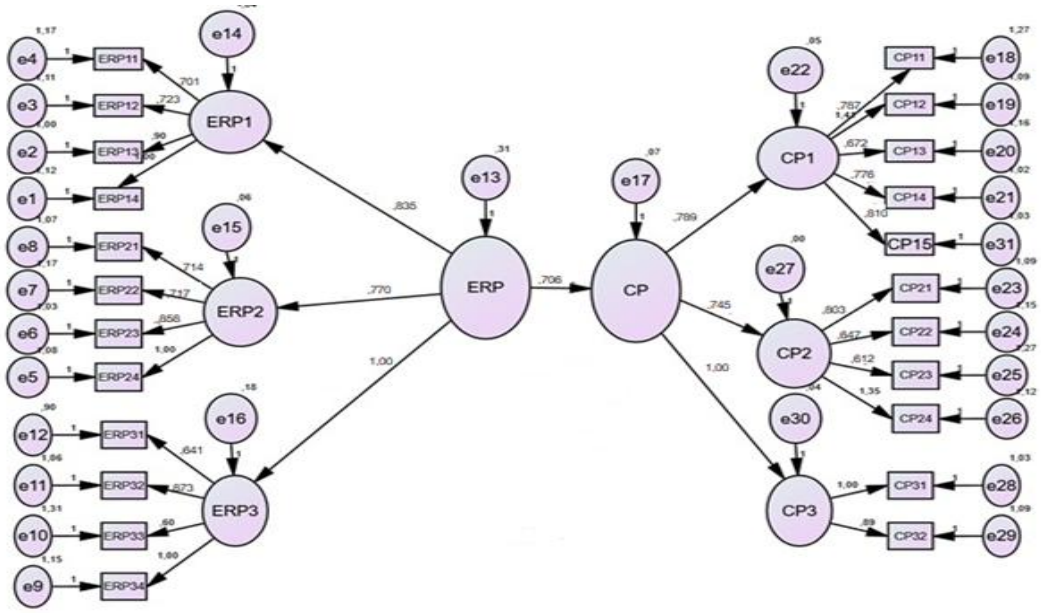

Fig 2.Hypothesis Model Results

Table 3.Hypothesis Test Output Results

			Estimate	S.E.	C.R.	P
CP	<---	ERP	,706	,128	4042	***
ERP1	<---	ERP	,835			
ERP2	<---	ERP	,770	,165	4474	***
ERP3	<---	ERP	1000	,198	5263	***
CP1	<---	CP	,863			
CP2	<---	CP	,998	,277	4136	***
CP3	<---	CP	,958	,382	4593	***
ERP11	<---	ERP1	,701	,199	5979	***
ERP12	<---	ERP1	,723	,187	5631	***
ERP13	<---	ERP1	,901	,164	5472	***
ERP14	<---	ERP1	1000			
ERP21	<---	ERP2	,714	,222	4526	***
ERP22	<---	ERP2	,717	,221	4735	***
ERP23	<---	ERP2	,858	,228	4920	***
ERP24	<---	ERP2	,704			
ERP31	<---	ERP3	,651	,152	7431	***
ERP32	<---	ERP3	,785	,147	7015	***
ERP33	<---	ERP3	,678	,118	5065	***
ERP34	<---	ERP3	,756			

			Estimate	S.E.	C.R.	P
CP11	<---	CP1	,776			
CP12	<---	CP1	,826	,287	4919	***
CP13	<---	CP1	,668	,223	4188	***
CP14	<---	CP1	,782	,250	4851	***
CP15	<---	CP1	,715	,273	4867	***
CP21	<---	CP2	,897			
CP22	<---	CP2	,640	,235	4951	***
CP23	<---	CP2	,620	,240	4804	***
CP24	<---	CP2	,700	,255	5287	***
CP31	<---	CP3	,780			
CP32	<---	CP3	,725	,132	6750	***

Table 4.13 shows that in hypothesis H1, ERP implementation has a positive effect on CP with a significant level of 0.001. The estimated parameter value is 0.706, that every one unit increase in ERP implementation can increase CP by 0.706. Previous studies that support are Suharto, R. &Devie, (2013) [13]; Pramana YK, (2015) [16]; Sulistyowati, et al (2020) [21].Based on the table above, it is obtained information on the results of hypothesis testing that ERP implementation has a positive effect on CP. Based on the data processing results obtained a P value (probability) of *** / 0.000 <0.05, then this value can illustrate that the hypothesis of this study can be accepted. Meanwhile, the standardized regression weights table shows that the relationship between indicators and dimensions, the relationship between dimensions and variables, and also the relationship between variables has a value above 0.5. This shows that all of these relationships can be explained [21].

In the hypothesis test data, it was also found that the "Low Cost Strategy" indicator on the "Strategic (Strategic benefit of ERP)" dimension had the most effect on ERP with a parameter estimate value of 0.785, so that this became a positive point for improvement, besides that PT. XYZ needs to improve "On Time Delivery" in the "Operational Performance" dimension in order to produce even better corporate performance. In the corporate performance indicator variable the most influential is non-financial compared to financial, this shows that the first success value is at PT. XYZ is based on non-financial achievements such as On time delivery, Fulfillment, Day of inventory, Inventory level.

V. CONCLUSION

Based on the results of the analysis, this study can be concluded as ERP implementation has a positive effect on CP. Each increase in one unit of ERP implementation can increase CP by 0.706.Then it was also found that the "Low Cost Strategy" indicator on the "Strategic (Strategic benefit of ERP)" dimension had the most influence on ERP, so that this became a positive point for improvement, besides that PT. XYZ needs to develop "On Time Delivery" in the "Operational Performance" dimension in order to produce even better corporate performance. In the corporate performance indicator variable the most influential is non-financial compared to financial, this shows that the first success value is at PT. XYZ is based on non-financial achievements such as On time delivery, Fulfillment, Day of inventory, Inventory level.

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