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Analysis of Factors Influencing Business Process Engineering with the Structural Equation Mode Method Approach

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ABSTRACT

BPR or business process reengineering is a process to achieve radical improvements in terms of time, quality, rewards, and of course costs by simultaneously redesigning processes, organizations, and information systems. In this study, IT/technology and HR factors (human resources) are used in re-engineering public facilities assisted by expert systems to create efficiency and effectiveness and increase value. The main factor used in this study is the management system, especially for making changes to the organizational structure, improving the administration system, and Relationship Management. The model suitability test in this report uses several criteria, including Chi-Square, GFI, AGFI, and RMSEA. Although the final model obtained a high Chi-square value (13.157) with a probability of zero, because several other criteria were met with an AGFI value above 0.9 and an RMSEA value below 0.08, the model is considered suitable. Based on the model output, it is known that not all antecedent variables have a significant influence on the consequent variables. Likewise, not all hypotheses are accepted. All antecedent variables cannot explain the consequent variables because the R2 value is less than 0.5.

INTRODUCTION

Product and service companies must be able to create a product or service that is cheaper, better, and faster than other competitors, to avoid going bankrupt. Companies need to make the latest innovations to maintain existing market share and even gain new market share [1], [2]. A company consists of a series of business processes or business activities that are carried out by requiring an efficient and effective management process to achieve targets [3], [4]. Business processes can be improved through strategies or approaches such as business process reengineering [5]. Business process design aims to create a business process plan that will be improved according to business goals [6]. BPR or business process re-engineering is a process to achieve radical improvements including time, quality, rewards, and of course costs by simultaneously re-planning the process, organization, and information systems.

Business process re-engineering (BPR) is an approach used to improve organizational performance with increasing global or even local competition [7], [8]. According to [3], business process reengineering is an approach used in decision-making to reduce implementation costs and manage complexity. BPR modifies management processes, practitioner positions, process composition, and process quality in optimizing operations, increasing productivity, reducing costs, improving quality, and providing competitive advantage [9]. Research by [10] revealed that BPR can increase efficiency, reduce costs, and customer satisfaction. Consumers are the main target in business process engineering because the main goal is to design a process by simplifying work processes that can satisfy customers and increase existing values, especially customer value. Research by [11] shows that business process reengineering on information technology capabilities and human resource management has a significant positive impact on organizational performance.

Several studies that use the BPR method in solving problems have used various factors, these factors influence the success of implementing business engineering processes in increasing value. Research on Business Process Re-Engineering is closely related to increasing productivity and eliminating all types of activities that do not have added value, such as research conducted by [12], based on 11 aspects, namely concept, impact, use of information technology, focus, worker involvement, degree of change, risk level, manufacturing studies, models, duration, and costs that require organizational change can adopt BPR in making improvements. [13] conducted research related to the integration of BPR tools that are tailored to the manufacturing sector in maximizing process improvement and operational excellence. In addition, research by [14] revealed that knowledge management increases efficiency and stores the knowledge of an organization. The main factors used in this study are management systems that specifically make changes to the organizational structure, improve the administration system, and Relationship Management. This study focuses on the study to find out whether these factors have an influence on the implementation of business process engineering in increasing value.

RESEARCH METHODS

This research model was tested using AMOS 16.0 software using the following steps in running SEM:

1. Forming a relationship diagram between variables and indicators
   The first step is to form a relationship diagram between variables and their indicators as in Figure 1. The model has 2 exogenous variables and 2 endogenous variables.

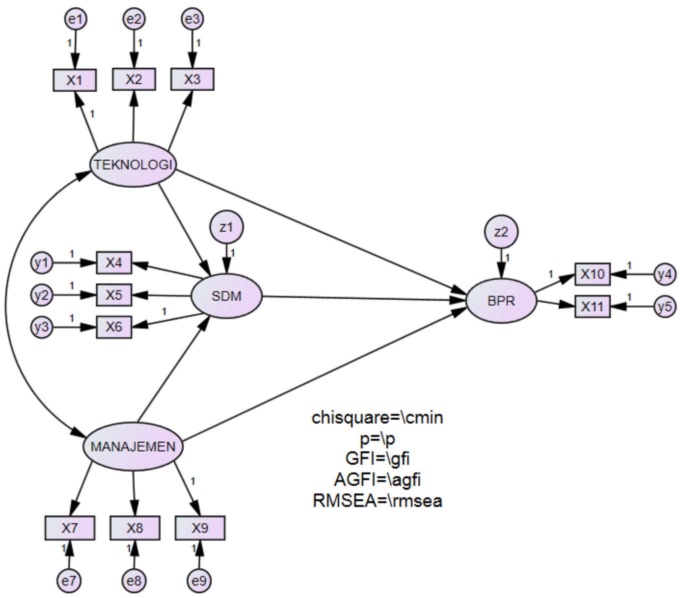

Fig. 1. Initial Model of the relationship between various variables and their indicators

2. Confirmatory Analysis Factor for Exogenous and Endogenous Variables in the initial model

   Significant indicators are used to measure constructs (latent variables) using confirmatory factor analysis.

   a. Confirmatory Analysis Factor on Exogenous Variables

      Confirmatory tests are conducted on exogenous variables, namely on the Technology and Management variables. Both variables are covaried, with the results of the diagram output and the estimated output from the confirmatory test given in Figure 2 and Table 1 and Table 2.

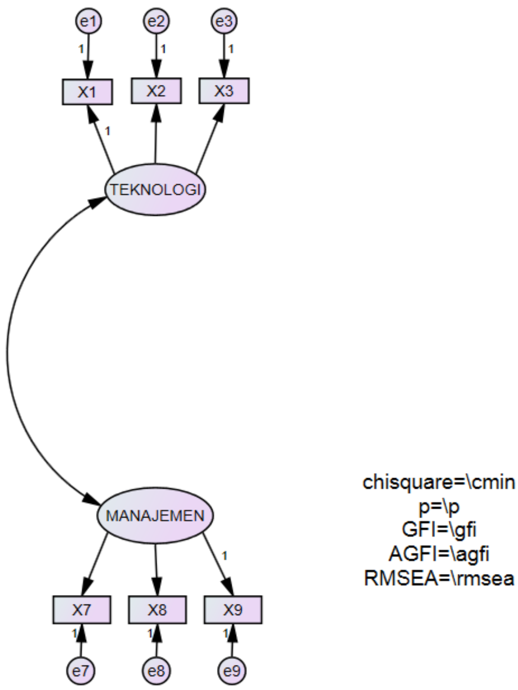

Fig. 2. Exogenous Variable Diagram for Confirmatory Factor Test

Table 1. Regression Weights for Exogenous Variables

	Estimate	S.E.	C.R.	P Label
X1 <--- Technology	1,000			
X2 <--- Technology	,507	,264	1,922	,055
X9 <--- Management	1,000			
X8 <--- Management	1,040	,190	5,489	***
X7 <--- Management	,492	,105	4,699	***

Table 2. Standardized Regression Weights for Exogenous Variables

	Estimate
X1 <--- Technology	1,050
X2 <--- Technology	,566
X9 <--- Management	,787
X8 <--- Management	,726
X7 <--- Management	,373

The results of the Chi-Square test show that the model does not fit with a Chi-Square value with a probability of P = 0.003 (less than 0.05). However, based on the GFI criteria (0.977), which is above 0.9, and RMSEA (0.108) which is below 0.08, the model is fit. To improve the fit model, an evaluation of the significance value of the regression weights is carried out. In Table 1 there is 1 indicator that is not significant, namely indicator S3 with a probability above the significance level of 0.001. Therefore, this indicator should be removed. However, the convergent validity value will be checked first, if the convergent validity value is less than 0.5 then the indicator will be removed from the analysis. The next step is to evaluate the convergent validity value, namely indicators with a loading factor of less than 0.5 are declared invalid as a measure of the technology and trust constructs. From the results of the standardized regression weights in Table 2, it is known that indicator S3 has a loading factor below 0.5 so it is removed from the initial model. The output results of the confirmatory test of exogenous variables contain one indicator removed given in the diagram in Figure 4. Based on the output in Figure 3, reviewed from the Chi-Square value (16.401) with a probability of GFI = 0.977 indicates that the model is fit.

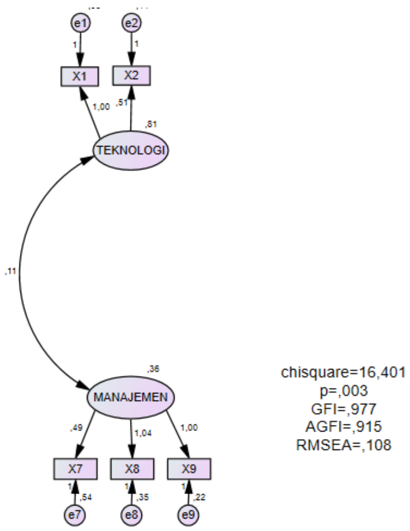

Fig 3. Final results of the confirmatory factor test for exogenous variables

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b. Confirmatory Factor Analysis on Endogenous Variables

Confirmatory tests were conducted on endogenous variables, namely on HR AND BPR variables. All endogenous variables were covaried, so that the results of the diagram and estimates for the confirmatory test were obtained as given in Figure 5 and Tables 4 and 5. The results of the Chi-Square test showed that the model was fit with a p-value = 0.635 AGFI = 0.996 and RSMEA = 0.000 with the criteria GFI (0.986) and chi-square = 2.454 the model was fit. In this model, a confirmatory test was conducted by reviewing the standard regression estimates and standardized regression weights as presented in Tables 3 and 4.

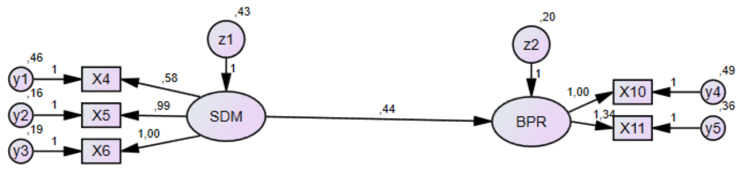

Fig 4. Endogenous Variable Diagram for Confirmatory Factor Test

Table 3. Regression Weights for endogenous variables

	Estimate	S.E.	C.R.	P Label
BPR <--- SDM	,440	,089	4,963	***
X6 <--- SDM	1,000			
X5 <--- SDM	.986	,091	10,790	***
X4 <--- SDM	,580	,077	7,515	***
X10 <--- BPR	1,000			
X11 <--- BPR	1,343	,258	5,203	***

Table 4. Standardized Regression Weights for Endogenous variables

	Estimate
BPR <--- SDM	,540
X6 <--- SDM	,834
X5 <--- SDM	,850
X4 <--- SDM	,488
X10 <--- BPR	,606
X11 <--- BPR	,768

The model results are given in Figure 6 with the Chi-Square value showing p value = 0.635 AGFI = 0.996 and RSMEA = 0.000 with the criteria of GFI (0.986) and chi-square = 2.454 stating that the model fits. All indicators are convergent, so they are valid for measuring endogenous latent variables. These results will be used to construct a complete model.

3. Estimation test on the full model

The results of the confirmatory test on exogenous and endogenous variables, then a complete model is compiled by correlating all variables based on the theoretical framework and the proposed hypothesis. The complete output is given in Figure 5.

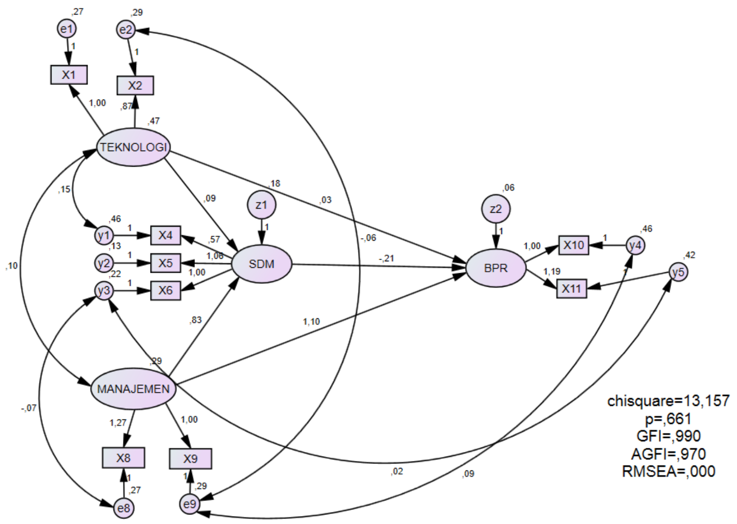

Fig 5. Complete Model Output

RESULTS AND DISCUSSION

The development of the proposed model using the SEM method can be known as the estimated strength of the relationship between various variables along with significant indicators of business process engineering in an increasing vacuum as hypothesized in the proposed model. The estimation method used is Maximum Likelihood (ML), which is by finding the parameter value that is most likely to produce the highest covariance or correlation of the existing data. According to some experts, this approach can be used for data that has problems with normality. However, this ML method is very sensitive to the non-normality of data so other estimation methods such as Weighted Least Square (WLS), Generalized Least Squares (GLS) and Asymmetrically Distribution Free (ADF) have emerged [15].

The model fit test in this report uses several criteria, including Chi-Square, GFI, AGFI, and RMSEA. Although the final model obtained a high Chi-square value (13.157) with zero probability, because several other criteria were met with an AGFI value above 0.9 and an RMSEA value below 0.08, the model was considered suitable. This is because there is no agreement on which goodness of fit criteria are truly fit. A high Chi-Square value can be caused by data that is not normally distributed multivariate. A high Chi-Square value relative to the degree of freedom indicates that the observed and predicted covariance or correlation matrices are significantly different and this results in a probability (p) that is smaller than the significance level (σ). Efforts to reduce Chi-square are made by modifying the model (Modification Indices) but p remains smaller than the significance level (σ).

To meet the assumption requirements that must be met with maximum likelihood, this report conducted a data normality test. From the test results, it was found that the data was not normally distributed. To improve data normality, outliers were performed by eliminating extreme data that were far from the centroid value. Based on the model output, it is known that not all antecedent variables have a significant effect on the consequent variables. Likewise, not all hypotheses are accepted. Based on the model output, it is known that not all antecedent variables have a significant effect on the consequent variables. Likewise, not all hypotheses are accepted. All antecedent variables cannot explain the consequent variables because the R2 value is less than 0.5.

CONCLUSION

The results of the analysis and discussion can be concluded that:

1. The results of the confirmatory analysis test and the construct indicators used to compile the final model are significant for measuring endogenous and exogenous latent variables.
2. The estimation method used is Maximum Likelihood (ML), namely by finding the parameter value that is most likely to produce the highest covariance or correlation from the existing data.
3. From the test results, it was found that the data was not normally distributed multivariate with a critical ratio value of 13.157.
4. Overall, the proposed model is a Fit when viewed from the GFI and RMSEA criteria, but not a Fit when viewed from the Chi Square Criteria. However, because there is no agreement on which goodness of fit criteria is truly fit, it can be concluded that the proposed model is FIT.
5. From the hypothesis test, it was concluded that:
   a. The use of technology has a positive effect on BPR (H1 is accepted), but based on the P value, the effect is not significant.
   b. The use of IT technology has a positive effect on HR (H2 is accepted), but based on the P value, the effect is not significant.
   c. Management has a positive effect on BPR (H3 is accepted), but based on the P value, the effect is not significant.
   d. Management does not have a positive effect on HR (H4 is rejected)
   e. HR does not have a positive effect on BPR (H5 is rejected)

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