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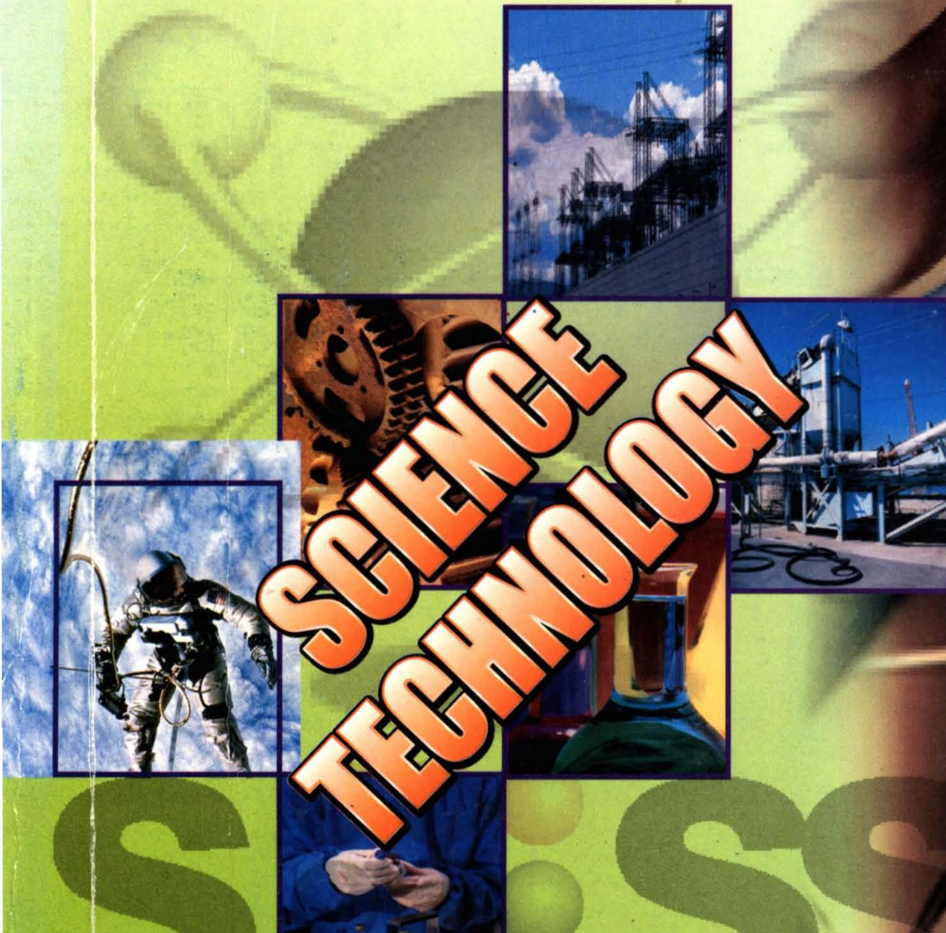


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# Development of Business Performance Model Against Customer's Satisfaction Factors Using Amos Structural Equation Modeling Software

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ABSTRACT

*Delivering customer satisfaction has been a critical concept in contemporary thought and in research related to buyer behavior. It is generally argued that if customers are satisfied with a particular product or service offering after its use, then they are likely to engage in a repeat purchase and try line extensions. Satisfied customers are also likely to tell others of their favorable experiences and thus engage in positive word of mouth advertising. In the context of services, customer satisfaction is often described as being related to factors such as service quality and service features. Market research emphasizes that customer's satisfaction will lead to customer's retention and inevitably to better business performance. The main objective of this paper is to develop a Structural Equation Modeling (SEM) using AMOS to determine the most influential customers' satisfaction factors that give positive impact on business performance.*

**Key words**: *Business performance, customer's satisfaction factors, Amos Structural Equation Modeling*

## Introduction

The measuring of customer satisfaction has certainly proved one of the most resilient products for market research agencies during the recession. One conclusion which has been drawn from such developments has been that measuring and monitoring customer satisfaction is central to marketing control and this control mechanism has been strongly recommended to management. It can be seen that in all the approaches regarding the marketing, one enduring and shared factor is the focus on customer satisfaction, as the most important route to high and sustained marketing performance. The practical problems of implementing this customer satisfaction strategy and of using customer satisfaction in a practical setting have been almost totally ignored (Piercy 1995). While there has been a lot of development work undertaken in the area of customer satisfaction measurement techniques and systems, no real attention has been given to identify the most influential factors to customer satisfaction using current statistical technique. The aim of this article is to examine the available data concerned with measuring customer satisfaction by analyzing using the AMOS Structural Equation Modeling and to identify the most influential factors of customer's satisfaction in determining the corporation's business performance.

## Customer Satisfaction

Customer satisfaction could be explained as a satisfying feeling towards expectation after the customer accepts the entire quality of a product or the process procedure of a quality (Chien et. al. 2002). Fredericks et. al. (1995) and Martensen et. al. (2000) discovered that price, product quality, service quality, expectation, innovation and corporate image are the facilitating factors in ensuring customer satisfaction and loyalty. Customer's satisfaction could increase customer loyalty, which in turn improves profits, and through word of mouth may attract new customers and improve the corporation's overall image (Chien et. al. 2002).

## Business Performance

Business performance is an important factor in determining organization success. Many researchers often use objective measures such as turnover and profit as a form of measuring enterprise business performance. However, Khong and Richardson (2003) used perceived measures and in this research, the perceived measures of business performance of the organization involve the mean visit, mean purchase and mean number of centers per week.

## Customer's Satisfaction Analysis

In the analysis of customer's satisfaction, a questionnaire was designed based on the literature review. To test the degree of consistency of variables when measuring the customer satisfaction, reliability analysis was performed using SPSS to calculate Cronbach's alpha. A rule of thumb suggests that the acceptable Cronbach's alpha value should exceed 0.7 ( Hair et. al. 1998). All the customer's satisfaction factor constructs were above the recommended threshold of 0.7, implying that the questionnaire was measuring the customer's satisfaction in a useful manner while maintaining the internal consistency of construct measurement in a summate scale. Hence all the variables measuring services factors, products factors, and employee's factors were retained.

The customer's satisfaction towards Koperasi UiTM Pahang was of interest whereby the sample units were selected using cluster sampling method and the programs were selected using simple random sampling technique (lottery method). The sampling frames are the student's list for each semester excluding the first semester and list of staff according to departments. The questionnaires were then distributed to 285 students and staff who had been chosen as respondents. They were requested to answer all questions and the questionnaires were collected immediately after the respondents have completed it. Of the 285 questionnaires distributed, 228 were returned.

## Structural Equation Modeling Using Amos

The core analysis of this paper was the structural equation modeling that measures causal relationships between the customer's satisfactions and the Koperasi UiTM Pahang Berhad business performance. Structural equation modeling (SEM) encompasses model analysis techniques such as covariance structure analysis, latent variable analysis, confirmatory factor analysis, path analysis and linear structural relation analysis. SEM estimates a series of separate, but interdependent, multiple regression equations simultaneously by specifying the structural model used by the statistical program (Hair et al. 1998). The confirmatory factor analysis specifies the indicators for each construct and assesses the reliability of each causation with theoretical justifications and the structural model portrays the causal relationships of latent constructs thus asserting the hypotheses (Yap and Khong 2004).

### Exploratory Factor Analysis

Exploratory analysis examines possible relationships in only the most general form and then allows the multivariate technique to estimate relationships. The general purpose of factor analytic techniques is to find a way to condense (summarize) the information contained in a number of original variables into a smaller set of new, composite dimensions or variates (factors) with a minimum loss of information – that is to search for and define the fundamental constructs or dimension assumed to underlie the original variables (Hair et. al. 1998). Using SPSS, varimax rotation of factor loadings was used to make loadings more interpretable and only factor loadings with values above 0.3 were displayed. Exploratory factor analysis can help in assessing whether the dimensions extracted reflected the factors anticipated in the literature review (Yap and Khong 2004).

According to the results in Table 1, five factors were extracted. The results fairly illustrated the consistency between the dataset and the literature review. Although the dataset showed an additional factor, it was not considered as a flaw. In fact, it was probably an extended manifestation of variables from various dimensions mentioned in the literature review due to cultural and norms differences (Yap and Khong 2004).

Table 1: Results of Exploratory Factor Analysis

**Rotated Component Matrix** [a]

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| S1 | | | .397 | .593 | |
| S2 | | | .453 | .478 | |
| S3 | | | | .728 | |
| S4 | .336 | .354 | | .705 | |
| S5 | | | | .755 | |
| S6 | .328 | .362 | .594 | .364 | |
| S7 | | | .760 | | |
| S8 | | | .773 | | |
| P1 | | .432 | .701 | | |
| P2 | .304 | .493 | .322 | .438 | |
| P3 | | .613 | | | |
| P4 | | .634 | .374 | | |
| P5 | | .751 | | | |
| P6 | .331 | .650 | .339 | | |
| P7 | .310 | .701 | | | |
| P8 | | .802 | | | |
| E1 | .699 | .320 | | | |
| E2 | .744 | .335 | .379 | | |
| E3 | .719 | | .365 | | |
| E4 | .761 | | | .338 | |
| E5 | .754 | | | .362 | |
| E6 | .715 | .306 | | | |
| minvis | | | | | .708 |
| minpur | | | | | .828 |
| Center | | | | | .854 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

## Confirmatory Factor Analysis

While exploratory factor analysis lets the variables define the relationships between the variables and the factors, confirmatory factor analysis specifies and confirms the relationships of the variables and factors prior to the analysis. Unlike exploratory factor analysis, confirmatory factor analysis allows total control of which variables describe the factor (Hair et. al. 1998). Factors with loadings exceeding 0.7 indicate more shared variance between the construct and its measures and thus the retained factors were succinctly measured by these variables. Reliability analysis as was done previously with Cronbach's alpha exceeding 0.7 as a rule of thumb implyies that the five rating scaled questionnaire was measuring in a useful manner.

Table 2 displays the variables that meet the minimum factor loadings threshold of 0.7 and above with each construct represented or manifested by three or more indicator variables. Five constructs were identified: four exogeneous constructs (Constructs A, B, C, and D) and one endogeneous construct (Construct E). The constructs were: Construct A (Employee factors), Construct B (Products factors), Construct C (Image factors), Construct D (Service factors) and Construct E (Performance factors). The heavy loading in the five constructs suggested correspondence with the propositions underlying customer satisfaction by various authors mentioned. Table 3 summarized the variables extracted for SEM analysis.

Table 2: Five-Construct Measurement Model Using Principal Component Analysis and Varimax Rotation

| | Construct A | Construct B | Construct C | Construct D | Construct E |
|---|---|---|---|---|---|
| E2 | 0.744 | | | | |
| E3 | 0.719 | | | | |
| E4 | 0.761 | | | | |
| E5 | 0.754 | | | | |
| E6 | 0.715 | | | | |
| P5 | | 0.751 | | | |
| P7 | | 0.701 | | | |
| P8 | | 0.802 | | | |
| S7 | | | 0.760 | | |
| S8 | | | 0.773 | | |
| P1 | | | 0.701 | | |
| S3 | | | | 0.728 | |
| S4 | | | | 0.705 | |
| S5 | | | | 0.755 | |
| Minvis | | | | | 0.708 |
| Minpur | | | | | 0.828 |
| Center | | | | | 0.854 |

Note: Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
A Rotation converged in 14 iterations
Only factors with values above 0.7 are retained

## Modelling and Hypothesis Testing

In order to examine the relationship between customer satisfaction (exogeneous constructs) and the business performance (endogeneous constructs) of the corporate, the following hypotheses are put forth:

H1: Employee factors (Construct A) have a positive effect on business performance (Construct E).
H2: Product factors (Construct B) have a positive effect on business performance (Construct E).
H3: Image (Construct C) has a positive effect on business performance (Construct E).
H4: Service factors (Construct D) have a positive effect on business performance (Construct E).

These hypotheses were set to examine the impact of customer's satisfaction on business performance. Accepting $H_i$'s indicates that satisfaction towards the exogenous constructs has a positive and significant impact on business performance (endogenous construct).

Table 3: The Variables Extracted for SEM Analysis

| | | | |
|---|---|---|---|
| Construct A: Employee Factors | | | |
| E2 | Politeness | E5 | Knowledge of procedures |
| E3 | Friendliness | E6 | Treatment received |
| E4 | Knowledge of products | | |
| Construct B: Products Factors | | | |
| P5 | Advertisement of products | P8 | Information of new products |
| P7 | Availability of products | | |
| Construct C: Image Factors | | | |
| S7 | Neatness | P1 | Range of products |
| S8 | Cleanliness | | |
| | | | |
| Construct D: Service Factors | | | |
| S3 | Waiting time | S5 | Handling customer's problems |
| S4 | Handling customer's request | | |
| | | | |
| Construct E: Performance | | | |
| Minvis | Mean Visit | Centre | Number of centers visited |
| Minpur | Mean Purchase | | |

Based on these hypotheses, a path diagram was constructed showing the relationships set forth. A path diagram is a visual portrayal of the relationships that is helpful in depicting a series of causal relationships. Figure 1 depicts each relationship amongst constructs for further analysis.

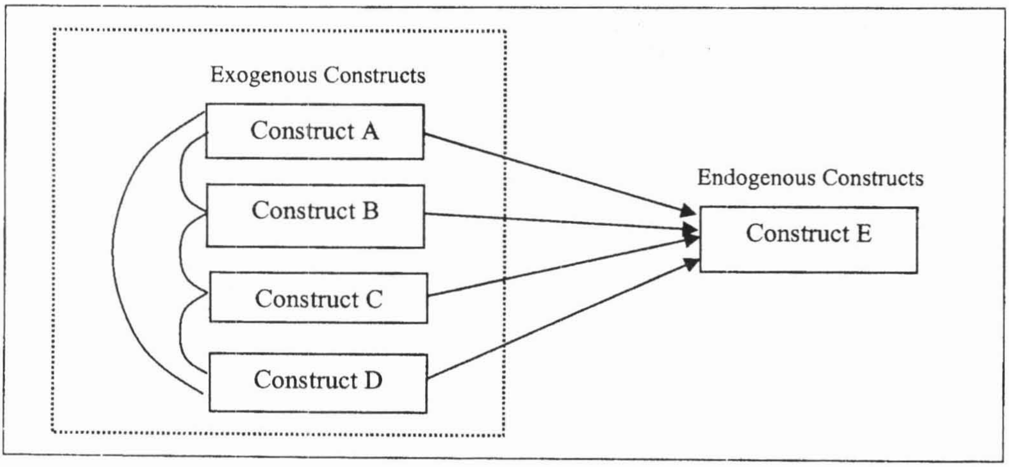


Figure 1: Brief Path Diagram of SEM

In order to enhance the details of the brief path diagram, a full scale SEM diagram is depicted in Figure 2. The Constructs A, B, C, D and E were assigned labels $\xi_1$, $\xi_2$, $\xi_3$, $\xi_4$ and $\eta_5$ respectively.

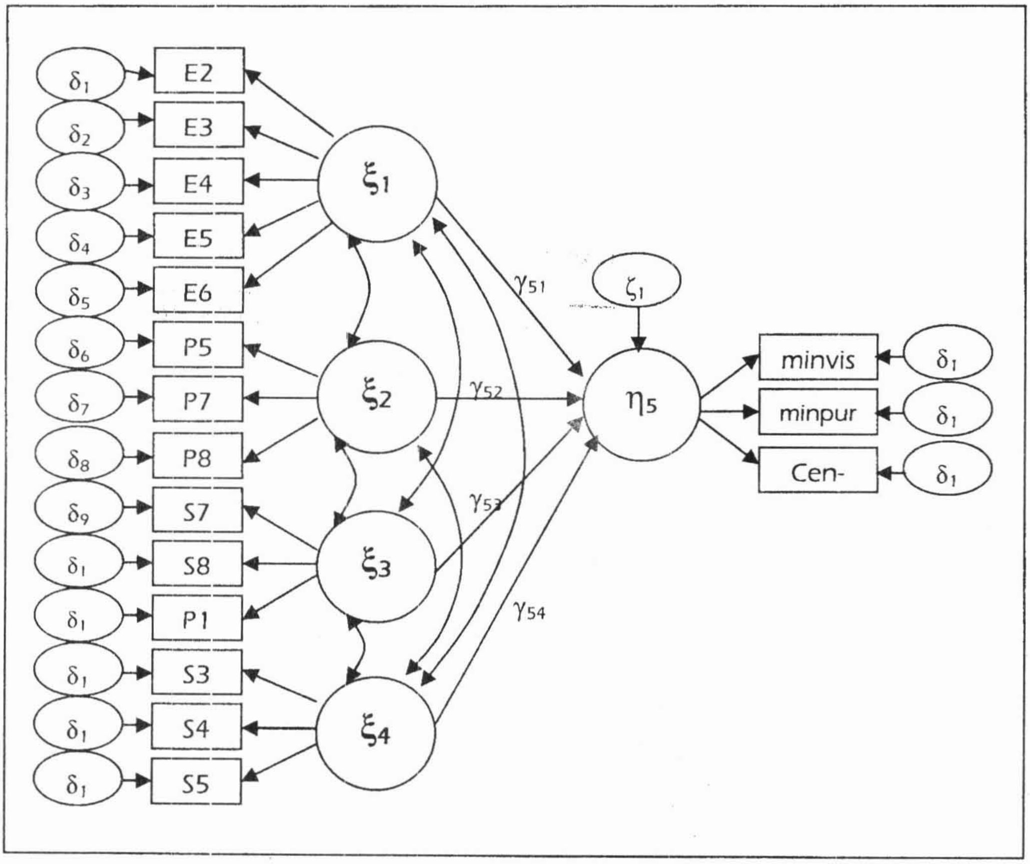


Fig. 2: Full Path Diagram of SEM

where: Gamma ($\gamma_{nm}$) is the relationships of exogenous constructs to endogenous constructs

Phi ($\varphi_{nm}$) is the correlation among exogenous constructs

$\xi_{nm}$ is the exogenous construct

$\eta_n$ is the endogenous construct

m is number of exogenous constructs

n is the number of endogenous constructs

p is number of exogenous construct indicators

is number of endogenous construct indicators

$\zeta$, and $\delta$ are measurement errors

Referring to Figure 2, each indicator variable is associated with a measurement error, i.e. $\zeta$, or $\delta$. For example $\zeta$ is associated with the endogenous construct while $\delta$ is associated with the indicator variables.

## The Proposed Model

"When testing a series of causal relationships, covariances are the preferred input matrix type" because this matrix is essential in theory testing (Hair et. al. 1998). However when using SPSS AMOS both input matrix, i.e. variance-covariance and correlation were displayed as they depict similar implication on the results. The latter constraints hold the threshold values between -1 to 1 while the former has no threshold constraints of values. Maximum Likelihood Estimate (MLE), the most common estimation procedure, was used in the estimating process (Hair et. al. 1998). MLE is used "to seek parameters that best reproduce the estimate population variance-covariance matrix" (Thompson 2000). The recommended sample size when directly estimating the overall model using MLE is 100 to 150 (Hair et. al. 1998). Results of the estimation of the proposed model were depicted in Figure 3.

To summarize, the structural equation will be presented as (note E( $\zeta$ ) = 0).

$$\eta_5 = -0.289\xi_1 + 0.105\xi_2 + 0.156\xi_3 + 0.363\xi_4 \quad \ldots (5.10)$$

## Interpreting the Model

In this section, the results of the proposed model were interpreted. Table 4 shows the overall results of the structural model, and explanations follow.

Table 4: Overall Standardized Parameter Estimates for the Structural Model

| Construct Associations | Significance Level ($\alpha$) | Parameter Estimates (PE) | p-value | Significant (Yes / No) |
|---|---|---|---|---|
| A with E | 0.05 | - 0.289 | 0.271 | No |
| B with E | 0.05 | 0.105 | 0.617 | No |
| C with E | 0.05 | 0.156 | 0.481 | No |
| D with E | 0.10 | 0.363 | 0.089 | Yes |

Results showed that at 0.05 significance level, satisfaction towards Employee Factors (Construct A) has a negative but insignificant association with Construct E (Business Performance) with parameter estimate = -0.289 and p-value = 0.271. Hence the null was asserted showing insufficient evidence to prove that the employees have positive effects on business performance of Koperasi UiTM Pahang. Construct B (Products Factors) has a positive but insignificant association with Construct E (parameter estimate = 0.105; p-value = 0.617) at 5% significance level. Hence the null was asserted indicating insufficient evidence to show that products have positive effects on business performance. At 5% significance level, Construct C (Image Factors) indicates a positive but insignificant association with Construct E (parameter estimate = 0.156; p-value = 0.481). Hence the null was asserted indicating insufficient evidence to show that a corporate image has positive effects on business performance. However at 0.10 significance level, Construct D (Service Factors) has a positive and significant association with Construct E (parameter estimate = 0.383; p-value = 0.089). Failure to reject H4 based on the dataset shows that satisfaction on service factors has positive effects on Koperasi UiTM Pahang business performance.

## Evaluating the Model Fit

In order to evaluate whether the model has a good fit, the goodness-of-fit index and the normed fit index were examined. The goodness-of-fit index (GFI) has a value of 0.916, which is quite high. The Normed Fit Index (NFI) is 0.925, signifiying that the model has a discrepancy of 92.5% of the way between the independent model (terribly fitting) and the satisfied model (perfectly fitting model). Both fit measures exceed the recommended level of 0.90 which was above the 0.9 threshold (Hair et. al. 1998), indicating that the model has a good fit.

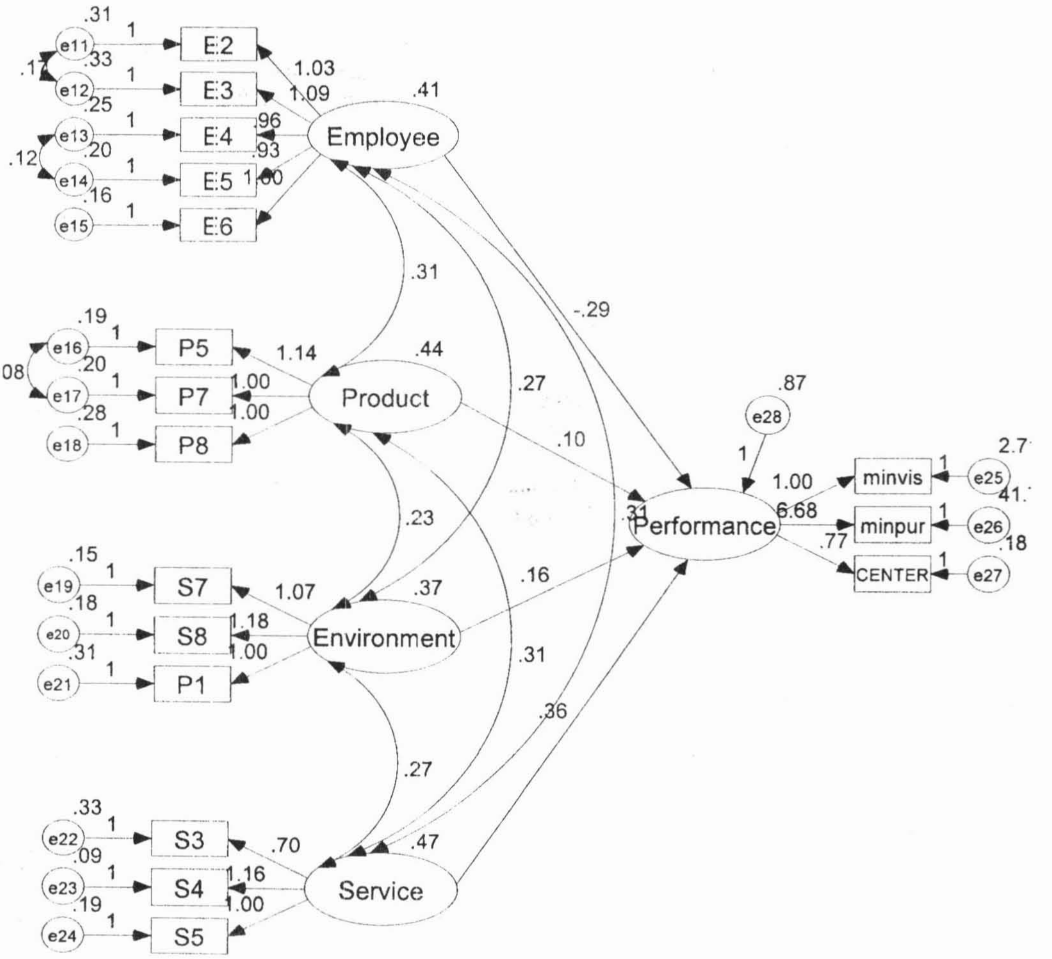


Figure 3: Path Diagram and Values of Parameter Estimates of the Model

## Conclusion

Structural Equation Modeling results indicate that satisfaction towards service is the most important factor influencing business performance of Koperasi UiTM Pahang. This confirms the literature in market research, which emphasizes that customer satisfaction will lead to customer retention and this inevitably leads to better business performance. Customer service can positively affect the business performance and thus proactive customer service and constant feedback of customer requests and problems on the products or services are found to affect customer service positively. This enables the enterprise to understand the wants of customers and this model can direct top management in undertaking initiatives by emphasizing the key variables.

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