# Investigating the Drivers in Selecting Third Party Logistics (3PL) Provider: A Case Study from Indonesian Manufacturing Industry

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***Abstract*— Logistics activities have become much concerned by many companies in term of an effective and efficient selection of Third-Party Logistics (3PL) provider. The use of 3PL providers and its effects to the customer satisfaction is mostly discussed in the case of manufacturing industry considering information technology variable, but the inclusion of trust as moderating variable between customer loyalty and customer satisfaction is limited. In addition, the involvement of these variables will also be a reference for 3PL providers to improve their services. This article aims to identify the factors considered by Indonesian companies in selecting 3PL. Respondents of this research are managers of logistics or persons in charge of logistics activities. Structural Equation Modeling (SEM) is used to elaborate the relationship between factors affecting 3PL selection decision. The results indicate that Information Technology (IT) usage, service quality, trust and customer satisfaction are the factors affecting the companies to select a 3PL provider. Other results also show that there is a significant relationship between those factors.**

***Keywords*—** *Third-party logistics, drivers, information technology, trust*

## 1. Introduction

The reason why a company uses 3PL in their logistics activities is to obtain the efficiency of their logistics operations and responsiveness to their customers. Most 3PL studies indicate that the use of 3PL could increase the economic performance of the firms [5]. In addition, the decision to have a partnership with the 3PL is not only about economic reasons but also about the core business focus of the 3PL and the company. As the core business of 3PL is providing the best service in logistics operations, IT is one of 3PL's specialization that can be used in Supply Chain Management to achieve a competitive edge [10, 11]. Other factor that affects customer service in managing logistics activities is trust. Trust is the aspect of a critical consideration when managing the contract and commitment between the company and the 3PL providers. The most problem occurs in term of the lack of trust between a firm and 3PL providers could affect the financial performance [13]. The function of 3PL has been investigated by Ghijsen et al [14] which is related to the service performance level. It is found that the trust perception of the customers could be increased with a better service performance for the company. As results of the better service performance, it will lead customers' trust perception. In addition, it can increase the customer's loyalty.

The relationship between 3PL usage and information technology on customer loyalty involving trust as the moderating variables on customer satisfaction is not given much attention previously. Most discussion of prior logistics studies only focus on the effect of 3PL usage and IT utilization on customer satisfaction and service quality as the moderating variable. For example, some studies investigate the effect of information technology variable on customer loyalty on logistics activities [8, 12, 15, 16], while the investigation of the effect of the usage of 3PL on customer loyalty has been also discussed [17, 18]. Moreover, trust variable was investigated in the perspective of supply chain management adoption [6, 19, 20], e-procurement [21-23] and marketing [24, 25]. Thus, this study investigates the effect of 3PL usage and

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**Table 1.** Considered Variables on The Use of 3PL

| Author | 3PL Variable Measurement | | | |
|---|---|---|---|---|
| | IT usage | Customer loyalty | Trust | Customer satisfaction |
| Evangelista and Sweeney [1] | √ | √ | | √ |
| Lai, Zhao et al.[3] | √ | √ | | √ |
| Masudin, Wastono et al.[6] | | | √ | √ |
| Innis and La Londe [8] | | √ | | √ |
| Tontini, Söilen et al.[12] | √ | √ | | √ |

information technology on customer loyalty, while trust is used to moderate those relationships to customer satisfaction.

## 2. Literature Review

Third-party logistics (3PL) is the function of logistics operations outside the company which has specialization in logistics areas of handling and managing organization's logistics processes. The most reason for firms operates their logistics operations to the third party are the specialization of 3PL providers in technology and other resources so the firm can focus on their core businesses. The fact that 3PL provider is now the demanding party in logistics and supply chain activities, many researches currently focus on the criteria in selecting 3PL. The adoption of the outsourcing strategy has been discussed intensively in term of the global market invasion and the increased global competitiveness. According to Gino, Marco et al [26] a third-party logistics (3PL) provider creates the adding value on firm's logistics operations that help them to become more competitive, more profitable and responsive. Table 1 informs the previous studies discuss the usage of 3PL and IT on customer loyalty and the use of trust on customer satisfaction.

Table 1 shows that the variables used by manufacturing industries for selecting 3PL providers are IT usage, customer loyalty and customer satisfaction, while trust is not involved in the constructs that combining those three variables.

### 2.1 The Role of Information Technology (IT)

As the third-party logistics (3PL) employees the expertise is in the logistics operations for handling company's logistical processes to aim today's global competitiveness, IT provided by the 3PL is the critical factors. The Role of 3PL IT is the significant aspect in advancing logistics services in uncertain supply chain environment. IT is currently the hottest discussion in logistics research. The intensive investigation of the use of IT in 3PL providers has been investigated by Evangelista and Sweeney [1]. They discuss the logistics competency in IT of 3PL and its impact on the ultimate logistics services. The integration of IT into logistics activities on the channels of the supply chain was also discussed in Porter and Millar [27]. It is suggested that those integrations could potentially add the value of supply chain strategy. Based on the study by Lai, Zhao et al. [3], IT has potentially helped the supply chain of the firm in facing the uncertain demand, increasing the accuracy of delivery, increasing flexibility and reducing costs that will finally increase the firm's profit. Other investigation by Sauvage [28] found that IT is a critical variable to achieve an advanced competitive business.

### 2.2 Information Technology (IT) Usage in 3PL

3PL providers have been a new strategy for firms to operate their logistics operations and therefore IT capability of 3PL providers would bring a new e-services and a new function in term of business to business (B2B) or business to customers (B2C) activities [1]. It is clear that the capability of IT of 3PL providers could leverage some logistics costs includes distribution and inventory costs. It is also bridging the integration of the channels of the supply chain in effective and efficient ways. The IT capability of 3PL providers could enable the ultimate customizations of products for customers as well as reducing lead times of product replenishment. In short-term periods, the adoption of IT in 3PL providers could impact significantly on the customer service in because some logistics activities have been value-added [12]. More specific, the study about IT indicators that impact on logistics and supply chain performance, there are some indicators should be concerned by firms and 3PL providers such as IT research and development quality, the utilization of IT, and management concern on IT [4].

### 2.3 Role of Trust in 3PL

Trust is concerned with an output of well quality of internal services within the organizations. Thus, the better quality provided in internal service of the firm, the level of trust is higher. Trust plays a very important role in developing the relationship between two parties both internal and external [6, 29]. In marketing studies, the trust concept has been given much attention because of its impact on the long-term benefit gained by the parties involved in the relationship. Trust is identified as the person's behaviors intention to involve and maintain the relationship as a commitment to achieve the goals [30].

The definition of trust stated by Gefen et al. [31], which is defined as "a set of specific beliefs dealing mainly with the integrity, benevolence (trustee caring and motivation to act in the trustee's interest), competence and predictability of a particular vendor" is used in this study. In term of external relationship, a firm which has a relationship with 3PL providers is potentially having a significant loss of investment if they do not maintain trust as a B2B basis. Otherwise, a negative consequence such as distrust and termination of the relationship will occur between firms and 3PL providers.

### 2.4 Customer Relationship Outcomes

The image of the product depends on the perception of customers judgment of the performance of the products based on their expectation [32]. Bejou and Palmer [33] believed that reducing perceived risk, lowering cost of orders, up-leveling customer loyalty and increasing customer satisfaction could not be done without maintaining customer relationship satisfactory. In addition, the maintained customer relationship could be the weapon on cost-based competition [34] as well as increasing the market share [35].

Most studies in marketing and logistical operation try to link customer satisfaction and organization's performance. Customers tend to be more satisfied with providers who have a better delivery performance. For example, the study by Wulf, Odekerken-Schröder et al. [9] found that a better delivery performance is the aspect that will tend to customers satisfaction. Moreover, the performance of customer satisfaction can be achieved by a higher service quality. Bansal and Taylor [36] stated there is a significant relationship between the responsiveness of customer's demand and buyer satisfaction. Furthermore, It is explicitly stated by Yang, Zhao et al. [37] that customer satisfaction is positively influenced by both operational performance and relational performance.

### 2.5 Service Performance and 3PL

Most studies support that 3PL providers impact positively on the firm's performance. The increasing firm's performance can be achieved in the ways of cost-cutting of logistics operations, time-saving from delivery and replenishment activities, flexibility increases and also increasing market [18]. The 3PL providers can lead the firms to create value-adding on their products to become more competitive, responsive and more profitable [17]. Subramanian, Gunasekaran et al. [38] proved that 3PL providers have the beneficial functions help most companies to get the advantages in competitiveness and responsiveness. It also helps firms to improve the customer service level and reduce most logistics costs. Moreover, Huo, Ye et al.[39] believe that by using 3PL providers on logistics operations, transaction costs will be eliminated significantly, while Knemeyer, Corsi et al.[40] argue that partnership with 3PL providers will be beneficial for firms in the financial performance as well as service performance.

## 3 Methodology

The method used in this article is quantitative methods [41]. Quantitative method is used to collect data by using questionnaires distributed to respondents. Then the data will be analyzed with Structural Equation Modeling (SEM) analysis tool to find out whether the hypotheses are relevant to the actual result of research.

### 3.1 Population and Sample

The research object of this 3PL study is the medium and big manufacturers located in Eastern Java province – Indonesia, which has more than 20 employees. The survey was held in the

**Table 1.** Measurement Variables

| Latent Variable | Indicator | Literature |
|---|---|---|
| 3PL usage | Level of 3PL ($X_1$)<br>Percentage of outsourcing logistics budget ($X_2$) | Arroyo, Gaytan et al. [2] |
| IT usage | Hardware and software performance ($X_3$)<br>Business application software performance ($X_4$)<br>Communications services efficiency ($X_5$)<br>Communication service performance ($X_6$)<br>Application development cycle time ($X_7$)<br>IT investments and expenditures ($X_8$)<br>Software maintenance efficiency ($X_9$) | Byrd & Davidson [4]. |
| Service performance | Delivery dates ($Y_1$)<br>Order cycle times ($Y_2$)<br>Accuracy ($Y_3$)<br>Fillrate ($Y_4$) | Gassenheimer, Calantone et al. [7] |
| Trust | Commitment ($Y_5$)<br>Openness ($Y_6$)<br>Risk sharing ($Y_7$) | Wulf, Odekerken-Schröder, & Iacobucci [9] |
| Customer satisfaction | High-quality relationships ($Y_8$)<br>Satisfaction ($Y_9$)<br>Happiness ($Y_{10}$) | Wulf, Odekerken-Schröder, & Iacobucci [9] |

manufacturing industries which are consisted of major industries such as textile products, food and beverages products, chemical products and electronic products. The selection of those manufacturing industry types because that manufacturing industry provides the biggest value of the gross domestic product of the province. It is around 29.48% compared to other types of products [42]. The sample criteria in this study are the managers and supervisors who work in the manufacturing industry and have the decisions to select 3PL providers for their logistics activities. This study has 10 measurement points which mean that at least 50 respondents have to fill out the questionnaire. In term of measuring the scale of questionnaires, 4-scale points is used, which is from 1 (strongly disagree) until 4 scales (strongly agree).

## 3.2 Definition and Constructing Measurements

Measurement points in the questionnaire in this study are divided into 4 different sections. Respondents are asked to choose from a scale of 1 to 4 to state how closely they are about the statements containing 3PL usage, IT usage, service performance, trust, and customer satisfaction. Further explanation of the measurement variables can be seen in Table 2, which also contains the measurement points for each variable.

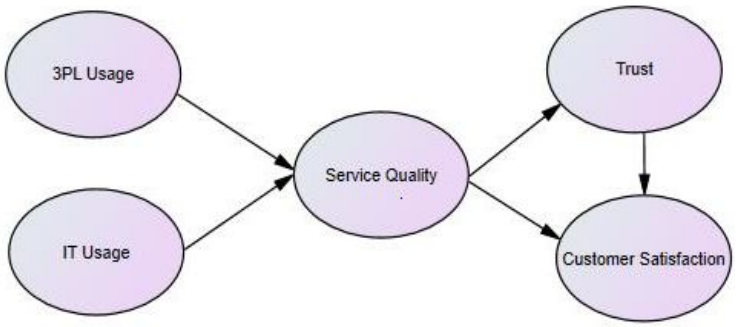


**Figure 1.** Research framework model

**Table 3.** Validity and Reliability of IT Usage ($X_2$)

| Variable | Item | r Value | Sig | Validity | Cron-bach | Reliability |
|---|---|---|---|---|---|---|
| 3PL Usage ($X_1$) | $X_{11}$ | 0.856 | 0.00 | Valid | 0.694 | Reliable |
| | $X_{12}$ | 0.896 | 0.00 | Valid | | |
| IT Usage ($X_2$) | $X_{21}$ | 0.639 | 0.00 | Valid | 0.773 | Reliable |
| | $X_{22}$ | 0.683 | 0.00 | Valid | | |
| | $X_{23}$ | 0.585 | 0.00 | Valid | | |
| | $X_{24}$ | 0.645 | 0.00 | Valid | | |
| | $X_{25}$ | 0.751 | 0.00 | Valid | | |
| | $X_{26}$ | 0.666 | 0.00 | Valid | | |
| | $X_{27}$ | 0.607 | 0.00 | Valid | | |

**Table 2.** Validity and Reliability of Trust ($Y_2$)

| Construct | Item | r Value | Sig | Validity | Cronbach Alpha | Reliability |
|---|---|---|---|---|---|---|
| Service Quality ($Y_1$) | $Y_{11}$ | 0.669 | 0.00 | Valid | 0.842 | Reliable |
| | $Y_{12}$ | 0.728 | 0.00 | Valid | | |
| | $Y_{13}$ | 0.665 | 0.00 | Valid | | |
| | $Y_{14}$ | 0.604 | 0.00 | Valid | | |
| | $Y_{15}$ | 0.619 | 0.00 | Valid | | |
| | $Y_{16}$ | 0.620 | 0.00 | Valid | | |
| | $Y_{17}$ | 0.686 | 0.00 | Valid | | |
| | $Y_{18}$ | 0.716 | 0.00 | Valid | | |
| | $Y_{19}$ | 0.677 | 0.00 | Valid | | |
| Trust ($Y_2$) | $Y_{21}$ | 0.845 | 0.00 | Valid | 0.736 | Reliable |
| | $Y_{22}$ | 0.796 | 0.00 | Valid | | |
| | $Y_{23}$ | 0.787 | 0.00 | Valid | | |
| Customer Satisfaction ($Y_3$) | $Y_{31}$ | 0.865 | 0.00 | Valid | 0.736 | Reliable |
| | $Y_{32}$ | 0.817 | 0.00 | Valid | | |
| | $Y_{33}$ | 0.842 | 0.00 | Valid | | |

Based on the research framework model and the construct of the research, we can posit 5 hypotheses that dealing with the 3PL provider:

a. H1: The level of usage of 3PL has a positive relationship with customer performance
b. H2: The information level of technology in 3PL is positively related to service quality
c. H3: Service quality has a positive relationship to customer satisfaction
d. H4: Service quality has a positive relationship with trust
e. H5: Trust has a positive relationship with customer satisfaction

# 4 Results and Discussion

## 4.1 Population and Sample

The reliability of the constructs in this study is tested using Cronbach's alpha test (shown in Table 3). The purposive samples are chosen as respondents who are expected to answer all the provided questions. The number of the sample who filled in the questionnaires are 101 respondents. This study uses the standard value of standard Cronbach's alpha $\geq$ 0.60 [43]. Table 3 shows the reliability value uses Cronbach's alpha, which indicates that all the value of the questions for X's variables is acceptable (Alpha >0.600) or reliable. It is also shown that the first construct, 3PL usage and IT usage, have a higher alpha than 0.600, which are reliable questions provided to respondents. Validity and reliability results for variables are shown in Table 3.

Test of validity results indicates that all the instruments in 3PL usage (X1) and IT usage (X2)

**Table 4.** Results of Linearity Test

| Relation of Variables | Significant | Linearity |
|---|---|---|
| $X_1 \rightarrow Y_1$ | 0.000 | Linear |
| $X_2 \rightarrow Y_1$ | 0.000 | Linear |
| $Y_1 \rightarrow Y_2$ | 0.002 | Linear |
| $Y_1 \rightarrow Y_3$ | 0.000 | Linear |
| $Y_2 \rightarrow Y_3$ | 0.000 | Linear |

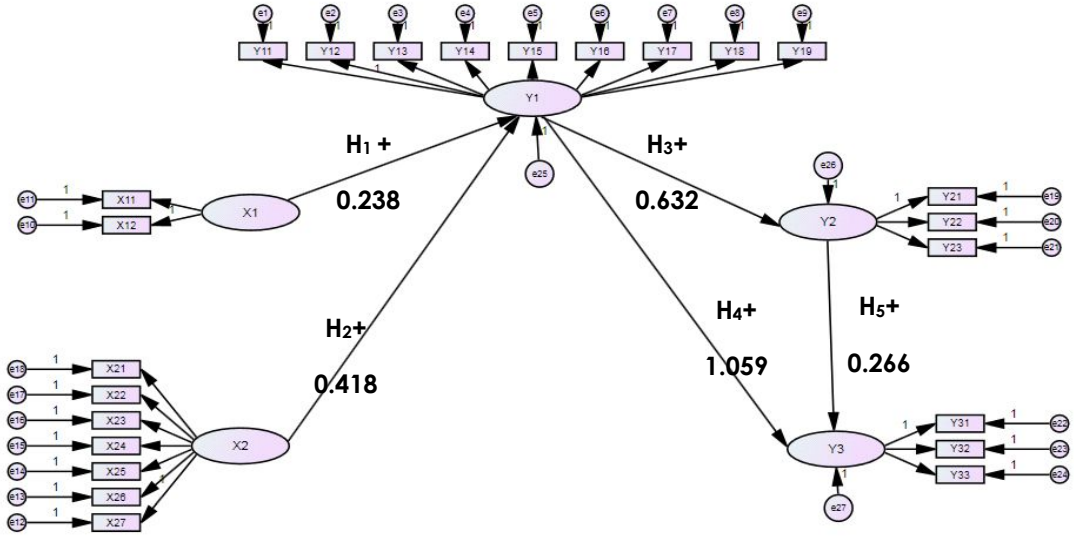


**Figure 1.** Result of The Estimated Model

construct are valid. For instance, for the construct of 3PL usage, two instruments (X11 and X12) which are represented by two questions regarding with the 3PL usage value more than 0.05 that indicates all those instruments in these two constructs are valid. Moreover, for the construct of 3PL IT usage, seven instruments (X21 – X27), which are corresponded to the questions dealing with the usage of IT in 3PL providers have value more than 0.05, which concludes all those instruments are valid (see Table 4).

Table 4 shows the reliability value uses Cronbach's alpha for Y's variables, which indicates that all the value of the questions for Y's variables is acceptable (Alpha > 0.600) or reliable. The results also show that the construct of service quality (Y1) is the highest value of Cronbach Alpha (0.842) which is the most reliable questions provided to respondents than the others. Table 4 shows the test of validity results that indicate all the instruments in the construct of service quality (Y1), trust (Y2) and customer satisfaction (Y3) are valid. For instance, for the construct of service quality, trust, and customer satisfaction, all the values are more than 0.05 that indicates that all the instruments provided are valid.

## 4.2 Structural Equation Modeling (SEM): Normality and Linearity Test

Before SEM analysis runs, it should be tested for normality multivariate. In this study, normality multivariate assumption is tested using skewness and kurtosis method and run on AMOS software. The criterion of normality multivariate assumption is accepted as CR value on statistic skewness and kurtosis testing value is ± 2.58. Based on results, the CR value is 1.708 which is less than 2.58; so that can be defined that normality assumption is accepted. Moreover, the linearity assumption of the model using curve fit model by SPSS indicates that the relationship of the variables is linear (Table 5).

Besides those above tests, the outlier test is run using Mahalanobis approach to observe the average distance between variables on a multidimensional. AMOS software is used for this test based on the Chi-Square compared to the current degree of freedom on the current significant level (alpha). The results show that the value of Mahalanobis distance on the 34th observation is 43.441; which is less compared with 48.602.

### 4.3 Structural Model Analysis Results

**Table 5.** Results of Structural Model Analysis ($Y_2$)

| Hypothesis | Coefficient |
|---|---|
| H1 : 3PL Usage --→ Service Quality | 0.238 |
| H2 : IT Usage --→ Service Quality | 0.418 |
| H3 : Service Quality --→ Trust | 0.632 |
| H4 : Service Quality --→ Customer Satisfaction | 1.059 |
| H5 : Trust --→ Customer Satisfaction | 0.266 |

Based on statistic testing result which has been used, all tested hypotheses have achieved all criteria or can be used as measurement model in this research. Overall, the model of this study is divided to direct influence and indirect influence. Figure 2 shows the result of the structural model of the relationship between 3PL and customer satisfaction. It represents the hypothesis result of X1 to Y1, X2 to Y1, Y1 to Y2, Y1 to Y3, Y2 to Y3.

Table 6 shows the relationship between constructs developed in this study. The relationships are structured according to the hypotheses. The coefficient indicates the strength of the relationship between the dependent (X) and independent variables (Y).

As summarized of the results of this study, 5 hypotheses that have been tested indicate that hypothesis 1: the usage level of 3PL is positively related to customer performance. This result is relevant to the previous study by Purba, Nakamura et al [44] who found that there is a significant contribution of 3PL services to customer performance. Meanwhile, in the hypothesis 2 that indicates the level of IT in 3PL has a positive relationship to service quality, is in line with the findings of the study by Rai, Tang et al [45]and Zuna, Hadiwardoyo et al [46] which believe that in advances in IT, it can play a key role in the business service quality. Moreover, hypothesis 3 in this study found that service quality is positively related to customer satisfaction. This result is similar to the previous study by Russo, Gaudenzi et al. [47]. Finally, in the hypotheses 4 and 5: service quality is positively related to trust and trust is positively related to customer satisfaction are relevant with previous studies [6].

## 5 Conclusion

The use of technology in 3PL providers has been widely discussed in previous studies but not many studies have included variables of trust in relation to customer satisfaction. This study investigates the relationships between 3PL providers, IT usage, service quality, trust and customer satisfaction in the case of Indonesian manufacturing Industry. The customer relationship outcomes actors and leads to a number of important managerial implications. It shows that all hypotheses have a significant influence on the variables. The 3PL providers are not the one who leads to make service quality better. The firms should have IT usage to develop the service quality and built the customer satisfaction. Nevertheless, IT investment should be considered with some prudence. Managers should clearly understand their company's competitive advantages and assess the IT applications for their ability to support these functions, rather than follow current competitors to make a huge IT investment. Although this study focuses on the customer's perspective of outsourcing, the findings also have implications for the 3PL providers. By building trust, 3PL providers may be able to improve customer satisfaction. The results of this study are expected to be used as a reference for manufacturing industries in Indonesia and other developing countries in choosing 3PL providers. Further study should be carried out that 3PL provider manager's understanding of customer relationships, service quality, and trust in their customer relationships in their logistics channels reveals greater trends.

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