



SELECTION CRITERIA OF THIRD PARTY LOGISTICS SERVICES

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Introduction:

A key decision in logistics management from the customer's point of view is the selection of the transportation mode and carrier to move company's inbound and outbound freight. When making this decision, managers must typically consider different attributes related to cost and transit time as the primary criteria. However, the importance of individual factors often depends on the industry and company size. Moreover, even these factors may differ within a company from one facility to the next (Meixel & Norbis, 2008). 3PL selection criteria, especially the mode choice and carrier selection are part of the logistics decision making process of the 3PL customers. These include identifying relevant logistics performance variables, selecting the most suitable mode of transport and carrier, negotiating rates and level of service, and evaluating the carrier performance (Monczka, Trent & Handfield, 2005). According to Russell and Taylor (2003), transportation costs within manufacturing firms in 2003 were average 20 percent of the total production costs. Thus, no doubt these decisions are important to logistics managers.

Need for the Study:

As selection criteria for third party logistics is an important factor in logistics decision making, the researcher has made an attempt to study the conditions of selecting a third party logistics along with its additional consideration such as closeness to 3PL services and Infrastructure facilities of 3PL service providers.

Sampling Design:

The sample respondents were 800 employees of third party Logistics providers and the data were collected through a structure questionnaire.

Objectives of the Study:

- ✓ To analyse the selection criteria of third party logistics providers.
- ✓ To analyse the closeness of 3PL services.
- ✓ To analyse the infrastructure expectation in selecting 3PL services.

Hypothesis of the Study:

- H1: The closeness of 3PL services has an influence over Infrastructure Expectation of Equipments
 H2: The Infrastructure Expectation of Equipments and Infrastructure Expectation of warehousing are related.
 H3: The Selection criterion has an influence over closeness to 3PL services.

Measures for Selecting Third Party Logistics Providers:

In order to analyse Smart PLS version 3 has been used.

PLS Analysis - Measurement Model Results:

The first step in order to present the results of PLS analysis is to assess the reliability and validity of the measurement items or indicators, as it is important to determine that the measures represent the constructs. This section provides an evaluation on how accurate the measures are and also their convergent and discriminant validities.

Reliability:

All constructs consist of more than one item. Cronbach's alpha was used to assess the internal consistency, since it provides an estimate for the reliability based on the indicator inter correlations (Henseler et al, 2009). Alpha coefficients range from 0 to 1 where higher coefficients indicate higher reliability. The accepted value of cronbach's alpha is 0.70, whereas a value below 0.6 indicates a lack of reliability (Nunnally et.al, 1967).

Table 1 - Reliability Results – Composite Reliability and Cronbach's Alpha

Construct	Number of Indicators	Composite Reliability	Cronbach's Alpha
Closeness to 3PL services	2	0.889	0.753
Infrastructure Expectation – Equipments	3	0.709	0.419
Infrastructure Expectation - warehousing	2	0.846	0.644
Selection criteria	7	0.593	0.691

Cronbach's alpha tends to provide an underestimation of the internal consistency (Henseler et al., 2009), therefore it is also appropriate to apply the composite reliability measure. The composite reliability takes into account that indicators have different loadings, and can be interpreted in the same way as cronbach's alpha.

The accepted value for composite reliability is 0.70 or higher (Henseler et al., 2009). The composite reliability values which were shown in the above table, the values for all constructs are above the cut off level. The averaged composite reliability for all constructs is shows high reliability. Therefore, it can be said that the measurement instrument of this study is reliable.

Validity:

For the assessment of validity, convergent and discriminant validities are used. Convergent validity means that a set of indicators represents one and the same underlying construct, which can be analyzed through their unidimensionality. Discriminant validity is a complementary concept, meaning that each indicator should not have a stronger connection with constructs other than the one it attempts to reflect.

Table 2: Validity - Results

Construct	AVE
Closeness to 3PL services	0.801
Infrastructure Expectation – Equipments	0.503
Infrastructure Expectation - warehousing	0.733
Selection criteria	0.313

Fornell and Larcker (1981) suggest using the average variance extracted (AVE) as a criterion of convergent validity. AVE measures the amount of variance that a latent variable captures from its indicators relative to the amount due to measurement error. (Chin, 2010). An AVE value of at least 0.5 indicates sufficient convergent validity, meaning that a latent variable is able to explain more than half of the variance of its indicators on average (Henseler et al., 2009).

There are two measures of discriminant validity: The Fornell-Larcker criterion and the cross loadings (Henseler et al., 2009). The Fornell-Larcker criterion indicates that a latent variable shares more variance with its assigned indicators than with any other latent variable, in other words, the AVE of each latent variable should be greater than the latent variable’s highest squared correlation with any other latent variable. The second measure of discriminant validity takes into account the loading of each indicator, where it is expected to be greater than all of its cross-loadings (Henseler et al., 2009). Although the Fornell-Larcker criterion assesses discriminant validity on the construct level, the cross loadings allow this evaluation on the indicator level (Chin, 2010).

Structural Model Results:

Having tested for reliability and validity of the measures, the next step is to focus on the structural model. PLS analysis implies great emphasis on variance explained as well as establishing the significance of all path estimates.

PLS algorithm was executed on Smart PLS using 300 as maximum number of iterations, path weighting scheme was selected since Haenlein and Kaplan (2004) suggest that the choice between the different weighting schemes for determining inner model proxies has only a minor impact on the final results.

Variance Explanation:

The explanation power of the structural model is assessed by the R² values of the endogenous constructs, these values represent the amount of variance in the construct that is explained by the model (Tabachnick and Fidell, 2007).

Chin (1998) describes R² values of 0.67, 0.33, and 0.19 in PLS path models as substantial, moderate, and weak, respectively. Below table summarizes the R² value of perceived norms. In other words, the model is able to explain 91 percent of the variance in perceived norms.

Table 3: Variance explanation Results

Construct	R2
Closeness to 3PL services	0.008
Infrastructure Expectation – Equipments	0.742
Infrastructure Expectation - warehousing	0.813

Path Analysis:

The path coefficients of the PLS structural model provide a validation of the theoretically assumed relationships between constructs (Adams et al., 2007). The individual path coefficients measure the magnitude of the causal relation between constructs, they can be interpreted as standardized beta coefficients of ordinary least squares regressions (Henseler et al., 2009). The results of the structural path analysis are depicted in the above diagram – smart PLS Output – path analysis, in which PLS path coefficients and indicators loadings are shown. All path coefficients are positive and this indicates that the causal relation is positive.

Effect Size:

Henseler et al. (2009) recommend that all indirect effects of a particular latent variable on another variable should be evaluated, considering that the standardized inner path model coefficients decline with an increased number of indirect relationships. In order to evaluate the effect size in the path model, Cohen’s (1988) f² was calculated as the increase in R² relative to the proportion of variance of the endogenous latent variable that remains unexplained (Henseler et al., 2009):

$$f^2 = \frac{(R^2 \text{ included} - R^2 \text{ excluded})}{(1 - R^2 \text{ included})}$$

According to Cohen (1988) values of 0.02, 0.15, and 0.35 can be interpreted as small, medium, and large effects at the structural level, respectively.

The f^2 values were calculated manually for each latent variable. The results of closeness to 3PL services to Infrastructure expectation - equipments, infrastructure expectation – warehousing and selection criteria 2.879, 4.351 and 0.008 respectively. The effects of problems faced represent small effect.

Figure 1: Smart PLS model

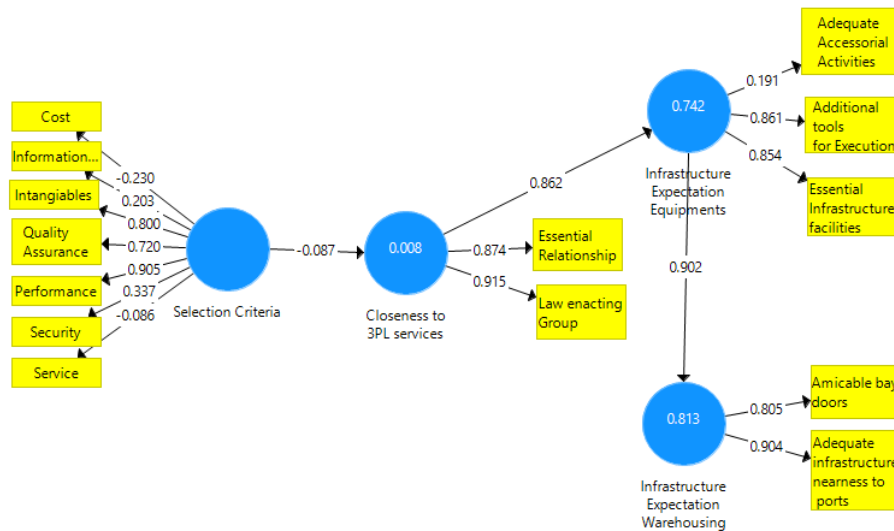


Table 3: Tests of PLS paths with Boot strap

Hypotheses	Path Co-efficients	T- statistics
H1 : Closeness to 3PL services ->Infrastructure Expectation - Equipments	0.862	92.660**
H2 : Infrastructure Expectation –Equipments ->Infrastructure Expectation - warehousing	0.902	113.729**
H3 : Selection Criteria ->Closeness to 3PL services	-0.087	0.861
Note: one-tail * Significant at .05 level ** Significant at .01 level		

The results support the proposed relationships between Closeness to 3PL services and Infrastructure Expectation – Equipments (H1) (t = 92.660, p > 0.01); Infrastructure Expectation – expectation and Infrastructure Expectation - satisfaction (H2) (t = 113.729, p < 0.01). The results support the proposed relationships of H1 and H2.

Conclusion:

The findings of the present study clearly shows that Infrastructure expectation of Equipment and warehousing are interrelated and the closeness of 3PL services is based on the Infrastructures with good equipments.

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