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# EVALUATING CRITICAL SUCCESS FACTORS ON WILLINGNESS TO IMPLEMENT CROWD LOGISTICS APPLICATIONS FOR FLEET SHARING IN SRI LANKAN 3PL WAREHOUSES

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**ABSTRACT** – Crowd Logistics (CL) is a widely used concept in the global context due to its numerous advantages to logistics services.Implementing CL allows sustainable fleet sharing in warehouses but there is limited research on what drives the organizations to adopt this concept in Sri Lankan context. Based on technology-organization-environment theoretical model, this paper develops a model to evaluate critical success factors on willingness to implement CL applications for fleet sharing in Sri Lankan third party logistics (3PL) warehouses. Data was collected using questionnaires and confirmatory composite analysis in partial least square structural equation modelling was used to analyze data. The results indicate "relative advantage, absorptive capacity,market environment and external motivation" have significant impact on willingness to implement CL while "complexity, resources and geographical distance" have no significant impact. Sri Lankan 3PL warehouses can consider these factors and take necessary precaution to minimize risk of CL implementation.

**Keywords:** Crowd Logistics; 3PL warehouses; Critical success factors, Fleet sharing,

## 1. INTRODUCTION

Crowd Logistics (CL) is defined as an information connectivity enabled marketplace concept that matches supplyand demand or logistics services with an undefined and externalcrowd that has free capacity with regards to time and space or participants on a voluntary basis and is compensated [1],[3]. The evolving CL applications for fleet sharing is a challenge for 3PL warehouses. Collaborative transport which is a CL application for fleet sharing is an identified challenge in Sri Lankan 3PL warehouses [2]. CL has the potential to improve distribution, efficiency and reduce logistics costs when compared with the traditional logistics approaches [4]. Therefore, Sri Lankan 3PL companies can also look forward to adopting a collaborative transport solution such as CL platform-based application as a solution to optimize distribution service provided by them [5]. Therefore, this study is focused on identifying and evaluating the critical success factors (CSFs) on willingness to implement CL applications for fleet sharing in SriLankan 3PL warehouses under three research objectives (Ros): (RO1) Investigate and evaluate the critical success factors for the implementation of CL for fleet sharing in Sri Lankan 3PL warehouses, (RO2) Explore the willingness to implement CL by Sri Lankan 3PL warehouses, (RO3) Identify the potential limitations when implementing CL in Sri Lankan 3PL warehouses for fleet allocation.

## 2. MATERIALS AND METHODS

RO1: The initial phase of this study involved a literature survey, which identified seven common success factors related to the willingness to implement CL in 3PL warehouses. To validate and measure the practical applicability of these factors in the Sri Lankan context, a survey was conducted among managers and assistant managers from 3PL warehouses with over four years of experience in the industry. The sample size comprised 10 participants, and the data was collected through a questionnaire. The validated success factors are then categorized under TOE framework to build the conceptual framework. The validity of the model is evaluated using: Confirmatory Composite Analysis (CCA) in partial least square structural (PLS) modeling conducted

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through SMART PLS software. To gather sufficient data for this analysis, a sample of 40 3PL managers was required, and data was collected using a questionnaire.
RO2: Hypothesis testing is run on the structural model formed in RO1. In the structural model two tailed test is carried out with 5% significance level.
RO3: Discussion of the rejected hypothesis referring to literature.

## 3. RESULTS AND DISCUSSION

The seven factors investigated through extensive literature survey as CSFs for the implementation of CL were confirmed by the interviews conducted with operational managers of 3PL industry. As per Figure 2 all the factor- loadings of the nine variables are more than 0.7. Therefore, all these coefficients are valid confirming the construct validity of the model. As per Figure 3 all the values obtained for Cronbach's alpha for each variable is higher than 0.7 proving the accurate internal consistency of the model. As all the composite reliability measures of the seven latent variables are greater than 0.7, this proves that the same results will be produced by the model under various conditions. Rhos value obtained as in Figure 3 are between the value of Cronbach's alpha and composite reliability, which is recommended for a good fit model. All the AVE values obtained are greater than 0.5. All VIF values are less than 5. All the F square values are less than 0.35 which represent a medium effect size except the F square value of Relative Advantage which represent a large effect size. According to the output of the analysis, the measurement model and the reflective model are both at the satisfactory level.

Hence theoretical model (TOE model) built which is showed in Figure 1, can be considered as a good fitting model to measure the willingness of implementing CL in Sri Lankan 3PL warehouses. Hypothesis with P values less than 0.05 are rejected and the results are in Table 1. The results of the indicate as per Table 1 that "relative advantage, absorptive capacity, market environment and external motivation" have significant effect on willingness to adopt CL to Sri Lankan 3PL warehouses while "complexity, resources and geographical distance" do not have a significant effect on willingness to adopt CL to Sri Lankan 3PL warehouses. Hence, Complexity, Resources and Geographical distance are identified as potential limitations when implementing CL in Sri Lankan 3PL warehouses for fleet allocation.

## 4. CONCLUSION

The built model provides a theoretical guidance to logistics entrepreneurs for decision making in adopting this process as this is still under developing stage. The research findings indicate that, relative advantage, absorptive capacity, market environment and external motivation have significant influence on the adoption of CL in Sri Lankan 3PL warehouses while complexity, resources and geographical distance show noimpact on the same. 3PL companies need to build a learning environment and gathering of information on CL practical applications conducted by other countries. Sharing of such knowledge enables higher management of 3PL companies to evaluate further this concept based on their organization culture and this is a practical challenge faced in real world. These factors can be used when implementing novel actions related to CL. The conceptual framework was used in the perspective of 3PL management and for further studies this can be improved with perspective of crowd workers and crowd platforms. Furthermore, the study can be conducted using other CSFs and 3PL warehouses outside Western province.

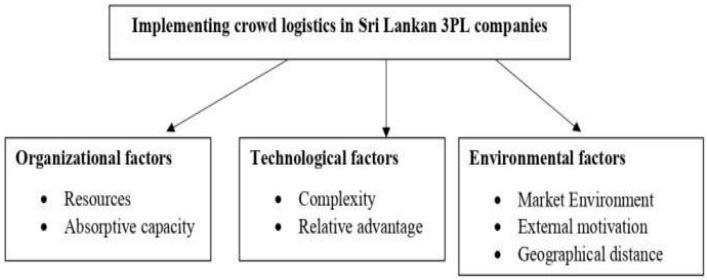


**Figure 1.** Reflective model built using TOE framework.

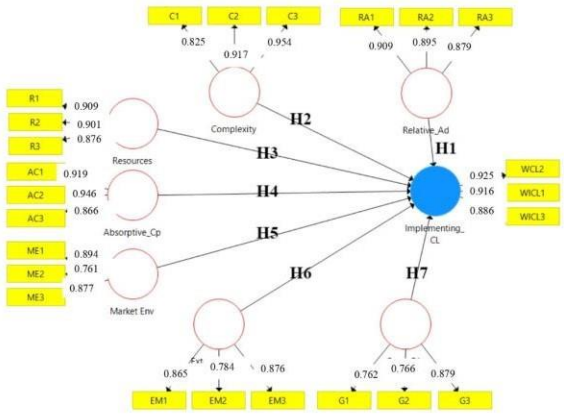


**Figure 2.** Factor loadings of each variable

**Table 1.** Hypothesis results

| Path | Path coefficient | T stat | P stat | Hypothesis supported |
|---|---|---|---|---|
| H1-H | 0.862 | 4.639 | 0 | Yes |
| H2-H | 0.334 | 1.786 | 0.075 | No |
| H3-H | 0.138 | 0.666 | 0.506 | No |
| H4-H | -0.288 | 3.648 | 0.005 | Yes |
| H5-H | 0.176 | 0.245 | 0.036 | Yes |
| H6-H | -0.572 | 2.255 | 0.015 | Yes |
| H7-H | 0.332 | 1.339 | 0.181 | No |

| | Cronbach's Alpha | rho_A | Composite Reliability | (AVE) | VIF | F square |
|---|---|---|---|---|---|---|
| Absorptive_Cp | 0.912 | 0.863 | 0.935 | 0.929 | 3.942 | 0.049 |
| Complexity | 0.881 | 0.871 | 0.927 | 0.81 | 2.787 | 0.096 |
| External Motv | 0.914 | 0.905 | 0.913 | 0.95 | 4.934 | 0.15 |
| Geog_Dis | 0.825 | 0.867 | 0.907 | 0.935 | 4.513 | 0.05 |
| Market Env | 0.899 | 0.907 | 0.911 | 0.831 | 3.528 | 0.043 |
| Relative_Ad | 0.875 | 0.876 | 0.923 | 0.8 | 1.839 | 0.78 |
| Resources | 0.891 | 0.899 | 0.933 | 0.823 | 1.113 | 0.019 |

**Figure 3.** Validity of measurement variables

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