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# A STUDY ON THE FACILITIES LOCATIONS AND TRANSPORTATION ACTIVITIES IN THE SUPPLY CHAIN MANAGEMENT ON FIRM'S PERFORMANCE

**Diriba Ayele Gebisa***

*Researcher,
Department of Management,
Guru Jambheshwar University of Science and Technology,
Hisar, Haryana State, INDIA
Email id: dirayele@gmail.com

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## ABSTRACT

***Purpose***

*The main objective of this paper is to study the effect of facility location and transportation factors in the supply chain management practice on firms' performance.*

***Methodology***

*To realize the specified objective of the paper data were gathered from 196 respondents in seven companies operating under three different types of industries operating in Ethiopia. Before applying Confirmatory Factor Analysis in AMOS, explanatory factor analyses were made by principal components analysis in SPSS to prove whether the respondents correctly understand and filled the survey. Further, reliability and validity test were made and proved that the results are satisfactory to proceed. To answer the research objective three hypotheses proposed and tested by structural equation modelling (SEM).*

***Result***

*The result indicates that facility location and transportation factors in the supply chain management have direct and significant effects on organizational performance. Further, the result also show the existence of indirect effects of location factors on firms performance when transportation factors acts as intermediary variable between facility location and organizational performance.*

***Conclusions***

*In general, the result of this study theoretically fill the gap of literature in the specified area of study in developing countries; and practically the result allows the companies under considerations to use the result of the study to improve current performance and to use the result as inputs in planning locations decisions in case of business expansion or new business development. The novel contribution of this study is its examination of the effects of facility locations decisions and transportation activities in integrating supply chain activities and leading to higher organizational performance; and the mediating effects of transportation between facility location and organizational performance.*

## 1. INTRODUCTION

Supply chain management is more than efficient movement of goods from its origin to destination point. There are several types' of strategic and operational decisions to be made in supply chain management in order to serve customers better and operate efficiently than* competitors. Among the important decisions to be made is a location decision from the side of strategic decisions and transportation decisions from operational side to realize an efficient supply chain practices. Location issue is an influential decisions relating to where to locate plants, distribution and collection centers. Where to locate facilities is a strategic decision to be made by companies in the supply chain management (Van Mieghem, 2001). Location decision is also becoming important decisions with increased cost of distribution (Pishvaee et al., 2010). Similarly, as Christopher (2005) specified decisions of where to put plant is a basic determinant of profitability in international logistics. These days, decisions of facility location are more important than before due to the concern for environmental issues, and different legal impositions by government that force a firms to practice reverse supply chain; where defective products, hazardous end products, excess inventory or recycling of used products are needed to be moved in reverse flow (Jayaraman, and Patterson, 2003).

The decision of facility location is determination of the right geographic site for a firm's operations (Krajewski, 2007); and similarly facility location is the decisions of establishing proper location for a company in the supply chain (Arabani and Farahani, 2012). The decision of facility location is extremely important to achieve efficient supply chain practices to expand to the new markets, for cost minimization and for re-collection of end of life products or defective products from consumers for recycling or proper disposal (Thanh, 2009). The right facility location enables firm to serve customers' efficiently within minimum possible time and delivery cost (Harris et al., 2014). The performance of supply chain management is extremely subjected to location selection (Heizer and Render, 2006); where key decisions relating to capital allocation and service to customer are affected by facilities location decisions.

In existing dynamic and competitive globalized business environment finding the best facility locations is a difficult task for decision makers. In advance for locating a business in a specific location, there are a number of factors that needs to be considered for better customer services, cost minimization and revenue maximization. Numerous researches made around facility location decisions identified different factors to be considered in selection of right facility location. The major factors to be considered are availability of skilled labor, taxes and environmental regulations, and transportation infrastructure (Dogan, 2012); accessibility of reliable and quality modes of transport, nearness to marketplace (Bello, 2007); proximity to raw material, and transportation costs (Hilmola et al., 2010); and costs, availability of labor and infrastructure (Acosta et al., 2010); and Costs, proximity, quality of workers, availability of infrastructure, and tax effects (Chopra and Meindl, 2010). FLD affect delivery time and flexibility (Mazzarol and Choo, 2003).

Besides, the decisions of facility location supply chain management concerned with transportation of raw materials and finished products in the distribution channels. Sustained and effective freight transport is fundamental for the economic development (Kuse, 2010); and the

improvements in physical distribution can yield tremendous improved supply chain performance for supply chain partners (Kotler& Wong, ( n.d.). A good transport system in logistics activities could provide better supply chain performance by reducing operation cost, and promoting service quality. Hence, transportation plays the key role in moving and integrating people and raw materials. Transportation activities have the potential to integrate and improve the overall national and international economic growth through supply chain linkages by making the products available from the surplus area to shortage area. Effective and efficient transportation also improve the perceived value of particular firm's products by making easily available everywhere, and offering faster delivery. The scope of transportation issue is comprehensive and complicated. A transportation issue includes decisions relating to selections of the right modes of transportation, minimization of transportation cost and time, shortening lead time, loading and unloading time for on time delivery, flexible delivery, and overall customer satisfaction.

Generally, this paper broadly aims to investigate the effects of facility location and transportation in the supply chain practices on firm's performance. Specifically, to achieve the stated objective of this paper, three basic questions answered by the researcher. The questions are: what is the effect of facility location in the supply chain management on firm's performance; what is the effect of transportation in the supply chain practices on firm's performance and what is the intermediary effect of transportation between location factors and firms performance. Finally, this paper is arranged in five basic sections; where the first section is introduction section, second section is review of the literature; section three is research methodology, section four is results and discussion and the last section is conclusion, limitation, and future research direction.

## 2. LITERATURE REVIEW

### 2.1 FACILITY LOCATION

The basic issues to be answered in the facility locations are where to locate and how to size facilities? How to meet customer demands from the facilities? Which facilities serve each customer? How much customer demand is met by each facility? The need for highly dealing with facility location decision in the supply chain management and considering the issue as part of the firm's strategic issue is for the long-term impact of the decision on the firm performance.

Facility location influence efficiency of supply chain management by influencing inventory level and cost, delivery cost and time, and for quick response to customer request. Research shows strong relationship between location problem and inventory (Shen et al., 2003) and the existence of linear relationship between transportation cost and location (Shen and Qi, 2007). Generally, for right locations decisions there is a need to consider availability infrastructure, raw materials, nearness to consumer, and availability of cheap and skilled labor to offer quick service delivery at minimum cost and to offer quality service to improve supply chain performance. Therefore, for the smooth flow and cost effectiveness of all these activities locations of the networked facilities have significant impact on firm's performance (Wang, & Yang, 2014).

Facility location in forward supply chain has been extensively studied in the operation research from the angles of the quantitative aspects of cost minimization disregarding qualitative features supporting the competitive advantage. However, facility location decisions for closed loop supply chain practices is more complicated issue relative to location decisions in a traditional supply chain practices since the strategic decision makers needs to optimize the bidirectional

supply chain practices. In a traditional supply chain the concern of strategic manager is only the way to minimize cost and maximize profit by focusing on the flow of raw materials and finished goods along the downstream. However, in a closed loop supply chain practices firms need to consider again the effectiveness of the locations for reverse flow of end of life products, defective products or excess inventory to be flow back in the reverse supply chain. Toni and Tonchia (2001) revealed facility location largely measured from the traditional cost based view performance than the advanced non-cost measures as quality, flexibility and time based performance; Melo et al., (2009) also measured commercial success and competitive advantage of the location advantage of the firm on the basis of distance from customer, time and costs taken in delivering the product; Achillas et al. (2010a) measured right facility location from aspects of social, economic and accessibility of the facilities.

Also large number of supply chain dimensions such as minimum lead times, flexibility of productions and delivery, and target corporate objectives are highly influenced by decisions relating to facilities locations (Koskinen and Hilmola, 2008; & Hilletofth, 2009). A right location decision enable supply chain to be responsive besides keeping associated costs low, whereas a wrong location decisions makes supply chain performance to be inefficient (Chopra and Meindl, 2010). Generally, there is a strong relationship between flexibility, responsiveness quality, and inventory turnover in the supply chain of firms with facility location (Bhatnagar and Sohal, 2005).

The studies made by different scholars on the issues of facility location identified a wide range of variables to be considered in facility location decisions. Some of the results of these studies are, the result of Badri et al. (1995) were they identified availability of transportation facilities and raw materials, industrial sites, utilities, government attitude, tax structure, community outlook, economic and political related factors; Ray (1995) pointed capacity of suppliers; proximity to suppliers' and market, transportation cost; existence of adequate facility, cost of land and labor, accessibility of skilled labor; attractiveness of the environment, government strategies relating the planned location; and Kupke and Pearce (1998) identified proximity to the market and accessibility to roads facility as two most important determinants of facility location factors.

## 2.2 TRANSPORTATION

Effective means of transportation make raw materials and finished goods to be available at the right place and right time for manufacturers, distributors and consumers. From variety of transportation system, freight transportation plays significant roles in coordinating and integrating all the supply chain partners from upper stream to lower stream. Freight transportation is the key component in integrating supply chain partners by extracting raw materials and moving to producers; and move finished products from production site to consumption center; and reverse back fault products, excess inventory or defective products from mass consumption to manufacturers for desired purposes. As Kuse (2010) pointed persistent and active freight transport is essential for the economic development, and efficient physical distribution in the supply chain enhance firms performance (Kotler& Wong, ( n.d.). Also, freight transportation support flow of commodity in the global market and supply chain partners from extraction of raw materials to distribution of final products to market (Nijkamp 2003).

The movement of raw materials, and finished goods in the in the supply chain takes place either through private carriers or public carriers; where very carrier use different modes of transportation, including road, rail, air water, and pipe lines (Chopra &Meindl, 2004). The selection of these carriers needs to consider nature of products, cost of transportation, value of the products, availability of facilities, and distance between production and consumptions centers. Also the selection of the right mode of transportation needs the considerations of the speed of movement, regularity of services by the firms', service dependability, potential of loss and damage rate of the products by the specified modes of transportation, and convenience of service (Talley, 2006). Similarly, carriers can actually differentiate themselves by proving their ability in cost reduction, building high competitive advantage and creating strong supply chain practices (Neeraja et al., 2014).

Also, the mode of transportation is an important consideration when desiring certain target level of supply chain performance. Transportation mode compounded with uncertainties that seriously affect performance of supply chain (Sheu et al., 2005). The most important consideration in the selection of a particular mode of transport is its cost since nearly one third of the total cost of logistics operations is transportation cost (Alan et al., 2006). Similarly, another study show of dealing with transportation issue since 1/3 to 2/3 of enterprises' logistics costs are transportation cost and the cost of transportation on average account 6.5% of market revenue and a fall in transportation cost by one unit leads to inventory costs to be dropped in triple (Wilson, 2004).

The right mode of transportation is the modes that results the shortest time and minimum cost path between source and consumption point. Transportation model have a critical impact on supply chain performance since the adopted modes of transportation affect reliability and dependability on the mode, quality of service to be offered, capacity to be loaded, delivery time, and cost of transportation. Generally, the right mode of transportations are modes with minimum cost (Ben-Tal et al, 2011; & Safeer et al., 2014), minimum time (Yuan and Wang, 2009) and minimum risk of transportation (Safeer et al., 2014), and minimum loading and unloading time (Barbarosoglu et al., 2002) that enhances the overall performance of the firms.

The other factor to be considered in transportation issue is road network. As Parmar& Shah, (2016) stated a road network shows the standard of roads, its connectivity and accessibility. Parmar& Shah also added that poor road network connectivity makes supply chain management uncertain and disrupt transportation and creates customer dissatisfaction, low customer responsiveness and low on time delivery. Road network design is determination of the routes, allocation of the resources and evaluation of its reliability (Safeer, et al., 2014). A poor and inadequate road network can creates a traffic congestion that results traffic delay (Weisbrod et al., 2001). Further, congestion can create delay and uncertainty in logistics practices that decrease customer satisfaction, increases holding cost and level inventory and make capital unproductive (Disney et al., 1997).

Further, decision of transportation needs to consider lead time. Lead time is a time between placements of an order to acceptance of product ordered. It is a function of order processing time and time to be taken by carrier on delivery. An average waiting time/ lead time minimization is creating a new means of competition between producers (Kingman, 1989). The effects of lead time variability studied by many researchers. For example, Song (1994) studied lead time effects on firm's performance; Treville et.al (2004) proved an improved in lead time enhance time of

delivery; Kim (2005), and Song et al. (2010) analyze the effect of lead-time variability on optimal inventory control policies and the resulting total costs under standard inventory control policies; and Chaharsooghi and Heydari (2010) shown the significant impact of lead-time variability on performance of inventory levels, product availability and the bull whip effect. Unexpected delays at loading or unloading points, failures within the distribution network and unforeseen situations negatively affect efficiency of supply chain management (Stajniak, Hajdul, Foltynski, &Krupa, 2008).

## 2. RESEARCH MODEL AND DEVELOPMENT OF HYPOTHESES

The assumed model is given on Figure 1. The model portrayed on Figure 1 shows the effects of location and transportation factors in the supply chain management on organizational performance. The researcher examined both the direct and indirect effect of location factors on firms' performance and the mediating effect of transportation factors on the relationship between location issues and firms' performance. The proposed theoretical model given on figure 1 show that transportation issues mediates the effect of location factors in the supply chain activities on organizational performance. The researcher proposed three hypotheses based on the constructed model given on Figure1.

The first proposed hypothesis related location factors with supply chain performance. As discussed in the introduction section and review of related literature section, location factors are the strategic decision making in the supply chain management that can affect the financial and non-financial performance of firms. This particular paper analyzed three indicators as components of latent variable location factors. The indicators used are proximity of the location to market, proximity to resources and availability of infrastructure in the location. The researcher proposed the first hypothesis as:

H1: Location factors are positively related to firm's performance in supply chain practices.

The second hypothesis developed related transportation facilities in the supply chain management with firm's performance. Given that the transportation is the heart and influencing factor for the success of supply chain management, it is unquestionable that favorable transportation factors fosters firm's performance in the supply chain practices. Transportation can facilitate the free flow of inputs and outputs among the supply chain partners and creates time and place utility by moving raw materials, intermediate goods and finished goods at the right time to the right place. Therefore, transportation can serve as a catalyst in integration of supply chain partners and enhancement of the overall performance of the firms.

Similar to location factors, the researcher selected five indicators for the second latent variable of transportation factors. The selected indicators are the mode of transportation, transportation cost, average lead time, average loading/unloading time and road quality. Generally, well-developed transportation facilities facilitate movement and communications that can decrease transportation cost, enables firms' to be customer responsive, and decrease firms delivery time to customer request. Thus, the second proposed hypothesis proposed as:

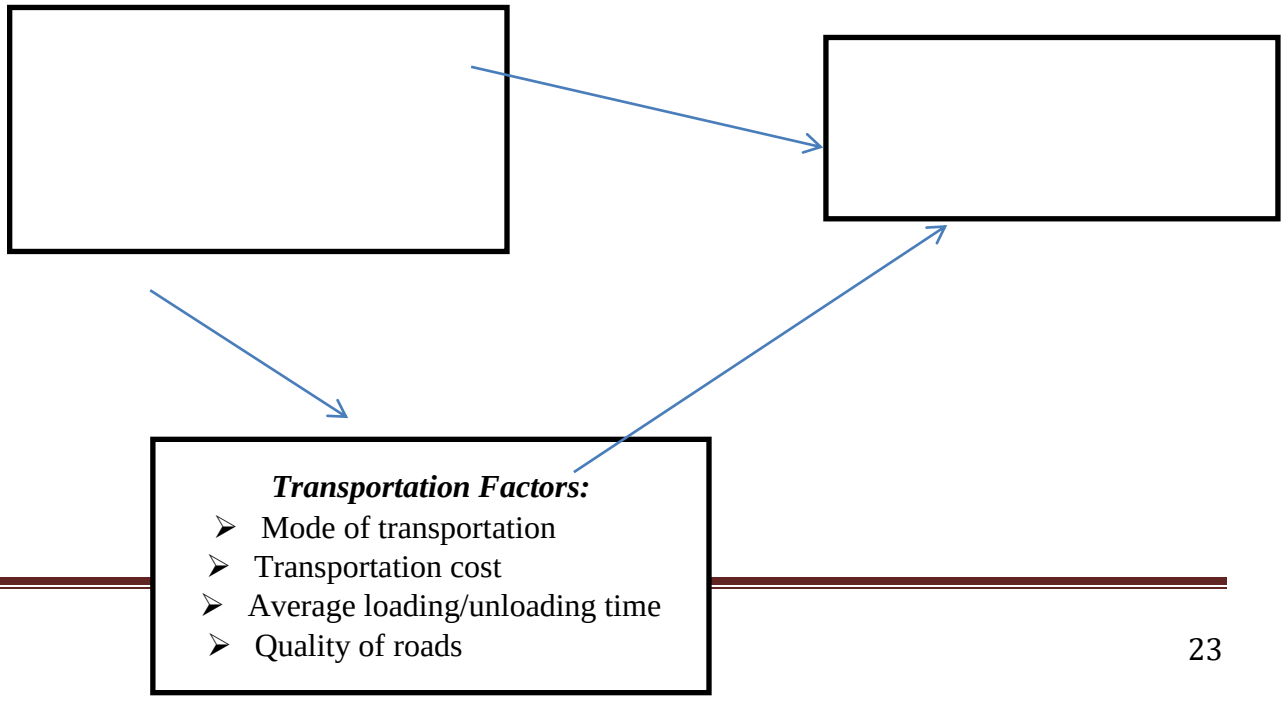
H2. There is a positive relationship between the transportation factors and firms' performance in the supply chain management.

The third hypothesis developed based mediating effects transportation between location factors and firms performance. From the developed conceptual model, the transportation factors denoted as mediating variable between location factors and firms performance in the supply chain practices. The mediating effect specifies how a given variable affects the relationships that exist among other variables. In this research the researcher specified that location factors directly influence firms' performance in the supply chain practices. Also transportation factors improve the movement of resources between supply chain partners so that inputs and outputs can be easily moved to the right place at the required time; these in turn improve firms' performance. Furthermore, the model specified transportation factors as a mediating variable between location factors and firms performance. The direct and indirect effects of location factors on firms' performance in the supply chain practices is decomposed and interpreted by structural equation modelling, where the indirect effects of transportation factors are interpreted as the result of mediating effects of the variable on firm's performance. Therefore, the third hypothesis proposed as:

H3: location factors positively related transportation factors.

A framework displayed on Figure1.shows the relationship between location factors and firm's performance, the effects of location factors on transport factors, and the influence of transportation factors on firm's performance in the supply chain practices. Therefore, this research empirically investigated the linkages between the above-mentioned four dimensions of transportation factors namely, mode of transportation, transportation cost, road quality and average loading and unloading time with the three dimensions of firm's performance namely cost, customer responsiveness, and delivery time. Similarly, the effects of location factors from the dimensions of proximity to markets, proximity to resources and infrastructure availability of the location on the firm's performance in the supply chain practices from the location dimensions. Furthermore, the paper investigated the mediating effects of transportation factors on the relationship between location factors and firm's performance in the supply chain practices.

**Figure 1. Conceptual framework of the study**



## 4. Research Methodology

To test the three hypotheses developed from the conceptual framework given on Figure 1, data were collected from seven companies operating in Ethiopia. The sample frame used for this study contained dairy, beer, and cement industries operating in Ethiopia. The organizations taking part in the survey are two dairy factories, three cement factories and three beer factories that are located in and around the capital city, Addis Ababa, Ethiopia. The companies were selected based on the criterion of their long duration they stayed in operation, capital size and the volume of their production; and 205 respondents purposively selected from seven specified companies based on their expertise on the specified issues of the paper to be used as a sample of the study.

To test the hypotheses a survey questionnaire of five-point Liker scales of responses ranged from (1) strongly disagree to (5) strongly agree were designed based on extensive literature review. The total survey questionnaires initially distributed to the target respondents to be used for this study is 205 respondents, however only 196 or around 96% of response rate of survey questionnaires were collected back from the respondents.

## 5. Results and Discussions

The collected data analysed using SPSS Version 20 and AMOS software package version 23 to test the proposed hypotheses. In the analysis first an Exploratory Factor Analysis (EFA) of a Structural Equation Modelling (SEM) was used to test the proposed model. Structural Equation Modelling consists of two basic components as structural model and measurement model. In order to test the accuracy of the conceptual model, the most common method encountered in the literature on structural equation modelling is a two-stage method consisting of measurement model and structural model. In the first stage, the measurement model is tested; in the second stage the structural model is tested. The measurement model measure how well hidden variables are represented by the observed variables. It is mainly confirmatory factor analysis (CFA) and indicates the construct validity of scales. Therefore, if the measurement model fit indices are low, it will not make sense to test the structural model (Dursun & Kocagöz, 2010).

In order to test the proposed hypotheses and answer the research objectives, the researcher used two steps to investigate the collected data. The first action taken is selection of important measurement items to be used for the measurement, and the second is to confirm the structure of the structure of the measurement model by the confirmatory factor analysis as explained by (Mulaik& Millsap, 2000).The analysis of collected data started by testing the validity of questionnaire used for data collection. In this analysis even though the adopted method is confirmatory factor analysis from structural equation modelling, before running CFA the result of EFA applied to confirm whether the survey fillers correctly perceive the questions. As Mustafa ( 2018) briefed it is necessary to see the results of explanatory factor analysis (EFA) in practice before applying confirmatory factor analysis (CFA) even though scales generally accepted in the literature are used.

Before analysis of collected data, the necessary test for evaluation of the validity and reliability of the scale used were made. Then, the internal consistency and convergent validity of data were measured. The need for these tests is to confirm whether a scale designed is consistent and measuring what we really want to measure. For this the principal factor analysis (PFA) results given on Table 1 show the results of reliability and validity of the questionnaire used under all the constructs used. Several tests were conducted to evaluate measurement validity. First, internal consistency and convergent validity were assessed. The results displayed in Table 1 are the factor loadings, average variance extracted, construct reliabilities, and Cronbach's alpha of 19 indicators. The results of the factor loading ranges from 0.62 to 0.94 for each item selected and statistically significant ($p< 0.000$) for all loadings. The Cronbach's alpha values for all the constructs are above the minimum acceptable value of 0.70 and the average variances extracted for all the constructs exceeds 0.5, which are acceptable (Fornell and Larcker, 1981). Generally, the resulted Cronbach α values and reliability values indicating the reliability of the scales used.

**Table I. Results of Construct reliability and validity from principal factor analysis using SPSS**

| Indicators | Factor loading | Cronbach's α | Construct reliability | Average variance extracted (AVE) |
|---|---|---|---|---|
| *Location Factors:* | | | | |
| Proximity to large market | 0.94 | 0.92 | 0.83 | 0.75 |
| Proximity to cheap labour | 0.71 | | | |
| Proximity to adequate labor | 0.86 | | | |
| Proximity to skilled labor | 0.90 | | | |
| Proximity to raw materials | 0.72 | | | |
| Availability of adequate utilities | 0.78 | | | |
| *Transportation Factors* | | | | |
| Right mode of transportation | 0.80 | 0.83 | 0.72 | 0.71 |
| Transportation cost | 0.83 | | | |
| Average loading/unloading time | 0.74 | | | |
| Road quality | 0.62 | | | |
| Minimum lead time | 0.65 | | | |
| *Price/cost*: | | | | |
| Offer competitive prices. | 0.88 | 0.86 | 0.78 | 0.66 |
| Offer prices lower than competitors | 0.73 | | | |
| Quality | | | | |
| Compete based on quality | 0.71 | 0.74 | 0.76 | 0.61 |
| Offer products that are highly reliable | 0.78 | | | |
| Offer high quality products | 0.68 | | | |

| | | | | |
|---|---|---|---|---|
| Delivery dependability<br>Deliver the kind of products needed | 0.84 | 0.92 | 0.86 | 0.76 |
| Deliver customer order on time | 0.93 | | | |
| Provide dependable delivery | 0.82 | | | |

**Structural equation modelling using AMOS**

In the receding section explanatory factor analysis (EFA) were made by principal components analysis in SPSS Version 20 to look the results prior to use confirmatory factor analysis (CFA) in AMOS. This is due to the need to prove if the survey fillers correctly understand the questions even if the scales used are not new in the literature. Once the results of reliability and validity test are proved that the results are satisfactory, the next step is testing the proposed hypotheses using structural equation modelling (Anderson and Gerbing, 1988).

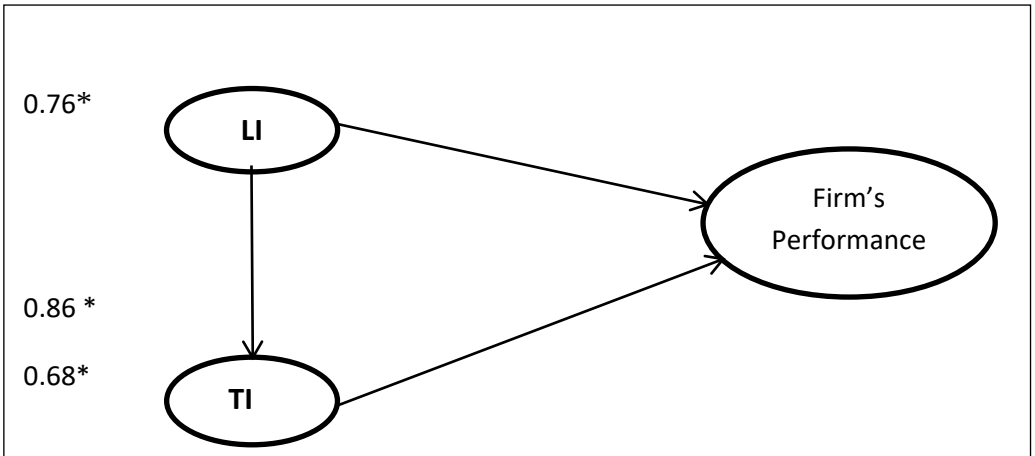
The three proposed hypotheses that were derived from the conceptual model built in structural equation modelling were tested in AMOS version 23. Different test for model fit indexes were made in the analysis in Table 2. The results of these tests were made by $x^2$statistics at significant significance level of $p < 0.05$; and used other fit indexes including the normed fit index (NFI) that takes values from 0 to 1 and where higher values indicate better fit (Bayram, 2013);comparative fit index (CFI)values that can range from 0 to 1, and values beyond 0.90 and close to 1 show good fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003);root mean square error of approximation (RMSEA)value of 0.05 or less than 0.5 for the RMSEA indicates good fit (Bayram, 2013) and values from 0.05 to 0.08 show acceptable fit (Byrne, 2010) and goodness-of-fit index (GFI) , where GFI value ranges from 0 to 1 and values above 0.90 show that the fit is good (Bayram, 2013). The results of all these tests satisfied the minimum required criteria summarized by Bayram, (2013) as the standard for acceptable CFI index is between $0.95 < CFI < 0.97$; for GFI $0.85 < GFI < 0.90$; for NFI $0.90 < NFI < 0.95$; and for RMSEA $0.05 < RMSEA < 0.08$.

To further assess the discriminant validity tested for each dimension of constructs used. It reflect the degree to which a structure or the questionnaires used in a given measurement model can vary from other questionnaires under the other constructs as proposed by Fornell and Larcker (1981).Then the discriminant validity calculated for each dimension based on the value of Average Variance Extracted (AVE) for each dimension. In order to determine discriminant validity, it is also desirable that the values of the AVE for each construct in the data set are larger than the correlation coefficients of that construct with the other constructs and the acceptable AVE value must be greater than 0.50 or 0.50. Hence, the measured values of discriminant validity given in Table 2 shows that the results are beyond the acceptable threshold. Generally, the results of Confirmatory Factor Analysis (CFA) reveal satisfactory reliability and validity for the three in analysis.

Figure 2 show the used portion of the standardized results estimated by Maximum Likelihood in AMOS 23.0 for the structural regression model. The standardized results displayed in Figure 2 indicate the level of significant relationships at $p < 5\%$ level between the three latent variables under investigations. From the standardized path coefficient displayed on Figure 2 the significance of the path coefficient from location issues (LI) to transportation issues (TI), from location issues (LI) to Firm's Performance (FP); and from transportation issues (TI) to firm's

performance (FP) was determined by analysing their respective unstandardized results and standard error. In the paths model the statistical significance of the parameter can be estimated by dividing the unstandardized results of the parameter by their respective standard errors; and if the critical values (t values) are more than 1.96, they are significant at the .05 level as suggested by (Schumacker and Lomax, 2004). Although significance between the respective latent variables determined by estimating from the results of the critical ratio (i.e., z score) automatically calculated with AMOS program. For this particular paper, to test the significance of the values in the paths coefficients the researcher based on the results automatically estimated by AMOS program and displayed in the last column of Table showing the results of confirmatory factor analysis.

Therefore, from the Figure 2, the significance of the path coefficient from location issues (LI) to transportation issues (TI) was determined by examining0.540the unstandardized result, and 0.069the standardized error of the paths. The results show that whether the coefficient displayed is significant (i.e., $z \geq 1.96$ for $p \leq .05$) at a given alpha level. To check the significance between LI and TI, thecritical ratio is 7.826, which is larger than the critical z value (at $p = .05$) of 1.96, indicating that the relationship between location issue and transportation issue is significant. Similarly, the significance of the path coefficient between TI and FP is 5.65 which are greater than the critical Z value of 1.96 at 5% probability level, showing that the relationship between LI to FP is significant. Finally, the significance of the relationship between location issue and firm's performance show that the critical ratio is 7.65 which are greater than the critical Z value of 1.96 at 5% probability level, showing that the relationship between LI to FP is significant.




* P < .001 Figure 2. Structural model with path coefficients LI = Location issues, TI = Transportation issues

**Table 2.The Descriptive Statistics, Correlation Coefficient, Reliability Results and Discriminant Validity**

| Factors | Mean | SD | LF | TF | P/C | Q | DD |
|---|---|---|---|---|---|---|---|
| **LF** | 3.42 | 1.31 | 0.77 | | | | |
| **TF** | 3.58 | 1.05 | 0.80* | 0.84 | | | |
| **P/C** | 3.61 | 0.98 | 0.72* | 0.68* | 0.77 | | |
| **Q** | 3.05 | 0.95 | 0.60* | 0.71* | 0.76* | 0.72 | |
| **DD** | 3.86 | 1.04 | 0.78* | 0.86* | 0.56* | 0.54* | 0.86 |
| | | | | | | | |
| **AVE** | | | 0.59 | 0.706 | 0.59 | 0.52 | 0.74 |

* P<0.05, Note: the values on the last upper diagonal show the square root of the AVE values.

Table 2 displays descriptive statistics and a correlation matrix. The means of all the three constructs measures were between 3 and 4, with standard deviation between 0.95 and 1.31 showing significant variation to the responses of the items used. The mean value of delivery dependability which is 3.86 much higher than 3.61 mean value of price/cost, 3.05 mean value of construct quality, 3.58 mean value of transportation issues, and 3.42 mean value of location issues. The higher mean values of delivery dependability and price/ cost constructs reflect that the firms' under considerations are relatively utilizing the opportunity of favourable location and transportation issues in achieving delivery dependability and achieving minimum operation costs. Further, the minimum mean value of construct quality which was 3.05 among all constructs is an indicator of relatively minimum contributions of transportations and location issues in achieving quality of products in the supply chain performance. From Table 3 the correlations values of all the constructs ranges between 0.54 and 0.86 above 0.50 of the minimum acceptable threshold value which implies the criterion validity of the constructs' used (Nunnally, 1978). In addition to the correlation values for the determination of the discriminant validity of the scales used the values of Average Variance Extracted (AVE) are above the 0.50 acceptable margin and the square roots of the AVE values that were given on the last upper diagonal values on Table are greater than the correlation values for each dimension given in each. Hence, the discriminant validity of the scales is maintained.

## 6. CONCLUSIONS

The study conducted with the aims of investigating the effects of facilities location and transportation in the supply chain management on firm's performance. To answer the research objective a conceptual frame work developed with two independent variables and one dependent

variable. The independent variables considered were facilities location and transportation factors; and the dependent variable is organization's performance.

The researcher tested the direct effect of facility location and transportation infrastructure in supply chain management on firm's performance; and the mediating effect of transportation on the relationship between facility location and firm's performance in the supply chain practices. The results of this study indicate that facility location and transportation infrastructure have positive and significant effects on firm's performance in the supply chain practices. Likewise, there is a positive intermediary effects transportation infrastructure between location of a facility and organization's performance.

The result of this study has two major theoretical implications to the literature on supply chain management practices besides empirically confirming a theoretical model. Among the contribution, as a novel contribution, the researcher examined the significant effects of facility locations decisions and transportation activities in integrating supply chain activities and leading to higher organizational performance. The second novel contribution of the result is that the researcher investigated the mediating effects of transportation between facility location and organizational performance.

The managerial implication of the result is that the result of this study is an indicator for manager to give critical attention in making facility location decisions in case of deciding where to locate a facility to effectively serve customers through integrating and working with supply chain partners besides the ultimate objective of an organization. Further, the managerial implications of this result is that, the result is good indicator for manager in developing countries to give considerable attention to location decisions where transportation infrastructure is poor and able to significantly influence firms performance in supply chain practices. Therefore, the strategic manager of an organization needs to consider transportation infrastructure in making location decisions in supply chain activities of developing countries where road quality and network is low, and inadequate and accessible rail road's frequently observed.

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