

3rd Party Logistics Providers: Comparative Study And Analysis By Using SPSS In Indian Market

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Abstract: With competitive pressures placing an increasing dependence on the ability of organizations to deliver customer adapted products quickly and on time, logistics has been an area that has been subjected to investigation. While, there is a growing evidence of organizations increasingly seeking to outsource their logistics activities, there have been few comprehensive studies on the outsourcing of logistics in the Middle Eastern region. The purpose of this paper is to examine the usage of third party logistics (3PL) services. In India the logistics industry is evolving rapidly and it is the interplay of infrastructure, technology and new types of service providers that will define whether the industry is able to help its customers, reduce their logistics costs and provide effective services. Third party logistics (3PL) is drawing attention at government, industrial, academicians and practitioner's levels. This project is an attempt to provide 3PL practices perspective in India. The project focuses on present extent of usage of third party logistics services based on data collected from the working professionals in 3PL companies. Data analysis is done using SPSS software and descriptive statistics analysis, correlation, regression analysis and reliability test of collected data is performed. This has helped to compare the best third party logistics provider in Indore and Nasik cities of India. Analysis shows that there are similarities on the use of contract logistics services in Madhya Pradesh and Maharashtra. These include the proportion of firms utilising contract logistics, the extent of involvement of functional managers, and activities outsourced. Notable differences between the 3PL providers include process, and the benefits to the firms from the use of contract logistics.

Index Terms: Logistics, Third Party Logistics, logistics outsourcing; service providers; India, SPSS software, statistics analysis.

1 INTRODUCTION

In the today's era supply chain management (SCM) is growing rapidly and the business of supply chain management is increasing every places in the world Supply chain management includes many logistics function such as transportation, warehousing, distribution management and freight consolidation etc. Supply chain management is the man concern to represent this project and the intention of the research is to identify the most effective ways of choosing a third party Logistics (3PL) provider. Third party logistics is defined as when a third party is brought to manage various logistics functions. A 3PL provider is an independent economic entity that creates value for its client. A trucking company, a warehouse operator, and a contract manufacturer can all be considered third parties. The 3PL industry is constantly changing, although its existence is nothing new. The range of value propositions they offer today has changed dramatically in recent years. Global industry consolidation, technology integration, Third-party logistics (3PL) refers to outsourcing transportation, warehousing and other logistics related activities to a 3PL service provider that were originally performed in-house. More and more corporations across the world are outsourcing their logistics activities due to various reasons, some of which are outlined below.

- Due to globalization, corporations across the world are increasingly sourcing, manufacturing and distributing on a global scale making their supply chains very complex. Hence they have to outsource their logistics activities to experienced 3PL providers, who have global operations. Today's 3PL providers with their sophisticated IT capabilities and state-of-

the-art transportation and material handling equipment and warehousing facilities offer complete supply chain Solutions.

- Logistics outsourcing is used to complement the logistics activities the corporations do not have competency in, and also to increase the geographic reach. When a corporation expands business overseas, it may not be conversant with the customs duties, tax structures, rules and regulations, import/export policies of the government, and culture of the foreign country. A 3PL provider, who has long been operating in that country, will be better able to carry out the logistics operations.

- Logistics may not be one of the core activities of a corporation. So, inefficiency may creep in if it is looked upon as a secondary activity. By outsourcing logistics, corporations may focus on their core competencies.

- Logistics outsourcing may also reduce costs as the 3PL providers can get the advantage of the economies of scale, which is otherwise not available to the corporations.

- By outsourcing logistics, corporations can reduce their asset base, and deploy the capital released for other productive usage.

- Logistics outsourcing improves cycle time and delivery performance, thereby increasing customer satisfaction.

- Since the 3PL providers are now offering a number of value-added services such as customs clearance, freight forwarding, import/export management, distribution, after sales support, reverse logistics and so on, corporations can outsource all these activities, and concentrate on their core business operations.

- Due to an incredible growth in electronic retailing since the late 1990's, many firms around the world with virtually no distribution systems rely heavily on the 3PL providers for delivery of the merchandise at the customer's doorstep. This has resulted in a significant growth in the order fulfillment

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sector of the 3PL service industry. (Wandel, 1999)

2 LITRATURE REVIEW

2.1 Introduction

The literature on logistics has dealt mainly with managing logistics activities from the perspective of the logistics users. A third-party logistics provider is a firm that provides service to its customers of outsourced (or "third party") logistics services for part, or all of their supply chain management functions. Third party logistics providers typically specialize in integrated operation, warehousing and transportation services that can be scaled and customized to customers' needs based on market conditions and the demands and delivery service requirements for their products and materials. [Mitra, 2008]

Third-party logistics (3PL) or logistics outsourcing is gaining importance as more and more corporations across the world, unable to manage their complex supply chains, are outsourcing logistics activities to the 3PL or logistics service providers. By outsourcing logistics activities, corporations are able to not only concentrate on their core business operations, but also achieve cost-efficiency and improve delivery performance and customer satisfaction. The 3PL revenue around the world was \$141 billion in 2003, and it is expected to increase more than \$500 billion in 2016. The largest market is the U.S., which was about \$80 billion in 2003 accounting for nearly 60% of the world market. The 3PL market in India is least developed and highly fragmented. However, there is an immense potential for growth of 3PL in India, about 20% per annum, and if the logistics cost can be brought down from the current level of 13% of GDP to 8.7% (level in the U.S.), the savings would be around \$20 billion resulting in a potential 4.3% cut in prices of Indian goods globally making them more competitive. The most important roadblock to the growth of 3PL in India, identified by the respondents, was poor transportation and communications infrastructure, and the most important opportunity for growth of 3PL in India was indicated as the increasing awareness of the Indian firms towards the benefits of logistics outsourcing. [Mitra, 2005]

The logistics industry in India is evolving rapidly and it is the interplay of infrastructure, technology and new types of service providers that will define whether the industry is able to help its customers, reduce their logistics costs and provide effective services. (Chandra and Jain, 2007). Third party logistics (3PL) is drawing attention at government, industrial, academicians and practitioner's levels (Gupta et. al, 2011). This project is an attempt to provide 3PL practices perspective in manufacturing industries in M.P. region in India. It focuses on present extent of usage of third party logistics services based on primary data collected from the working professionals in manufacturing firms. (Gupta, 2011)

Current research on 3PL provides valuable insights into the 3PL industry; it is primarily descriptive in nature and does not explore the underlying relationships among several factors and key issues related to the industry. For example (Adam, 2003) presents an exploratory study of the North American 3PL industry in terms of the key success factors, performance metrics, and globalization issues. Respondents to the survey are categorized based on their ratings of key success factors,

and the differences in perceptions among categories are highlighted. Also, the factors with respect to which respondents are significantly underperforming are identified. Importance of the key success factors for various performance metrics is established through dependency relationships, which provide a guideline to managers for allocation of scarce resources. Factors responsible for growing globalization, important issues in connection with setting up 3PL operations in a foreign country, and growth strategies adopted by 3PL firms are also analyzed from the point of view of the respondents. Finally, the contribution to logistics research, implications of the survey findings for logistics managers and directions for future research on 3PL are presented in the concluding section. [North American Service Providers, 2008]

3PL selection criteria and 3PL performance evaluation criteria "To a lesser degree, the 3PL literature also mentioned the enablers of 3PL selection and assessment criteria as predictors of firm performance (Knemeyer and Murphy, 2004; Stank and Goldsby et al, 2000; Menonetal, 1998; Harringtonetal, 1991). For example, Menon et al. (1998) examined how the firm's competitive environment affects the criteria for selecting 3PLs. Also, Harrington et al. (1991) developed and implemented a 3PL performance assessment model for a healthcare provider, which resulted in reduction of lead time variability in inbound shipments. In a recent study, Knemeyer and Murphy (2004) used a relationship marketing perspective to argue for a need of a performance measurement scheme to ensure alignment of strategic goals between the focal firm and 3PLs. A similar concept was also elaborated and echoed by Stank and Goldsby (2000), who studied the linkages between logistical performance and perceived performance of 3PLs. These studies point to the need to develop a set of 3PL selection criteria and a set of performance evaluation criteria. The selection criteria are needed initially and the performance evaluation criteria are needed on an ongoing basis to monitor the performance of 3PLs. These studies also show that there is a positive relationship between the criteria used to select and evaluate 3PL performance, and firm performance. (Jayaram, 2003).

2.2 Gaps in the Literature

As far as the literature is concerned, it has been tried to collect the relevant data from the respondent for the comparative study between the 3PL providers. But in context of India, as it is in growing stage, so the method of collecting data and analysis work still seems to go long way. In developing country like India, where the technology and the attitude of the implementer are to be improved and a consensus needs to be developed to accept the analytical methods. In India and especially in Madhya Pradesh, where the industrial development is low, the proposed method is to be improved with the knowhow. Also as this being a real life project, many theoretical concepts are to be mapped to practical situation. This literature review presents the overall view about the 3PL providers and their services but there are various gaps in the literature which are discussed below:

- Not many studies in Indian context about service quality of 3PL provider.
- Not many studies in 3PL Industry.
- Not many Variables are taken together.

3. METHODOLOGY

3.1 Introduction

The research methodology adopted in this paper is based on data collected from the respondent's directly through personal visits and by mail survey. Collection of data is based on questionnaire surveys. The word research is composed of two syllables, re and search, re is a prefix meaning again, A new or over again while search is a verb meaning to examine closely and carefully, to test and try, or to probe. Together they form a noun describing a careful, systematic, patient study and investigation in some field of knowledge, undertaken to establish facts or principles. Research is a structured enquiry that utilizes acceptable scientific methodology to solve problems and create new knowledge that is generally applicable. Scientific methods consist of systematic observations, classification and interpretation of data. Research can be classified from three perspectives:

1. Application of research study.
2. Objectives in undertaking the research.
3. Inquiry mode employed.

From the point of view of application, there are two broad categories of research:

- Descriptive
- Correlational
- Explanatory
- Exploratory
- Unstructured approach

To meet the mentioned objectives of the present study, the proper methodology among the mentioned above is required to be designed. In the present study the focus is on-

- (1) Survey to identify the level of satisfaction of a particular service.
- (2) Data analysis and interpretation to determine statistical parameters of importance. We have conducted a survey. A total of 30 respondents were strategically selected to conduct the survey in different field. The study has been conducted to identify the factors that mostly satisfy the customer. a structured questionnaire has been constructed on Likert's 5 point scale to conduct the survey. The questionnaire includes questions on each of the 12 variables. In this project, software Statistical Package for Social Sciences 16 (SPSS 16) which provides the descriptive statistics and other statistical analyses is used. The responses obtained from the respondents are entered in SPSS sheet for calculating the descriptive statistics, Pearson correlation, Reliability and Multiple Regression analysis. In this we calculate a comprehensive index to compare the various 3PL providers.

3.2 Design of the Questionnaires

The questionnaire had 12 variables each variable includes some questions and hence the total questions are 92. In this, the respondents are asked to choose one from the possible alternatives provided. Options in each question particular scale for each answer. The questions asked in each section are given below.

Data Collection

Variables

V1 Fleet Strength

Here the respondent is asked about the Vehicles they have like LMV, HMT, Travelling record per KM, etc.

V2 Geographical Coverage

In this section, the respondent asked to define their market range national, international, state, rural area and reason for outsourcing and the reason for not outsourcing.

V3 Qualities

In this section, the respondents are asked about the qualities which they are providing moreover it includes system for tracking and identification, percentage of accuracy of order fulfillment, on time delivery, reliable delivery, flexibility in billing payment, operations, availability of sales support, qualified logistic manpower, efficiency for information transformation and taking promptly decision on unexpected unforeseen events.

V4 Warehousing

In this section, respondents are asked about the management of receiving and shipment of goods moreover inspect each importing shipment percentage level of physical inspection in shipment etc.

V5 Service Level

In this section, respondents are asked about the Export and Import of Industrial machinery & equipments, metals and mining automotive parts Textile materials. Respondent make Schedule for transport transaction, use bill of delivery for transport transaction, use Gate entry for the detail of transport transaction, use Technical Standard/ Health Certificate for the detail of transport transaction, and use Bill of landing / Truck Bill of for the detail of transport transaction.

V6 Managerial Capabilities

In this section, respondents are asked about the control on the transportation related activities, management of technical control, custom control, authority for transport, managers responsible to take decision about the transport and management of vehicles, take decision about selection of the place, operating assistant to support in vendor management and asset visibility, vendor quality assurance and quality control, planning and control productivity improvement operations improvement.

V7 Information Sharing

In this section, respondents are asked about the availability of software for information transmission. And the organization providing training in fleet management, transport planning budgeting and financial planning, health and safety, and in defensive driving. And how much is the efficiency of information transformation in organization. Management of continuance of agreement and about the emphasis on improvement of service.

V8 Cost

In this section, respondents are asked about the receiving of payment from the customers through direct cash payment or NEFT payment, or Net Banking payment, or Cheque payment for the items, and about the cost of service which is similar to the market rate or different.

V9 Experiences

In this section, respondents are asked about the experience in different activities like experience in analysis of routing and

mode of transportation, experience in space booking with carriers, experience in clearing of goods through customs, experience in Import/export insurance, and experience in payment arrangement with bank, experience in preparation, elaboration and submission of trade documents in compliance with customs.

V10 Flexibility

In this section, respondents are asked about the flexibilities which provided to the customers such as flexibility in operation, flexibility in Billing & Payment and make good will to the users.

V11 Information Communication Transformations

In this section, respondents are asked about the Information Communication Transformations like track the order through people contact, or through Internet, and the IT capacity which helps in reducing uncertainties, tracking of the goods through an easy process.

V12 Technical Capabilities

In this section, respondents are asked about the using of Bar-Coding and RFID as enabling technology, vehicles are equipped with GPS to navigate, Installed tracking system in vehicles and Material handling automation system all these technical control equipments are available and in working condition.

Table 3.1 shows the connotation used in Likert scale.

Table 3.1: Connotations used in Likert's scale

| 1 | 2 | 3 | 4 | 5 |
|-------------------|----------|----------------|-------|----------------|
| Strongly disagree | Disagree | Somewhat agree | Agree | Strongly agree |

Table 3.2: General Interpretation of Correlation Coefficient.

| S. No. | Range | Interpretation |
|--------|--------------|-------------------------------|
| 1 | -1.0 to -0.7 | Strong negative associations. |
| 2 | -0.7 to -0.3 | weak negative association |
| 3 | -0.3 to +0.3 | Little or no association. |
| 4 | +0.3 to +0.7 | Weak positive association. |
| 5 | +0.7 to +1.0 | Strong positive association. |

Table 3.3: The Analysis of Variance (ANOVA) set up

| Source of variation | Sum of Square | d.f. | Mean Square | F_{n-k}^{k-1} |
|---------------------|--------------------------------|-------|--|-----------------------------------|
| Regression | $r^2 \sum (Y - \bar{Y})^2$ | $k-1$ | $\frac{r^2 \sum (Y - \bar{Y})^2}{k-1}$ | $\frac{r^2/(k-1)}{(1-r^2)/(n-k)}$ |
| Error | $(1-r^2) \sum (Y - \bar{Y})^2$ | $n-k$ | $\frac{(1-r^2) \sum (Y - \bar{Y})^2}{n-k}$ | |
| Total | $\sum (Y - \bar{Y})^2$ | $n-1$ | | |

4. DATA ANALYSIS

4.1 Introduction

Based on the responses from the respondents, an overall analysis of the respondent's firm was carried out. Given below is an analysis of data collected, followed by a summary of findings. In this Chapter, analysis of data is done by SPSS software. It helps in finding the mean, standard deviation, Cronbach's alpha, Pearson correlation, Regression analysis.

4.2 Profile of the Respondent

Table 4.1 shows the profile of the 30 respondents.

Table no 4.1: Categorization of Respondent on the basis of Gender, Experience & Department.

| S.N. | Factor | Category | No. of respondent | Percentage |
|------|------------|--------------------------|-------------------|------------|
| 1 | Gender | Male | 28 | 93 |
| | | Female | 2 | 7 |
| | | Total | 30 | 100 |
| 2 | Experience | Less than 5 year | 10 | 33 |
| | | In between 5 to 10 years | 18 | 60 |
| | | More than 10 years | 2 | 7 |
| | | Total | 30 | 100 |
| 3 | Department | Slaes | 14 | 46 |
| | | Marketing | 16 | 54 |
| | | Total | 30 | 100 |

There are many national and multinational third party logistic companies in India but in this thesis I was collected survey data from the following companies of different places. The names of these companies are listed in Table 4.2

Table 4.2: Companies Detail

| S.NO. | NAME OF COMPANIES | PLACE |
|-------|--------------------------------------|-------------------|
| 1 | Gati-Kwe Express Pvt. Ltd. | Indore |
| 2 | Jeena & Company | Indore |
| 3 | Patel Integrated logisitic Ltd. | Indore |
| 4 | Aargus Global logistic Pvt. Ltd. | Indore |
| 5 | Flyjac logistic Pvt. Ltd. | Indore |
| 6 | Agility logistic Pvt. Ltd. | Indore |
| 7 | All cargo logistic Ltd. | Indore |
| 8 | Speedage logistic corporation | Indore |
| 9 | Atlas logistic Pvt. Ltd. | Indore |
| 10 | DHL Lemuir logistic Pvt. Ltd. | Indore |
| 11 | Opal logistic Pvt. Ltd. | Indore |
| 12 | Capricon logistic Pvt. Ltd. | Indore |
| 13 | OM logistic Ltd. Indore | Indore |
| 14 | Palak Logistics & Packaging Solution | Indore |
| 15 | Safexpress Pvt. Ltd. | Indore |
| 16 | Baphana weigh Bridge | Nasik Maharashtra |
| 17 | DTS Logistic | Nasik Maharashtra |
| 18 | Okay Transport Corporation | Nasik Maharashtra |
| 19 | ABC India Ltd. | Nasik Maharashtra |
| 20 | Darcl logistic Ltd. | Nasik Maharashtra |
| 21 | Savani Transport Pvt. Ltd. | Nasik Maharashtra |
| 22 | Economic Transprt Organisation | Nasik Maharashtra |
| 23 | HIMI International | Nasik Maharashtra |
| 24 | IRC India Ltd. | Nasik Maharashtra |
| 25 | Swastik Transport Company | Nasik Maharashtra |
| 26 | Supersonik carrier Pvt. Ltd. | Indore |
| 27 | Container Corporation of India Ltd. | Pithampur |
| 28 | TAC Logisitic | Indore |
| 29 | Aryika logistic Pvt. Ltd. | Indore |
| 30 | Sacro 3PL logistic park Pvt. Ltd. | Indore |
| 31 | T K Warehousing Enterprises Pvt Ltd | Indore |
| 32 | Manish Packers & Movers | Indore |

4.3 Descriptive Statistics Analysis

Data were processed using SPSS software and descriptive statistics were found for all variables. The attributes score is added and average of them is taken to obtain the score of the variables in each section and for each variable mean for all the cases together (N=30) and standard deviation is calculated. Reliability is tested using Cronbach's alpha. Correlation and regression analysis is also done using SPSS. These descriptive statistics are presented in the Table 4.3 and Table 4.4.

Table 4.3: Descriptive Statistics for Overall Mean

| S. NO. | Variables | Mean |
|--------|--|------|
| 1 | Fleet strength | 3.96 |
| 2 | Geographical coverage | 3.52 |
| 3 | Quality | 4.29 |
| 4 | Warehousing | 4.09 |
| 5 | Service level | 3.93 |
| 6 | Managerial capability | 3.59 |
| 7 | Information sharing | 3.94 |
| 8 | Cost | 3.46 |
| 9 | Experience | 3.66 |
| 10 | Flexibility | 3.46 |
| 11 | Information and communication transfer | 4.07 |
| 12 | Technical capability | 4.34 |

Table 4.4: Descriptive Statistics for Cronbach's Alpha

| Attributes | No. of items | Minimum | Maximum | Mean | Std. Deviation | Cronbach's Alpha |
|--|--------------|---------|---------|------|----------------|------------------|
| Fleet strength | 30 | 3.44 | 4.56 | 3.96 | 0.29 | 0.61 |
| Geographical coverage | 30 | 2.90 | 4.00 | 3.52 | 0.25 | 0.51 |
| Quality | 30 | 3.92 | 4.58 | 4.29 | 0.15 | 0.62 |
| Warehousing | 30 | 3.50 | 4.75 | 4.09 | 0.33 | 0.56 |
| Service level | 30 | 3.62 | 4.15 | 3.93 | 0.16 | 0.53 |
| Managerial capability | 30 | 3.17 | 3.92 | 3.59 | 0.17 | 0.51 |
| Information sharing | 30 | 3.67 | 4.33 | 3.94 | 0.17 | 0.53 |
| Cost | 30 | 3.03 | 4.30 | 3.46 | 0.15 | 0.60 |
| Experience | 30 | 3.17 | 4.33 | 3.66 | 0.27 | 0.50 |
| Flexibility | 30 | 3.33 | 4.33 | 3.46 | 0.24 | 0.56 |
| Information and communication transfer | 30 | 3.50 | 4.75 | 4.07 | 0.35 | 0.59 |
| Technical capability | 30 | 4 | 5 | 4.34 | 0.35 | 0.58 |

In the Table 4.4 represents the descriptive statistics minimum, maximum, standard deviation and Cronbach's Alpha between the variables. In this table first column shows attributes and

second column shows no of items N=30. The value of Cronbach's Alpha for the variable quality (0.62), fleet strength (0.61) and cost (0.60), is maximum than other variable and it shows that these variables are our more critical than the other variables.

4.4 Pearson Correlation Analysis

Inter correlations between the studied variables are calculated using most widely used Pearson correlation coefficient for analysis of critical attributes of service. Pearson correlation coefficient is preferred because it assumes that the two variables are measured on at least interval scales and it determines the extent to which values of the two variables are proportional to each other. The value of correlation coefficient does not depend on the specific measurement units used. Proportional means linearly related; that is, the correlation is high if it can be "summarized" by a straight line. Results are summarized in Table 4.3 and there are many significant correlations amongst the attributes.

Table 4.5: Correlation Coefficients between Attributes using Pearson Correlation

Coefficient

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed) The result of the Pearson's correlation, which is a correlation matrix, as shown in Table 4.5. The correlation coefficient may range from -1 to +1 or indicates a "perfect" relationship. The further the coefficient is from 0, regardless of whether it is positive or negative, the stronger the relationship between the two variables. We can see twelve variable names in twelve rows and twelve columns. We can find the Pearson's statistics in the top of each box. The Pearson's r for the correlation between the fleet strength and quality variable is 0.395.

When Pearson's r is close to 1:

This means that the change in one variable are strongly correlated with changes in the second variable. For example if Pearson's r is 0.985. this number is very close to 1 therefore we can conclude that there is strong relationship between the variables.

When Pearson's r is close to 0:

This means that there is a weak relationship between the two variables it means that changes in one variable is not correlated with second one. For example if Pearson's r is 0.01 it is close to 0 so it shows the weak relationship between the variables.

When Pearson's r is Positive:

This means that when one variable value increases the other variable value also increases and if one variable decreases other variable also decreases. This is called positive correlation.

When Pearson's r is Negative:

This means that when one variable value increases the other variable value also decreases and if one variable decreases

other variable increases. This is called positive correlation.

Table 4.6 shows the relationship between the independent and dependent variables

| Variables | FS | GC | QUALITY | WAR | SER | MC | IS | COST | EXP | FLEX | ICT | TC |
|-----------|---------|---------|---------|---------|--------|--------|--------|---------|--------|--------|-------|----|
| FS | 1 | | | | | | | | | | | |
| GC | 0.398* | 1 | | | | | | | | | | |
| QUALITY | 0.395 | 0.309 | 1 | | | | | | | | | |
| WAR | 0.120 | -0.150 | 0.025 | 1 | | | | | | | | |
| SER | 0.083 | -0.0187 | 0.011 | 0.118 | 1 | | | | | | | |
| MC | -0.0143 | 0.085 | -0.232 | -0.357 | -0.166 | 1 | | | | | | |
| IS | -0.072 | -0.080 | -0.075 | 0.025 | 0.163 | -0.265 | 1 | | | | | |
| COST | 0.052 | -0.0117 | -0.118 | -0.044 | 0.292 | 0.283 | 0.313 | 1 | | | | |
| EXP | 0.059 | -0.008 | -0.307 | 0.100 | 0.075 | 0.158 | 0.177 | 0.631** | 1 | | | |
| FLEX | 0.191 | -0.0074 | -0.046 | 0.093 | 0.409* | -0.004 | 0.449* | 0.570** | 0.387* | 1 | | |
| ICT | 0.087 | -0.0194 | -0.001 | 0.985** | 0.135 | -0.343 | 0.069 | -0.055 | 0.108 | 0.114 | 1 | |
| TC | 0.149 | 0.024 | 0.544** | 0.113 | 0.309 | -0.321 | -0.071 | -0.181 | -0.176 | -0.152 | 0.066 | 1 |

Table 4.6: Relationship of Variables

| Independent | Dependent |
|-------------|-----------|
| FS | SL |
| GC | |
| QUALITY | |
| WAR | |
| MC | |
| IS | |
| COST | |
| EXP | |
| FLEX | |
| ICT | |
| TC | |

4.5 Multiple Regression Analysis

Multiple regression analysis is conducted to visualize the causal relationship between various variables. Multiple Regression analysis computed by choosing 1 dependent variables and 11 independent variables. Dependent variable is service and independent variables are Fleet strength, Geographical coverage, Quality, Warehousing, Managerial capability, Information sharing, Cost, Experience, Flexibility, Information and communication transfer, Technical capability and their relationship shows the positive and negative impact on the attributes. Results of regression analysis are summarized above in Table 4.5, 4.7, 4.8, and 4.9.

4.6 Service Level as Dependent Variable

$$Y=4.015+0.92X_1-0.76X_2-0.531X_3-0.930X_4-0.178X_5-0.207X_6-0.727X_7-0.396X_8-0.256X_9-0.891X_{10}+0.313X_{11}$$

P value=
 (0.009)(0.339)(0.485)(0.020)(0.070)(0.326)(0.242)(0.010)(0.004)(0.066)(0.064)(0.062)

Above equation represent the relationship between the dependent variable and independent variables here X represents the independent variables which are 11 in number and Y represent dependent variable. P value represents the product of unstandardized coefficient B value with its significant value of the variables.

Table 4.7: R Square Model Summary

| Model | R | R Square | Adjusted R Square | St. Error of the Estimate | Change Statics | | | | |
|-------|-------|----------|-------------------|---------------------------|-----------------|----------|------|------|---------------|
| | | | | | R Square change | F change | df 1 | df 2 | Sig. F change |
| 1 | 0.814 | 0.662 | 0.456 | 0.12411 | 0.662 | 3.207 | 11 | 18 | 0.014 |

The first table of interest is the model summary table. This table provides the R, R², adjusted R², and the standard error of the estimate, which is used here to determine how well a regression model fit to data. The “R” column represents the value R, the multiple correlation coefficients. R can be considering to be one measure of the quality of the prediction of the dependent variable, in this case, AVGSL. A value of 0.814, in this example, indicates a good level of prediction. The “R Square” column represents the R² value (also called the coefficient of determination), which is the proportion of variance in the dependent variable that can be explained by the independent variables (technically, it is the proportion of variation accounted for by the regression model above and beyond the mean model) we can see from our value of 0.662 that our independent variables shows 66.2% of the variability of our dependent variable AVGSL. Table 4.8 represented the ANOVA value.

Table 4.8: ANOVA

| S.No. | Model | Sum of Squares | df | Mean square | F | Sig. |
|-------|------------|----------------|----|-------------|-------|-------|
| 1 | Regression | 0.534 | 11 | 0.049 | 3.207 | 0.014 |
| 2 | Residual | 0.277 | 18 | 0.015 | | |
| | Total | 0.821 | 29 | | | |

The F-ratio in the ANOVA table tests whether the overall regression model is good fit for the data. The table shows that the independent variables statistically significantly predict the dependent variable, $F(11, 18) = 3.207$, $P = 0.005$ (i.e. the regression model is good fit for the data.) Table 4.9 shows the Beta coefficient value.

Table 4.9: Beta Coefficient

| S.N. | Model | Unstandardized Coefficient | | Standardized Coefficient | t | Sig. |
|------|----------|----------------------------|------------|--------------------------|--------|-------|
| | | B | Std. Error | Beta | | |
| 1 | Constant | 4.015 | 1.382 | - | 2.906 | 0.009 |
| 2 | AVGFS | 0.092 | 0.094 | 0.165 | 0.981 | 0.339 |
| 3 | AVGGC | -0.076 | 0.107 | -0.117 | -0.713 | 0.485 |
| 4 | AVGQ | -0.531 | 0.209 | -0.492 | -2.543 | 0.020 |
| 5 | AVGW | -0.930 | 0.482 | -1.833 | -1.929 | 0.070 |
| 6 | AVGMC | -0.178 | 0.176 | -0.187 | -1.011 | 0.326 |
| 7 | AVGIS | -0.207 | 0.171 | -0.218 | -1.210 | 0.242 |
| 8 | AVGCOST | 0.727 | 0.253 | 0.674 | 2.874 | 0.010 |
| 9 | AVGEXP | -0.396 | 0.120 | -0.647 | -3.310 | 0.004 |
| 10 | AVGFLEX | 0.256 | 0.131 | 0.367 | 1.954 | 0.066 |
| 11 | AVGICT | 0.891 | 0.451 | 1.877 | 1.976 | 0.064 |
| 12 | AVGTC | 0.313 | 0.085 | .677 | 3.677 | 0.002 |

Table 4.9 shows that unstandardised coefficient indicates how much the dependent variable varies with an independent variable, when all other independent variables are held constant. Consider the effect of AVGFS in this example. The unstandardised coefficient, B for AVGFS is equal to 0.092 it indicates that for increase in AVGFS, there is a decrease in AVGS of 0.092. Table 4.10 shows the decision matrix for weight identification.

Table 4.10: Decision Matrix for Weight Identification

| Variables | FS | GC | Q | W | SL | MC | IS | C | EX | F | ICT | TC | Sum | Add + 1 | Wt. | Avg wt (W) |
|-----------|----|----|---|---|----|----|----|---|----|---|-----|----|-----|---------|------|------------|
| FS | - | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 5 | 5/8 | 0.06 |
| GC | 1 | - | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 6 | 7 | 7/8 | 0.09 |
| Q | 0 | 0 | - | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 4 | 4/8 | 0.05 |
| W | 0 | 0 | 0 | - | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 4 | 4/8 | 0.05 |
| SL | 1 | 1 | 1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 6 | 6/8 | 0.08 |
| MC | 1 | 1 | 1 | 1 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 7 | 8 | 8/8 | 0.10 |
| IS | 1 | 0 | 1 | 1 | 1 | - | - | 0 | 0 | 0 | 1 | 1 | 7 | 8 | 8/8 | 0.10 |
| C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | 0 | 0 | 1 | 1 | 9 | 10 | 10/8 | 0.13 |
| EX | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | 0 | 1 | 1 | 11 | 12 | 11/8 | 0.14 |
| F | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | 1 | 1 | 12 | 13 | 12/8 | 0.15 |
| ICT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 1 | 2 | 3 | 2/8 | 0.03 |
| TC | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 1 | 1/8 | 0.01 |

Table 4.10 represent weights of the variables these variables are arranged horizontally and vertically in the table shows average of weight in the last column. All the data obtain from the above decision matrix is calculated from following relation

$$\text{Score } (C_i) = \sum M_i * W_i$$

I= Overall score of company,

M_i =all variable means,

W_i = Weights of the variables

Sample calculation

$$C1 = (3.78 \times 0.06) + (3.3 \times 0.09) + (4.3 \times 0.05) + (4.3 \times 0.05) + (4.08 \times 0.08) + (3.75 \times 0.10) + (4.11 \times 0.10) + (4.33 \times 0.13) + (3.83 \times 0.14) + (3.67 \times 0.15) + (4.25 \times 0.03) + (4.67 \times 0.01) = 3.83$$

From the above calculation we get the score 3.83 it show a score of a particular company, and all other calculation for other companies score is done in the similar way and all the result obtained from the calculation is presented in the Table 4.11.

Table 4.11: Scores of Companies

| COMPANIES | SCORES |
|-----------|--------|
| C1 | 3.83 |
| C2 | 3.73 |
| C3 | 4.06 |
| C4 | 3.60 |
| C5 | 3.11 |
| C6 | 3.09 |
| C7 | 4.37 |
| C8 | 3.76 |
| C9 | 3.11 |
| C10 | 3.65 |
| C11 | 3.66 |
| C12 | 3.75 |
| C13 | 3.66 |
| C14 | 3.81 |
| C15 | 3.85 |
| C16 | 3.78 |
| C17 | 3.78 |
| C18 | 3.67 |
| C19 | 3.67 |
| C20 | 3.75 |
| C21 | 3.72 |
| C22 | 3.02 |
| C23 | 3.65 |
| C24 | 3.64 |
| C25 | 3.80 |
| C26 | 3.61 |
| C27 | 3.71 |
| C28 | 3.76 |
| C29 | 3.76 |
| C30 | 3.69 |

Table 4.12 represents the categorization of the companies with their scores.

Table no. 4.12: Categorization of the Companies with their Score

| GOOD COMPANIES Score (4 to 5) | AVERAGE COMPANIES Score (3.5 to 4) | POOR COMPANIES Score (2 to 3.5) |
|----------------------------------|---------------------------------------|------------------------------------|
| C7 - 4.37 | C15 - 3.85 | C22 - 3.02 |
| C3 - 4.06 | C25 - 3.80 | C6 - 3.09 |
| | C1 - 3.83 | |
| | C14 - 3.81 | C5 - 3.11 |
| | C16 - 3.78 | C9 - 3.11 |
| | C17 - 3.78 | |
| | C8 - 3.76 | |
| | C28 - 3.76 | |
| | C29 - 3.76 | |
| | C12 - 3.75 | |
| | C20 - 3.75 | |
| | C2 - 3.73 | |
| | C21 - 3.72 | |
| | C27 - 3.71 | |
| | C30 - 3.69 | |
| | C18 - 3.67 | |
| | C19 - 3.67 | |
| | C11 - 3.66 | |
| | C13 - 3.66 | |
| | C10 - 3.65 | |
| C23 - 3.65 | | |
| C24 - 3.64 | | |
| C26 - 3.61 | | |
| C4 - 3.60 | | |

5.2 Descriptive Result Interpretation

- The result shows that the statistics mean for the Technical Capability is highest.
- The result shows that the statistics mean for the Cost is Lowest.
- The result shows that the statistics Cronbach’s Alpha has highest value for the variable Quality.
- The result shows that the statistics Cronbach’s Alpha has lowest value for the variable Experience.
- The result shows that the value of R Square is equal to 0.662 that is 66.2%.
- The overall statistics data reveals that according to the customer's perception among all 12 variables. Under study the Technical capability gets the highest score.
- Result of correlation shows much significant positive correlation between the variables.

5.3 Result and Discussion

- Means of variable technical capability has the higher value it shows that the respective companies are technically strong.
- Mean of twelve factors is 3.86 which is average of overall attributes showing satisfactory results on Likert’s five point scale. Out of 12 factors 4 are identified as most critical factors with mean ranging from more than 4 which is presents in Table 5.1. Four other factors are sub critical factors with mean ranging between 3.59 and 3.96. Remaining four factors with mean less than 3.59 are considered less critical. The results of mean with their ranking are showing in Table 5.1

Table 4.13 represented the categorization of no of companies.

Table no. 4.13: Categorization of No of Companies

| CAT | CAT 1 | CAT 2 | CAT 3 |
|-----------------|-------|---------|-------|
| | Good | Average | Poor |
| NO OF COMPANIES | 2 | 24 | 4 |

Result from Table 4.11 and 4.12 the decision matrix for weight identification now it is clear that the companies which having the highest score is good company and the companies which having low scores are average and poor so good companies having highest scores are the best 3PL providers and low score companies are average and poor 3PL provider.

5. RESULT AND DISCUSSION

5.1 Introduction

The result obtained from the analysis of data and discussion about obtained results. Mean, Pearson correlation coefficient, and Regression analysis is done to measure the customer perception in 3PL organizations. Discussion about result shows percentage variation of mean and suggests how to improve other factors which are ranked low in the analysis.

Table 5.1: Categorization of Variables

| Most Critical Variables | Critical Variables | Less Critical Variables |
|---|------------------------|--------------------------|
| 1. Quality | 1. Fleet strength | 1. Geographical coverage |
| 2. Warehousing | 2. Service Level | 2. Managerial capability |
| 3. Information and communication transfer | 3. Information Sharing | 3. Cost |
| 4. Technical Capability | 4. Experience | 4. Flexibility |

Table 5.1 indicates the categorization of the variables it contain three category Most critical variable, critical variable and less critical variable. Most critical variable indicates that these variables are highly under observation as compared to the other two. Result of correlation shows many significant positive correlations between factors which are presented in Table 5.2.

Table 5.2: Result of Correlation between Factors

| Factors | Positive Correlation with other Factors |
|-----------------------|--|
| Fleet Strength | Geographical coverage, Quality, Warehousing, Service, Cost, Experience, Flexibility, Information and communication transfer, Technical capability. |
| Geographical coverage | Quality, Technical capability, Managerial capability, |
| Quality | Technical capability, Warehousing, Service, |
| Warehousing | Information and communication transfer, Service, Technical capability, Experience, Flexibility, Information Sharing. |
| Managerial | Cost, Experience, Geographical coverage |

| | |
|--|--|
| capability | |
| Information Sharing | Flexibility, Cost, Experience, Information and communication transfer, Warehousing, Service |
| Cost | Experience, Flexibility, Information Sharing, Service, Fleet Strength, Managerial capability |
| Experience | Cost, Information Sharing, Managerial capability, Fleet Strength, Warehousing |
| Flexibility | Cost, Experience, Information Sharing, Service, Fleet Strength, Warehousing, |
| Information and communication transfer | Warehousing, Technical capability, Service, Fleet Strength, Information Sharing, Experience, Flexibility |
| Technical capability | Quality, Geographical coverage, Service, Fleet Strength, Warehousing, Information and communication transfer |

Result of multiple regression analysis showing positive relationship between dependent and independent factors is presented in Table 5.3

Table 5.3: Result of Multiple Regressions between Factors

| Dependent factors | Positive Correlation Relation with Independent Factors |
|-------------------|--|
| Service | Fleet Strength |
| | Geographical coverage |
| | Quality |
| | Warehousing |
| | Managerial capability |
| | Information Sharing |
| | Cost |
| | Experience |
| | Flexibility |
| | Information and communication transfer |
| | Technical capability |

5.4 Result of Decision Matrix for Weight Identification

Using decision matrix for identification of weights of the variables as shown in the Table 4.11 & 4.12 clearly depicts that the companies which are good at 3PL capabilities have got highest score while average and poor got low scores respectively.

6. CONCLUSION

Following major Conclusions are drawn after careful analysis of data and discuss these of:

- In the project there are 12 variables each of one contains some questions, among this 12 variable one is dependent and all other are independent variables, from the descriptive statistics, the mean of all the variables is calculated and it shows that the technical capability, quality, warehousing & information and communication transfer variables are highest values so they are critical and important.
- For these 12 variables the other analysis is also done that is Cronbach's alpha, Pearson Correlation, and multiple regression analysis and it is found that again the variables technical capability, quality, warehousing, & information and communication transfer are important variables.
- On the basis of this important factors or variables a

decision matrix for weight identification is prepared and it shows a comprehensive index between these variables.

- From this comprehensive index the overall capabilities of each of these 30 3PL providers is prepared and it shows a comparative analysis between them.
- Through the scores of these 3PL providers as obtained from comparative analysis, I assign a range that is if the score between (4 to 5) than it is categorized as a good 3PL provider and if score between (3 to 3.5) than it is categorized as average 3PL providers and if score between (2 to 3.5) than it is categorized as poor 3PL providers. And from this analysis it is finally conclude that the 2 companies are good at 3PL capabilities have got highest score while 24 companies are average and 4 companies are poor and got low scores.
- The contribution of this study is the identification of factors that determine customer satisfaction with the quality of services provided in 3PL organization.

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