Research Paper
Impact Factor: 5.494
Peer Reviewed & Indexed Journal
www.iibarr.com

IJBARR
E- ISSN -2347-856X
ISSN -2348-0653

ANALYZING THE RELIABILITY TEST FOR THE PILOT STUDY OF SUPPLY CHAIN MANAGEMENT

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Abstract
Supply chain plays a very crucial role in various industries.This paper revolves around the pilot study done on the supply chain management of the E-commerce organizations. This paper discusses the reliability test performed for the pilot study done of the supply chain management in the E-commerce industry. This paper analyzes the Cronbach's Alpha test for reliability in detailto examine the quality of the questionnaire.

Keywords:Supply Chain Management, E-commerce, E- retail, Pilot Study, Reliability Test, Cronbach's Alpha Test

Introduction

Mohanty and Deshmukh (2004) [22] describe, "A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm."

Supply chain is an important term for every business now. It is the process which help companies to improve their processes to increase their productivity through enhanced efficiency. Every organization is trying to adopt the supply chain practices to get that

extra inch of advantage to rush ahead in the race to the path that leads to success. Supply chain management is considered as a revolutionary concept which can eliminate the weaknesses of any organization resulting in higher profits.

Due to the cut-throat competition in the world now. Everyone wants to succeed. Everyone wants to get ahead of others. There is a high competition amongst the organizations within each industry. Supply chain is essential for organizations to gain competitive advantage in the industry. It provides an upper hand to the organizations who have adopted and applied the supply chain concept. [1]

Not only big brands have applied this supply chain concept but even small-scale industries are also adopting it. Big brands do have senior level managers who are well versed with this concept but small-scale industries have to rely on second hand knowledge to make their business work. It is significant to distribute this knowledge to the small-scale industries as they will too contribute towards the growth of the economy. Thus, complete understanding of supply chain is needed to effectively apply it and then get efficient usage out of it. Supply chain is the need of the hour.

E-commerce has a new section added to it called E-retail. This new concept has given a new platform to the retail world to capture customers world-wide. E-retail has provided employment to the remote villages in India too. The products from these remote villages are now made available to the consumers around the globe. This is an opportunity for the rural people to showcase their talent to the outside world and earn their living without sharing their profit with any middle man, who in the past, have not let the villagers get the true worth of their talent. [6]

E-retail is the answer provided by e-commerce. E-retail means making products and services available for the customers online where they can browse and choose their option in the vicinity of their home. [5] It provides a

IJBARR
E- ISSN -2347-856X
ISSN -2348-0653

possibility for the consumers to purchase the products and services without stepping into a shop or a mall that is, without leaving the threshold of their residence.E-retail hosts a large number of organizations that provide products and services to the customers with varying high number of categories to choose from.

Literature Review

Oliver and Webber (1982) [7], the phrase 'supply chain management' appears to have originated in the early 1980s. Christopher (1992) [8],had defined supply chain management as an alternative to vertical integration.Also, NABCA (2004) [19] sayssupply chain management is a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, and customers so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time in order to minimize system wide costs while satisfying service-level requirements.

According to James B. Ayers (2000) [14],the supply chain is more than the physical movement of goods "from earth to earth". It is also information, money movement, and the creation and deployment of intellectual capital.

M. Venkata Ramana Reddy, N.V.S. Raju (2013) [2], stated that generally supply chain consists of different functions:logistics, inventory, purchasing and procurement,production, planning, intraand inter-organizational relationships and performance measures.If companies choose to compete in the global environment, they will have to look for ways to reduce expenditures of their suppliers and channel partners, logistics or distribution partners. This reduction in cost will lead the revamping of supply chains and significant investment in information technology, because information technology tools and techniques play a very important role in the performance of the SCM.

Kevin B. Hendricks, Vinod R. Singhal (2005) [9], supply chain glitches indicate a mismatch between demand and supply.Supply chain glitches can lead to both shortand long-term loss in sales and market share, lower sales price due to markdowns of excess inventories, and could prevent the firm from capitalizing on strong market demand due to unavailability of products.Glitches can negatively impact customer service if customers are unable to get the products, they want at the time they want them, resulting in higher customer dissatisfaction and lower customer loyalty. Glitches can hurt the reputation and credibility of the firm, causing customers not to consider the firm as a possible source for meeting their needs.On the cost side, glitches can increase the costs associated with expediting, premium freight, obsolete inventory, additional marketing, and penalties paid to the customer. Glitches can negatively impact the productivity and utilization of assets. In some cases,equipment may be overutilized and in other cases it may be underutilized. The firm can end up with inventory imbalances. Overall, glitches could lead to poor asset and inventory performance.

Rajwinder Singh, H.S. Sandhu, B.A. Metri and Rajinder Kaur (2010) [3], conceptualized and developed five secondary constructs for supply chain practices such as use of technology, SC speed, Customer satisfaction, SC integration, and Inventory management.They also identified four primary competitive advantage constructs that are Inventory Management, Customer Satisfaction, Profitability, and Customer Base Identification and six primary organizational performance constructs such as Market Performance, SC Competencies, Stakeholder Satisfaction, and Innovation and Learning.

Applegate, Holsapple, Kalakota, Radermacher and Whinston (1996) [21], views e-commerce as more than simply buying and selling goods electronically. Zwass (1996) [10], points out that e-commerce includes not only buying and selling goods, but also various processes within individual organizations that support that goal. Dr. Pawan Kumar Singh, Dr. ShriKrishna Tripathi (2016) [13], indicated that, India is the 5th largest retail market in the world. Retailing in India accounts for over 10% of the country's Gross Domestic Product (GDP) and around 8% of the employment. The current market size of Indian retail industry is about US$600 billion (Source: IBEF). Retailers should leverage the digital retail channels, which would enable them to spend less money on real estate while reaching out to more customers in tier-2 and tier-3 cities.

Bruke (1999) [11], has identified about several impediments for the growth of e-tailing. They are: (i) consumers can not touch and feel products, (ii) orders can take several days to be delivered, (iii) shipping costs are often excessive and (iv) customer service is often poor and (v) Returns can be difficult.Deighton (1997) [12], have identified a number of consumer characteristics as potential obstacles to Internet growth, including consumer traditional shopping experiences, an aversion or lack of access to the required technology and the perceived risks of electronic shopping.

According to, R.P. Mohanty, D. Seth and S. Mukadam (2007) [4],quality needs to be managed with differentperspectives such as the following: Business Perspective:which focuses on why, where, and to what extent the organization must invest in orexploit quality.Management Perspective: This focuses on determining, organizing, directing, and monitoring quality-related activities required to achieve the desired business strategies and objectives.
Hands-on Operational Perspective: This focuses on applying the knowledge and expertise to conductexplicit quality-related tasks.Customer Satisfaction Perspective: Customer satisfaction is assessed on the basis of the characteristic of the service demanded.

Robert D. Hof (1999) [26], E-tailers depend on hundreds of distributors and manufacturers to handle inventory and delivery face all sorts of problems. E-tailers know that if they want the buyers coming back, they must build and stock warehouses, pack the boxes themselves, and hire enough staff to handle customer calls and returns.Controlling the back rooms of e-commerce also could provide the competitive advantage so lacking on the wide-open web.

Steve Keifer (2013) [24], expressed that the growth of internet shopping is causing retailers to radically rethink the way they manage their supply chains.One of the key factors that influence online shopping behavior is delivery times, with most shoppers wanting to receive their purchase as quickly as possible. Therefore, it follows that the retailer that can offer the fastest delivery speeds will be best positioned to win the most business. The methods such as third-party fulfillment, drop ship, ship from store and click and collect, each of which can lower costs are used now. On-time Delivery has become ever more complex.

E. Van Teijlingen, V. Hundley (2001) [20], The term 'pilot studies' refers to mini versions of a full-scale study (also called 'feasibility' studies), as well as the specific pre-testing of a particular research instrument such as a questionnaire or interview schedule. Pilot studies are a crucial element of a good study design. Conducting a pilot study does not guarantee success in the main study, but it does increase the likelihood. Pilot studies fulfill a range of important functions and can provide valuable insights for other researchers. Baker (1994) [23], However, a pilot study can also be the pre-testing or 'trying out' of a particular research instrument.

Tashakkori and Teddlie (1998) [15], Pilot studies can be based on quantitative and/or qualitative methods and large-scale studies might employ a number of pilot studies before the main survey is conducted. Thus, researchers may start with "qualitative data collection and analysis on a relatively unexplored topic, using the results to design a subsequent quantitative phase of the study".

Mohsen Tavakol and Reg Dennick (2011) [16], Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test. Internal consistency should be determined before a test can be employed for research or examination purposes to ensure validity.

Joppe (2000) [25], defines reliability as the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable. Embodied in this citation is the idea of replicability or repeatability of results or observations.

Kirk and Miller (1986) [17], identify three types of reliability referred to in quantitative research, which relate to: (1) the degree to which a measurement, given repeatedly, remains the same (2) the stability of a measurement over time; and (3) the similarity of measurements within a given time period.

Charles (1995) [18], adheres to the notions that consistency with which questionnaire test items are answered or individual's scores remain relatively the same can be determined through the test-retest method at two different times. This attribute of the instrument is actually referred to as stability. If we are dealing with a stable measure, then the results should be similar. A high degree of stability indicates a high degree of reliability, which means the results are repeatable.

Objectives of the Pilot Study

- To check if the questionnaire is understood by the target audience.
- To check if the interpretation of the questions made by the target audience is similar to the researcher's perspective.
- To identify problems that might occur while collecting data in large numbers for the actual study and rectifying them.
- To improve the quality and reliability of the questionnaire and get reliable data which is needed to test the hypothesis.

Reliability Test

Reliability test is necessary to perform because it is essential to confirm that the tools to be usedfor the research will give optimal results needed. Reliability testing is done to assess the consistencyof the measurement device used for the research. [27]

The reliability test chosen for this study is:

Cronbach's Alpha Test for Reliability

This test is performed to estimate the internal consistency of the group as a whole containing various items. This test can also be counted as scale reliability measurement test of the tools used for the research study. [28]

Formula of Cronbach's Alpha is as given below:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where,
N = The number of items or variables
$\bar{c}$ = Average covariance between item-pairs
$\bar{v}$ = Average Variance

Thepilot study was conducted with 45 respondents.The Cronbach's Alpha test is performed on theLikert scale questions in the questionnaire. Thus, for this test the variables are taken from the 37 Likert scale questions. Each question is a 5-point Likert scale varying from strongly disagree to strongly agree.

For the formula stated above, the values ofN (The number of items or variables), $\bar{c}$ (Average covariance between item-pairs),$\bar{v}$ (Average Variance)are shown in the Table 1 given below:

For the pilot study we have obtained the following output for the Cronbach's Alpha test:

Summary Item Statistics		
	Mean	N of Items
Item Variances	0.398	37
Inter-Item Covariances	0.073	37

Table 1: Statistics Value for Cronbach's Alpha Formula

Reliability Statistics	
Cronbach's Alpha	0.892

Table 2: Cronbach's Alpha Value Obtained

According to the above Table 1, the values obtained for the Cronbach's Alpha formula from the 45 respondents are:

N (The number of items or variables) = 37
$\bar{c}$ (Average covariance between item-pairs) = 0.073
$\bar{v}$ (Average Variance) = 0.39

Thus, Cronbach's Alpha value for the pilot study obtained from the 45 respondents is 0.892.

Cronbach's Alpha interpretation is done as per the following table 3:

Cronbach's Alpha Value	Interpretation of Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Table 3: Cronbach's Alpha Interpretation Criteria

Analysis
According to the above Table 2, the Cronbach's Alpha value obtained for the study is 0.892. This value can be interpreted using the above Table 3.

So, the Cronbach's Alpha value obtained for the study is 0.892. This means that the internal consistency of the items of the measurement device is considered as good. This clearly states that all the scale items are closely related to each other having high correlation and covariance. This conveys that the items involved in the study will probably measure the same notion.

The 0.892 Cronbach's Alpha value represents a high-level internal consistency of the scale of the study with respect to the sample. This indicates that the questionnaire is reliable.

Item Statistics			
	Mean	Std. Deviation	N
Q.10.ResolveIssues	4	0.47673	45
Q.11.ShareRisks	4	0.47673	45
Q.12.ScmCommonGoals	3.8889	0.57296	45
Q.13.Stansardizing	3.8889	0.53182	45
Q.14.TimeWastage	3.9556	0.63802	45
Q.16A.Reliability	4.0667	0.44721	45
Q.16B.Availability	4.3778	0.64979	45
Q.16C.Transit	4.0889	0.55687	45
Q.16D.OnTime	4.2222	0.51737	45
Q.16E.Expense	3.7778	0.59882	45
Q.16F.CustomerService	4.5333	0.66058	45
Q.16G.Visibility	3.9556	0.76739	45
Q.18A.Stability	3.9556	0.63802	45
Q.18B.Cost	3.9333	0.75076	45
Q.18C.Performance	4.0444	0.6727	45
Q.18D.Transport	3.8444	0.6727	45
Q.18E.Loss	3.9111	0.51444	45
Q.18F.Product	4.3778	0.64979	45
Q.18G.Delivery	4.1333	0.50452	45
Q.18H.CycleTime	4.0667	0.61791	45
Q.18I.Returns	4.2	0.66058	45
Q.18J.Complaints	4.2	0.81464	45
Q.18K.Service	4.5333	0.81464	45
Q.19.Relation	4.0444	0.47461	45
Q.20.Quality	3.8667	0.62523	45
Q.21.Improvement	3.8667	0.78625	45
Q.22.Planning	3.6	0.88933	45
Q.23.Problems	3.6444	0.67942	45
Q.24.LeadTime	3.6889	0.70137	45
Q.26A.OwnDelivery	4.9111	0.66818	45
Q.26B.OutsourceDelivery	4.5333	0.86865	45
Q.49.Requirement	4.0667	0.49543	45
Q.50.FairPlay	4	0.4264	45
Q.51.Consistency	4	0.52223	45
Q.52.Feedback	4	0.56408	45
Q.53.Satisfaction	4.2	0.54772	45
Q.54.Expectation	4.0222	0.45171	45

Table 4: Descriptive Statistics of Each Variable

The above Table 4, showcases the descriptive variables that is the mean and standard deviation of each variable used in the Cronbach's Alpha test.

The mean value of each variable seems to be similar. This indicates that all the variables are contributing to the same concept.

There are few variables which have a slightly higher mean value than the others. Those variables are:

Q.16.(F)CustomerServicehaving mean value = 4.5333,

Q.18.(K)Servicehaving mean value = 4.5333,

Q.26.(A)OwnDelivery having mean value= 4.9111,

Q.26.(B)OutsourceDelivery having mean value = 4.5333.

Since, the above listed variables indicate higher mean values with respect to the other values, they may need to be removed from the questionnaire. This would help inincreasing the reliability of the questionnaire.

Inter-Item Correlation Matrix											
	Q.10.	Q.11.	Q.12.	Q.13.	Q.14.	Q.16.(A)	Q.16.(B)W	Q.16.(C)	Q.16.(D)	Q.16.(E)	Q.16.(F)
Q.10.	1	0.5	0.416	0.448	0.374	0.32	0.147	0.171	0	0.08	0
Q.11.	0.5	1	0.499	0.359	0.448	0.32	0.073	0.086	-0.184	0.08	0.217
Q.12.	0.416	0.499	1	0.406	0.359	0.296	0.237	0.174	0.085	0.324	0.16
Q.13.	0.448	0.359	0.406	1	0.454	0.032	0.124	0.188	0.009	0.135	0.043
Q.14.	0.374	0.448	0.359	0.454	1	0.09	-0.013	0.139	-0.245	0.212	0.058
Q.16.(A)	0.32	0.32	0.296	0.032	0.09	1	0.224	0.158	0.033	0.481	0.339
Q.16.(B)	0.147	0.073	0.237	0.124	-0.013	0.224	1	0.282	0.218	0.279	0.579
Q.16.(C)	0.171	0.086	0.174	0.188	0.139	0.158	0.282	1	0.403	0.129	0.177
Q.16.(D)	0	-0.184	0.085	0.009	-0.245	0.033	0.218	0.403	1	0.163	0.244
Q.16.(E)	0.08	0.08	0.324	0.135	0.212	0.481	0.279	0.129	0.163	1	0.249
Q.16.(F)	0	0.217	0.16	0.043	0.058	0.339	0.579	0.177	0.244	0.249	1
Q.16.(G)	0.062	0.124	0.247	0.099	0.228	0.406	0.308	0.275	0.312	0.67	0.362
Q.18.(A)	0.075	0	-0.014	-0.149	0.163	0.25	0.37	-0.053	0.168	0.093	0.435
Q.18.(B)	0.191	0.127	0.088	-0.019	0.231	0.284	0.239	0.014	-0.078	0.371	0.119
Q.18.(C)	0	0.142	-0.046	-0.367	-0.048	0.292	0.169	-0.193	0.036	0.025	0.252
Q.18.(D)	0.071	0	0.013	-0.049	0.142	0.111	0.345	0.159	0.363	0.025	0.549
Q.18.(E)	0.093	0.093	-0.034	-0.037	0.057	0.125	0.239	0.028	0.161	0.082	0.143
Q.18.(F)	-0.147	-0.073	-0.19	-0.27	-0.013	0.146	0.3	0.156	0.15	0.162	0.526
Q.18.(G)	-0.094	-0.094	-0.262	-0.113	0.019	-0.04	0.051	0.119	0.145	-0.125	0.259
Q.18.(H)	0.077	0.386	0.021	-0.115	0.123	0.066	-0.121	0.048	0.024	0.102	-0.089
Q.18.(I)	0.144	0.144	-0.06	0	0.291	0.185	0.297	0.259	0.066	-0.057	0.219
Q.18.(J)	0.059	-0.117	-0.049	0	0.017	0.15	0.498	0.06	0.162	0	0.431
Q.18.(K)	0.117	0.117	-0.162	-0.122	0.134	0.274	0.426	-0.007	-0.072	0.109	0.515
Q.19.	0.402	0.502	0.436	0.47	0.457	0.093	0.018	0.157	0.144	0.195	0.213
Q.20.	0.381	0.61	0.465	0.433	0.327	0.195	-0.041	-0.096	-0.258	-0.081	0.066
Q.21.	0.303	0.364	0.42	0.344	0.35	0.284	-0.077	-0.076	-0.372	0.08	0.096
Q.22.	0.375	0.375	0.357	0.288	0.168	0.24	0.031	-0.018	-0.247	0	0.023
Q.23.	0.421	0.491	0.422	0.391	0.225	0.155	-0.101	-0.095	-0.093	-0.031	0.027
Q.24.	0.34	0.476	0.251	0.454	0.121	0.068	0.064	0.014	-0.306	-0.006	0.023
Q.26.(A)	0.143	0.357	0.211	-0.028	0.257	0.248	0.236	0.144	-0.073	0.234	0.316
Q.26.(B)	0.055	0.329	0.304	0.18	0.249	0.433	-0.043	-0.006	-0.32	0.189	0.127
Q.49.	0.192	0.289	0.427	0.201	0.297	0.287	0.344	-0.022	-0.059	0.357	0.306
Q.50.	0.224	0.335	0.279	0.301	0.418	0.238	-0.082	-0.096	-0.309	0.178	0.081
Q.51.	0.183	0.274	0.38	0.164	0.546	0.292	-0.067	0	-0.336	0.291	-0.066
Q.52.	0.507	0.423	0.352	0.379	0.505	0	0.062	0.145	-0.156	0	0
Q.53.	0.522	0.435	0.507	0.546	0.546	0.223	0.102	0.387	-0.08	0.208	0.138
Q.54.	0.211	0.422	0.361	0.294	0.556	0.218	-0.029	0.082	-0.216	0.271	0.112

Table 5: Inter-Item Correlation Matrix - Part 1

	Q.16.(G)	Q.18.(A)	Q.18.(B)	Q.18.(C)	Q.18.(D)	Q.18.(E)	Q.18.(F)	Q.18.(G)	Q.18.(H)	Q.18.(I)	Q.18.(J)
Q.10.	0.062	0.075	0.191	0	0.071	0.093	-0.147	-0.094	0.077	0.144	0.059
Q.11.	0.124	0	0.127	0.142	0	0.093	-0.073	-0.094	0.386	0.144	-0.117
Q.12.	0.247	-0.014	0.088	-0.046	0.013	-0.034	-0.19	-0.262	0.021	-0.06	-0.049
Q.13.	0.099	-0.149	-0.019	-0.367	-0.049	-0.037	-0.27	-0.113	-0.115	0	0
Q.14.	0.228	0.163	0.231	-0.048	0.142	0.057	-0.013	0.019	0.123	0.291	0.017
Q.16.(A)	0.406	0.25	0.284	0.292	0.111	0.125	0.146	-0.04	0.066	0.185	0.15
Q.16.(B)	0.308	0.37	0.239	0.169	0.345	0.239	0.3	0.051	-0.121	0.297	0.498
Q.16.(C)	0.275	-0.053	0.014	-0.193	0.159	0.028	0.156	0.119	0.048	0.259	0.06
Q.16.(D)	0.312	0.168	-0.078	0.036	0.363	0.161	0.15	0.145	0.024	0.066	0.162
Q.16.(E)	0.67	0.093	0.371	0.025	0.025	0.082	0.162	-0.125	0.102	-0.057	0
Q.16.(F)	0.362	0.435	0.119	0.252	0.549	0.143	0.526	0.259	-0.089	0.219	0.431
Q.16.(G)	1	0.367	0.35	0.18	0.427	0.162	0.308	0.25	0.054	0.108	0.16
Q.18.(A)	0.367	1	0.468	0.587	0.619	0.403	0.48	0.442	0.008	0.453	0.717
Q.18.(B)	0.35	0.468	1	0.411	0.249	0.455	0.379	0.144	0.157	0.348	0.357
Q.18.(C)	0.18	0.587	0.411	1	0.367	0.471	0.429	0.25	0.266	0.44	0.44
Q.18.(D)	0.427	0.619	0.249	0.367	1	0.353	0.449	0.464	0.08	0.327	0.597
Q.18.(E)	0.162	0.403	0.455	0.471	0.353	1	0.307	0.134	0.448	0.522	0.369
Q.18.(F)	0.308	0.48	0.379	0.429	0.449	0.307	1	0.536	0.162	0.402	0.455
Q.18.(G)	0.25	0.442	0.144	0.25	0.464	0.134	0.536	1	0.044	0.259	0.376
Q.18.(H)	0.054	0.008	0.157	0.266	0.08	0.448	0.162	0.044	1	0.245	0.018
Q.18.(I)	0.108	0.453	0.348	0.44	0.327	0.522	0.402	0.259	0.245	1	0.473
Q.18.(J)	0.16	0.717	0.357	0.44	0.597	0.369	0.455	0.376	0.018	0.473	1
Q.18.(K)	0.221	0.703	0.58	0.536	0.445	0.387	0.598	0.376	0.154	0.557	0.658
Q.19.	0.255	0.082	0.136	-0.006	0.093	-0.077	0.092	0.259	0.067	-0.029	-0.024
Q.20.	0.035	-0.072	0.029	0.068	-0.05	-0.038	-0.209	-0.014	0.141	-0.044	0.098
Q.21.	0.028	0.079	0.177	0.054	0.003	-0.142	0.056	0.103	0.112	0.009	0.185
Q.22.	-0.06	-0.032	0.197	0.258	0.084	0.169	-0.047	-0.081	0.256	0.255	0.207
Q.23.	0.013	0.068	0.264	0.035	0.025	0.298	-0.101	0.009	0.22	0.111	0.09
Q.24.	-0.026	-0.286	-0.04	-0.115	-0.201	-0.015	-0.285	-0.201	0.049	-0.059	-0.127
Q.26.(A)	0.214	0.097	0.35	0.161	0.171	0.175	0.341	0.306	0.235	0.35	0.117
Q.26.(B)	0.105	0.044	0.439	0.192	0.106	0.159	0.078	-0.062	0.186	0.246	0.167
Q.49.	0.247	0.297	0.318	0.195	0.168	-0.065	0.061	0.055	-0.089	0.167	0.304
Q.50.	0.208	0.167	0.213	-0.079	0	-0.104	0	0.106	0.086	0	0
Q.51.	0.17	0.136	0.406	0.065	-0.065	0	0	0	0.141	0.066	0
Q.52.	0.053	0.189	0.107	-0.06	0.06	0	0.062	0.16	0	0.061	-0.099
Q.53.	0.292	0.026	0.088	-0.21	-0.037	-0.177	-0.026	-0.016	-0.107	0.138	-0.041
Q.54.	0.265	0.082	0.139	-0.153	0.012	-0.089	0.048	0.186	0.076	-0.015	-0.198

Table 6: Inter-Item Correlation Matrix - Part

	Q.18.(K)	Q.19.	Q.20.	Q.21.	Q.22.	Q.23.	Q.24.	Q.26.(A)	Q.26.(B)	Q.49.	Q.50.
Q.10.	0.117	0.402	0.381	0.303	0.375	0.421	0.34	0.143	0.055	0.192	0.224
Q.11.	0.117	0.502	0.61	0.364	0.375	0.491	0.476	0.357	0.329	0.289	0.335
Q.12.	-0.162	0.436	0.465	0.42	0.357	0.422	0.251	0.211	0.304	0.427	0.279
Q.13.	-0.122	0.47	0.433	0.344	0.288	0.391	0.454	-0.028	0.18	0.201	0.301
Q.14.	0.134	0.457	0.327	0.35	0.168	0.225	0.121	0.257	0.249	0.297	0.418
Q.16.(A)	0.274	0.093	0.195	0.284	0.24	0.155	0.068	0.248	0.433	0.287	0.238
Q.16.(B)	0.426	0.018	-0.041	-0.077	0.031	-0.101	0.064	0.236	-0.043	0.344	-0.082
Q.16.(C)	-0.007	0.157	-0.096	-0.076	-0.018	-0.095	0.014	0.144	-0.006	-0.022	-0.096
Q.16.(D)	-0.072	0.144	-0.258	-0.372	-0.247	-0.093	-0.306	-0.073	-0.32	-0.059	-0.309
Q.16.(E)	0.109	0.195	-0.081	0.08	0	-0.031	-0.006	0.234	0.189	0.357	0.178
Q.16.(F)	0.515	0.213	0.066	0.096	0.023	0.027	0.023	0.316	0.127	0.306	0.081
Q.16.(G)	0.221	0.255	0.035	0.028	-0.06	0.013	-0.026	0.214	0.105	0.247	0.208
Q.18.(A)	0.703	0.082	-0.072	0.079	-0.032	0.068	-0.286	0.097	0.044	0.297	0.167
Q.18.(B)	0.58	0.136	0.029	0.177	0.197	0.264	-0.04	0.35	0.439	0.318	0.213
Q.18.(C)	0.536	-0.006	0.068	0.054	0.258	0.035	-0.115	0.161	0.192	0.195	-0.079
Q.18.(D)	0.445	0.093	-0.05	0.003	0.084	0.025	-0.201	0.171	0.106	0.168	0
Q.18.(E)	0.387	-0.077	-0.038	-0.142	0.169	0.298	-0.015	0.175	0.159	-0.065	-0.104
Q.18.(F)	0.598	0.092	-0.209	0.056	-0.047	-0.101	-0.285	0.341	0.078	0.061	0
Q.18.(G)	0.376	0.259	-0.014	0.103	-0.081	0.009	-0.201	0.306	-0.062	0.055	0.106
Q.18.(H)	0.154	0.067	0.141	0.112	0.256	0.22	0.049	0.235	0.186	-0.089	0.086
Q.18.(I)	0.557	-0.029	-0.044	0.009	0.255	0.111	-0.059	0.35	0.246	0.167	0
Q.18.(J)	0.658	-0.024	0.098	0.185	0.207	0.09	-0.127	0.117	0.167	0.304	0
Q.18.(K)	1	0.055	-0.036	0.185	0.176	0.145	0.019	0.34	0.295	0.304	0.131
Q.19.	0.055	1	0.48	0.382	0.097	0.473	0.247	0.299	0.107	0.374	0.449
Q.20.	-0.036	0.48	1	0.749	0.597	0.581	0.422	0.297	0.427	0.396	0.511
Q.21.	0.185	0.382	0.749	1	0.67	0.462	0.212	0.28	0.539	0.49	0.61
Q.22.	0.176	0.097	0.597	0.67	1	0.436	0.379	0.283	0.577	0.423	0.3
Q.23.	0.145	0.473	0.581	0.462	0.436	1	0.573	0.129	0.367	0.072	0.314
Q.24.	0.019	0.247	0.422	0.212	0.379	0.573	1	0.085	0.204	0.061	0.152
Q.26.(A)	0.34	0.299	0.297	0.28	0.283	0.129	0.085	1	0.514	0.43	0.399
Q.26.(B)	0.295	0.107	0.427	0.539	0.577	0.367	0.204	0.514	1	0.444	0.491
Q.49.	0.304	0.374	0.396	0.49	0.423	0.072	0.061	0.43	0.444	1	0.538
Q.50.	0.131	0.449	0.511	0.61	0.3	0.314	0.152	0.399	0.491	0.538	1
Q.51.	0.107	0.458	0.418	0.609	0.294	0.192	-0.062	0.391	0.501	0.439	0.612
Q.52.	0.049	0.594	0.193	0.256	0.091	0.178	0.115	0.181	-0.046	0.244	0.472
Q.53.	0.061	0.664	0.411	0.433	0.168	0.379	0.343	0.236	0.201	0.369	0.487
Q.54.	-0.033	0.631	0.333	0.392	0.023	0.174	0.022	0.383	0.201	0.399	0.708

Table 7: Inter-Item Correlation Matrix - Part 3

	Q.51.	Q.52.	Q.53.	Q.54.
Q.10.	0.183	0.507	0.522	0.211
Q.11.	0.274	0.423	0.435	0.422
Q.12.	0.38	0.352	0.507	0.361
Q.13.	0.164	0.379	0.546	0.294
Q.14.	0.546	0.505	0.546	0.556
Q.16.(A)	0.292	0	0.223	0.218
Q.16.(B)	-0.067	0.062	0.102	-0.029
Q.16.(C)	0	0.145	0.387	0.082
Q.16.(D)	-0.336	-0.156	-0.08	-0.216
Q.16.(E)	0.291	0	0.208	0.271
Q.16.(F)	-0.066	0	0.138	0.112
Q.16.(G)	0.17	0.053	0.292	0.265
Q.18.(A)	0.136	0.189	0.026	0.082
Q.18.(B)	0.406	0.107	0.088	0.139
Q.18.(C)	0.065	-0.06	-0.21	-0.153
Q.18.(D)	-0.065	0.06	-0.037	0.012
Q.18.(E)	0	0	-0.177	-0.089
Q.18.(F)	0	0.062	-0.026	0.048
Q.18.(G)	0	0.16	-0.016	0.186
Q.18.(H)	0.141	0	-0.107	0.076
Q.18.(I)	0.066	0.061	0.138	-0.015
Q.18.(J)	0	-0.099	-0.041	-0.198
Q.18.(K)	0.107	0.049	0.061	-0.033
Q.19.	0.458	0.594	0.664	0.631
Q.20.	0.418	0.193	0.411	0.333
Q.21.	0.609	0.256	0.433	0.392
Q.22.	0.294	0.091	0.168	0.023
Q.23.	0.192	0.178	0.379	0.174
Q.24.	-0.062	0.115	0.343	0.022
Q.26.(A)	0.391	0.181	0.236	0.383
Q.26.(B)	0.501	-0.046	0.201	0.201
Q.49.	0.439	0.244	0.369	0.399
Q.50.	0.612	0.472	0.487	0.708
Q.51.	1	0.463	0.477	0.674
Q.52.	0.463	1	0.588	0.714
Q.53.	0.477	0.588	1	0.625
Q.54.	0.674	0.714	0.625	1

Table 8: Inter-Item Correlation Matrix - Part 4

The above Table 5, Table 6, Table 7 and 8 represents the correlation of each variable with all the variables. Across the diagonal, the list of 1 depicts correlation of the variable with themselves. This indicates that the correlation is perfect, that is, r = 1. It means the scores are identical.

The row variables Q.16.(A)Reliability, Q.16.(C)Transit, Q.16.(D)OnTime, Q.16.(E)Expense, Q.18.(G)Delivery, Q.18.(H)CycleTime show relatively weak correlations. They do not correlate well together with all the other variables with high consistency. These variables would be taken into consideration for elimination for making the questionnaire more reliable.

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q.10.ResolveIssues	146.4	107.291	0.428	0.89
Q.11.ShareRisks	146.4	106.336	0.527	0.888
Q.12.ScmCommon Goals	146.5111	106.21	0.441	0.889
Q.13.Stansardizing	146.5111	108.074	0.306	0.891
Q.14.TimeWastage	146.4444	105.162	0.472	0.889
Q.16A.Reliability	146.3333	107.227	0.466	0.889
Q.16B.Availability	146.0222	106.568	0.354	0.891
Q.16C.Transit	146.3111	109.31	0.183	0.893
Q.16D.OnTime	146.1778	111.877	-0.036	0.896
Q.16E.Expense	146.6222	107.422	0.319	0.891
Q.16F.CustomerService	145.8667	105.209	0.45	0.889
Q.16G.Visibility	146.4444	104.343	0.435	0.889
Q.18A.Stability	146.4444	105.116	0.476	0.889
Q.18B.Cost	146.4667	103.164	0.526	0.887
Q.18C.Performance	146.3556	106.553	0.341	0.891
Q.18D.Transport	146.5556	105.571	0.414	0.89
Q.18E.Loss	146.4889	107.846	0.34	0.891
Q.18F.Product	146.0222	106.659	0.348	0.891
Q.18G.Delivery	146.2667	108.836	0.252	0.892
Q.18H.CycleTime	146.3333	108.545	0.219	0.893
Q.18I.Returns	146.2	105.3	0.443	0.889
Q.18J.Complaints	146.2	103.936	0.43	0.889
Q.18K.Service	145.8667	102.118	0.544	0.887
Q.19.Relation	146.3556	106.416	0.521	0.888
Q.20.Quality	146.5333	105.436	0.461	0.889
Q.21.Improvement	146.5333	102.8	0.522	0.887
Q.22.Planning	146.8	102.709	0.457	0.889
Q.23.Problems	146.7556	105.143	0.441	0.889
Q.24.LeadTime	146.7111	108.756	0.171	0.894
Q.26A.OwnDelivery	145.4889	103.983	0.537	0.887
Q.26B.OutsourceDelivery	145.8667	102.209	0.5	0.888
Q.49.Requirement	146.3333	105.682	0.571	0.888
Q.50.FairPlay	146.4	107.2	0.494	0.889
Q.51.Consistency	146.4	106.291	0.481	0.889
Q.52.Feedback	146.4	107.2	0.362	0.89
Q.53.Satisfaction	146.2	105.8	0.501	0.888
Q.54.Expectation	146.3778	107.513	0.43	0.89

Table 9: Item-Total Statistics of each Variable

In the above Table 9, the fourth column 'Corrected Item-Total Correlation' explains the extent to which each variable correlates with the entire questionnaire.

The less value of correlations has been found in the variables Q.16.(C)Transit, Q.16.(D)OnTime, Q.18.(G)Delivery, Q.18.(H)CycleTime, Q.24.LeadTime For these variables we will check the fifth column 'Cronbach's Alpha If Item Deleted'. This column provides the Cronbach's Alpha value when that particular variable is deleted from the questionnaire resulting in the high reliability of the questionnaire.

Here, we are trying to achieve a higher Cronbach's Alpha value to get a more reliable questionnaire. Therefore, we will compare the Cronbach's Alpha of the above-mentioned variables with the Cronbach's Alpha value evaluated for the test, that is, 0.892.

Considering,variable Q.16.(C)Transit, if we delete this question from the questionnaire, we would get Cronbach's Alpha value as 0.893.

Considering, variable Q.16.(D)OnTime, if we delete this question from the questionnaire, we would get Cronbach's Alpha value as 0.896.

Considering, variable Q.18.(G)Delivery, if we delete this question from the questionnaire, we would get Cronbach's Alpha value as 0.892.

Considering, variable Q.18.(H)CycleTime, if we delete this question from the questionnaire, we would get Cronbach's Alpha value as 0.893.

Considering, variable Q.24.LeadTime, if we delete this question from the questionnaire, we would get Cronbach's Alpha value as 0.894.

From the above deductions, it is evident that the highest Cronbach's Alpha value can be achieved of 0.896 if the variable Q.16.(D)OnTime is deleted. Therefore, the elimination of this variable should be taken into consideration to get a more reliable questionnaire.
Also, taking into consideration the analysis of 'Inter-Item Correlation Matrix' (i.e., Table 5, 6, 7, 8), variable Q.16.(D)OnTime was highlighted for deletion from the questionnaire for having relatively weak correlation with the other variables of the questionnaire.

Therefore, variable Q.16.(D)OnTime should definitely be taken into consideration for elimination from the questionnaire to achieve a more reliable questionnaire.

Observations

1. Few questions were modified as the respondents interpreted them in a wrong sense.
2. Few questions were modified because the technical terms used in the questions were not clear to the respondents.
3. Respondents did not fill up the questionnaire because they did not understand the questions.
4. We had to personally explain each question to the respondent to get the answer from them.
5. Respondents were not comfortable in providing demographic data.

Conclusion

1. The reliability test indicates that the measurement tools used would work for the main study.
2. The questions have to be modified to get effective data from the respondents.
3. It is essential to contact the respondents personally to get the data as the technical terms in the questions have to be made clear to them.

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