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Modeling Supply Chain Performance of Organized Garment Retailing

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***Abstract*- Purpose –** The purpose of this paper is to produce the findings of a research project seeking to develop and validate a model for measuring supply chain performance of organized garment retailing in India.

Design/methodology/approach – The paper draws its conclusions from an analysis of survey data from samples of Indian organized garment retailing practitioners and consultants. The pre-pilot and pilot survey has been done to improve the questionnaire. Later, large scale survey is used to classify key performance indicators and structural equation modeling has been used to develop and validate a model for measuring supply chain performance of organized garment retailing in India.

Findings –The twenty key performance indicators have been arranged to measure the supply chain performance of organized garment retailing. The first most important group of key performance indicator is inventory metrics with seven indicators in this node. This nodal point needs to be supported by another supply chain node, i.e., flexibility metrics with three indicators. Also, keeping in view the customer requirements, customer metrics have developed another nodal point for assessing supply chain performance. This nodal point has the support of six performance indicators. The stakeholder metric presents the final nodal point for assessing supply chain performance. This nodal point uses four indicators and projects the monetary outcome of the business.

Research limitations/implications – Larger-scale empirical studies are required from the top management for enhanced validity. In particular, the explicit comparison of the supply chain performance of major firms is recommended for future research. Also, there is a need to compare organized and unorganized garment retailing sector for gap analysis.

Originality/value – This is the first study to systematically develop and validated a model for measuring supply chain performance of organized garment retailing in India. The analyses and discussions provide a basis for future research. In addition, the insights of this study shall help for the betterment of this sector.

***Index Terms*-** Key performance indicators, Organizational performance, Organized garment retailing, Supply chain management, Supply chain performance metrics

I. Introduction

Organized Garment Retailing (OGR) is a sunrise industry with maximum growth rate and maximum contribution to GDP in India. It has attracted many national and international players. Nowadays the intense market competition has shifted to the supply chain (SC) domain. Hence, the need for developing a SC performance of OGR is now a major concern for all the organizations. It shall be counted by using selective sets of key performance indicators (KPI) for measuring SC performance. Also, measuring supply chain performance (SCP) is one of the key managerial tasks associated with a wide range of activities of planning, organizing, motivating the workforce and controlling events. Providing a long list of KPI shall overload the managers leading to inefficiency.

A performance measurement system helps to address the issues of finance, customer, internal processes, and innovation and improvements. Hence, "No measures, No improvement" (Kaplan and Norton, 1996). In the early stage of high technology organizations, managers focus on efficiency, reliability, and speed. However, in the different stages of organizational growth KPI are also different (Bhasin, 2008). Here, it is pertinent to mention that OGR in India is in the growth stage. Hence, developing a SCP measurement model shall be applicable to this industry as a whole.

However, many organized retail outlets failed despite best growth for the industry. The OGR professionals revealed it an SCP failure. The reason for the failure was unavailability of an effective SCP measurement model for OGR. So, we identified the need to develop a SCP measurement model by selecting limited sets of KPI and arranging them in the form of a model. Here, we have used structural equation modeling (SEM). It is pertinent to mention that factor analysis, correlation, regression etc. shall test, single relationship at a time. However, SEM shall test multiple relationships at a time. Hence, we used this technique to develop and validate a model for measuring SCP of OGR.

The remainder of this paper is organized as follows. The second section presents KPI used in this sector based on strong literature support in consultation of practitioners and consultants in the field of OGR. The third section focuses on database and methodology. The fourth section focuses on the discussion. In the last section we concluded the results and future research space has been discussed with the reference studies.

II. Key performance indicators

Measuring SCP leads to informed decision making to track the efficiency failure. The aim of implementing a performance

measurement system is to improve organizational performance. The selected KPIs are shown in the Table 1 as follows:

Table I: Key performance indicators

Performance Indicators/Researchers
Product Quality: Beamon (1999), Ramdas & Speakman (2000), Sahin et al. (2000), SCC (2000), Lambert & Terrance (2001), Luning et al. (2002), Krajewski & Ritzman (2002), Lin et al. (2005), Jile et al. (2007)
Process Quality: SCC (2000), Luning et al. (2002)
Customer Response Time: Viswanadham (1999), Beamon (1999), Sahin et al. (2000), SCC (2000), Ramdas & Speakman (2000), Lambert & Terrance (2001), Tan (2002), Morgan (2004), Jile et al. (2007), Zheng & Li (2008), Gunawan et al. (2008)
Return Adjustment: Viswanadham (1999), Lambert & Terrance (2001), Harrison & New (2002), Morgan (2004), Zheng & Li (2008)
Product Personality: Ramdas & Speakman (2000), Lambert & Terrance (2001), Sahin et al. (2000)
Transaction Satisfaction: Ramdas & Speakman (2000), Bowersox et al. (2000), SCC (2000), Morgan (2004), Zheng & Li (2008), Gunawan et al. (2008)
Spoilage Adjustment: Harrison & New (2002), Morgan (2004), Zheng & Li (2008)
VMI: Lambert & Terrance (2001)
Lead Time: Viswanadham (1999), Bowersox et al. (2000), Sahin et al. (2000), Ramdas & Speakman (2000), Harrison & New (2002), Krajewski & Ritzman (2002), SCC (2000), Harrison & New (2002), Chan & Qi (2003b), Morgan (2004), Taylor (2004), Lin et al. (2005), Jile et al. (2007), Zheng & Li (2008), Gunawan et al. (2008)
Fill Rate: Viswanadham (1999), SCC (2000), Lambert & Terrance (2001), Harrison & New (2002), Chen & Qi (2003b), Morgan (2004), Lin et al. (2005), Jile et al. (2007), Zheng & Li (2008)
Inventory Cost: Viswanadham (1999), Ramdas & Speakman (2000), SCC (2000), Tan (2002), Krajewski & Ritzman (2002), Harrison & New (2002), Chen & Qi (2003a), Morgan (2004), Taylor (2004), Zheng & Li (2008)
Distribution Cost: Viswanadham (1999), Krajewski & Ritzman (2002), SCC (2000), Harrison & New (2002), Chen & Qi (2003b), Taylor (2004), Morgan (2004), Zheng & Li (2008),
Operations Flexibility: Beamon (1999), Viswanadham (1999), SCC (2000), Krajewski & Ritzman (2002), Chen & Qi (2003b), Jile et al. (2007), Zheng & Li (2008)
Volume Flexibility: Beamon (1999), Viswanadham (1999), SCC (2000), Krajewski & Ritzman (2002), Chen & Qi (2003a), Jile et al. (2007), Zheng & Li (2008)
Delivery Flexibility: Beamon (1999), Viswanadham (1999), Bowersox et al. (2000), SCC (2000), Harrison & New (2002), Krajewski & Ritzman (2002), Chen & Qi (2003b), Taylor (2004), Jile et al. (2007), Zheng & Li (2008)
ROI: Kaplan & Norton (1996), Beamon (1999), SCC (2000), Chen & Qi (2003b), Morgan (2004), Zheng & Li (2008), Gunawan et al. (2008)
Sales Profit: Kaplan & Norton (1996), SCC (2000), Tan (2002), Chen & Qi (2003), Taylor (2004), Morgan (2004), Zheng & Lai (2008), Gunawan et al. (2008)
Stakeholder Value: Neely et al. (1995); Jusoh & Parnell (2008)
Innovations: Kaplan & Norton (1996), Lummus et al. (2000), Speakman et al. (2002), Zheng & Li (2008)
Shipping Errors: Harrison & New (2002),Morgan (2004), Zheng & Li (2008),Gunawan et al. (2008)

Product quality is one of the most important metric to retain customers. The customers always expect better quality at lower prices. Lin et al. (2005) and Jile et al. (2007) revealed product quality as an important metric for SC performance measurement. The product quality is also associated with the *process quality.* The use of efficient processing technologies shall help to mitigate wastage and ultimately the product quality shall be better. The use of statistical process control, root cause analysis of poor quality, improvement in process capability, staff training and development of facilities shall help to improve process quality. Luning et al. (2002) revealed process quality as an important metric for better SCP.

Customer response time is the time taken to handle customer queries. The customers visit retail stores to collect the products for their requirements. They shall ask questions regarding product variety, quality, availability and prices. A prompt response shall help to attract and retain customers. Hence, it is also an important metric for measuring SCP (Nuthall, 2003; Morgan, 2004; and Gunewan et al., 2008).

Many times the products shipped shall be of inferior quality. The customers may return them even after purchase. The efforts should be made to adjust the returns immediately otherwise the long flow of products in the SC shall waste time and resources. Viswanadham (1999) and Morgan (2004) also added that *return adjustment* significantly affects SCP.

Product personality is also one of the important indicators of better SCP. It can be judged by focusing on colour, size, appearance and design of the fabric. These factors shall not only help to attract customers but also to retain them. Gunasekaran et al. (2004) and Aramyan (2006) also revealed product personality as an important indicator to evaluate SCP.

Customers visit garment retail stores to get their requirements satisfied. *Transaction satisfaction* helps to convert visits into a purchase. Neely et al. (1995), Beamon (1999) and Viswanadham (1999) revealed transaction satisfaction as a means to attract and retain customers. Gunawan et al. (2008) revealed it as an important SCP indicator. The customer satisfaction-pre-transaction, transaction and post-transaction shall help to develop customer loyalty.

The garment products are very delicate in nature and mishandling shall adversely affect the quality of the garments. The movements in the value added process should be in a position to maintain product quality. Otherwise, the damaged products shall waste time and resources. Hence, *spoilages adjustment* plays an important role in better SCP. So, efforts should be made to immediately identify spoilage and adjust it to prevent further delay and the products (Harrison and New, 2002; Morgan, 2004).

The *inventory cost* involves major cost component of retail supply chains. Tan (2002) and Harrison and New (2002) focused on inventory cost as an important indicator of SCP. The management of inventory is also one of the important indicators in measuring SCP. Inventory ordering, receiving and inspecting needs great efforts. Shifting these responsibilities to the suppliers helps to save time and resource. Nowadays organized retailers are using automated inventory management system with the help of advanced software and internet. Hence, *vendor managed* (VMI) has significantly reduced major inventory overheads. As and when inventory falls below certain levels automated orders are placed with the suppliers at the negotiated rates. Hence, VMI is also an important indicator for measuring SCP (Lambert & Terrance, 2001).

Lead time is the time between placement of an order and receipt of the goods. Many times the customers ask for products not available in the garment retail outlet. Also, these products may not be listed for VMI. In such situations and also when demand fluctuates sudden, the lead time plays a very important role. It is a critical success factor in SCM. Also, uncertainty in different stages of procurement, packaging, distribution, and forecasting amplifies lead time. Novac and Thomas (2004) identified lead time as an important indicator for measuring SCP.

The efforts of procuring best inventory in the stock is useless until the products are displayed in the racks to attract customers. These efforts can be vitalized by using efficient *fill rate*-which is the rate at which products are transferred to the rack for sale. Many researchers focused on fill rate as an important SC indicator (Harrison and New, 2002; Kleijnen and Smiths, 2003).

Distribution cost is the second major cost component of the OGR business. It is an important component of SC where cost shall be minimized by selecting suitable modes of transportation compatible with urgency and capacity. Sahin et al. (2000) and Krajewski and Ritzman (2002) also revealed it as one of the important SC indicators.

Operational flexibility refers to the firm's ability to rapidly design and implement new products/services for the customers. The operational flexibility adjusts the demand fluctuations without excessive costs, time and organizational disruptions. Shepherd and Gunter (2006) identified it as an important SC indicator.

Volume flexibility is making a variable quantity of products available at any location and time. Here, capacity of transportation shall play an important role. Flexible modes of transportation and large volume flexibility can make any quantum available at the demand point. Jile et al. (2007) and Zheng and Li (2008) identified it as an important KPI in measuring SCP.

The delivery flexibility measure is more concerned with the location of the destination. Many times the customers expect home delivery. Hence, to satisfy customers delivery flexibility has become an important indicator for measuring SCP (Jile et al. 2007; Zheng & Li, 2008).

Return on investment (ROI) is also one of the important indicators that shall be calculated over a period of time. It gives the overall business outcome for which the retailers look for good results. Nuthall (2003) and Morgan (2004) revealed ROI as one of the important indicators for measuring SCP.

Sales profit is the gain over the quantum of goods sold. It shall be calculated when goods are sold for the satisfaction of customers. Nuthall (2003) identified it as an important SCP indicator. Here, it is pertinent to mention that not only the sale but also the sales profit, helps to evaluate OGR business success.

Stakeholders are the investors, customers, employees, regulators and suppliers who play an active role in the business. The wants and needs of stakeholders should be satisfied for the business success. Neely et al. (2002) considered *stakeholder value* as the focal point of the performance measurement process. The collaboration among stakeholders plays an important role in business growth.

Innovations is the design, invention, development and/or implementation of new/modified ideas for business growth. The emergence of OGR has made it necessary not only to train employees for attitude and skill development but also to develop technology for performance enhancement. Shepherd and Gunter (2006) identified innovation as a valuable SCP indicator. It focuses on growth by making innovative efforts through people, systems and organizational procedures.

Shipping errors are the errors associated with delivery of products/services to the SC nodes. Many times short lead time, manual processing of outbound products and dispatch bottlenecks shall add to costly shipping errors, delivery related disputes, claims, and charge back. These errors should be eliminated immediately otherwise customer dissatisfaction shall not only loose a sale but also tarnish company image. Many researchers (Harrison and New, 2002;Morgan, 2004; and Gunawan et al., 2008) identified it as an important SCP indicator.

III. Gap Analysis

The studies quoted above are applicable to the manufacturing and service industries other than organized garment retailing. Also, most of the studies have been conducted abroad. Organized garment retailing is a new industrial sector in India with maximum growth rate. Despite all many store outlets failed. Hence, it is the necessity to focus on it to find a solution for the same. In this paper an attempt has been made to provide insights for the organized garment retailing practitioners by developing a model to develop supply chain performance.

IV. Database and Methodology

Scale development

A survey questionnaire has been designed based on a strong literature support in consultation with both the practitioners and consultants working on OGR. A 20-item Likert scale was used

to rate the importance/use of the KPI discussed in the literature survey. The items so developed were rated on a five point Likert scale.

The pre-pilot survey helped us to get insights to improve the questionnaire. Later, a pilot survey was done and questionnaire was improved based on the insights from professionals engaged in SC activities of OGR. Finally, the full scale survey was conducted in north India i.e., Chandigarh, New-Delhi, Gurgaon and the principal cities of state Punjab.

A total of 600 questionnaires were mailed by randomly selecting respondents from OGR websites, telephone directory 2011 and PROWESS data base maintained by CMIE. The questionnaires send were followed and finally 398 questionnaires were received from respondents operating in the banking sector (CEO/President /VP/GM=25; Sr.Managers/MIS coordinators, etc.=100; Managers(Store/purchase/SC), Supervisors etc. =273) yielding a response rate of 63.3%. The questionnaire responses were digitized using SPSS software and scale reliability was done.

V. Scale Refinement

The items were refined and purified to obtain the reliable scale. Here, corrected item-to-total correlation(Table:II) and Cronbach's alpha statistics were used. Item and reliability analysis was performed to retain and delete scale items for the purpose of developing a reliable scale. Corrected item-to-total correlations and Cronbach's alpha statistics were employed to conduct this type of analysis. It was used to know the extent to which any one item is correlated with the remaining items in a set of items under consideration. This analysis found Cronbach's alpha to be 0.8335 and item-to-total correlation (Table:II) was more than 0.5 and inter-item correlation (Table:III) is greater than 0.3. Here, it is pertinent to mention that Alpha value greater than 0.6 and item-to-total correlation greater than 0.5 and inter-item correlation greater than 0.3 is good enough for conducting research in social sciences (Hair et al. 2009).

Hair et al. (2009) classified modelling techniques using SEM as; confirmatory modelling strategy, competing modelling strategy and model development strategy. The confirmatory modelling strategy specifies a single model and SEM is used to assess how well the model fits the data. Here, the focus is on "either model works or not". The competing model strategy is a mean of evaluating the estimated model with alternate models and overall model comparisons can be performed with this strategy. The model development strategy differs from these two. Here basic framework is proposed and modeling tries to improve the model through modification of structural and measurement models. Here, theory provides only a starting point for development of a theoretically justified model. Here, we have used confirmatory modeling technique. It is due to the fact that the location of KPI in the model was supposed to work in the direction of theoretical and practical logic. So, we tested and validated the model with AMOS 4.0 version.

Factor analysis results for key performance indicators

The scale mean for the twenty key performance indicators is 78.46 (Table:II). If all the KPIs are rated at 5 the total comes to be 100. Hence, 78.46% of the construct is explained. This is sufficient to explain construct validity. The correlation matrix is shown in Table: III. The inter-item correlation is more than 0.5, scale reliability is 0.8335 and item-to-total correlation is more than 0.03. Also, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.878 and the Bartlett's Test of Sphericity has chi-square=0.8890.75, degree of freedom=190 and level of significance=0.00. The communality ranges from 0.765 to 0.896 (Table:II). Hence, all the requirements for conducting factor analysis are met. The factor analysis was conducted using principal component analysis (Table:IV). The four grouped factors are explained as follows:

Inventory Metrics

This factor covers seven KPI. These are Inventory cost, Distribution cost, Lead time, Vendor Managed Inventory, Fill rate, Spoilage adjustment, and Shipping errors. The factor loading ranges from 0.923 to 0.846. The inter-item correlation ranges from 0.945 to 0.714 and item to total correlation ranges from 0.9005 to 0.8293. Here, 32.81% of the variance is explained and it covers 6.563 of the Eigen values.

Customer Metrics

This factor covers six KPI. These are customer response time, product personality, transaction satisfaction, return adjustment, process quality, and product quality. The factor loading ranges from 0.926 to 0.873. The inter-item correlation ranges from 0.855 to 0.746 and item to total correlation ranges from 0.8996 to 0.8219. Here, 25.97% of the variance is explained and it covers 5.195 of the Eigen values.

Stakeholder Metrics

This factor covers four KPI. These are stakeholder value, sales profit, innovations, and return on investment (ROI). The factor loading ranges from 0.898 to 0.869. The inter-item correlation ranges from 0.835 to 0.777 and item to total correlation ranges from 0.8781 to 0.8361. Here, 19.49% of the variance is explained and it covers 3.899 of the Eigen values.

Flexibility Metrics

This factor covers three KPI. These are volume flexibility, delivery flexibility, and operations flexibility. The factor loading ranges from 0.887 to 0.856. The inter-item correlation ranges from 0.828 to 0.790 and item to total correlation ranges from 0.8742 to 0.8484. Here, 5.653% of the variance is explained and it covers 1.131 of the Eigen values.

Structural model results

The proposed structural model is shown in Fig. I. It has Chi-square = 958.982, Degrees of freedom = 167, Probability level = 0.000. The fit measures are; RMR=0.051, GFI=0.803, NFI=0.900, RFI=0.880, IFI=O.904, TLI=0.900, CFI=0.904. The total effect estimates are shown in Table… The total effect for f1->f4 is 0.327, f1->f2 is 0.113, and f3-> f1 is -0.203. All the total effects are significant i.e., greater than 0.05. Hence this model is valid.

The total effect (Table:V) for inventory metrics are; shipping errors (0.89), distribution cost (1.0), lead time (0.97), VMI (0.96), fill rate (0.92), spoilage adjustment (0.99) and

inventory costs (0.95). Here, it is pertinent to mention that the distribution cost plays most significant role followed by spoilage adjustment. It is due to the fact that distribution cost has major component in the supply chain. Also, the garment products are very delicate in nature and defects shall appear during procurement of raw material, production, transportation and display of the final product. Hence, spoilage metric plays an important role. The lead time to customer response is also needed to be taken care of by efficient vendor managed inventory. The vast variety shall lead to shipping errors. All the metrics covered here have a significant total effect. Also, the KPI in these constructs are in consonance with the studies quoted in the Table: I.

The total effect for items on customer metrics are product quality (0.93), process quality (0.91), return adjustment (0.97), transaction satisfaction (1.0), product personality (0.95), and customer response time (0.99). Here, transaction satisfaction plays most dominating role followed by customer response time. It is pertinent to mention that these metrics are important to attract customers. The return adjustment is also important for retaining customers. The product quality, process quality, and product personality are helpful to attract customers. All the KPI mentioned here are in consonance with the studies quoted in the Table: I.

The total effect on the flexibility metrics are volume flexibility (1.0), operations flexibility (0.96) and delivery flexibility (0.92). Here, volume flexibility plays most significant role followed by operations flexibility and delivery flexibility. It is pertinent to mention that qualified customers visit organized garment stores. They compare product quality with price and quantity. Many times they purchase in bulk for less price. Also, to satisfy customers' operations and delivery flexibility is needed. All the KPI mentioned here are in consonance with the studies quoted in the Table: I.

The total effect for the stakeholder metrics are stakeholder value (1.0), sales profits (0.95), innovations (0.97), and return on investment (0.92). Here, stakeholder value plays most significant role. It is pertinent to mention that the stakeholders are investing in the business. They shall remain part of the business if satisfied otherwise shall depart. Innovations are needed for competing the competitors. The ultimate objective of the business is to maximize sales for better return on investment. All the metrics mentioned here are in consonance with the studies quoted in the Table: I.

Table II: Mean, corrected item-to-total correlation and communality for key performance indicators

SN	Items	Mean	Corrected item-total correlation	communality	
				Initial	final
I1	Product Quality	3.8741	.5278	1.00	.975
I2	Cust Response Time	3.9244	.5063	1.00	.949
I3	Return Adjustment	3.9169	.5034	1.00	.968
I4	Process Quality	3.9144	.5088	1.00	.968
I5	Product Personality	3.9144	.5083	1.00	.967
I6	Transaction Satisfaction	3.9169	.5050	1.00	.920
I7	Spoilage Adjustment	3.9723	.5171	1.00	.923
I8	VMI	3.9899	.5450	1.00	.954
I9	Lead Time	4.0000	.5618	1.00	.837
I10	Fill Rate	4.0252	.5324	1.00	.722
I11	Inventory Cost	4.0403	.5059	1.00	.758
I12	Distribution Cost	4.0126	.5381	1.00	.805
I13	Shipping Errors	2.2796	.5380	1.00	.753
I14	Operations Flexibility	3.9673	.5441	1.00	.850
I15	Volume Flexibility	3.9698	.5721	1.00	.821
I16	Delivery Flexibility	3.9698	.5402	1.00	.653
I17	ROI	4.1763	.5390	1.00	.708
I18	Sales Profit	4.1788	.5626	1.00	.975
I19	Stakeholder Value	4.1839	.5314	1.00	.949
I20	Innovations	4.1839	.5347	1.00	.968
Statistics for Scale: (Mean=78.4106;Variance=71.9648,Std Dev=8.4832,N of Variables=20; N of cases=397; alpha=.8335)					

Table III: Correlation matrix of key performance indicators

	11	12	9	8	10	7	13	2	5	6	3	4	1	19	18	20	17	15	16	14
K11	1.0																			
K12	.766	1.0																		
K9	.780	.801	1.0																	
K8	.714	.813	.812	1.0																
K10	.793	.784	.810	.764	1.0															
K7	.709	.740	.788	.833	.730	1.0														
K13	.779	.945	.827	.778	.797	.752	1.0													
K2	.041	.07	.09	.06	.07	.05	.08	1.0												
K5	.047	.10	.10	.07	.08	.07	.07	.818	1.0											
K6	.053	.08	.08	.06	.12	.06	.11	.842	.831	1.0										
K3	.053	.08	.07	.06	.10	.07	.09	.855	.806	.817	1.0									
K4	.081	.09	.08	.10	.09	.07	.10	.828	.814	.816	.816	1.0								
K1	-.01	.09	.09	.15	.05	.17	.06	.768	.802	.747	.747	.746	1.0							
K19	-.17	-.12	-.17	-.15	-.19	-.17	-.17	-.17	-.15	-.15	-.17	-.16	-.16	1.0						
K18	-.13	-.14	-.17	-.17	-.18	-.13	-.18	-.17	-.15	-.16	-.17	-.17	-.15	.811	1.0					
K20	-.15	-.14	-.14	-.17	-.15	-.15	-.13	-.19	-.17	-.17	-.19	-.18	-.16	.835	.789	1.0				
K17	-.14	-.15	-.16	-.18	-.13	-.15	-.17	-.21	-.19	-.17	-.21	-.20	-.18	.789	.780	.777	1.0			
K15	.28	.26	.31	.29	.28	.25	.25	.03	.01	-.01	.03	.06	.01	.383	.326	.383	.346	1.0		
K16	.24	.29	.31	.25	.29	.24	.28	.03	.03	.011	.03	.02	.01	.365	.328	.406	.369	.828	1.0	
K14	.25	.26	.28	.27	.29	.26	.24	.01	-.01	-.02	.04	.01	-.003	.393	.396	.433	.376	.828	.79	1.0

Table IV: Factor analysis results for key performance indicators

	Factors			
	Inventory metrics (f1)	Customer metrics(f 2)	Stakeholder metrics(f 3)	Flexibility metrics(f 4)
Inventory Cost	.923			
Distribution Cost	.921			
Lead Time	.901			
VMI	.890			
Fill Rate	.878			
Spoilage Adjustment	.870			
Shipping errors	.864			
Cust Response Time		.926		

Product Personality		.921		
Transaction Satisfaction		.919		
Return Adjustment		.911		
Process Quality		.908		
Product Quality		.873		
Stakeholder Value			.898	
Sales Profit			.895	
Innovations			.876	
ROI			.869	
Volume Flexibility				.887
Delivery Flexibility				.867
Operations Flexibility				.856
Eigen values	6.563	5.195	3.899	1.131
% variance	32.81	25.97	19.49	5.653
Cumulative % variance	32.81	58.79	78.28	83.973
Scale Reliability alpha	0.9624	0.9606	0.9401	0.9305
Kaiser-Meyer-Olkin Measure of Sampling Adequacy=.878, Bartlett's Test of Sphericity (Chi-Square=8890.759, Df=190, Sig.=0.00) Mean=79.39				

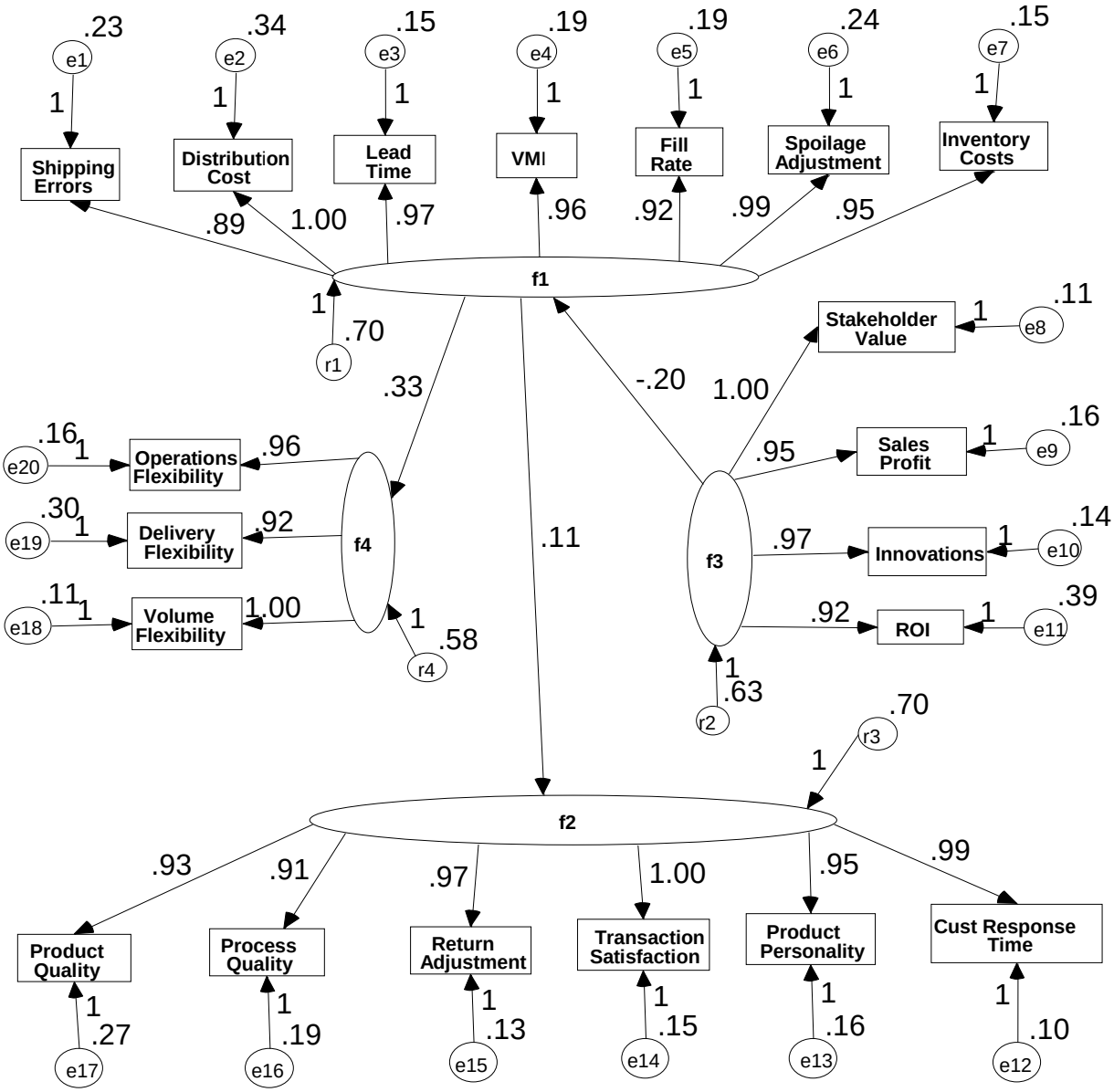

Fig. I: Structural model for measuring supply chain performance

Table V: Total effect estimates for key performance indicators

SN	Effect Estimates				
		f3	f1	f4	f2
Total Effect	f1	-0.203	0.000	0.000	0.000
	f4	-0.067	0.327	0.000	0.000
	f2	-0.023	0.113	0.000	0.000
Direct Effect	f1	-0.203	0.000	0.000	0.000
	f4	0.000	0.327	0.000	0.000
	f2	0.000	0.113	0.000	0.000
Indirect Effect	f1	0.000	0.000	0.000	0.000
	f4	-0.067	0.000	0.000	0.000
	f2	-0.023	0.000	0.000	0.000
Chi-square = 958.982, Degrees of freedom = 167; Probability level = 0.000. RMR=0.051, GFI=0.803, NFI=0.900, RFI=0.880,IFI=O.904, TLI=0.900, CFI=0.904					

VI. Conclusion, Limitations and Future Research

The model developed to evaluate SC performance of OGR has been shown in the Fig. I. All the twenty KPI are well arranged to meet the SC performance measurement requirements. The first most important group of KPI is *inventory metrics.* Here, seven KPI are suggested to measure the SC performance of this node. This nodal point needs to be supported by another SC node i.e., *flexibility metrics.* The flexibility metrics focus on operations, delivery and volume of the inventory. Also, keeping in view the customer requirements, *customer metric* has developed another nodal point for assessing SC performance. This nodal point has the support of six KPI. Here, organized garment retailers do their best to attract and retain customers. The *stakeholder metric* presents the final nodal point for assessing SC performance. This nodal point has four KPI to project the monetary outcome of the business.

This model has projected the structural relationship among KPI. It shall help OGR professionals to understand and make use of limited sets of KPI. However, focusing on a large number of KPI shall be confusing and leading to inefficiency. Also, it need to be noted that all the SC nodes are connected directly and indirectly to meet the business goals. Hence, all the nodal points are important for better SC performance. Here, practitioners shall be helped by dividing the SC into nodes for better management. This nodal formulation shall help to answer the questions; (1) How to construct SC nodes ?; (2) How to fix responsibility ? and (3) How to improve SC performance?

Despite the statistical sophistication of structural equation modeling, this research has the main limitations: (1) we could not contact better lot from the top management; (2) the SC performance assessment has a major role of organizational culture; (3) the OGR professional hesitate to respond to the questionnaire. However, the purpose here is not to validate the results statistically but to provide insights to develop this sector.

The future research is required to assess the performance of both the organized and unorganized garment retail sector. This shall help us to understand the gap between them. Also, it is needed to compare the performance national and international players in this sector.

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