EXPLORING THE RELATIONSHIP BETWEEN SUPPLY CHAIN COMPETENCE AND PROFILE OF MANUFACTURING INDUSTRIES

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ABSTRACT

The purpose of this research work is to study the relationship between supply chain competence and profile of Puducherry manufacturing industries. Empirical survey of 255 samples was collected from the executives of manufacturing industries in the Union Territory of Puducherry using structured questionnaire. On the basis of chi-square test, Analysis of Variance (ANOVA), Independent sample t-test, correspondence analysis and canonical correlation analysis the relationship among supply chain competence and profile of manufacturing industries was assessed and reported. A general conclusion is that positive correlation and 14% of the share variance exists between the supply chain competence factors and the business profile of manufacturing enterprises.

Keywords: *Supply chain competence, Empirical Research, Manufacturing industries.*

INTRODUCTION

Enterprises around the world are faced with intense competition. In the current economy, customers require the product with shorter response times, more product variety, and higher service levels requirement. Business executives recognize that the ultimate success of any enterprise is no longer built around a ûrm's capability, but on a supply chain's capability and capacity. To respond to these challenges, it is important to integrate supply chain processes and listen to the voice of the customer. Supply chain management is a holistic and strategic approach to demand, operations, procurement, and logistics process management. We aim to explore the relationship between supply chain competence and business profile of the manufacturing industries. To accomplish these objectives, an empirical survey was carried out on manufacturing enterprises located in Union territory of Puducherry. Data pertaining to the supply chain competence and business profile of manufacturing industries were collected. The results derived from the analysis of collected data have been elaborately discussed in the results and discussion section. Section two consists of literature review of the present research work through previous research studies and defining the operational terms. Section three address the research methodology followed in the research work with respect to research design, data collection, sample size estimation, sampling methodology followed and statistical tools employed for this research work and finally section five contains conclusions and implications of this research work.

REVIEW OF LITERATURE

Supply chain competence is a necessary pre-requisite for firms to react to market and financial uncertainties and to manage and sustain their supply chain performance and organizational performance (Bhatnagar and Sohal, 2005). SCM is literally stable only when it is completely endorsed by stakeholders of the organization. Supply chain competences are the ability of

the organization to be in total power and control of supply chain operations and performance in spite of issues of external and internal environmental factors. As noted by Cohen and Mallik (1997) and Chow et al (2008), core competency of organizations is a reflection of the collective learning of the organization over a period of time and their ability to coordinate the diverse skills through an efficient full proof technical system. Larson and Halldorsson (2002) put forth the argument that an organization in today's business environment is driven by four major factors of forecasting; planning of inventory, supply chain efficiency and information accuracy. Effective management of these factors will help the firm to distribute the product or service to their customer at the right time, place and price in effective and efficient manner. Spekman et al (2002) and Trkman et al (2010) suggested that supply chain competence should also comprise of planning of supply chain, in order management, service fulfillment and procurement of raw material in effective manner. Supply chain competence has been defined as "A portfolio of organizational, managerial, technical and strategic capabilities and skills developed by enterprises over time" (Tracey et al., 2005; Wong et al., 2011; Stand et al., 2011; and Chow et al., 2008).

RESEARCH METHODOLOGY

The research design of the proposed research work is descriptive in nature. The research work has been conducted mainly based on primary. Primary data relating to supply chain competence variable of manufacturing industries have been collected from executives of manufacturing firms. The data collection instrument used for this research is a well structured questionnaire. The sample population for this study consists of the manufacturing firms located in the Union Territory of Puducherry including Pondicherry, Karaikal, Mahe and Yanam. Sampling technique adopted in this research work is simple random sampling method, and the sample size for the study was 255 manufacturing firms. The variables needed for the questionnaire was generated through the literature review and pre-pilot study was conducted to test the content validity of the questionnaire by administering it to subject experts and necessary suggestions were incorporated. The Pilot study was conducted on 30 manufacturing firms in the Union Territory of Puducherry and the initial reliability of the questionnaire was tested using Cronbach's- Alpha value, which revealed a good reliability result. The main survey was conducted using final questionnaire and the results are represented in tabular and figurative forms. The statistical tools used in this research work are Analysis of Variance (ANOVA), Independent sample t-test, Correspondence analysis and Canonical correlation analysis and software packages used to analyze above statistical tools are SPSS 16 and STATA 10.

RESULTS AND DISCUSSIONS

This section presents descriptive and inferential statistical analysis of supply chain concerns using statistical tools namely using chi-square test, Analysis of Variance (ANOVA), Independent sample t-test, correspondence analysis and canonical correlation analysis and results are represented in tabular and figurative forms. The supply chain competence of manufacturing enterprises are grouped into three factor concerns namely quality and service competence, design effectiveness competence and operations and distribution competence. Manufacturing units segmented into three clusters based on the three supply chain competence factors. Each variable and its nature of relevance with supply chain competence are described in detail in the forthcoming sections.

CHARACTERISTICS OF SUPPLY CHAIN COMPETENCE

The business enterprises have been classified based on supply chain competence into three categories namely "high supply chain competence units", "moderate supply chain competence units" and "low supply chain competence units". It is obvious that high supply chain competence units will have a very high improved overall performance. The characteristics of the supply chain competence clusters are studied using chi-square test along with correspondence analysis, T-test, analysis of variance (ANOVA) and canonical correlation. The chi-square test values along with their level of significance have been portrayed in Table 4.1.

Table 4.1 Chi-Square Test for Profile of Manufacturing Industries

S. No	Variable	Chi-Square Value	Sig. Value	Significance or not
1.	Type of Industry	22.880	0.443	Not Significant
2.	**Number of Employees**	**20.017**	**0.029**	**Significant**
3.	**Total Capital Invested**	**15.458**	**0.017**	**Significant**
4.	Supply Chain Position	9.098	0.168	Not Significant
5.	Nature of Industry	4.543	0.337	Not Significant
6.	Side of Supply Chain	1.379	0.502	Not Significant
7.	Type of Goods Produced	0.034	0.983	Not Significant
8.	**Type of Business Organization**	**12.959**	**0.044**	**Significant**
9.	Type of Ownership	4.627	0.592	Not Significant
10.	**Type of Listing**	**14.799**	**0.022**	**Significant**
11.	Kind of Manufacturing	6.706	0.152	Not Significant
12.	Manufacturing Pattern	1.423	0.964	Not Significant
13.	Type of process	4.640	0.591	Not Significant
14.	**Annual Sales**	**20.180**	**0.028**	**Significant**
15.	Market Coverage	9.140	0.058	Not Significant
16.	**Area of Market**	**16.298**	**0.038**	**Significant**
17.	Business years	9.888	0.129	Not Significant
18.	**Software Usage**	**8.639**	**0.013**	**Significant**

To understand the characteristics of these three supply chain competence segments, association among the segments with various manufacturing profile related variables are analyzed. The chi-square test is applied to test the significance of association. The chi-square values displayed in Table 4.1 reveal that manufacturing enterprises grouped on the basis of type of industry, nature of industry, supply chain position, side of supply chain, type of goods produced, type of ownership, kind of manufacturing, manufacturing pattern, type of process, market coverage, and business years have no significant association with supply chain competence based segments, whereas there is significant association between supply chain competence segments and manufacturing units grouped on the basis of number of employees, total capital invested type of business organization, type of listing, annual sales, Area of market and software usage.
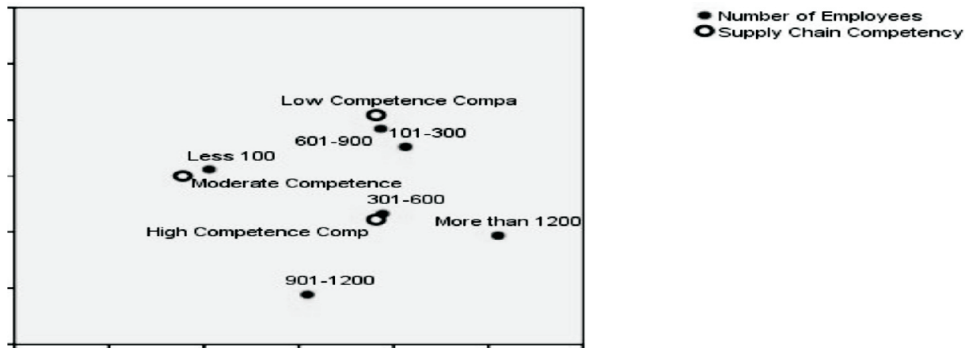
RELATIONSHIP BETWEEN SUPPLY CHAIN COMPETENCE AND PROFILE OF MANUFACTURING INDUSTRIES

Chi-square analysis shows significant association between supply chain competence segments and the units grouped on the basis of the variables namely, number of employees, total capital invested, type of business organization, type of listing, annual sales, Area of market and software usage. The relationship of manufacturing enterprises grouped on the basis of different profile variables and their supply chain competence is discussed at length in the forthcoming paragraphs.

Number of Employees

To test the significance of association, chi-square test is applied. The chi-square value is 20.017 and significant values as 0.029 are shown in Table 4.1. This suggests that there is significant association among the units categorized on the basis of number of employees and supply chain competence of manufacturing enterprises.

The association between number of employees and supply chain competence is displayed in Figure 4.1.

Figure 4.1 Employees and Competence -Correspondence Diagram

The above figure portrays the association between manufacturing units grouped on the basis of number of employees and the three supply chain competence clusters. It can be inferred from the above figure that manufacturing units employing 301-600, 901-1200 and More than 1200 employees are associated with the "Highly supply chain competence units", while manufacturing units employing less than 100 are associated with the "Moderate supply chain competence units" and the units employing 101-300 and 601-900 employees are associated with "Low supply chain competence units".

The relationship between number of employees category and supply chain competence is displayed in Table 4.2.

Table 4.2 ANOVA for Number of Employees and Supply Chain Competence

Supply Chain Competence	F	Sig.
Quality and Services	1.576	0.167
Design Effectiveness	1.486	0.195
Operations and Distribution	2.464	0.033

It can be observed from the above ANOVA table that significant differences prevail among the units categorized based on number of employees in respect of quality and services, design effectiveness and operations and distribution competence factors.

Total Capital Invested

To test the significance of association between the units grouped on the basis of capital invested and the three clusters segmented on the basis of supply chain competence, chi-square test is conducted. The chi-square value is 15.458 and value of significance is 0.017 are shown in Table 4.1; Which clearly indicates significant association between the units

categorized based on total capital invested and supply chain competence of manufacturing enterprises.

The association between total capital invested and supply chain competence has been portrayed in Figure 4.2.

Figure 4.2 Total Capital Invested and Competence -Correspondence Diagram

It can be observed from the above figure that those manufacturing units which have invested 1-50 crores are associated with the "Highly supply chain competence units", while those units with capital investment of less than 50 lakhs are associated with "Moderate supply chain competence units", and those units with capital investment of more than 50 crores are associated with "Low supply chain competence units".

The relationship between total capital invested category and supply chain competence factor is exhibited in Table 4.61.

Table 4.3 ANOVA for Total Capital Invested and Competence

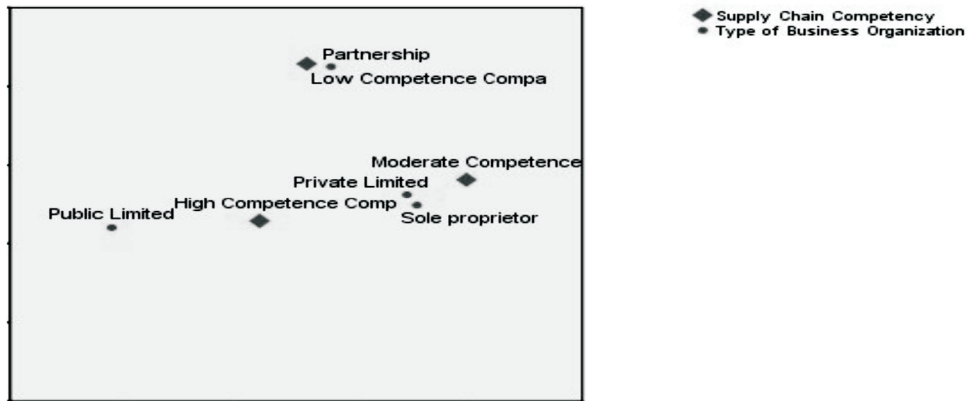| Supply Chain Competence	F	Sig.
Quality and Services	0.668	0.573
Design Effectiveness	2.312	0.077
Operations and Distribution	1.004	0.391

It can be observed from the above ANOVA table that there is no significant difference among manufacturing units categorized based on capital investment with respect to quality and services, design effectiveness and operations and distribution related supply chain competence.

Type of Business Organization

To test the significance of association, chi-square test is conducted. The chi-square value is 12.959 and significant value as 0.044 is shown in Table 4.1. This clearly indicates that there is significant association between the units categorized based on type of business organization and supply chain competence.

The association between manufacturing units categorized on the basis of type of business organization and supply chain competence segments is portrayed in Figure 4.3.

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Figure 4.3 Business Organization and Competence -Correspondence Diagram

It can be observed from the above figure that manufacturing firms using the Public Limited Company form of organization are associated with the "Highly supply chain competence units" while those units using the Private Limited Company and Sole Proprietorship forms of organization are associated with "Moderate supply chain competence units" and those units using the Partnership form of organization are associated with the "Low supply chain Competence Group".

The relationship between manufacturing units categorized on the basis of type of business organization and the three supply chain competence clusters is shown in Table 4.4.

Table 4.4 ANOVA for Business Organization and Competence

Supply Chain Competence	F	Sig.
Quality and Services	1.776	0.152
Design Effectiveness	4.685	0.005
Operations and Distribution	1.145	0.332

It is observed from the above table that no significant difference exist among the units categorized on the basis of type of business organization with respect to quality and services and operations and distribution, while there is a significant difference among such groups with respect to design effectiveness competence.

Mean values in respect of design effectiveness competence of manufacturing enterprises categorized on the basis of business organization used is displayed in Table 4.5.

Table 4.5 Mean Values for Design Competence of Business Organization

Type of Business Organization	N	1	2
Partnership	70	2.97	
Sole proprietorship	41	3.10	
Private Limited Company	115	3.21	
Public Limited Company	29		3.59

The above table indicates that two homogeneous sub groups can be formed among the four categories of manufacturing enterprises grouped on the basis of business organization in respect of design effectiveness. The mean values of manufacturing units using the Partnership, Sole proprietorship and Private Limited company forms of organization are 2.97, 3.10 and 3.21 respectively. It can be observed that the units using Partnership, Sole

proprietorship and Private Limited company forms of organization comprise one group, while the units using the Public sector company form of organization constitute the other group. This categorization has been conducted based on mean values at 99 percent confidence level This implies that manufacturing units using Public Limited company form of organization have high level of design effective competence than those units using Sole Proprietorship, Partnership and Private Limited Company forms of organisation.

Type of Listing

To test the significance of association, chi-square test is carried out. The chi-square value is 14.799, and value of significance is 0.022 are shown in Table 4.1. Which clearly indicates significant association between the units categorized on the basis of type of listing and the three supply chain competence clusters.

The association between manufacturing units categorized on the basis of type of listing and supply chain competence clusters is portrayed in Figure 4.4.

Figure 4.4 Listed and Competence -Correspondence Diagram

It can be observed from the above figure that those manufacturing units which have got their shares listed in India and abroad are associated with "High supply chain competence units", while those units whose shares have been listed in India are associated with "Moderate Supply Chain Competence Units" and the units whose shares have not been listed are associated with "Low Supply Chain Competence Units".

The relationship between manufacturing units categorized based on type of listing and supply chain competence factor is shown in Table 4.6.

Table 4.6 ANOVA for Type of Listing and Supply Chain Competence

Supply Chain Competence	F	Sig.
Quality and Services	0.485	0.693
Design Effectiveness	3.594	0.014
Operations and Distribution	5.518	0.001

It is observed from the above table that no significant difference prevails among the units categorized on the basis of type of listing with respect to quality and services, while there is a significant difference among the units categorized on the basis of type of listing and design effectiveness and operations and distribution related supply chain competence.

Mean values in respect of design effectiveness competence of the units categorized on the basis of type of listing is displayed in Table 4.7.

Table 4.7 Mean Values for Design Competence of Listing Category

Type of Listing	N	1	2
Listed only abroad	12	3.02	
Not listed	146	3.10	
Listed in India	64	3.14	
Listed in India and Abroad	33		3.59

The mean values of the business units listed only abroad, not listed at all, and listed only in India, comprising of a homogeneous group, are 3.02, 3.10 and 3.14 respectively while the units categorized on the basis of shares listed in India and abroad have a higher mean than the other three categories. This suggests that business units whose shares are listed in India and Abroad have high level of design effective competence than the other three categories of manufacturing enterprises.

Mean values for operations and distribution of type of listing category are depicted in Table 4.8.

**Table 4.8 Mean Values for Operations Competence of Listing Category**

Type of Listing	N	1	2
Not listed	146	3.01	
Listed in India	64	3.32	
Listed in India and Abroad	33		3.40
Listed only abroad	12		3.43

The mean value of the units not listed and Listed in India are 3.01 and 3.32 respectively and the mean value of the units listed only in abroad and listed in India and Abroad is 3.40 and 3.43 respectively. Hence, two groups can be formed based on the mean values. The first group consists of manufacturing units whose shares have been listed only in India and not at all listed, while the second group consists of units whose shares have been listed only in abroad and listed in India and abroad. It can be noted that those manufacturing units which have not got their shares listed and whose shares have been listed in India alone have low level of operations and distribution competence than the other groups of enterprises.

Annual Sales

To test the significance of association, chi-square test has been conducted. The chi-square value as 20.180 and significant value as 0.028 are shown in Table 4.59; which clearly indicates prevalence of significant association between manufacturing units categorized based on annual sales and supply chain competence.

The association between manufacturing units categorized based on annual sales and supply chain competence segment is displayed in Figure 4.5.
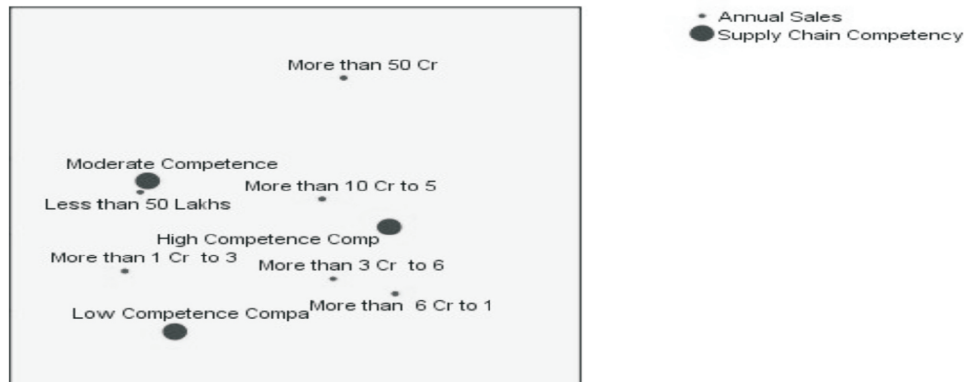
Figure 4.5 Annual Sales and Competence- Correspondence Diagram

It can be observed from the above figure that manufacturing units with an annual turnover of 1-3 crores and 3-6 crores are associated with the "Highly supply chain competence units", while those units with annual turnover of less than 1 crore and 10-50 crores are associated with "Moderate supply chain competence units" and those units with annual turnover of 6-10 crores are associated with "Low supply chain competence units".

The relationship between annual sales category and supply chain competence factor is highlighted in Table 4.9.

Table 4.9 ANOVA for Annual Sales and Supply Chain Competence

Supply Chain Competence	F	Sig.
Quality and Services	0.945	0.452
Design Effectiveness	3.611	0.004
Operations and Distribution	2.605	0.026

It is observed from the above table that no significant difference prevails among the units categorized based on annual sales with quality and services related competence. However, there is a significant difference among the units categorized based on annual sales in respect of design effectiveness and operations and distribution related competence.

Mean values of different manufacturing units with different annual turnover and design effectiveness factor is displayed in Table 4.10.

Table 4.10 Mean Values for Design Effectiveness of Annual Turnover Category

Annual Turnover	N	1	2	3
1 Crores to 3 Crores	74	2.96		
Less than 1 Crore	55	3.05		
3 Crores to 6 Crores	41	3.11		
6 Crores to 10 Crores	34		3.42	
10 Crores to 50 Crores	32		3.42	
More than 50 Crores	19			3.57

The above table indicates that three homogeneous sub groups can be formed among the six groups of units with different levels of annual turnover based on design effectiveness. The mean values of units with annual turnover of 1 crore to 3 crores, less than 1 crore and 3 crores to 6 crores are 2.96, 3.05 and 3.11 respectively. The mean value of units with

annual turnover of 6 crores to 10 crores and 10 crores to 50 crores is 3.42 and 3.42 respectively. The mean value of units with annual turnover of more than 50 crores is 3.57. This signifies that units with annual turnover of more than 50 crores have high level of design effectiveness competence than other units with different levels of annual turnover.

Mean values for operations and distribution competence of annual turnover category is shown in Table 4.11.

Table 4.11 Mean Values for Operations and Distribution of Annual Turnover

Annual Turnover	N	1	2
1 Crores to 3 Crores	74	3.03	
3 Crores to 6 Crores	41	3.06	
6 Crores to 10 Crores	34	3.08	
Less than 1 Crore	55	3.23	
10 Crores to 50 Crores	32	3.32	
More than 50 Crores	19		3.55

Mean values of manufacturing units with annual turnover of 1 crore to 3 crores, 3 crores to 6 crores, 6 crores to 10 crores, Less than 1 crore and 10 crores to 50 crores are 3.0, 3.1, 3.0, 3.2 and 3.3 respectively. The mean value of the category of manufacturing units with annual turnover of more than 50 crores is 3.6. The difference in mean values between the two groups is significant at 95 percent level of confidence (Table 4.67, Significant value is 0.026). This signifies that those manufacturing units with annual turnover of More than 50 crores have high level of operations and distribution competence than the other group of manufacturing units.

Area of Market

To test the significance of association the chi-square test is carried out. The chi-square value as 16.298 and significant value as 0.038 are shown in Table 4.59, which clearly indicates the existence of significant association between area of market and supply chain competence of manufacturing Industries.

The association between the units categorized on the basis of area of market and supply chain competence segments is displayed in Figure 4.6.

Figure 4.6 Area of Market and Competence- Correspondence Diagram

It can be observed from the above figure that those manufacturing units enjoying market of the whole of India and both the national and international markets are associated with the "Highly supply chain competence units", while those units possessing market in Puducherry and Tamil Nadu are associated with "Moderate supply chain competence units" and those units possessing market in South India are associated with "Low supply chain competence units".

The relationship between area of market category and supply chain competence factor is shown in Table 4.12.

Table 4.12 ANOVA for Area of Market and Supply Chain Competence

Supply Chain Competence	F	Sig.
Quality and Services	1.268	0.283
Design Effectiveness	2.174	0.072
Operations and Distribution	2.171	0.073

It is observed from the above table that there is no significant difference among the manufacturing units segmented based on area of market with respect to quality and services, operations and distribution and design effectiveness competence factor.

Software Usage

The chi-square value as 8.639 and significant value as 0.013 are shown in Table 4.1. which clearly indicates significant association between manufacturing units categorized based on software usage and supply chain competence.

The relationship between manufacturing units categorized based on software usage and supply chain competence factor has been displayed in Table 4.13.

Table 4.13 Independent Samples Test for Software Usage and Supply Chain Competence

Supply Chain Competence	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig.
Quality and Services	12.632	0.000	0.174	119.08	0.862
Design Effectiveness	1.554	0.214	2.656	253	0.008
Operations and Distribution	0.125	0.724	2.130	253	0.034

It can be observed from the above table that there is no significant difference among the units categorized based on software usage and quality and services oriented competence, while significant relationship exist in respect of such groups regarding Design Effectiveness oriented competence and operations and distribution oriented competence.

CANONICAL CORRELATION BETWEEN SUPPLY CHAIN COMPETENCE AND PROFILE OF MANUFACTURING INDUSTRIES

Canonical correlation was applied to predict the shared relationship among two or more set of variables. This analyis result provides individual relationship that is between two variable and also provide overall relashionship that is between two or more set of variables. The following section describes canonical correlation between two sets of varaibles.First set of varaible is supply chain competence factors namely quality and service competence, design effectiveness competence and operations and distribution competence and second set of variable is profile of manufacturing industry variables namely number employes, total capital, type of organization, type of listing,annual sales, area of market and useage of software are used.

Canonical Correlations in respect of supply chain competence with regard to different profile characteristics of manufacturing units is displayed in Table 4.14.

		Coefficient.	Std. Err.	t	P>|t|	[95% conf. interval]	
U1							
	Quality	-.9999181	.4012591	-2.49	0.013	-1.790137	-.2096996
	Design	1.026804	.283937	3.62	0.000	.4676336	1.585975
	Operations	.7329715	.3522367	2.08	0.038	.039295	1.426648
V1							
	Employees	.4362894	.2102167	2.08	0.039	.0222996	.8502792
	Capital	-.114036	.2897084	-0.39	0.694	-.6845725	.4565005
	Organization	.1254188	.2758852	0.45	0.650	-.417895	.6687327
	Type of listing	.1046589	.2150684	0.49	0.627	-.3188856	.5282033
	Annual sales	.1401398	.1967936	0.71	0.477	-.2474153	.5276948
	Mark area	.1355039	.2279061	0.59	0.553	-.3133223	.5843302
	Software	-.5586552	.5663026	-0.99	0.325	-1.673902	.5565915
U2							
	Quality	1.223069	.5342726	2.29	0.023	.1709008	2.275238
	Design	.75180961	.3780595	1.99	0.048	.0072792	.49634
	Operations	-1.173543	.4689998	-2.50	0.013	-2.097167	-.2499196
V2							
	Employees	-.5378403	.2799016	-1.92	0.056	-1.089064	.0133832
	Capital	.0679975	.385744	0.18	0.860	-.6916665	.8276614
	Organization	.2978718	.3673385	0.81	0.418	-.4255455	1.021289
	Type of listing	.53563981	.2863616	1.87	0.063	-.0283056	1.099585
	Annual sales	.4779563	.2620288	1.82	0.069	-.0380695	.9939822
	Mark area	-.1031655	.3034547	-0.34	0.734	-.7007734	.4944424
	Software	.1185035	.7540266	0.16	0.875	-1.366437	1.603444
U3							
	Quality	-1.073647	.8762032	-1.23	0.222	-2.799195	.6519019
	Design	.4553084	.6200147	0.73	0.463	-.7657161	1.676333
	Operations	-.9470926	.7691563	-1.23	0.219	-2.461829	.5676433
V3							
	Employees	.3974773	.4590365	0.87	0.387	-.5065252	1.30148
	Capital	.6537611	.6326172	1.03	0.302	-.5920821	1.899604
	Organization	-.1709151	.6024325	-0.28	0.777	-1.357314	1.015484
	Type of listing	.5816817	.4696308	1.24	0.217	-.3431846	1.506548
	Annual sales	-.3920336	.4297254	-0.91	0.362	-1.238312	.454245
	Mark area	-.3478136	.4976636	-0.70	0.485	-1.327886	.6322589
	Software	.3360041	1.236598	0.27	0.786	-2.099287	2.771295

Canonical correlations: 0.2878 0.2201 0.1363
Tests of significance of all canonical correlations

	Statistic	df1	df2	F	Prob>F
Wilks' lambda	.856537	21	704	1.8577	0.0113 a
Pillai's trace	.14984	21	741	1.8551	0.0114 a
Lawley-Hotelling trace	.160134	21	731	1.8581	0.0112 a
Roy's largest root	.0902787	7	247	3.1855	0.0030 u

Table 4.14 Canonical Correlation of Supply Chain Competence

Two sets of data have been taken for this study. The first set contains the three factors relating to supply chain Competence, while the second set consists of the seven profile of manufacturing industry variables of number of employees, type of listing, area of market, types of organization, annual turnover, total capital invested and software usage. Based on these two sets of data, Canonical Correlation has been performed. The Canonical Correlation coefficient values in respect of these three factors are 0.29, 0 .22 and 0.14. Other results displayed in the above table such as df1 value of 21, df2 value of 704, f value of 1.858, Wilks's ë value of 0.8565, and p value of 0.0113, which is less than 0.05, reveals that there is significant relationship between the two sets of data. To predict the overall relationship between these two sets of data, Wilk's (ë) value should be deducted from one. From the three canonical function set, the r^2 value is 0.1435. This implies that the entire canonical

model explains a considerable portion of about 14% of the variance. Hence, there is a decent positive correlation between the two sets of data namely, the three supply chain Competence factors and the seven variables relating to the profile of manufacturing enterprises.

CONCLUSION AND IMPLICATIONS

Supply chain competence of the manufacturing enterprises have significant relationship between the clusters formed on the basis of supply chain competence and the demographic variables like number of employees, total capital invested, type of business organization, type of listing, annual sales, Area of market and software usage and it also found that there is positive correlation and 14% of the share variance exists between the two sets of variables supply chain competence factors and the business profile of manufacturing enterprises in Union Territorry of Puducherry. Supply chain competence of manufacturing firm variable shall differ among the manufacturing firms with different nature and demographic characteristics. Hence, this study has made an attempt to analyze the difference existing among the manufacturing firms in respect of Indian context. The manufacturing firms in the Union Territory of Puducherry have been categorized based on their demographic characteristics to better understand their nature and features using variety of statistical tools. Understanding the characteristics of manufacturing enterprises with respect to supply chain will be useful to the policy makers, and practitioners. The policy makers can frame suitable industrial policies to attract good investment avenues. The practitioners of manufacturing enterprises can alter or tailor their strategy to suit to the needs of the manufacturing enterprises in Indian context.

REFERENCES

- Bhatnagar, R. and Sohal, A.S. (2005). Supply chain competitiveness: measuring the impact of location factors, uncertainty and manufacturing practices, *Technovation, 25, 443–456.*

- Chopra, S. and Meindal, P. (2005). Supply chain management: strategy, planning, and operation, *Prentice Hall of India Private Limited, New Delhi, India*

- Chow, W.S., Madu, C.N., Kuei, C., Lin, C., Tseng, H. and Lu, M.H. (2008). Supply chain management in the US and Taiwan: an empirical study, *Omega, The international journal of management science 36, 665-679.*

- Cohen Morris and Mallik Suman. (1997). Global supply chains: research and applications. *Production and operations management, 6(3), 193-210.*

- Field, A. (2005). Discovering statistics using SPSS, *Sage Publications, New Delhi*

- Larson, P.D., and Halldorsson, A. (2002). What is SCM? and Where is It? *The Journal of Supply Chain Management: A Global Review of Purchasing and Supply, 36-44.*

- Sahay, B.S. and Mohan, R. (2003). Supply chain management practices in Indian industry, *International Journal of Physical Distribution and Logistics Management, 33(7), 582-606.*

- Shah, J. (2009). Supply chain management: text and cases, *Pearson Education Publication, India.*

- Simichi-Levi, D., Kaminsky, P., Simchi-Levi, E. and Shankar, R. (2008). Designing and managing the supply chain, *TATA McGraw- Hill Publishing Company Limited, New Delhi, India.*

- Spekman, R.E., Spear, J. and Kamauff, J. (2002). Supply chain competency: learning as a key component, *Supply chain management: An international journal, 7(1), 41-55.*

- Stank, T.P., Dittmann, J.P. and Autry, C.W. (2011).The new supply chain agenda: a synopsis and directions for future research, *International Journal of Physical Distribution and Logistics Management*, 41(10), 940-955.

- Tracey, M., Lim, J.S. and Vonderembse, M.A. (2005). The impact of supply chain management capabilities on business performance, Supply *Chain Management: an International Journal*,10(3), 179–191.

- Trkman, P., McCormack, K., Oliveira, M.P.V., and Ladeira, M.B. (2010). The impact of business analytics on supply chain performance, *Decision Support Systems*, 49, 318–327.

- Wong, W.P. and Wong, K.Y. (2011). Supply chain management, knowledge management capability, and their linkages towards firm performance, *Business Process Management Journal*,17(6), 940-964.