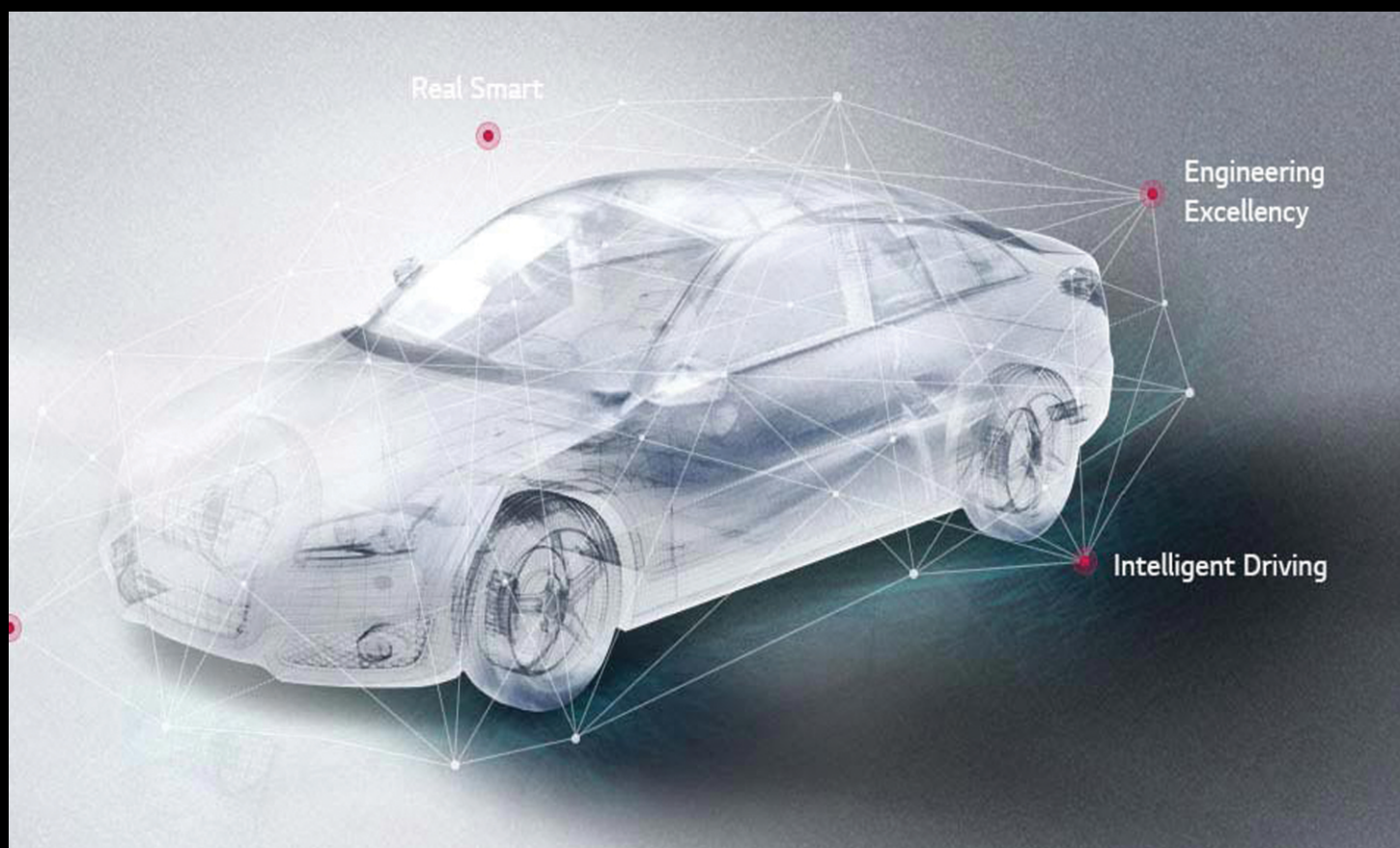


A Study of Business Networks in Pune Auto-component Cluster of India

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ABSTRACT

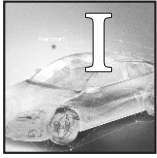
This paper aims to identify the different types of business networks formed by firms with the participants present in an auto-component cluster by using an exploratory research design. The study is being carried out in two stages, first stage involves use of semi-structured personal face-to-face interviews and second stage involves survey research method where data was collected through survey questionnaire. The study has identified four types of business networks between a firm and its buyers, only type of business network with suppliers, only one type of business network with educational institutes, four types of business networks with research institutes, lastly two types of business networks with government agencies. However with respect to networks with other stakeholders like financial institutes and competitors the study shows that such networks remains largely unfilled which is the area of concern for policy makers. The identified business networks provide a much deeper understanding of how firms connect with its buyers, its suppliers, government agencies, research and educational institutes operating in an auto-component cluster.

Keywords:: Auto-component cluster, Business networks, Clusters, Cluster participants

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INTRODUCTION

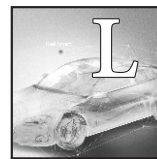
Clustering has been an age old phenomenon in India. Clusters have been in existence in India for centuries and are known for their products at the national and international level (Singh, 2010). Clusters can be defined as geographic concentration of interconnected institutions and companies in a particular field that include participants such as standards-setting agencies, universities, think tanks, trade associations, suppliers, customers, manufacturers, and government institutions (Porter, 1998). With respect to micro, small and medium enterprises (MSMEs) in India, a cluster is a sectoral and geographical concentration of micro, small and medium enterprises producing a similar range of goods or services and facing similar threats and opportunities (UNIDO, 2006; Das et al., 2007). Industrial clusters consist of firms in a region facing favourable environment and producing a particular product which help the firms in easily pooling the resources for them to become more competitive (Niu et al., 2008).

A particular characteristic of a cluster that allows enterprises to have competitive advantage is the interconnectedness or the linkages between the firms (Connell et al., 2014). Cooperation between a group of firms in order to achieve collective efficiency, penetrate and conquer markets, and overcome common problems beyond their individual reach is known as a business network (Ceglie and Dini, 1999; UNIDO, 2001). Business networks consist of independent firms coordinating their activities and working together toward common goals (Johnston et al, 1999). In small businesses, business networks are long-term contacts between organizations or external persons and business owners in order to share information (Premaratne, 2002). Business networks of firms includes inter-connections with suppliers, buyers, industry associations, R&D organisations, business development service providers, relevant government and inter-government bodies (Das, 2008). Lei and Huang (2014) define business network as a multi-facet concept where different firms display different degree of involvement. Business networks within and between firms and other supporting institutions are the basis for today's business (Connell et al., 2014).

Networking approach adopted by micro, small and medium enterprises in India has helped them to overcome many barriers such as global competition, technological obsolescence, and investment shortages (IBEF, 2013). Ceglie and Dini (1999) stated that collaborative actions involving enterprises, buyers, suppliers, services providers, local and regional government agencies help in improving competitive position of firms involve in such collaborative actions. Small and medium enterprises are able to improve their efficiency in production and capacity for learning and innovation by forming networks with other firms (UNIDO, 2001). Inter-firm collaboration and networks with supportive institutions are important determinants for firm's innovativeness (Niu, 2010b). Firms present in a cluster should focus on building strong vertical inter-firm relationship to improve their marketing performance (Lamprinopoulou and Tregear, 2011). Martinez et al., (2012) suggested that inter-firm linkages in a cluster help firms in maintaining long term competitiveness.

Networks developed with firms within a cluster strengthen the firm's competitive advantage thus making their competitive advantages different from others (Lei and Huang, 2014). Firms' relationship with agents like business service providers which helps firms in connecting with external networks plays an important role in firm innovativeness thus proving to be an important determinant of firm innovativeness (Exposito-Langa et al., 2015). Degree of cluster linkages (intra and extra) drives innovation performance of a firm in a cluster (Chandrashekar and Hillemane, 2018).

Despite this significance of business networks formed by firms in a cluster, there are some research gaps which remain relatively unexplored. There is a need to highlight the difference between the kind of relationship among firms and the other participants in a cluster (Lamprinopoulou and Tregear, 2011). Another gap highlights how firms in cluster interact with other firms suggested by Zhao et al., (2010). Therefore, there exists a need to focus and provide a better understanding of different types of business networks which a firm forms with the other participants in a cluster. In addition to this, studies conducted on auto-component sector of India are related to the following areas: analysis of different strategies adopted by firms in the Indian auto component sector to become competitive (Singh et al., 2007), creation and categorisation of knowledge (Pillania, 2008), measuring performance and leanness (Saranga, 2009; Singh, Garg, and Sharma, 2010), study of strategic technology management practices adopted by firms operating in the auto component industry of India (Sahoo et al., 2011), determining determinants of competitiveness (Joshi et al., 2013), factors contributing to efficient inventory management (Saranga et al., 2015). Given the lack of literature on types of business networks formed by the firms with the other participants present in an auto-component cluster, this study tries to answer this research gap. This paper consists of 5 sections. Section 1 is the introduction. Section 2 consists of literature review related to clusters, business networks in a cluster and its types. Section 3 and 4 are about objective and research methodology, and research results respectively. Section 5 is related to conclusion of the study and also discusses about some theoretical implications and practical recommendations along with limitations of this study and finally offers some suggestions for future research.



LITERATURE REVIEW

Cluster Concept: The underlying concept of cluster dates back to 1890 in the work of Alfred Marshal. Alfred Marshall is among the first who examined the clustering phenomenon in industrial organizations. However, Michael

Porter was the one who gave relevance to cluster concept or clustering of firms. Michael Porter, introduced the term industry cluster in his book *The Competitive Advantage of Nations* in 1990. Later various other scholars and organizations worked in this area (Baptista and Swann, 1998; Morosini, 2004; Planning Commission, 2012). Baptista and Swann (1998) defined geographic cluster as an intense collection of related companies located in a small geographical area. Morosini (2004) defined industrial cluster as a socioeconomic entity characterized by a social community of people and a population of economic agents

localized in close proximity in a specific geographic region. In India, a Cluster is defined as a geographically proximate group of interconnected firms and associated institutions that shares technologies and common markets in a particular field and which are also often linked by buyer-seller relationship (Planning commission, 2012). Industry clusters are geographic agglomerations of enterprises that are specialized in one or more related industries (Giuliani, 2013). According to Fundeanu and Badele (2014), a cluster can be defined as a form of partnerships between businesses, research institutions, universities and states that favours the emergence of new form of competitive advantages.

Business Networks: Business networks can be defined as pattern of relationships that tie large number of actors together (Iacobucci and Hopkins, 1992). Business networks are sets of connected and interactive relationships among firms (Hakansson and Johanson, 1993). Structures of

exchange relationships among individuals, business actors, firms are defined as business networks (Halinen and Tornroos, 1998). Business networks are established in an open and unplanned form from interactions of firms with market, social and institutional organisations coexisting within the cluster (Giuliani, 2007). Anderson, Dodd and Jack (2010) defined business networks as a socially constructed strategic alliance for instituting change, helping companies to grow and create their future. Rietveldt and Goedegebuure (2014) define business networks as relationships that are linked together by exchange transactions. Business networks can also be broadly described as interactive relationships that individuals, businesses or any other entities have with other participants (Desta, 2015).

Business Networks formed by firms: Different types of business networks are formed by firms in a cluster. Table 1 shows the summary of literature on business networks formed by firm in a cluster.

Table 1: Summary of literature on business networks formed in a cluster

Type of Business networks	Author (s)
Horizontal networks which are formed among small and medium enterprises (SMEs) and vertical networks which are among SMEs and larger enterprises.	UNIDO (2001)
Technological alliance and Joint R&D collaboration	Yamawaki (2002)
Managerial network where the first one is network of informal ties among managers and an institutional network which is network of formal ties between the firms.	Bell (2005)
Knowledge and business networks where knowledge network are the network which link firms through the transfer of innovation related knowledge and business networks as set of relationships established by technical professionals while meeting or interacting with other firms on various business issues.	Giuliani (2007)
Information networks and knowledge networks where information networks are the networks which involve free available generic information flow between the firms and knowledge networks as the networks which are intentionally formed by the firms and which involve specific problem-solving knowledge.	Morrison and Rabellotti (2009)
External and internal networks, where internal networks defined as links among firms inside the cluster and external networks as such networks which involve firm's relations with institutions such as banks, government, university, research institutes, state government owned companies, business association and local associations.	Tambunan (2009)
Supportive and competitive where supportive network consist of NGOs, designers, banks, and government; and competitive network shows the extent of competition with the rival firms in the form of copying designs, poaching of employees, price competition, and hiding information.	Prajapati and Biswas (2011)
Localised and external networks where localised network were formed within a cluster by the firms and second, external networks involve networks with firms outside the cluster.	Li et al., (2015)
Technical and business network	Balland, Belso-Martinez, and Morrison (2016)

The above literature on business networks in clusters explains the different types of business networks formed by firms with cluster participants. However these studies do not explain the different types of relationship which could be present within a network formed by the firm with a particular cluster participant. Also we did not find a literature which covered all the cluster participants present in a cluster. Thus this study is an attempt to answer these research gaps.



OBJECTIVE AND RESEARCH METHODOLOGY OF THE STUDY

Objective: The objective of this study is to identify the different types of business networks formed by the firms with the other participants present in a cluster.

Research context: The auto-component cluster of Pune was chosen as the research setting for this study. The reasons for selecting this particular auto-component cluster stemmed from the fact that this cluster has maximum number of firms including MSMEs operating in this cluster. The major products

Table 2: Summary of major auto-component clusters of India

Name	State	No. Of firms	No. Of workers
Shamli Axles and Wheels	Uttar Pradesh	40	600
Meerut Auto Components	Uttar Pradesh	4700	26000
Chennai Auto Components	Tamil Nadu	3000	NA
Jalandhar Auto Parts	Punjab	1500	50000
Pune Auto Components	Maharashtra	6000	47000
Ahmednagar Auto & Engineering	Maharashtra	406	8000
Aurangabad Auto Components	Maharashtra	650	20000
Hubli Auto Component	Karnataka	1000	10000
Peenya Automobile Components	Karnataka	1000	1000
Faridabad Auto Components	Haryana	2500	10000
Gurgaon Auto Components	Haryana	5000	260000
Jamshedpur Auto Components	Jharkhand	506	25000

Source: Cluster Observatory of India (2016)

manufactured in Pune cluster are clutch components, gear components, brake components, shafts, axles, valves, engine components, electrical components, etc. The auto-components industry of India is active in three major regions .i.e. western region (Mumbai, Pune, Nashik, and Aurangabad), southern region (Chennai, Bangalore, and Hosur), and northern region (Delhi, and Gurgaon). In addition to these three regions, the eastern region that includes Jamshedpur and Kolkata also consist of many firms involved in auto-components manufacturing. Due to the presence of large number of unorganised units and MSMEs, the auto components industry in India is present in the form of clusters. The auto-component industry occupies a prominent place in India's industrial development which is mainly due to its capability of being the driver of economic growth. Major auto component clusters of India are Chennai auto cluster, Pune auto cluster, Gurgaon auto cluster, Jamshedpur auto cluster and Meerut auto cluster (Cluster Observatory of India, 2016). Table 2 shows details about auto components clusters present in India.

Research Method: To answer the research question, this study uses an exploratory research design which is carried out in two stages, first stage involves use of semi-structured personal face-to-face interviews and second stage involves survey research method where data was collected through survey questionnaire.

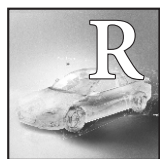
The interview method was used to get an idea about the type of linkage or relationship a firm could share with a particular participant in a cluster. The duration of the interviews ranged from 25 to 40 minutes. Respondents during the interviews indicated their agreement to interview questions (including probing questions) like your firm acquire information either informal or technical, your firm engage in resource sharing, your firm engage in R&D collaboration, your firm share human resource, your firm do joint marketing, your firm do joint training and development of workers, etc. In order to get deeper understanding of the relationships among firms and participants and to improve the reliability of data short notes were also made at the time of interview. Different types of linkages were derived after analysing data collected through these interviews.

The questionnaire method was used to find out the appropriate measure of different business networks which could be formed by firms with cluster participants. Due to the lack of appropriate measures of business networks a questionnaire based on the data collected through interviews and appropriate literature was developed. Responses from interviews are used to form questionnaire for each type of cluster participant like buyers, suppliers, research institutes, local associations and government agencies. Reviews of owner and managers of firms, academicians, and experts working in auto-component industry were also taken into consideration to refine survey questions, questionnaire wording, identifying and removing misleading questions, and to improve the overall presentation of the survey instrument. The questions were developed based on relationships like acquiring information either informal or technical, resource sharing, R&D collaboration, sharing human resource, joint marketing, and training and development of workers between firm and stakeholders in a cluster as suggested by interviews and

previous literature. Respondents in the survey indicated their responses to questions / items through using seven point Likert scale, with 7 as strongly agree, 6 as agree, 5 as slightly agree, 4 as neutral, 3 as slightly disagree, 2 as disagree, and 1 as strongly disagree.

Sample: Firms operating in Pune auto-component cluster are included to form a sampling frame. The sampling frame consisting of firms operating in Pune auto component cluster was made with the help of database of Maharashtra Chamber of Commerce, Industries and Agriculture (MCCIA). We used convenience sampling technique for this study. The sampling elements or the respondents were the managers and owners who had knowledge and experience of working in an auto-component sector. Data for interviews and questionnaire was collected from managers and owners of firms operating in the cluster at their offices. Twenty interviews were conducted at the first stage and then at second stage 100 questionnaires were filled from the owners and managers of firms operating in Pune auto-component cluster.

Data analysis tool: This study has used content analysis and factor analysis for analyzing the data. When the phenomenon to be observed is communication then content analysis is an appropriate method (Malhotra and Birks, 2006). As per Malhotra and Birks (2006), content analysis includes observation as well as analysis where the unit of analysis may be words, characters or themes; they also stated that it is one of the classical procedures for analysing textual material in qualitative research. Researcher can decide the themes before analyzing the text or new emerging themes can also be added (Thornton, Henneberg, and Naud, 2013). Initially while coding the data, we extracted those themes which were suggested by previous researchers like R&D collaboration and technological alliance, institutional tie-ups, technical and informal information transfer, and inter-firm cooperation. However as this study relates to little unexplored research area and is exploratory thus we also involved some new themes. Since the survey questionnaire was self-developed thus an exploratory factor analysis was carried out using SPSS to ensure the rightness of newly created questionnaire and to extract mutually independent common factors from multiple relevant variables which were names as different business networks among firms and cluster stakeholders.



RESULTS

Themes identified from interviews

For exploring the different types of business networks between a firm and cluster participants, firstly, different themes were identified separately for each cluster participant by analysing the data which was collected through semi-structured personal face-to-face interviews.

Table 3 shows the summary of the themes identified for each cluster participant.

Table 3: Types of themes identified with cluster participants

Participant(s)	Type of Theme	Possible relationship
Buyers / Suppliers/ Local Associations and Government agencies/ Research Institutes	Information exchange	Exchange of information about new equipments and markets, exchange of information through communicating with employees, sharing specific technical knowledge, sharing databases, taking advice, etc.
Buyers / Research Institutes	Technological Collaboration	Sharing technologies, jointly producing new products, joint R&D, jointly working on new patent(s), jointly purchasing specific equipments, etc.
Buyers / Research Institutes	Resource sharing	Sharing infrastructure resources, incubation center, human resources, and raw materials, etc.
Local Associations and Government agencies	Joint Marketing	Getting help in branding and promotion of products, in entering new market,
Buyers / Local Associations and Government agencies/ Research Institutes	Joint training	Organising workshops on skills enhancement, carrying out joint entrepreneurship programs, etc.
Local Associations and Government agencies	Support for development	Getting help in getting quality certification, in internet and e-commerce, in getting subsidies, etc.

However this was not the case with respect to other participants like financial institutes and competitors. With these participants we did not find any themes which suggested absence of all kinds of linkages between firms and them. The firms' owners and managers clearly stated that their firms do not share any kind of linkages with these participants.

Exploratory Factor Analysis on the questionnaire developed

For exploring the different types of business networks between a firm and cluster participant, a questionnaire was developed on the themes identified after the interviews and appropriate literature for measuring business networks formed by firm with each cluster participant. After the development of questionnaire an exploratory factor analysis

was carried out to ensure the rightness of newly created questionnaire. Reliability and content validity of the questionnaire was determined and exploratory factor analysis was carried out individually for each cluster participant.

Reliability: The reliability is commonly defined as the degree of consistency of a measure. The most general method of reliability estimation is the internal consistency method. The internal consistency of a set of measurement items refers to the degree to which items in the set are homogeneous (Singh and Shrivastava, 2013). Internal consistency was assessed using Cronbach's alpha (Cronbach, 1951). Table 4 illustrates that the values of Cronbach's alpha coefficients ranged from 0.70 to 0.89 for all business networks identified which indicates the questionnaire has good reliability.

Table 4: Cronbach's alpha values of business networks

Business network	Cronbach's alpha value
Business networks with buyers	0.702
Business networks with educational institutes	0.856
Business networks with suppliers	0.889
Business networks with government agencies and local associations	0.790
Business networks with research institutes	0.766

Content validity: A measure has content validity if there is general agreement among the subjects and researchers that the instrument has measurement items that cover all aspects of the variable being measured (Singh and Shrivastava, 2013). Content validity depends on how well the researchers created measurement items to cover the content domain of the variable being measured (Nunnally, 1967). Content validity is not evaluated numerically rather it is subjectively judged by the researchers. In this study the developed instrument have content validity since selection of measurement items were based on an exhaustive review of literature and detailed reviews of owner and managers of firms, academicians, and experts working in auto-component industry, which indicated that the content of each factor is well represented by the variables.

Exploratory factor analysis to find business networks formed by firms with cluster participants individually. Table 5 provides summary of EFA applied to find out business networks.

Exploratory factor analysis to find business networks with buyers: Prior to applying EFA, the study first calculated KMO value. The KMO value was 0.768 suggesting that data was suitable for factor analysis. The Kaiser-Meyer- Olkin (KMO) measure of sampling adequacy is an index used to examine the appropriateness of factor analysis. Values ranging from 0.5 to 1.0 indicate that factor analysis is appropriate whereas values below 0.5 imply that factor analysis may not be appropriate (Malhotra and Birks, 2006). The factor analysis results suggested four factors for business networks with

Table 5: Summary of EFA

Business network with cluster participant	Factors extracted
Business networks with buyers	4
Business networks with educational institutes	1
Business networks with suppliers	1
Business networks with government agencies and local associations	2
Business networks with research institutes	.4

buyers, with a cumulative explanatory variation of 70.81 percent. The result of factor analysis is shown in Tables 6. It can be seen from Table 6 that Factor I contains six questions, Factor II contains five questions, Factor III contains four questions and Factor IV contains three questions. The factors extracted in factor analysis were named as Information Network, Technological Collaborative network, Resource sharing network and Training network.

Table 6: EFA for business networks with buyers

	Factor loading	Accumulated explained variance (%)
Information Network		21.67
Your firm exchange information related to markets with your buyers	0.871	
Your firm share specific technical information with your buyers	0.813	
Employees of your firm can obtain data required for work from databases of your buyers	0.727	
In order to solve work problem employees of your firm usually communicate with workers of your buyers	0.691	
Your firm exchanges information about new equipments with your buyers	0.817	
Your firm take advice from your buyers	0.862	
Technological Collaborative network		19.44
Your firm is engaged in Joint R&D with your buyers	0.852	

Your firm jointly introduces new products with support of your buyers	0.865	
Your firm work on new patent(s) with support of your buyers	0.834	
Your firm uses technologies developed by your buyers	0.784	
For purchase of specific equipments your firm collaborates with your buyers	0.802	
Resource sharing network		16.62
Your firm shares infrastructure resources (land) with your buyers	0.834	
Your firm shares incubation center with your buyers	0.899	
To solve a technical issue your firm pools human resources with your buyers	0.850	
Your firm jointly use raw materials with your buyers	0.821	
Training network		13.08
Your firm gets help in comprehensive training of your employees from your buyers	0.894	
Your firm carries out joint entrepreneurship programs with your buyers	0.877	
To organise workshops on skills enhancement your firm set up consortia with your buyers	0.842	

Exploratory factor analysis to find business networks with educational institutes: The KMO value was 0.778 suggesting that data was suitable for factor analysis. The factor analysis results suggested only one factor for business network with educational institutes, with a cumulative explanatory variation of 63.58 percent. The result of factor analysis for educational institutes is shown in Tables 7. The factor extracted was named as Recruitment and Training network.

Table 7: EFA for business networks with educational institutes

	Factor loading	Accumulated explained variance (%)
Recruitment and Training network		63.58
Your firm easily obtains talented individual from educational institutes	0.844	
Your firm gets help in comprehensive training of your employees from educational institutes	0.837	
Employees of your firm get opportunity to learn technical skills from members of educational institutes	0.743	
Your firm carries out joint entrepreneurship programs with educational institutes	0.739	
To organise workshops on skills enhancement your firm set up consortia with educational institutes	0.816	

Exploratory factor analysis to find business networks with suppliers: The KMO value was 0.853 suggesting that data was suitable for factor analysis. As was expected, the factor analysis result suggested only one factor for business network with suppliers, with a cumulative explanatory variation of 64.38 percent. The result of factor analysis is shown in Tables 8. The factor extracted was named as Information network.

Table 8: EFA for business networks with suppliers

	Factor loading	Accumulated explained variance (%)
Information network		64.38
Your firm exchange information related to markets with your suppliers	0.851	
Your firm share specific technical knowledge with your suppliers	0.831	
Employees of your firm can obtain data required for work from databases of your suppliers	0.776	
In order to solve work problem, employees of your firm usually communicate with workers of your suppliers	0.726	
Your firm exchanges information about new equipments with your suppliers	0.803	
Your firm take advice from your suppliers	0.821	

Exploratory factor analysis to find business networks with government agencies and local associations: The KMO value was 0.799 suggesting that data was suitable for factor analysis. The factor analysis results suggested two factors for business networks with government agencies and local associations, with a cumulative explanatory variation of 62.94 percent. It can be seen from Table 9 that Factor I contains four questions and Factor II contains six questions. The factors extracted in factor analysis were named as Informational & training network and Market Development network.

Table 9: EFA for government agencies and local associations

	Factor loading	Accumulated explained variance (%)
Informational and training network		37.50
Your firm exchange information related to markets with government agencies and local associations	0.746	
Your firm acquires information about trade events, meetings, and seminars or other types of events from government agencies and local associations	0.711	
To organise workshops on skills enhancement your firm set up consortia with government agencies and local associations	0.839	
Your firm carries out joint entrepreneurship programs with government agencies and local associations	0.859	
Market Development network		25.44
Your firm get support of government agencies and local associations for entering into a new market	0.832	
For branding and promotion of products, your firm jointly participates in industrial fairs with government agencies and local associations	0.819	
In getting quality certification your firm get support from government agencies and local associations	0.720	

Your firm get assistance in ITR (Income Tax return) filling from government agencies and local associations	0.756	
To get subsidies your firm get support of government agencies and local associations	0.785	
In making more use of internet and e-commerce your firm get support of government agencies and local associations	0.814	

Exploratory factor analysis to find business networks with research institutes: The business networks formed with research institutes were similar to business networks formed with buyers. The KMO value was 0.706 suggesting that data was suitable for factor analysis. The factor analysis results suggested four factors, with a cumulative explanatory variation of 74.35 percent. The result of factor analysis is shown in Tables 10. It can be seen from Table 10 that Factor I contains five questions, Factor II, III, and IV contains three questions each.

Table 10: EFA for research institutes

	Factor loading	Accumulated explained variance (%)
Information network		24.39
Your firm exchange information related to markets with research institutes	0.845	
Your firm share specific technical knowledge with research institutes	0.835	
In order to solve work problem, employees of your firm usually communicate with employees of research institutes	0.722	
Your firm exchanges information about new equipments with research institutes	0.840	
Your firm take advice from research institutes	0.857	
	Factor loading	Accumulated explained variance (%)
Technological Collaborative network		41.255
Your firm is engaged in Joint R&D with research institutes	0.871	

Your firm jointly introduces new products with support of research institutes	0.883	
Your firm uses technologies developed by research institutes	0.848	
Resource sharing network		57.810
Your firm shares infrastructure resources (land) with research institutes	0.807	
Your firm shares incubation center with research institutes	0.931	
Your firm jointly use raw materials with research institutes	0.864	
Training network		74.356
Your firm gets help in comprehensive training of your employees from research institutes	0.897	
Your firm carries out joint entrepreneurship programs with research institutes	0.882	
To organise workshops on skills enhancement your firm set up consortia with research institutes	0.837	

After applying EFA, we can confirm the presence of construct validity. Construct validity refers to the degree to which a good representation of the measures can be made from the operationalisations in a study to the theoretical constructs on which those operationalisations were based. The two most widely adopted subcategories of construct validity are convergent validity and discriminant validity (Anderson and Gerbing 1988; Holmes-Smith 2013). Convergent validity is the extent to which the scale correlates positively with other measurements of the same construct and Discriminant validity is the extent to which a measure does not correlate with other constructs from which it is supposed to differ (Malhotra and Birks, 2006). Principle component factor analysis was used in this study to measure convergent and discriminant validity. Convergent validity is demonstrated if the items load strongly (more than 0.50) on their associated factors and discriminant validity is achieved when each item loads more strongly on its associated factor than on any other factor (Grandon and Pearson, 2003). Factor analysis tables 6, 7, 8, 9 and 10 illustrate that all items loaded more strongly on their associated factors than on other factors. Thus, there is evidence to support convergent and discriminant validity in this study.



ONCLUSION

This study contributed to the existing literature of business networks formed by the firms with the other participants in an auto-component cluster. The primary objective of this paper was to explore different types of business networks a firm can form in Pune auto component cluster. The study has identified four types of business networks each in case of buyers and research institutes which are informational network, technological collaborative network, resource sharing network, and training network. Even the owners of many firms told us that “...working with big buyers and research institutes in the auto-component industry has helped their firm in making their business grow further.” In case of business networks with the suppliers, the study has identified only one type of business network .i.e. informational network. Similarly with educational institutes, the study found only one type of business network .i.e. Recruitment and training network. Lastly with government agencies and local associations, the study found two types of business networks .i.e. Market Development network and Informational and training network. Following are the business network discussed in detail with some answers of interviewee from the interviews conducted.

- **Informational network:** This network involves flow of information either technical or informal between firm and the cluster participant like buyers, research institutes, and suppliers. Depending on the type of the information required, firms establish different linkages with the cluster participant. In this network, firms take advice, exchange information related to markets and new equipments, share specific technical knowledge. In this network, firms engage with the cluster participant for utilizing their databases and their employees as a source for solving any identified issue. All of these aspects of linkages can be crucial for firms to grow their business. In this context the owner of a company stated that “...most of our technical information generally comes from buyers, research institutes, and suppliers”. The owner of another company stressed that “...their firm get complete assistance from their buyers, suppliers, and research institutes in getting their technical problem solved”.

- **Technological Collaborative network:** This network involves firms working jointly with participants like buyers and research institutes for new innovations. Firms in this cluster use technologies developed by these participants, jointly introduces new products with support of the buyers and research institutes, engaged in Joint R&D with them, and also jointly work on new patent(s). In this context the owner of a company told us that “...working with research institutes and buyers help their firm in getting access to new technologies, moving to new markets, and getting market-specific expertise”. The manager of another company stated that “plenty of products of their firm are in demand just because of the innovation brought by these participants which has added value to their products”. In addition the manager of another company stressed that “...tie up with research institutes and buyers help in making sure that their product is as per set international standards”.

- **Resource sharing network:** This network is formed with buyers and research institutes. The main focus of this network is sharing resources like land and incubation centres for increasing production of firm. This network involves joint usage of raw materials by firms with the research institutes and their buyers. In such network there is easy mobility of workforce between them. In context of this the manager of a company outlined that "...such transfer of workforce helps our firm to know about new opportunities that exist in the market like new technologies used by other firms and also to know new potential suppliers in the market".

- **Training network:** The main focus of this network is working jointly with buyers and research institutes for increasing skills of employees. In this network firms join hands with research institutes and their buyers so that the employees of their firm get the opportunity to learn technical skills from members of these cluster participants, to set up consortia with them in order to organise workshops on skills enhancement, getting help in comprehensive training of their employees, and to carry out joint entrepreneurship programs with the buyers.

- **Recruitment and Training network:** This type of networked was observed with educational institutes. This network is quite similar to training network formed by firms with their buyers and research institutes. In addition to learning technical skills, organising workshops for skills enhancement and comprehensive training, this network involves recruitment aspect where firms easily obtains talented individual from the educational institutes by going there for recruitment. In context of this the manager of a company outlined that "...their firm always prefer to visit these colleges for recruitment of skilled employees". Owner of another company told us that "...working with these cluster participants has helped their employees in enhancing their knowledge and skills."

- **Marketing and development network:** The main focus of this network is working jointly for increasing the market of firms. In this network firms take help of government agencies and local associations for marketing their products, entering new market. In this network firms jointly participates with local agencies in industrial fairs to promote its brand. In context of this the manager of a company outlined that "...their firm always prefer to attend industrial fairs jointly with local associations in order to promote their product". Apart from marketing aspect, this network also involves the support or the assistance that a firm gets from the government agencies and local associations for their growth and development in the form of assistance in Income Tax return filling, support in getting quality certification, support in making more use of internet and e-commerce, and support in getting subsidies.

- **Informational and training network:** This network is slightly different from the informational networks formed by firms with their buyers, research institutes, and suppliers. This network involves more flow of informal information between firms and local associations and government agencies. In this network firms exchange information related to markets, and utilise the relationship with government agencies and local

associations for acquiring information about trade events, meetings, and seminars. Apart from exchange of informal information, this network also involve setting up of consortia between firms and local associations in order to organise workshops on skills enhancement and they also carry out joint entrepreneurship programs.

The business networks identified in the study are partially consistent with those identified in the previous research work carried out in other countries as discussed in the literature review section. However with respect to network with other participants like competitors and financial institutes, the study showed contrasting results. The study suggests that there is no such cooperation between a firm and these participants .i.e. the linkages between them remain largely unfilled. There is no dissemination of information, no sharing of resources, and no collaboration. In this context, even the manager of a company outlined that "the variety of linkages with participants other than buyers, research institutes, suppliers for obtaining valuable technical or informal information is absent".

The study provides theoretical contributions to the existing literature. Through this study the authors have tried to answer the research gap of lack of literature on types of business networks formed by firms with the stakeholders present in an industrial cluster. This study has enriched the understanding of business networks which could be present in an auto component cluster between a firm and other cluster stakeholders. This study has also supported the existing fact that firms do not have access to networks with all cluster participants just by being present in a cluster. As it was found that the firms of Pune auto-component cluster are aware of the fact that they are part of a cluster, however still most of them had business networks only with their buyers and research institutes, and government agencies, not with other stakeholders like educational institutes, competitors, and suppliers.

This study suggests the following recommendations to firms present in a cluster.

- A firm in a cluster should focus more on developing networks with participants like suppliers and educational institutes. Since business networks with the suppliers and educational institutes were related to only information and training aspect. Thus the absence of other types of business networks with suppliers and educational institutes is an area of concern for firms and policy makers. Combination of new .i.e. direct or indirect relationships with these stakeholders could put the firms in a strategic position through which they can easily reap the benefits from being embedded in this cluster. Even the manager of a company outlined that "the variety of linkages like technological collaboration and resource sharing are absent with educational institutes and suppliers". In addition to this the manager of another company stated that "forming more linkages with educational institutes and suppliers would help them in sensing new opportunities since such organizations can influence relevant legislative bodies to shape regulations and standards in their favour."

- Networks with supportive institutions and government are

important determinants for firm innovativeness (Niu, 2010b). Thus emphasis should be given to networks with these cluster participants.

- This paper also suggests that the policy makers should focus more on the networking aspect with stakeholders in a cluster and include this aspect in diagnostic study report and soft interventions part of medium small enterprises – cluster development programme (MSE-CDP) for all auto-component clusters present in India.

The findings from this research will add academic value in the context of expanding knowledge in relation to the impact of business networks on the performance of the firm and will also contribute in filling gaps within the existing literature related to types of business networks formed by the firms with the cluster participants. The findings would also provide deeper

insight into the future development of auto-component clusters in India. This study suggests that firms operating in Pune auto-component cluster should focus more on networks with all cluster participants especially educational institutes, financial institutes, and competitors for better management of their firms as it is evident that by simply moving to the cluster does not lead to better firm performance, instead it is formation of business networks with all the participants which assist a firm in making more informed decisions. The study has been limited to only one cluster thus it might not be appropriate to generalize the findings. Further research in this area needs to be done by taking other clusters in order to generalize the findings. Also further research could be carried out in exploring the possible reason for absence of business networks with cluster stakeholders other than buyers and government agencies.

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