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## Factors affecting collaboration in supply chain: A literature Review

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### Abstract

In this paper 69 randomly selected research papers published in the refereed journals in the area of supply chain collaboration has been reviewed. The papers are classified based on the year in which they published, based on specific countries, the journal in which they published, specific industry type, and finally based on research methodology. Based on the analysis of reviewed papers a total number of 28 factors affecting supply chain collaboration have been identified. Supply chain information sharing found to be highly talked factors for effective supply chain collaboration, therefore the papers further analyzed in the context of the role of information sharing in supply chain collaboration. The discussion, conclusions and future research directions have also been provided in this paper.

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### 1. Introduction

In today's globalized and highly competitive business era the manufacturing organizations have begun to realize that in order to gain and sustain the competitive advantage they have to deliver the best customer value at the lowest possible cost. The customer is increasing becoming the highly demanding with respect to faster response time, shorter product cycle time, customized products and services. Due to shrinking product life cycles and increasing global competition specialized skills and knowledge of business organizations have become more and more important in new product development. In the past decade, firms are looking outside their organizational boundaries for opportunities to collaborate with supply chain partners to ensure efficiency and responsiveness of supply chain,

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so as to leverage the resources and knowledge of their suppliers and customers (Cao and Zhang, 2011). This collaboration would result to have quicker product development processes, reduced development costs, greater technological improvements, and/or enhanced product quality (Walter, 2003) in dynamic market conditions. There is a greater need for the supply chain partners to be dynamic and responsive to add value for the customers in the form of extended business organization. The business goal might seem to be difficult to achieve by individual organizations, but can be easily achieved through collaborative supply chain relationships. Hence, collaborative behavior and activities in supply chain management gained considerable importance (Koçoglu *et al.*, 2011). Collaborative relationship between organizations has received considerable attention in recent times (Samaddar and Kadiyala, 2006). Collaboration in supply chain also results in performance improvement in the supply chain (Vereecke and Muylle, 2006). In demand chain management, the supply chain structure when aligned as per the needs of the customer would result in better performance. Hence there is a need to have tight integration of supplier and customer to make a supply chain successful (Vereecke and Muylle, 2006). Firms are building collaborative relationships with their supply chain partners in order to achieve efficiencies, flexibility, and sustainable competitive advantage (Nyaga *et al.*, 2010). Dyer and Singh, (1998) argued that collaborating firms can generate relational rents through relation-specific assets, knowledge-sharing routines, complementary resource endowments, and effective governance. The supply chain collaboration has been defined in different ways by different authors. In the table 1 a summary of different available definitions is provided.

**Table 1 Definitions of Collaboration in supply chain**

S. No.	Source	Definition
1	Simatupang <i>et al.</i> 2004	Collaboration is a cooperative strategy of supply chain partners with a common goal of serving customer through integrated solutions for lowering cost and increasing revenue.
2	Samaddar and Kadiyala, 2006	Collaborative relationship as one in which an organization initiates and implements a knowledge creation endeavor, and a collaborating organization shares the expense and benefits of newly created knowledge, including its joint ownership through patents and licenses.
3	Kampstra <i>et al.</i> 2006	Financially independent entities try to get the dependent parts of the chain to “play” together, i.e. ensuring that the entities in a chain interact successfully to provide the necessary coordinated outputs.
4	Fawcett <i>et al.</i> 2008	The ability to work across organizational boundaries to build and manage unique value-added processes to better meet customer needs.
5	Simatupang and Sridharan (2008)	Collaboration describes the cooperation among independent, but related firms to share resources and capabilities to meet their customers’ most extraordinary or dynamically changing needs.
6	Cao and Zhang, 2011	A partnership process where two or more autonomous firms work closely to plan and execute supply chain operations toward common goals and mutual benefits.

## 2. Supply chain collaboration in literature

In this section the extant literature on collaborative supply chain has been analyzed. In the below table 2, a brief description about reviewed paper has been provided and followed to this the key finding of the papers has been discussed.

Kalwani and Narayandas (1995) empirically assessed the impact of long-term relationships with specific customers on the performance of supplier firms using cross-sectional and longitudinal information available in the compustat collection of databases and the compact disclosure data base. Kumar *et al.* (1996) classified the inter organizational system (IOS) into three topologies namely pooled information resource IOS, value/supply chain IOS, and networked IOS to identify possible risks of conflict in inter organizational system arena and to suggest strategies for minimizing the likelihood of such conflict. The study by the Shore (2000) identified various variables that affect the flow of information between customers and their suppliers are: the industry, the market and competitive environment, national culture, corporate culture, size, and country IT support. The research presented and analyzed to validate the role of these variables in data sharing strategies.

Table 2: A brief description of reviewed paper on supply chain collaboration

Author	Year	Study type	Sector	Country
Kalwani and Narayandas	1995	Empirical study Compustat data base Compact Disclosure data base,	Manufacturing	US
Kumar <i>et al.</i>	1996	Literature	-	-
Shore	2000	Case study	Manufacturing	US
Simatupang and Sridharan	2002	Literature study	-	-
Simatupang <i>et al.</i>	2002	Literature study	-	-
Walter	2003	Empirical study	Manufacturing	German
Kwon and Suh	2004	Empirical study Regression model	Manufacturing	US
Simatupang <i>et al.</i>	2004	Theory of constraints or constraint based approach	-	-
Fynes et al	2005	Empirical study Structural equation model	Electronics manufacturing	Republic of Ireland
Simatupang and Sridharan	2005	Empirical study Correlation and factor analysis.	Retail and manufacturing	New Zealand
Simatupang and Sridharan	2005	Reciprocal approach Case study	-	-
Lavie	2006	Theoretical Model	-	-
Tan <i>et al.</i>	2006	Case study	Electronics manufacturing	UK
Vereecke and Muylle	2006	Empirical study Factor analysis and linear statistical models	Engineering / assembly industry	European countries
Jin and Hong	2007	Literature review	-	-
Krueger	2008	Case study	Manufacturing	China
Simatupang and Sridharan	2008	Case study	-	-
Fawcett <i>et al.</i>	2008	Exploratory study Contingency and force field theory	-	-
Crook <i>et al.</i>	2008	Exploratory study	computer hardware manufacturing, biotechnology, telecommunications, and airline	US
Forslund and Jonsson	2009	Empirical study	Manufacturing	Sweden
Cai <i>et al.</i>	2010	Empirical study Structural equation model	Manufacturing	China
Nyaga <i>et al.</i>	2010	Empirical study Structural equation modeling	manufacturing and service industries	US
Nath and Standing	2010	Literature review grounded theory approach	-	-
Cao and Zhang	2011	Empirical study Confirmatory factor analysis and structural equation modeling (i.e., LISREL).	Manufacturing	US
Chen <i>et al.</i>	2011	Empirical study Factor analysis, Multiple regression and ANOVA	oil and gas industry and semi conductors industry	Taiwan and Canada
Fawcett <i>et al.</i>	2011	Exploratory and Empirical study qualitative research method	Retailer, service providers, finish goods assemblers and direct material suppliers	US
Liu and Wang	2011	Literature study system theory, psychology and theory of business	-	-

Lee et al.	2011	operation Mathematical model	-	-
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Simatupang and Sridharan (2002) aimed to identify conflicts in supply chain collaboration. The study by Simatupang *et al.* (2002) focuses on coordination to establish a comprehensive taxonomy of coordination modes in the supply chain. Walter (2003) proposed and tested a relationship model that examines antecedents and central characteristics of close relationships and their impact on supplier involvement in new product development. The study by Kwon and Suh (2004) attempts to empirically validate the relationship between trust and commitment in a supply chain context. The results indicate that trust is positively associated with asset specific investments and negatively associated with behavioural uncertainty. Simatupang *et al.* (2004) investigated constraints in collaborative supply chain and also attempted to apply the theory of constraints (TOC) approach to overcome difficulties in releasing potential benefits of supply chain collaboration. Fynes *et al.* (2005) examined the impact of supply chain relationships on quality performance. Simatupang and Sridharan (2005a) proposed an integrative framework for supply chain collaboration, which is based on an approach that captures the interaction phenomenon of different features of collaboration in attaining overall supply chain performance. Simatupang and Sridharan (2005b) proposed an instrument to measure the extent of collaboration in a supply chain consisting of two members, suppliers and retailers. Lavie (2006) proposed an extended resource based view model, which incorporates the network resources of interconnected firms. Tan *et al.* (2006) aimed to highlight the underlying factors that contribute to the effective management of a global supply chain from the perspective of small and medium-sized enterprises. Vereecke and Muylle (2006) empirically tested the relationship between supply chain collaboration and performance improvement with IMSS 2001 data on 374 firms from the engineering/assembly industry across 11 European countries. The study by Jin and Hong (2007) explored the interactions among global supplier-manufacturer relationships. Furthermore, the impact of opportunities and risks of supplier-manufacturer partnership in the context of global product development is analyzed.

Crook *et al.* (2008) suggested that when independent firms collaborate and share knowledge with others, they can achieve the advantages beyond what could be achieved in arm's length exchange. Fawcett *et al.* (2008) applied problems contingency theory and force field theory with aims to study effectively overcome the cultural and structural impediments to SC collaboration. Krueger (2008) analyzed the ethical issues surrounding global supply chains of multinational companies in developing countries. In a study by Forslund and Jonsson (2009) tried to explain the degree to which the obstacles in supply chain relationship and operational tools hinder supply chain integration for performance management. The study by Cai *et al.* (2010) investigates the effects of Chinese companies' institutional environment on the development of trust and information integration between buyers and suppliers. The study by Nyaga *et al.* (2010) aimed at finding the factors that promote successful collaborations.

The purpose of the study by Nath and Standing (2010) is to identify the drivers of information technology (IT) use in the supply chain and to analyze the literature to identify patterns and key factors for success. Chen *et al.* (2011) investigated the role of information sharing, information quality, and information availability in the development of trust and commitment in supply chain relationships. A study by Fawcett *et al.* (2011) discovered that managers understand neither the nature of trust nor the dynamics of trust building. Liu and Wang (2011) analyzed the supply chain crisis and its causes in collaborative supply chain. Lee *et al.* (2011) investigated the coordination problems and corresponding incentive mechanisms between a manufacturer and a retailer for jointly investing in a new technology that has the potential to improve the efficiency and security of the supply chain. Based on the reviewed papers the supply chain factors have been identified and given in the below table 3.

Table 3 Factors affecting collaboration in the supply chain

Factor	Definition	Author
Commitment	Commitment refers to the willingness of trading partners to exert effort on behalf of the relationship and suggests a future orientation in which firms attempt to build a relationship that can be sustained in the face of unanticipated problems.	Walter, (2003)
		Fynes <i>et al.</i> (2005)
		Chen <i>et al.</i> (2011)
		Kwon and Suh, (2004)
		Nyaga <i>et al.</i> (2010)
		Zacharia <i>et al.</i> (2009)
Trust	A positive belief, attitude, or expectation of one party concerning the	Walter, (2003)

	likelihood that the action or outcomes of another will be satisfactory.	Fynes <i>et al.</i> (2005) Cai <i>et al.</i> (2010) Chen <i>et al.</i> (2011) Fawcett <i>et al.</i> (2008) Kwon and Suh, (2004) Nyaga <i>et al.</i> (2010) Forslund and Jonsson, (2009) Fawcett <i>et al.</i> (2011) Simatupang <i>et al.</i> (2004) Crook <i>et al.</i> (2008) Zacharia <i>et al.</i> (2009)
Adaptations	As investments of a customer in the supplier’s knowledge, structures, and processes to make use of its resources	Walter, (2003) Fynes <i>et al.</i> (2005)
Relationship promoter of the customer	RP are persons who intensively shape and advance inter organizational exchange processes, they do so on the basis of their network of good personal relationships.	Walter, (2003)
Stakeholders	All the players of the supply chain are referred as stakeholders. The supplier, the manufacturer, the distributor, the wholesaler the retailers and the customer.	Angerhofer and Angelides, (2006)
Topology	Supply chain configuration is referred as topology. Example convergent or divergent.	Angerhofer and Angelides, (2006)
Enabling technology	Information technology used in supply chain is referred to enabling technology. Example MIS, TPS, DSS, ERP, EIS etc.	Angerhofer and Angelides, (2006) Lee <i>et al.</i> (2011) Crook <i>et al.</i> (2008)
Level of collaboration	The decision on which level(s) collaboration is suitable and beneficial is determined by the market environment and business strategy. Levels of collaboration defined are at operational, managerial and strategic level.	Angerhofer and Angelides, (2006) Zacharia <i>et al.</i> (2009)
Business strategy / Goal congruence	Goal congruence between supply chain partners is the extent to which supply chain partners perceive their own objectives are satisfied by accomplishing the supply chain objectives. It is the degree of goal agreement among supply chain partners. “the degree to which objectives of two entities are compatible”	Angerhofer and Angelides, (2006) Cao and Zhang, (2011) Tan <i>et al.</i> (2006) Forslund and Jonsson, (2009) Jin and Hong, (2007)
Processes Integrated processes Innovative supply chain process	Integrated supply chain processes refer to the extent to which the chain members design efficient supply chain processes that deliver products to end customers in a timely manner at lower costs.	Angerhofer and Angelides, (2006) Simatupang and Sridharan, (2005) Simatupang and Sridharan, (2008)
Collaborative communication	Collaborative communication is the contact and the message transmission process among supply chain partners in terms of frequency, direction, mode, and influence strategy.	Fynes <i>et al.</i> (2005) Cao and Zhang, (2011) Forslund and Jonsson, (2009)
Dependence and interdependence Long term relationship Joint relationship effort	Dependence refers to a firm’s need to maintain an exchange relationship to achieve desired goals. The structure (magnitude and relative symmetry) of this ‘reciprocal’ dependence characterizes the level of interdependence in the relationship and has important implications for interaction, joint effort, such as planning, goal setting, performance measurement, and problem solving, is essential for successful collaborative relationships.	Fynes <i>et al.</i> (2005) Kalwani and Narayandas, (1995) Nyaga <i>et al.</i> (2010)
Co-operation	Co-operation refers to situations in which firms work together to achieve mutual goals	Fynes <i>et al.</i> (2005) Liu and Wang, (2011)
Legal protection coordinative structures collaborative agreement	It depends on the extent to which detailed formal legal rules and doctrine exist, the structure and operations of the institutions that implement them, and the so-called legal culture encompassing customs, opinions, and the ways of doing and thinking that define people’s practices of and attitudes toward laws. collaborative agreement is another essential element to manage differences in an integrative inter-firm relationship coordinative structures and mechanisms consist of a series of activities, structurally	Cai <i>et al.</i> (2010) Jin and Hong, (2007)

	identified by either explicit or implicit contracts, through which the distribution of joint rights and responsibilities are developed and agreed to by both the supplier and the manufacturer	
Government support	Governmental intervention in business activities. Local governments exert more direct influences by implementing formal and informal policies related to economic activity.	Cai <i>et al.</i> (2010)
Interpersonal relationship	The term <i>guanxi</i> refers to networks of informal, personal relationships and exchanges of favors that dominate business activities	Cai <i>et al.</i> (2010)
Information sharing	Information sharing refers to the exchange of critical, often proprietary, information between supply chain members through media such as face-to-face meetings, telephone, fax, mail, and the Internet. to the extent to which a firm shares a variety of relevant, accurate, complete, and confidential information in a timely manner with its supply chain partners.	Cai <i>et al.</i> (2010) Cao and Zhang, (2011) Chen <i>et al.</i> (2011) Kwon and Suh, (2004) Koçoglu <i>et al.</i> (2011) Nyaga <i>et al.</i> (2010) Simatupang and Sridharan, (2005) Stank <i>et al.</i> (2001) Simatupang and Sridharan, (2002) Simatupang and Sridharan, (2005) Simatupang <i>et al.</i> (2002) Simatupang and Sridharan, (2008) Jin and Hong, (2007) Zacharia <i>et al.</i> (2009)
Collaborative planning / Decision synchronization	Collaborative planning refers to collaborations among trading partners to develop various plans such as production planning and scheduling, new product development, inventory replenishment, and promotions and advertisement.	Cai <i>et al.</i> (2010) Cao and Zhang, (2011) Simatupang and Sridharan, (2005) Simatupang and Sridharan, (2005)
Joint decision making	Decision synchronization refers to the process by which supply chain partners orchestrate decisions in supply chain planning and operations that optimize the supply chain benefits.	Simatupang <i>et al.</i> (2002) Simatupang and Sridharan, (2008) Zacharia <i>et al.</i> (2009)
Incentive Alignment	Incentive Alignment refers to the process of sharing costs, risks, and benefits among supply chain partners	Cao and Zhang, (2011) Simatupang and Sridharan, (2005) Simatupang and Sridharan, (2002) Simatupang and Sridharan, (2005) Simatupang <i>et al.</i> (2002) Simatupang and Sridharan, (2008)
Resource sharing	Resource sharing refers to the process of leveraging capabilities and assets and investing in capabilities and assets with supply chain partners. Resources include physical resources, such as manufacturing equipment, facility, and technology.	Cao and Zhang, (2011) Fawcett <i>et al.</i> (2008) Kwon and Suh, (2004) Nyaga <i>et al.</i> (2010)
Asset specificity	Dedicated investments refer to investments made by a buyer or supplier that are dedicated to a relationship with a specific supplier or buyer, respectively.	
Joint knowledge creation	Joint knowledge creation refers to the extent to which supply chain partners develop a better understanding of and response to the market and competitive environment by working together.	Cao and Zhang, (2011) Fawcett <i>et al.</i> (2008) Crook <i>et al.</i> (2008) Simatupang <i>et al.</i> (2002) Zacharia <i>et al.</i> (2009)
Knowledge sharing		
Collective learning		
Information availability	Information availability is refers to the extent to which relevant information is available to all participants within a supply chain equally, beyond the information which is actively shared between partners within the supply chain	Chen <i>et al.</i> (2011)
Information quality	Information quality includes aspects such as the accuracy, timeliness, adequacy, reliability, credibility, understandability and ease of use of the information exchanged.	Chen <i>et al.</i> (2011)
Behavioral uncertainty	Behavioral uncertainty refers to the potential inherent in a situation for difficulty anticipating and understanding actions of partners	Chen <i>et al.</i> (2011) Kwon and Suh, (2004) Lee <i>et al.</i> (2011)

Cultural difference Organizational culture	Organizational culture is defined as a shared values and belief that can help to understand organizational functioning and provide behavioral norms.  the collective programming of the mind which distinguishes the members of one group or category of people from another. Differences in organisational or social level, could create differences of opinion or conflicts of interest.	Tan <i>et al.</i> (2006) Jin and Hong, (2007)
Management controls Integrated policies	Updating of Formal agreement, Comprehensive plan outlining common goal, requirement and expected benefits. . Determine extent of sharing. . Rewards/risks sharing scheme.	Tan <i>et al.</i> (2006) Simatupang and Sridharan, (2002)
Management commitment	The management from both companies have to view the partnership as a shared growth strategy and be fully committed so that they trust each other to act in their mutual best interest.	Tan <i>et al.</i> (2006) Fawcett <i>et al.</i> (2008)
Supplier performance Collaborative performance system	Defined as the process of devising and implementing performance metrics that guide the chain members to improve overall performance.	Fawcett <i>et al.</i> (2008) Forslund and Jonsson, (2009) Simatupang and Sridharan, (2005) Simatupang and Sridharan, (2002) Simatupang and Sridharan, (2008)

After analysis of above discussed literature, it is found that the information sharing plays a vital role in supply chain collaboration and found to be the most important factor. This leads the quest for further in depth analysis on the role of information sharing in supply chain collaboration. In the following a brief discussion of the literature on information sharing in collaborative supply chain is provided.

### 2.1 Role of information sharing in collaborative supply chain

A supply chain is a dynamic process and involves the constant flow of information, materials and funds across multiple functional areas both within and between chain members (Jain, Wadhwa, & Deshmukh, 2009). To improve supply chain coordination and product quality, manufacturing firms often demand that their supply chain partners such as subcontractors or suppliers implement common processes which often require the sharing of information (Cheng, 2013). Information sharing significantly affects in reducing supply chain costs, and achieving competitive advantage (Cheng, 2013, Jain, Wadhwa, & Deshmukh, 2009). Today's market is electronically connected and dynamic in nature. Therefore, companies are trying to improve their agility level with the objective of being flexible and responsive to meet the changing market requirements. In an effort to achieve this, many companies have decentralized their value-adding activities by outsourcing and developing virtual enterprise. All these highlight the importance of information technology (IT) in integrating suppliers/partners firms in virtual enterprise and supply chain (Jain, Wadhwa, & Deshmukh, 2009). Information is seen as the "glue" that holds together the business structures that allow supply chains to be agile in responding to the competitive challenges (Sanders and Premus, 2002). It is impossible to achieve an effective supply chain without IT. Since suppliers are located all over the world, it is essential to integrate the activities both inside and outside of an organization. This requires an integrated information system for sharing information on various value-adding activities along the supply chain. IT is like a nervous system for supply chain management (Gunasekaran and Ngai, 2004). IT plays an essential role in enabling the sensing and response capabilities of an organization (Ngai, Chau, & Chan, 2011). In this section the extant literature on information sharing in collaborative supply chain management has been analyzed. In the following table 4, the brief information regarding the analyzed articles is provided and subsequently the key finding of research articles is discussed.

The study by Christopher (1995) shows that companies are moving towards cooperative relationships in an effort to make the supply chain as a whole more competitive. Based on an empirical study of manufacturing firms, Sanders and Premus (2002) concluded that organizations need to clearly understand their company's competitive priorities and evaluate information technology adoptions for their ability to support these priorities, rather than follow current competitors. Ovalle and Marquez (2003) analyzed the impact of critical information sharing by using e-

collaboration tools on the local and global impact on the supply chain performance. Disney *et al.* (2004) stated that the use of internet and information and communication technology (ICT) enables cost effective information sharing between supply chain partners.

Table 4. Brief information regarding the analyzed articles

S. No.	Author	Year	Study type	Sector	Country
1	Christopher P Holland	1995	Case study analysis	Manufacturing and retail (textile)	UK
2	Sanders and Premus	2002	Empirical study	Manufacturing	US
3	Ovalle and Marquez	2003	Simulation and case study	-	-
4	Lee	2004	Analysis	Retail	US
5	Gunasekaran and Ngai	2004	Literature review	-	-
6	Disney <i>et al.</i>	2004	Simulation	-	-
7	De Kok <i>et al.</i>	2005	Empirical study	Manufacturing	Netherlands
8	Sahin and Robinson	2005	Mathematical model	Manufacturing	
9	Samaddar <i>et al.</i>	2006	Literature study	-	-
10	Barratt and Oke	2007	Exploratory study and case analysis	Retail	UK
11	Zhou and Benton	2007	Empirical study	Manufacturing	North America
12	Bayraktar <i>et al.</i>	2007	Empirical study	Manufacturing SMEs	Turkey
13	Ouyang	2007	Mathematical model	-	US
14	Chandra and Tumanyan	2007	Reference model	-	US
15	Jayaraman <i>et al.</i>	2008	Case study	Manufacturing	-
16	Bailey and Francis	2008	Case study evaluation	Agri-food and retail	UK
17	Hamid Mohtadi	2008	Empirical study	Food industry	US
18	Welker <i>et al.</i>	2008	Empirical study / Case study analysis	Manufacturing	Dutch
19	Martinez-Olvera	2008	Entropy-based formulation based on simulation	Manufacturing	-
20	Wu and Cheng	2008	Mathematical model	-	-
21	Sohn and Lim,	2008	Simulation	Manufacturing	-
22	Li <i>et al.</i>	2009	Empirical study	Manufacturing	China
23	Ryu et al	2009	Experiment	Manufacturing	-
24	Soroor <i>et al.</i>	2009	Experiment	-	-
25	Jain <i>et al.</i>	2009	Literature review	-	-
26	J.V. Pereira	2009	Literature review	-	-
27	Yu <i>et al.</i>	2010	simulation model	-	-
28	Barratt and Barratt	2011	Case study	Retail	UK
29	Cheng	2011	Empirical study	Manufacturing	Taiwan
30	Cheng	2011	Empirical study	Manufacturing	Taiwan
31	Ngai <i>et al.</i>	2011	Exploratory / case study	Manufacturing Textile	Hong Kong
32	Xue <i>et al.</i>	2011	Mathematical model	Construction	-
33	Ding <i>et al.</i>	2011	Model	-	-
34	Cho and Lee	2011	Modeling framework	-	-
35	Fawcett <i>et al.</i>	2011	Survey and case-study	-	-
36	Chengalur-Smith <i>et al.</i>	2012	Empirical study	Service	US
37	Du <i>et al.</i>	2012	Empirical study	Manufacturing	China
38	Prajogo and Olhager	2012	Empirical study	Manufacturing	Australia
39	Ciancimino <i>et al.</i>	2012	Mathematical model /design of experiment	-	-

Sahin and Robinson (2005) investigated the impact of information sharing and physical flow coordination in a make-to-order supply chain. De Kok *et al.* (2005) argued that collaborative planning process and tool can reduce



inventory and increase customer-service levels by integrating supply chain planning and control which ultimately results in reducing the bull-whip effect. Sahin and Robinson (2005) investigated the impact of information sharing and physical flow coordination in a make-to-order supply chain. Samaddar *et al.* (2006) presents a theoretical framework to investigate the relationships between the design of a supply network and inter-organizational information sharing. Chandra and Tumanyan (2007) proposed that the effective supply chain management can be achieved by sharing organizational knowledge. Ouyang (2007) stated that sharing customer demand information across the chain significantly reduces the bullwhip effect. Empirical research done by Zhou and Benton (2007) shows basic tenet about the role of information sharing and supply chain practice in supply chain management. Bailey and Francis (2008) argues that information sharing alone is insufficient, demand amplification effects can still be seen within a sophisticated value chain with high levels of information transparency and collaborative practices.

Martinez-Olvera (2008) proposed that in order to manage order fulfillment in a seamless way the level of information sharing between supply chain partners needs to be increased. Mohtadi (2008) examines the determinants of information sharing between retailers and their suppliers in the food industry supply chain. Sohn and Lim (2008) proposed that the proper selection of information sharing policy and forecasting method has a significant impact on supply chain performance especially where the product life cycle is short. Welker *et al.* (2008) investigated the influence of business conditions on internal and external information sharing and the role of ICT in SME's. Wu and Cheng, (2008) considered the impact of information sharing on inventory and expected cost of a three-echelon supply chain. The study by Bayraktar *et al.* (2009) established the casual relationship between SCM practices like a close relationship with suppliers and information systems (IS) practices like MRP, ERP etc. Jain *et al.* (2009) examined existing information systems that support supply chain dynamics at operational and strategic levels with its inherent focus on web-enabled collaboration among supply chain partners. A study by Li *et al.* (2009) shows that IT implementation in SCM has become very important in today's era due to globalization and competitive economy as the IT is able to provide timely, accurate, and reliable information, has greatly improved supply chain performance.

Pereira (2009) analyzed the key issues faced by supply chain as the current strategies and trends as well as to understand IT technical issues and implication for business performance. The study by Ryu *et al.* (2009) concluded that information sharing could help to eradicate the problems of excess inventory and, lack of service due to uncertainty. Soroor *et al.* (2009) introduced an innovative, practical method to organize and develop the intelligent wireless web and proposed framework for the implementation of a mobile real-time supply chain coordination system via the IWW services. Yu *et al.* (2010) analyzed that how information sharing can significantly improve the performance of the supply chain, how the different combination of information sharing affects the performance. Cheng (2011) presents a research model to examine the factors influencing information sharing and implementation of inter-organizational relationships. Cho and Lee (2011) found that the seasonal effect has an important impact on optimal inventory policies of the supplier under the three levels (echelons supplier, retailers and customer) of information sharing. Ding *et al.* (2011) proposed that retailers can be motivated to share information with other supply chain partners, as this can possibly make a contribution to lowering bullwhip effect of market demand and subsequently reducing stock holdings of distributors and manufacturer in upside of the supply chain. Fawcett *et al.* (2011) investigated the mechanisms through which IT influences the SC performance using resource based view approach. Xue *et al.* (2011) applied mathematical models to calculate the value of information sharing under different inventory policies. Zhu *et al.* (2011) analyzed the different scenario where a manufacturer and a retailer invest in their respective forecasting system in order to get an accurate forecast and intern profits. Chengalur-Smith *et al.* (2012) concluded that both information sharing and business system leveraging can provide important business benefits and that relational concurrence (i.e., shared business interests among supply chain partners). Ciancimino *et al.* (2012) applied mathematical models to analyze the operational response of a synchronized supply chain. Du *et al.* (2012) suggested that for efficient and effective supply chain, information needs to be shared. Prajogo and Olhager (2012) investigated supply chain integration from both information (backward integration) and material flows (forward integration or logistics) perspective between supply chain partners that affect operational performance. Based on case study analysis Ngai *et al.* (2011) concluded that IT competence is the foundation of supply chain competence, in which IT integration supports a better supply chain integration and flexibility and IT flexibility supports better supply chain advancement. Barratt and Oke (2007) explored that the level of visibility across linkages differs considerably based on various contributing factors which are both technology and non-technology based. Barratt and Barratt (2011) explored the specific roles of internal (logistics and production) and

external (customer and vendors) information-based linkages through visibility in achieving improved operational performance. Lee (2004) proposed that, the information transferred in the form of “orders” tends to be distorted and can misguide upstream members in their inventory and production decisions. Jayaraman *et al.* (2008) identified the costly bottlenecks in the reverse supply chain.

### 3. Results and Discussions

In this paper a review of 69 randomly selected papers on supply chain collaboration and the role of information sharing on supply chain collaboration is performed. The reviewed papers are classified according to the years in which they published. The selected papers are appearing from 1995 to 2012. It can be seen from figure 1 that the number of papers published over the years is approximately increasing over the years. The highest number of papers is found from the year 2011 (13 papers).

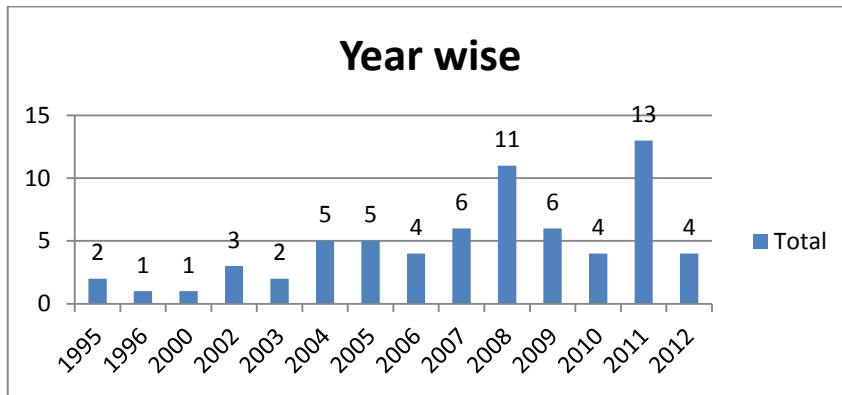


Figure 1. Year wise distribution of the reviewed papers

The journal wise distribution of the reviewed papers is discussed. The highest number of papers is found from International Journal of Production Economics (11 papers), followed by European Journal of Operational Research (9 papers), Journal of operations Management (7 papers). These all three journals cover 39% of the total reviewed papers. The country wise distribution of the papers (as given in figure 3) shows that there are highest 31 papers did not belong without any specific country type study. These papers actually belong to conceptual papers, literature papers etc. who did not study any specific industry type. The highest number of papers to a particular industry type study belongs to the United States (13), followed by the United Kingdom (5), and China (4).

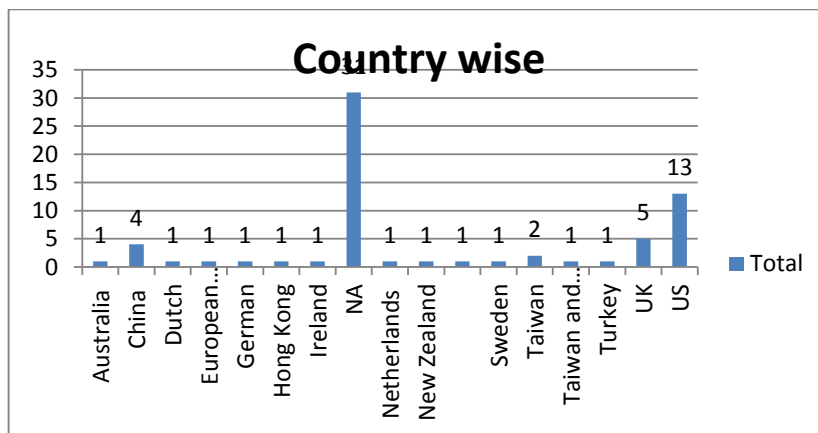


Figure 2. Country wise classification of papers

The industry wise classification as given in figure 3 shows that there are the highest number of papers belongs to manufacturing organizations, followed by retail companies.

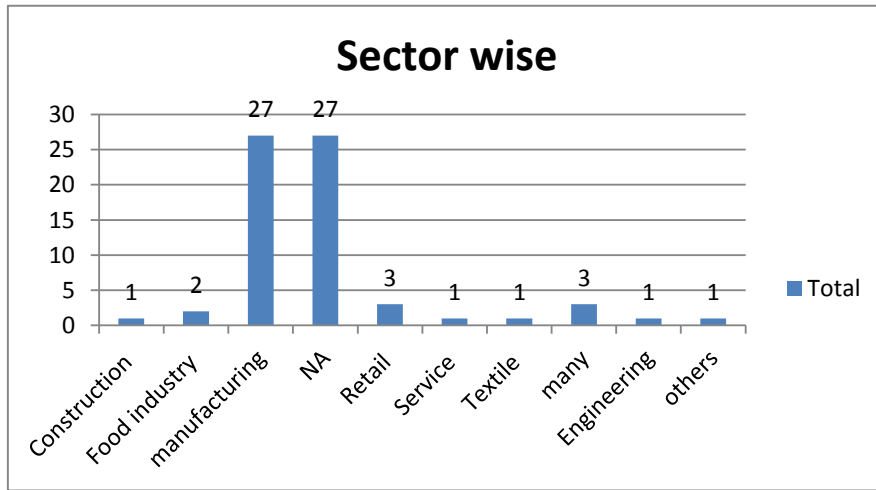


Figure 3. Industry wise classification of papers

The papers are also classified according to the used research methodology. The classification is shown in figure 4. As can be seen from figure 4 that, the empirical study type research methodology is highly applied in as many 23 papers, followed by case study type research methodology (14 papers), conceptual study (8 papers). These three methodologies all together cover 65% of the total papers.

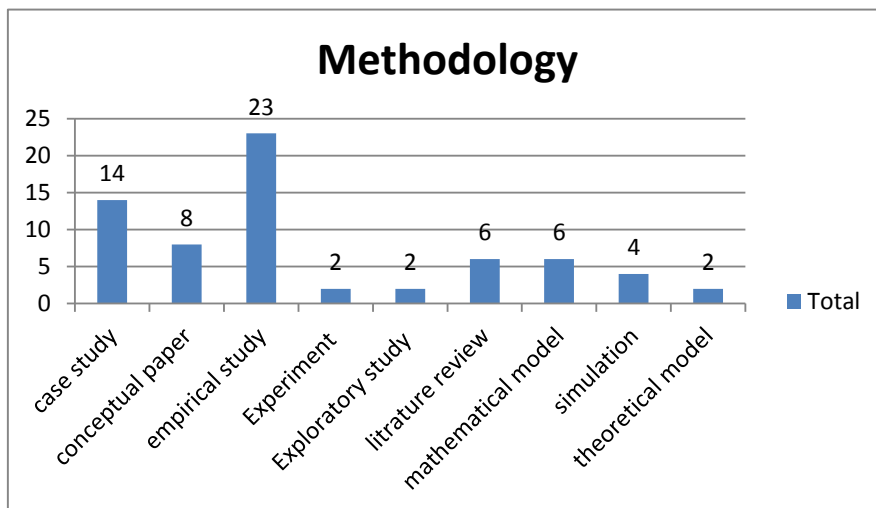


Figure 4. Methodology wise classification of papers

#### 4. Conclusions and future research directions

After analysis of the 69 randomly selected research publications, it is quite evident that no study has been found in the Indian context with respect to supply chain collaboration. In the reviewed papers a balance between empirical study type papers and conceptual study type papers has been observed. The major focus of the papers is on manufacturing and a retailer organization has been observed. Based on analysis of the reviewed papers, 28 factors

affecting the supply chain collaboration have been identified. The supply chain collaboration and supply chain coordination are interchangeably used in the extant literature. In the reviewed papers, the development framework to measure supply chain collaboration and, testing of empirical association between supply chain collaboration and increased supply chain performance are two most highly research themes has been traced. In the reviewed papers the collaboration between manufacturing organization and their suppliers has been highly dominated. In very few papers, the downstream to manufacturing organization collaborations has been discussed. Therefore, here as research gap can be found to address the downstream supply chain collaboration as well as collaboration with more than one tier supplier. Further, the most of the authors argued that the role of information sharing is found to be highly significant in effective supply chain collaborations. The main identified benefits are; cost saving, inventory reduction, increase visibility, reduction in bullwhip effect etc. So, we can conclude here that there is a greater need to study: collaboration in supply chain, the antecedents and benefit of information sharing in Indian manufacturing organizations.

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