

The Effect of Buyer-supplier Partnership and Information Integration on Supply Chain Performance: An Experience from Chinese Manufacturing Industry

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Abstract — Coordination, collaboration, and cooperation are often used in business term to enhance productivity and performance, in this way the partnership with supplier and information integration always play an important role in supply chain. This study investigates the effect of Buyer-supplier partnership and information integration on supply chain performance. The study also elaborates the development of trust and guanxi between suppliers and buyers for better business environment in supply chains. This study uses structural equation modelling to analyse data collected from 218 Chinese manufacturing industries. The Buyer-supplier relationship significantly affects trust and guanxi, which subsequently influences two elements of information integration, namely, quality information and real-time information. We found that Buyer-supplier partnership and information integration have a significant effect on supply performance. Furthermore, we found that trust and guanxi are pivotal role in sustaining better relationship between supplier and business for long run and growth.

Keywords—Buyer-supplier partnership, Guanxi, Information integration, supply chain performance, Manufacturing industry, China

1. Introduction

Supply chain performance goals that might be difficult to achieve by individual organizations alone, this efficiency can be achieved through value-based integration in business process. Hence, Buyer-supplier partnership and information integration activities in supply chain gained considerable importance in recent decades as an essential for staying competitive and enhancing performance. Researchers and practitioners have been emphasis on the good relationship between buyer and supplier to gain profitable business. Evidence showed that trust between buyer and supplier plays a crucial role in achieving information integration successfully in a supply chain performance [1]. By collaborating with its

suppliers, a firm can improve its ability to align supply and demand while ensuring costs are under control [2].

This, in turn, enables firms in the supply chain to capitalize on market opportunities ahead of competitors. The level of trust among partners in the supply chain is an important factor affecting information sharing throughout the supply chain, and for coordinating responses to market changes [3, 4, 5, 6]. The ability to integrate information sharing and partnership from multiple contexts can provide the firm with unique capabilities that are non-imitable and non-substitutable, enable them to transition processes quicker, reduce risks of process failure, improve customer service levels and consequently performance.

Furthermore, the use of IT in Information integration enhance strategic planning, forecasting, supply chain planning, master production scheduling, Inventory controlling, and offer techniques such as available-to-promise and capable-to-promise in supporting order acceptance throughout the supply chain. The information technology infrastructure of an organization is determined by its hardware and software resources that facilitate exchange of data through formal means [7]. This facilitates increased information sharing with the outsourcing partners and enables better coordination [8]. Shah et al. [9] suggest that supply chain practices like integration in supply chain and initiatives such as building long-term strategic relationships with suppliers require extensive use of IT and Web-based software. Firms that rely on partnerships with suppliers are better equipped to adapt to unexpected changes, identify and produce innovative solutions to organizational problems, and reduce monitoring costs, all of which help improve the economic outcomes [10].

In another hand, Buyer-supplier partnership provides organizations with multiple potential benefits, such as improve quality products, increased flexibility, reduce inventory levels, reduced total cost, and enhance supply chain as well as firm's performance. A good partnership

quality between the buyer and its supplier, based on mutual trust, fulfilment of promises and joint problem solving, helps in avoiding complex and lengthy contracts, that are expensive to write and difficult to monitor and enforce [11, 12]. Carson et al. [13] discussed that the influence of trust on performance in vertical R&D collaborations strengthens with buyers ability to understand the tasks involved. Similarly, Lahiri, Kedia, and Mukherjee [14] found that higher relationship quality between the buyer and the supplier leads to increased performance benefits when the management capability of the focal firm is also high. If buyer and supplier share a good relationship, they are likely to be more familiar with each other's information sharing which enhances the resulting performance.

By this study, we concluded that effective Buyer-supplier partnership and effective information integration are two important sources of supply chain improvement. While some firms emphasize improving supplier relationship, others emphasize leveraging the information integrations among supply chain partners. Since these two major approaches are not independent, firms must work on both Buyer-supplier partnership and information integration simultaneously. The benefit of such information integration can be attained through efficient linkage among various activities, and the linkage should be subject to the effective construction and utilization of various sources for integrated supply chain. Overall, findings reported in these studies indicate that the good relationship and real-time information sharing, higher the firm's and supply chain performance. This evidence has led to draw conclusions like increasing degrees of information integration will stimulate innovative activities, creation of new ideas, and ultimately higher performance.

The aim of this paper is to provide empirical evidence based on a sample as a basis for discussing whether buyer-supplier partnership and information integration can influence performance. This paper suggests that companies could achieve significant practical results by investing in both buyer-supplier partnership and information integration. The paper is set out as follows. First, we provide theoretical background from literatures hypotheses. Next, we develop the research model. We then describe methods and findings; an analysis of the results is then presented, followed by the implications resulting from the study and research limitations.

2. Literature review and hypotheses

As mentioned in the preceding section, the objective of this paper is to reveal the role of buyer-supplier partnership and information integration to

improve supply chain performance. Following literature review leads to the development of the proposed conceptual model and construct variables.

2.1 Buyer-supplier partnership

The key base of business success and supply chain management is emerging new competitive strategy in establishing cooperative relationship with its suppliers. Buyer-supplier partnerships have evolved towards a new form in order to respond to intensified competition. The effort towards closer co-operation between buyers and suppliers also results from the global and competitive market place that focuses on quality, cost, flexibility, and delivery which subsequently create a greater need to emphasize inter-firm collaboration with numerous business partners. Various researchers have been thus established the significant linkages between the construct of Buyer-supplier partnership and integration drawing on transaction cost analysis [15, 16].

To respond these challenges, supply chain management (SCM) is an important concept to effectively help a focal firm to manage its partners so that they can further build long-term partnerships [17, 18]. In supply chain partnership leads to increased information flows, reduced uncertainty, and a more performance. The ultimate customer will receive a better quality and cost-effective product in a lead time. In addition to improving operations, many manufacturers look externally to strive for competitiveness through the development of closer relationships with suppliers [19, 20]. The importance of collaboration in supplier relationships and the importance of information integration as a mechanism for improving supply chain performance are widely recognized and empirically proven [21, 22, 23, 24]. Information integration is an enabler for better information sharing, coordination and planning of the supply chain [25]. One of the most important ways through which manufacturers manage their supply chains is through the building of strategic supplier partnerships [26, 27]. Manufacturers that rely on high quality partnerships with suppliers are better equipped to adapt to unforeseen changes, identify and produce well-crafted solutions to organizational problems and reduce monitoring costs, all of which help to improve the economic outcomes [28].

In this study, we conceptualize Buyer-supplier relationship as a mutually beneficial relationship between a buyer and a supplier, which involves the development of trust and guanxi, and integration between the two parties [29]. In the present competitive business environment firms are continuously in the lookout for opportunities to

collaborate with suitable partners to ensure supply chain efficiency and responsiveness amidst dynamic market changes [30, 31]. Literature is full of studies that theoretically explain and discuss the importance of collaboration to counteract the bullwhip effect in multi-echelon supply chains but only few applications propose solutions to implement at a reasonable effort. Furthermore, only few studies address cases where real-time information is not possible or where the trade-off between the implementation cost and the potential benefits is not reasonable [32]. In the literature on supply chain management (SCM), the general opinion is that supplier contributes to improving various performance dimensions in the buying firm [33, 34, 35]. In fact, when buyers and suppliers behave in coordination with each other as part of a unified system they can gain several benefits as regards cost reductions, inventories, order fill rate, quality, customer satisfaction and profitability. A good relationship between the buyer and its supplier, based on mutual trust, joint problem solving and fulfilment of pre-specified promises, helps in avoiding complex and lengthy contracts, that are costly to write and difficult to monitor and enforce [36]. Huang et al [37] said that in supply chains with progressively mature buyer-supplier relationships, business practices should be designed based on many inter-personal and inter-organizational connections so that the relationship building between buyers and suppliers becomes even more effective than a formal contract. Buyer-supplier relationship elements such as cooperation, long-term commitment and information sharing have been found to have direct and positive associations with various performance dimensions [38]. After dealing with supplier for a long period of time smoothly, a buyer will have greater confidence in making Supplier integration, owing to its past experiences [39].

H₁: Buyer-supplier partnership positively affects supply chain performance.

H₃: Buyer-supplier partnership positively affects information integration in supply chain.

The basic elements building strong relationship between buyer and supplier especially in Chinese manufacturing industries are following:

2.1.1 Trust

Bachmann *et al.* [40] describe the interpersonal relationship, where the level of trust is thought to be function as alternative ways of controlling a partnership. Trust is defined by [41], the expectation that an actor (1) can be relied on to fulfil obligations, (2) will behave in a predictable manner, (3) will act and negotiate fairly when the possibility for opportunism is present. Trust is a

very powerful force that has such an impact in terms of decisions, actions and result in efficiency from both side supplier and buyer. Many studies argued that collaborative relationships rely on relational forms of exchange characterized by a high level of trust [42]. Narayanan *et al.* [43] said that the impact of collaboration on performance in buyer-supplier sourcing relationships can be positive, negative or neutral depending on the levels of trust. Specifically, in a buyer-supplier relationship, a high level of trust would create the motivation to open communication and be willing to take risks between partner firms. Trust among trading partners are required for effective supply chain planning and successful supply chain integration [44].

Trust plays an important role in building up strong relation between buyer and supplier for long term trading. Where a firm can trust its partner, both initial negotiations as well as ongoing relationship negotiations are eased. The risk of the partner behaving opportunistically is lessened in the presence of trust. Trust allows a firm to rely on the partner confidently [45, 46]. Trust in a partner implies their expertise and reliability. Greater efficiency in relationships and better performance are linked to trust. The success of supply chain rests on the degree of trust that the supply chain partners believe is in the partnership. For example, collaborative planning, forecasting and replenishment, a main driver for structural change in the supply chain optimization process requires information sharing, and such information sharing demands trust among and between supply chain partners.

H₄: Trust positively affects Buyer-supplier partnership in the supply chain.

2.1.1 Guanxi

Guanxi is defined as special personal connections that are bounded by an implicit psychological contract to follow related social norms such as long-term relationship, mutual commitment, trust and obligation [47, 48]. The word "Guanxi" in traditional Chinese describes how individuals in society form a social network where they can exchange favours and services between partners. This partnership can be between two individuals with different social status where the person with a lower status can benefit from the other at a higher status. In guanxi development between the buyer and the supplier, enhance communication and supplier trust, which in turn are positively related to supply performance.

The influence of guanxi on marketing and doing business in China is receiving heightened interest from both domestic and foreign researchers

because *guanxi* dominates business activities throughout China. Chinese economy has been developing and changing greatly, some traditional elements such as “*Guanxi*” and trust may still important in the business circle. Stanko and Bonner [49] studied the relationship between commitment and interpersonal tie strength, revealing that three of the four identified properties of tie strength (reciprocal services, mutual confiding and emotional intensity) were positively related to buyer commitment to the selling organization. Informal interaction patterns based on *guanxi* is one of the four key success factors for foreign direct investment [50] and *guanxi* can enhance long-term enterprise survival and growth in China

The Chinese have long been renowned for their emphasis on harmony in social relationships. The resources exchanged can range from moral support and friendship to favours and even material goods. The exchange of resources is said to follow the general principle of reciprocity: first, there is no specification as to when a person should return a received favour, rather, the exchange happens over time; second, the amount of exchange can be somewhat flexible. Hwang [51] classified *guanxi* into three categories: (1) Socio-affective, which refers to family and family-like relationships; (2) Instrumental, which refers to the type of *guanxi* involving exchanges of resource and material needs (such as the *guanxi* between sellers and buyers of goods and services); (3) Mix *guanxi*, which both feelings and material benefits are exchanged. In the modern Chinese culture, socio-affective *guanxi* is considered to be naturally stronger than other types of *guanxi* [52]. *Guanxi*-based business variables have a significant and positive impact on a venture’s financials and market performance in China.

H₅: *Guanxi* positively affects Buyer-supplier partnership in the supply chain.

2.2 Information Integration

Information integration refers to the sharing of key information along the supply chain network which is enabled by information technology (IT). Information integration is a key driver of effective and efficient supply chain by speeding up the information flow, shortening the response time to customer needs, providing enhanced coordination and collaboration and sharing the risks as well as the benefits [53]. Therefore, technological aspect of information integration is important, the quantity and the quality of information that is shared that really matters. One of the main purposes of information integration is to achieve real-time transmission and processing of information required for supply chain decision making. Benefits of information integration in supply chain networks

are a growing area of interest among researchers and practitioners from varied disciplines [54]. Information sharing significantly contributes in reducing supply chain costs [55], improving partner relationships, increasing material flow [56], enabling faster delivery [57], improving order fulfilment rate thus contributing to customer satisfaction, enhancing channel coordination [58], and facilitating the achievement of competitive advantage. Information is often inconsistent between upstream and downstream of supply chain partners [59]. Supply chain partners may have to forecast their market demands based on incomplete information. All partners thus require keeping higher stock for their products or components to immediately respond to market changes. As a result, this would cause the increase of production cost and the reduction of profit margin for partners. Information technology alignment among supply chain partners is beneficial to improvements in information sharing.

Moreover, supply chain resources and capability improve operational performance. This study does not consider information technology resources from the perspective of one firm but from the perspective of supply chains. There are numerous IT resources in a company, including computer aided design/engineering, computer-aided manufacturing, computerized production planning, electronic data interchange (EDI), and flexible manufacturing systems. The Internet helps supply chain partners exchange information on demanded products, available inventory, manufacturing process, and product delivery [60]. Effective information sharing relies upon an organization’s ability to employ an IT infrastructure in the vertical and horizontal distribution of information across the organization [61]. This means that a firm that is pursuing the effective construction of supply chain performance needs to pay attention to information integration using information technology.

The strategic supply chain information provides leverages to the supply chain partner for making strategic decision in their operations. For example, point of sale history helps suppliers to successfully forecast demand which subsequently improves service level and efficiency to their customers. Similarly, real-time inventory position helps suppliers to plan their replenishment and delivery schedules; thus, improving service levels and reducing inventory costs [62]. As Frohlich and Westbrook [63] suggested, the material flow from upstream to the downstream supply chain entities must be supported by the information flow from downstream to upstream. Based on five case studies of dyads (supplier–retailer), Sheu et al. [64] found that better IT capabilities as well as better communication contribute to a better platform for

both parties to engage in collaboration, participation, coordination, and problem-solving activities. Thus, both information technology and information sharing can be viewed as antecedents to material flow integration. Information integration is the inevitable choice for development of chain and improvement of competitiveness. It is also the basis of profit among enterprises. The core enterprise plays a key role and is responsible for the coordination of integrated information management.

H₂: Information integration positively affects supply chain performance.

2.2.1 Quality Information

Quality of information is the prerequisite for the development of network information sharing. It is the fitness for use of the information provided from the essential characteristics of information integration. Information sharing solve the optimization of the quality of information and the highest efficiency of sharing level, in order to achieve the value of quality information. Information sharing is seen as the fundamental capability in managing the flow of information in the supply chain process [65]. "Quality" is often perceived as subjective and the quality of information can then vary among users and among uses of the information. Nevertheless, a high degree of quality increases its objectivity or at least the inter subjectivity. Accuracy can be seen as just one element of quality information but, depending upon how it is defined, can also be seen as encompassing many other dimensions of quality. Wang and Strong [66] propose a list of dimensions or elements used in assessing Quality of Information is:

Intrinsic QI: Objectivity, Accuracy, Believability.

Contextual QI: Timeliness, Relevancy, Value Added, Quantity of information.

Representational QI: Completeness, Coherence, Interpretability, Format, Compatibility.

Accessibility QI: Access security, Accessibility.

Quality of information is a relatively new concept to many organizations. With the growth of storage and increase in data collection, and the mining of that data for further business process, the quality of the information produced becomes increasingly important. Bad and un-complete information can lead an organization to squander resources on ineffective project, but quality information can ascertain needs, direct targeted services and create higher performance in every day work.

H₆: Quality of information positively affects information integration in the supply chain.

2.2.2 Real-Time Information

The knowledge flow of real-time information would be one of the critical information transactions between parties [67]. It is necessary to develop a collaborative system that allows information-sharing between parties, and is capable of obtaining real-time information and providing decision support is needed. The suggested collaborative system is a web-based system which enables a lower implementation cost in comparing to ERP system. In addition, RFID has been suggested to provide real-time data for the information-sharing system. Real-time information capturing technology which enables the tracing of items and ascertaining of the production status on the shop floor, they are the Barcode system and the Radio Frequency Identification (RFID) system. As information is located in separated locations, the cooperation and communication between functions are difficult [68].

Due to real-time information access controlling ability of manager has been greatly improved. Meanwhile, it is faster to obtain information and make enterprises at each node of the supply chain and their internal departments form the "collaborative chain" which is based on the information sharing. Sharing local and global information improves forecasting and inventory control processes in order to gain inventory stability, assuming that all the supply chain partners have a real-time access on information [69, 70]. The product designs, required materials, and production schedules are shared among planners, designers, subcontractors, and customers. The system obtains these data in various ways, including inputting manually, obtaining from enterprise resources planning (ERP) systems, importing from software files, and capturing from RFID. To provide firms with a suitable decision framework for partner selection Further, the sharing of information can be facilitated by the advances in information and communication technology (ICT), for instance, more powerful information processing capabilities enable real-time information sharing with partners [71].

H₇: Real-time information positively affects information integration in the supply chain.

2.3 Supply chain performance

Supply chain is defined as a system of buyers, suppliers, manufacturers, retailers, distributors, and end-user where goods/services or material, financial and flows of information connect

participants in both directions. The Supply Chain Performance of a firm refers to the performance of the various processes included within the firm supply chain function. Neely *et al.*, [72] define performance measurement as the process of quantifying the effectiveness and efficiency of action. It has been argued that measuring supply chain performance can facilitate a greater understanding of the supply chain, positively influence actor behaviour, and improve its overall performance [73]. In this study, we examine a focal firm's supply chain performance for the relationships with partners. Traditionally, most studies have assessed organizational performance based largely on financial indicators. These indicators are important to assess whether operational changes are improving the financial condition of a firm's, but insufficient to measure supply chain performance. These indicators do not relate to important organizational strategies and non-financial performances, such as product quality and customer satisfaction

More specifically, several studies have proposed a classification for supply chain strategies with the nature of different products, such as efficient supply chains for functional products and responsive supply chains for innovative products. With the development of SCM, domestic and foreign experts and scholars put forward a number of different the performance assessment system of supply chain. Their studies indicate that supply chain performance affects more than 85% of manufacturer's costs and a large percent of its revenues. Different methods have been proposed for the performance evaluation of supply chain. Miao and Wang [74] implied that product-related characteristics are crucial in determining the types of supply chain strategies either more efficient or more responsive, and accordingly, are considered as the potential measures of supply chain performance.

Lot of research has been done in the area of supply chain performance improvement including reducing information asymmetry, reducing lead time, taming bullwhip effect, and minimizing total costs. A fundamental requirement to achieve that is to share information among the supply chain members. For example, Hsieh *et al.* [75] stated that information orientation and information collection could effectively reduce information asymmetry. Hou *et al.*, [76] reported that better coordination and revenue sharing could reduce lead time and transaction uncertainty in supply chain. De-Treville *et al.*, [77] discussed two perspectives, i.e. supply chain and demand chain, and investigated the role of lead time reduction in improving demand chain performance. Many other studies have confirmed

that information sharing is an essential mechanism to reduce the bullwhip effect [78, 79].

3. Research Model

A research model (Figure 1) is designed to verify the performance of supply chain on the basis of buyer-supplier partnership and information integration in supply chain management. The research herein, empirically tests the linkages of supply chain performance with buyer-supplier partnership (Trust, Guanxi) and information integration (Quality information, Real-time information) with suppliers. Moreover, basing the argument on the lack of explicit research especially in Chinese manufacturing industries regarding the relationship among buyer-supplier partnership, information integration and supply chain performance, the research investigates the relationship in consideration. Figure 1.

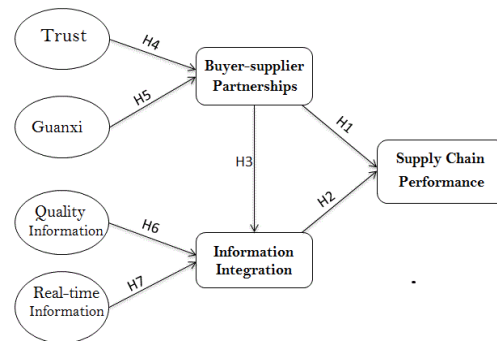


Figure 1 Conceptual Model for Supply Chain Performance

4. Research Methodology

4.1. Sampling

Our empirical study involves the supply chain performance on the base of buyer-supplier partnership and information integration in manufacturing Industries in China. Chinese firms have a long tradition of using relational ties (guanxi) to conduct business, though the use of contracts has become more prevalent with economic reforms.

A survey study was conducted to collect empirical data through questionnaire. The questionnaire was developed in English first and then translated into Chinese by Business Administration Faculty of China University of Geosciences. The instrument used to test the hypotheses was a mail survey and includes a two-part questionnaire and part-I collects basic information about organizational characteristics including industry type, annual revenue, and number of employees,, as well as

respondent characteristics including working experience, education level, gender. The part-II was consist of constructs of this study used five-point Likert scale for factors as independent variables Buyer-supplier partnership(Trust, Guanxi) and information integration (Quality information, Real-time information) and one dependent variable Supply chain performance. These items were measured 5-point Likert scale and adapted from Ryssel et al. [80], Kwon and Suh [81], and Cheng at al. [82]. This draft questionnaire then was pre-tested with academics and practitioners to check its content validity and modified accordingly. The modified questionnaire was pilot tested to examine its suitability for the target population before large-scale mailing.

4.2 Data Collection

The target population for this study is manufacturing sector in China. The population consisted of procurement and supply chain professional across manufacturing firms. Data was gathered by the survey method. The final version of the questionnaire in Chinese language with cover letter indicating the purpose of the study research, measuring all the items on a 5 point Likert scale, was administrated to 800 target respondents. Survey data was gathered using 2 methods: in-person survey, and mail survey. The research object of this questionnaire is large and medium-sized manufacturing industries in China, The data was collected from 5 big cities of China (Shanghai, Guangzhou, Shenzhen, Hangzhou, and Wuhan) using email, private relationship and in-person approached to the Head offices, branches and industries from relative procurement and supply chain management responsible persons like chief executive, director, manager supervisor and the person handling operations matters. The email list of electronic procurement manufacturers, suppliers, and buyers was obtained from (www.alibaba.com) web site, where huge buyers and suppliers are registered.

The data collected from the industries are involved in industrial machinery, electronics, automotive, pharmaceutical, chemical, metallurgy, cosmetics, and others industry. Through email 107 questionnaires were responded out of 669 e-mailed and 13 of them were omitted due to being incomplete and in-person 131 questionnaire were collected and 7 of them were omitted due to being incomplete. The majority classified themselves as a buyers and manager level at their respective industries. The total 218 responses were usable for data analysis and the response rate of 27.25 %. This survey was done from July, 2014 to November, 2014.

5 Research Results

5.1 Demographic characteristics

A summary of the demographic and characteristic profiles of participating respondent and firms is shown in Table 1. The majority of the respondents were Electronics and Electrical industry 15.2% while, 12% from Health and Beauty, 11% from automotive, 9.6% from Metallurgy, 8.8% from Furniture and Fixture, 8.2% from Food and Beverage, 7.8% from Sports and toys, 7.4% from Chemical and Pharmaceutical 5.9% from Apparel (Textile and Accessories), 7.3% from other manufacturing sectors. The remaining sectors identified as "others" included printing and paper, medical equipment, and defence. In terms of firms' capital and other about respondent firm and respondent personal detail shown in table 1.

Table 1
Demographic Characteristics

Characteristics	Frequency	Percent
Industry Type		
Apparel (Textile & Accessories)	13	5.9
Automotive	24	11
Chemical and Pharmaceutical	16	7.4
Electronics & Electrical	33	15.2
Furniture & Fixture	19	8.8
Food & Beverage	18	8.2
Equipment (Machinery & Mechanics)	15	6.8
Health & Beauty	26	12
Metallurgy	21	9.6
Sports and toys	17	7.8
Others Manufacturing	16	7.3
Annual Revenue		
1-20 RMB Million	45	20.6
20-50 RMB Million	59	27
50-100 RMB Million	67	30.7
100-1 RMB Billion	24	11.2
Greater than 1 RMB Billion	23	10.5

Departments		
Procurement Department	96	44
Supply Chain Management Dept.	26	11.9
Operational Department	15	7
Head Office of Industry	68	31.2
Others	13	5.9
Gender		
Male	117	53.7
Female	101	46.3
Respondents Age		
Below 25 Years	27	12.5
25-30 Years	68	31.2
31-35 Year	56	25.7
36-40 Years	46	21
Above 40 Years	21	9.6
Job Level		
Chief Executive	16	7.3
Director	27	12.4
Senior Manager	48	22
Manager	92	42.3
Supervisor	35	16
Education Level		
College degree	22	10
Graduate	74	34
Post-Graduate	97	44.5
Doctorate	8	3.7
Others	17	7.8
Job Experience		
1-5 Years	19	8.7
6-10 Years	36	16.5
11-15 Years	74	34
16-20 Years	48	22
20+ Years	41	18.8

5.2 Data Analysis

5.2.1 Reliability & Validity

PLS software was used to analysis the data, PLS is a structural equation modelling technique employing a component-based approach for estimation purpose. PLS allows latent variables to be modelled as formative constructs and places minimal demands on sample size and residual distributions. The evaluation was performed by two steps. The first step assesses reliability and convergent validity, and the second step is for discriminant validity.

Table 2

Descriptive statistics, item Loadings, Reliability and Validity (n=218)

Factors	Item No.	Item Loadings	A	AVE	CR
Buyer-supplier partnership			0.85	0.74	0.88
	BSP1	0.84			
	BSP2	0.81			
	BSP3	0.82			
	BSP4	0.78			
Trust			0.83	0.56	0.84
	TR1	0.78			
	TR2	0.82			
Guanxi			0.91	0.65	0.91
	GX1	0.88			
	GX2	0.82			
Information Integration			0.89	0.72	0.86
	II1	0.73			
	II2	0.85			
	II3	0.83			
Quality Information			0.84	0.57	0.82
	QI1	0.77			
	QI2	0.82			
Real-time Information			0.89	0.74	0.88
	RTI1	0.87			

	RTI2	0.81			
	RTI3	0.84			
Supply Chain Performance			0.92	0.77	0.91
	SCP1	0.88			
	SCP2	0.92			
	SCP3	0.86			
	SCP4	0.89			

RTI	0.18	0.40	0.42	0.29	0.36	0.84*	
SCP	0.21	0.14	0.16	0.25	0.45	0.38	0.88*

* Square root of AVE, Diagonal.

Correlations between Constructs : Buyer-supplier partnership (BSP), Trust (TR), Guanxi (GX), Information Integration (II), Quality Information (QI), Real-time Information (RTI), Supply Chain Performance (SCP).

The reliability of the survey instrument was tested using Cronbach’s alpha as a test of internal consistency for the constructs; buyer-supplier partnership, trust, guanxi, information integration, quality information, real-time information and supply chain performance. Cronbach’s alpha tests the interrelationship among the items composing a construct to determine if the items are measuring a single construct. The loadings for the measurement model presented in Table 1 indicate that reliability of items was examined by testing that item loadings were above 0.7 for all eight constructs. Reliability values over 0.70 are preferable [83]. The results show that the alphas range from .83 to .92 indicating that all three constructs have acceptable reliability. Convergent validity was assessed by three criteria: (1) item loading (λ) larger than .70 and statistical significance, (2) composite construct reliability larger than .80, and (3) average variance extracted (AVE) larger than .50 [84].

Next, discriminant validity was assessed by the criterion, the square root of AVE for each construct larger than its correlations with all other constructs. As it was indicated in Table 2, standardized item loadings range from .73 to .92, composite construct reliabilities range from .82 to .91, and average variances extracted (AVE) range from .56 to .77. In Table 3, the square root of AVE for each construct is larger than its correlations with all other constructs. Thus, these results show a highly acceptable level of reliability, convergent and discriminant validity.

Table 3
Correlations between Constructs and Validity

Construct	BSP	TR	GX	II	QI	RTI	SCP
BSP	0.81*						
TR	0.24	0.78*					
GX	0.22	0.28	0.82*				
II	0.32	0.15	0.23	0.81*			
QI	0.39	0.33	0.18	0.39	0.79*		

5.2.2 Hypotheses Result

PLS was used to analyse this structural model. The evaluation was performed by three steps. First, we needed to estimate path coefficient and statistical significance for the influential paths. Next, coefficient of determination (R^2) for endogenous variables was computed to assess their predicted power. Finally, it is necessary to examine the relative importance of the first-order indicators for the second-order constructs in terms of indicator weights [85].

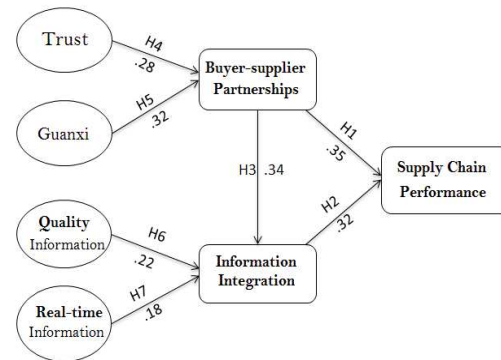


Fig. 2 Structure Equation Model of Hypothesized Research Model

Figure 2 presents the results of the structural model. In the buyer-supplier partnership, we found that trust, and guanxi, are reported as important antecedents ($p < .01$). Their path coefficients are .28 and .32. Hypothesis 4 and 5 are thus accepted. They jointly explain 36% of the variance in buyer-supplier partnership ($R^2 = .36$). In the information integration, quality information and real-time information are significant at ($p < .01$). Their path coefficients are .22 and .18 respectively. Hypothesis 6 and 7 are thus accepted. Similarly, buyer-supplier partnership had a significant impact on information integration with path coefficient, .34 ($p < .01$). Hypothesis 3 is thus accepted. Both buyer-supplier partnership and information integration were important in determining supply chain performance ($p < .01$) with path coefficient, .35 and .32. Hypothesis 1 and 2 are thus accepted. They jointly explain 35% of the variance in supply chain performance ($R^2 = .35$). According to our research model, path coefficients for both buyer-supplier partnership and information integration to supply chain performance are significant at same magnitude ($p < .01$).

6. Discussion of the findings and their implications

This study contributes to the research on supply chain performance by investigating the relationships between buyer-supplier partnership, information integration and their effect on performance. In general, the results of this research provide empirical evidence that effective relationship between buyer and supplier, and use of information integration in supply chain management. The findings show an important link between buyer-supplier and information integration and this strong link between buyer-supplier partnerships and information integration further imposes significant impact on supply chain performance. As Wu et al. [86] revealed that the degree of trust and information sharing enhance buyer-supplier relationship. The level of quality information between supply chain partners facilitates the integration of the supply chain management business process. We can argue for a fact that buyer-supplier partnerships plays an important role in achieving supply chain performance through the antecedent of information integration, although information integration also has positive impact on supply chain performance.

First, in maintaining buyer-supplier partnerships, a high level of trust would be the initial belief of participants to be willing to take risk in building partnership relationship. Without building the initial belief for their partners, the other issues in social exchange, such as *guanxi*, real-time information would not be possible. Therefore, a high level of trust is the basic fundamental to enable the building of a long-term collaborative strategy. The finding indicated that establishing strong partnership between supply chains parties need to develop mutual trust aiming for achieving mutual benefits from their relationships. Such mutual benefits have been instrumental in determining the effects of information integration as shown in the study of [87]

This study also presents evidence for the impact of firms' *guanxi* policy on supply chain performance. As discussed earlier, since performance play competitive role in a firm by coordinating the flow of goods and services from the suppliers the firm's *guanxi* policy is likely to affect supply chain and information acquisition, especially in *guanxi*-oriented China. Buyer-supplier relationships are also strengthened by the strong *guanxi*. When one party performs a favour, the other parties may perceive them as a form of "debt/favour" that should be repaid. This "debt/favour" consequently deepens and strengthens the buyer-supplier partnership, and then enhances the *guanxi* network as a whole. Therefore, *guanxi* is an important factor

in establishing and maintaining business relationships in China [88].

Second, it demonstrates that the integration of quality information and real-time information needs to make future planning decision in supply chain operation. By integrating the supply chain information, supply chain partners can virtually work as a single entity which will enable them together to respond to market's demands. The importance of having material and information integration has provided both opportunities and challenges for business firms today. The increasing rate of competition, buyer's expectations, and market's dynamic has increased the supply chain uncertainty which poses greater risks for companies. In addition, operational activities have become more fragmented as firms get more focused on the core competence and relinquish the non-core activities to their suppliers whose locations could be geographically dispersed. This trend calls for the need for building a solid integration mechanism between business entities of the supply chain members underpinned by accurate and timely information.

The study also highlights that both buyer-supplier partnerships and information integration have a relatively similar effect on supply chain performance, signifying their equal importance. Management need to build both aspects before they can see the real benefits derived from supply chain integration. While information sharing is considered as a high-level concept of collaborative effort, they are both significant in influencing supply chain performance at same magnitudes. Partners in the supply chain need to share various types of information, including inventory, production, order, delivery, and demand forecast, and this will further facilitate collaborative behaviours in the execution of inter-firm process activities, such as market response, product design, and problem solving. This finding reinforces the importance of buyer-supplier partnership and information integration in supply chain practice. According to the relational view theory [89], firms need to complement their internal capabilities with other capabilities which they cannot build internally in order to achieve competitive advantage. This finding therefore suggests that while supply chain integration in terms of both information and materials are important parts of the overall relationship with suppliers, they alone will not maximize the benefits which firms can derive from the suppliers.

Finally, the successful implementation of information integration in supply chains primarily depends on trusting relationships, as well as the influence of institutional factors conducive to such integration. It is a strategic decision to trust a

trading partner with critical information. In other words, Chinese firms customarily establish guanxi networks with carefully selected trading partners to build trust and seek assurance of government support to prevent problems or resolve conflicts before they engage in information integration. Managers should recognize that China, as an emerging country, continues to undergo dramatic transitions and changes in Chinese social structure may mean the diminishing importance of guanxi. Therefore, managers should consider the rapidly changing influences of institutional forces in China before adopting various supply chains practices, including information integration and collaborative planning.

6.1. Limitations and future research

This study has several limitations and thus has some recommendations for future research. First, the research examined buyer-supplier partnership and information integration effect on supply chain performance in Chinese manufacturing industry. Future studies can extend the study by examining other sectors that are not located in China. Second, our research only focused on several key aspects of buyer-supplier partnerships and information integration, especially guanxi in Chinese culture. Future studies can consider extending our model to consider other culture social bindings improving strong relationship between buyers and suppliers. Lastly, our research model may be applied in other Asian countries, such as Pakistan and Malaysia, where the relationships have been found to have similar influences on supply chain collaborations. Future research work can collect data from other developing or Asian countries and conduct a cross-country comparison.

7. Conclusions

This study shows that both buyer-supplier partnership and information integration are important for supply chain practice, having significant effects on performance. At the same time, quality information and real-time information acquisition is a difficult task as it involves many management aspects in terms of information exchange mechanisms in support of the supply chains activities concerning the goods/services, inventory, and physical material flow between the two parties. Such complex issues can only be managed where there is a better relationship between supply chain partners. This finding parallels that offered by Dyer and Chu [90]: trust and guanxi in exchange relationships contributes to superior information integration and improves coordination and joint efforts to minimize inefficiencies. This study, therefore, reinforces the importance of building better relationships with suppliers which have been promoted since the

emergence of the quality management era. All in all, competitive performance is positively affected by all constructs included in this study. This suggests that good buyer-supplier partnership and the integration of information in supply chains is multi-faceted, and that many competencies act complementary to achieve a higher level of performance.

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