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Building global logistics competence with Chinese OEM suppliers

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Abstract

In today's global economy, Chinese manufacturer networks serve as an important manufacturing base for many goods. Leading companies in those industries inevitably cooperate with Chinese manufacturers to build their global logistics capability to serve increasingly demanding customers worldwide. Many scholars have noted that guanxi (*connections*) relationships are a key practice of doing business with the Chinese. This paper presents a theoretical framework and empirical evidence on how to enhance global logistics competence by leveraging guanxi relationships with Chinese suppliers. Relationship development or network building between organizations is critical for corporate success in all parts of the world, not just in Chinese society. Results suggest that resource integration, manufacturing flexibility, and IT infrastructure capacities are positively associated with global logistics competence. The impacts of information sharing and asset specificity on global logistics competence are not significant. It is interesting that we found that guanxi serves as a moderating influence and it interacts with information sharing, resource integration, and manufacturing flexibility. Managerial implications are also discussed.

Keywords: Logistics competence; Guanxi; Networks; Manufacturing flexibility

1. Introduction

Global logistics is a complex inter-organizational process. For example, a single global shipment of toys requires an average of 27 parties to complete. Thus, to build global

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logistics competence poses a major challenge for manufacturing-based companies. *Business Week* [1] reports that both dot-coms and Old Economy companies are now paying more attention to collaborative logistics. Using the latest information and communication technologies to interconnect manufacturers, retailers, and transporters, these companies can easily exchange information with others. However, the use of information technologies is not all that is necessary to enhance global logistics competence. It is even more important to effectively manage the relationships with all supply chain partners. As such, relationship development or network building between organizations is critical for corporate success in all parts of the world, not just in Chinese society [2]. In today's world economy, Chinese manufacturer networks serve as important production bases for many goods ranging from sport shoes and umbrellas to cellular phones and notebook computers. Leading companies in those industries inevitably must cooperate with Chinese manufacturers to build their global logistics capability to serve increasingly demanding worldwide customers. Many scholars (e.g., [3–5]) have noted that guanxi (or connections) relationships are a key business practice in China. Unfortunately, little empirical work has been done to investigate the role of guanxi in the logistics and supply chain literature. Thus, this paper presents a theoretical framework and empirical evidence on how to enhance global logistics competence by leveraging guanxi relationships with Chinese suppliers.

2. Literature review

2.1. Global logistics competence

Global logistics competence is an important strategic asset for manufacturing firms to compete in the current global environment. To survive in today's business world "not only requires better use of logistics resources to coordinate geographically dispersed manufacturing and marketing activities, but also has created a situation in which supply chain efficiency and effectiveness are critical to success" [6, p.105]. Logistics competence, such as customer responsiveness and competing on time, can be valuable resources for corporate strategy [7]. Stank and Lackey [8] further suggest that logistics "has been positioned as one way for firms to differentiate their product or service offerings by enabling them to serve select customers better than competitors or at lower a price for the same service level" (p. 93). As competition becomes intense, more firms are seeking to enhance customer satisfaction by providing outstanding distribution service in order to reduce the need to compete on price, product, and/or promotional differentiation. Lynch et al. [9] assert that distinctive logistics capabilities are a firm's critical strategic resource that provides for competitive advantage and contributes to overall firm performance. Some scholars [6] go even further to argue that a unique opportunity exists for logistics managers to position logistics capability as a central component of their firm's theory of business.

From a strategic planning perspective, Stank and Lackey [8] suggest that logistics competence should include positioning, integration, agility, and measurement. Of these, positioning is the selected strategic and structural approach to guide logistical operations. Integration denotes techniques used to achieve internal logistical operating excellence and development of external supply chain relationships. Agility is a measure of a firm's ability to determine and quickly respond to changing requirements. Measurement refers to the

degree to which a firm monitors internal and external operations. From a customer value perspective, Morash et al. [7] suggest that logistics capabilities should include delivery reliability, post-sale customer service, responsiveness to the target market, delivery speed, pre-sale customer service, widespread distribution coverage, selective distribution coverage, and low total cost distribution. Logistics competence can support the two value disciplines of customer closeness and operational excellence. The former stresses customer focus, which often embraces product differentiation and service enhancements from logistics competence such as time advantages or service quality. The latter stresses the internal operational efficiency that is related to product availability, convenience, product quality, and low overall cost. It is widely recognized that in order to gain and maintain customer loyalty, information and communication technologies are critical to the successful implementation of the integrated global logistics concept [10].

2.2. Guanxi in Chinese supply networks

Western companies may find that doing business effectively with their Chinese partners requires a different mindset since eastern and western businessmen differ in their processes of building business relationships. Classic marketing textbooks (e.g., [11]) tell us that western businessmen are likely to view buyer–seller relationships as short-term transactional ones. They may decide to invest in a relationship by developing trust and commitment if they can see the potential for long-term profit from the relationship. In contrast, eastern businessmen are more likely to start with building a good relationship with partners without initially considering business aspects, much less potential returns on investment [5]. Einhorn [12] reports that Legend, China's biggest PC maker, may enjoy an unfair advantage over foreign-based competitors because of its guanxi (or connections) with local buyers and suppliers. Vanhonacker [13, p. 18] suggested, "Guanxi, or personal connection, is powerful stuff, and it can divide the loyalties of the sales and procurement people your company depends on." Knowing how to leverage guanxi is the most important skill for businessmen to know in order to do business in Chinese societies. In the Chinese business world, guanxi relationships are characterized by mutual trust and the willingness to engage in activities that engender mutual benefits. The art of using guanxi can in many cases enhance transaction efficiency in long-term business relationships. Businessmen engaged in a guanxi relationship are expected to "have empathy for each other, maintain the relationship, do favors for each other, help those who need help, and fully reciprocate for all favors received"[3, p. 10]. Luo [2] finds that business behavior in the Chinese society revolves around guanxi, and any business connecting to this society inevitably faces guanxi dynamics so that "no company can go far unless it has extensive guanxi in its setting" (p. 43). Luo [2] identified guanxi as being: transferable, reciprocal, intangible, essentially utilitarian rather than emotional, and virtually personal. Therefore, guanxi relationships between organizations are established and maintained by individuals. When an individual leaves an organization, the individual can still benefit from the guanxi that he or she built for the organization while the organization loses that guanxi.

One of the explanations of why guanxi exists in Chinese societies is that there are high uncertainties in business exchanges in Chinese societies and high transaction costs for arm's length transactions. Consequently, such an environment would lead firms to "internalize" transactions to avoid market turbulence. Thorelli [14] notes that networking

can enhance a firm's competitive advantage by providing access to the resources of other network members. However, it is still unclear how guanxi utilization in a supply network relates to global logistics competence. Guanxi utilization may also interact with the antecedents of global logistics competence. For instance, the effect of manufacturing flexibility on global logistics competence can be mitigated when guanxi is heavily used in the network. Thus, guanxi utilization could damage the capability of manufacturing flexibility if some preferred buyers or suppliers unexpectedly interfere in the manufacturing processes to pursue their own business goals, rather than the logistics efficiency of the network.

3. Theoretical framework

In the literature, five factors influencing global logistics competence have been identified: IT infrastructure, resource integration [15], manufacturing flexibility [16], information sharing [17], and asset specificity [18]. Fig. 1 shows an integrative framework for global logistics competence. Guanxi is a moderator in this model.

3.1. IT infrastructure capacity

Byrd and Turner [19] define IT infrastructure as "shared IT resources consisting of a technical physical base of hardware, software, communications technologies, data, and core applications and a human component of skills, expertise, competencies, commitments,

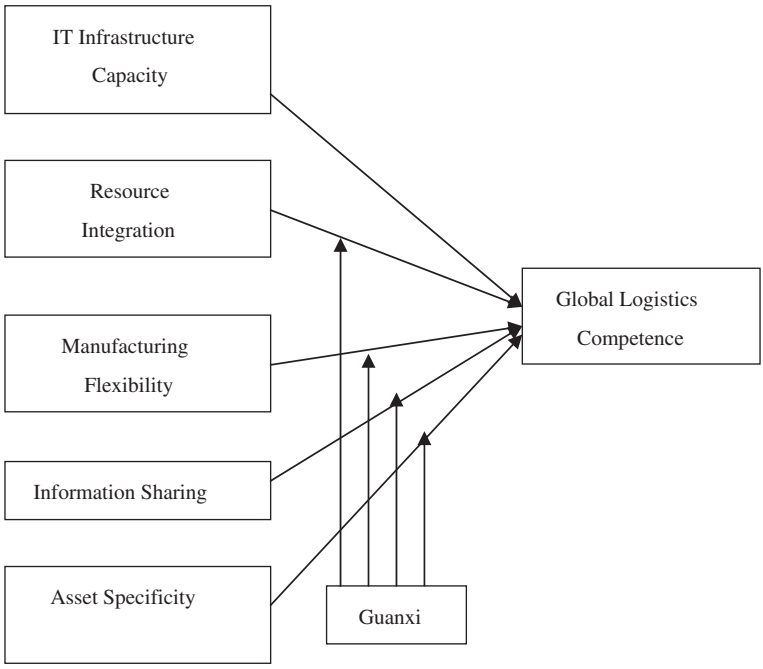

Fig. 1. A conceptual framework of global logistics competence.

values, norms, and knowledge that combine to create IT services that are typically unique to an organization'' (p. 172). Those IT services provide communication channels for data, information, and knowledge across the entire business, as well as for the development and implementation of global logistics and other business applications, tactics, and strategies. Duncan [20] sees the technical IT infrastructure as a set of shared, physical IT resources that form a foundation for various business applications. Henderson and Venkatraman [21] separate the concept of a firm's IT infrastructure into two components: (1) a technical IT infrastructure, and (2) a human IT infrastructure. The importance of the latter often exceeds the former. However, much attention has been paid to tangible IT resources including hardware and operating systems, network and telecommunications technologies, data, and core software applications because of their visibility and size of investment.

A recent special issue of *the Journal of Management Information Systems* addresses a subject of much debate among researchers: the relationships between organizational investment in information technology on one hand, and organizational performance and productivity on the other. Chatfield and Yetton [22] conduct a cross-case analysis to show that the strategic payoff of EDI (spell out) adoption is influenced by existing interfirm relationships. Sircar et al. [23] report that IT and corporate investments have a strong positive relationship with sales, assets, and equity. They also find that spending on information systems staff and staff training improves firm performance. IT investments in a variety of business domains and complementary assets (especially business process design and human capital) influence the firm's realization of value [24].

Advanced information and process technologies enable manufacturers to facilitate quick, frequent, and accurate information transfer among members of a supply chain [15]. In this way, the distortion of information as it passes up the supply chain from the end customer (known as the bullwhip effect) can be avoided. Tan and Kwan [25] report that facing intensified competition, firms need to compress their time-to-market by increasing their integration across functional departments and organizational boundaries. IT infrastructure competence is essential for networked firms to make decisions that make possible a faster introduction of new products to the market. A supply network with high IT infrastructure competence can thus reduce overall inventory and improve customer service quality by efficiently redistributing stock within the supply chain using strategies such as postponement and speculation [26]. Chou et al. [27] investigate whether different degrees of IT involvement lead to different processes that can lead to different outcomes, finding that IT intensity is positively associated with firm's decision-making performance. Dewan et al. [28] show that Internet commerce technologies and advanced manufacturing technologies offer significant advantages to early adopters, who gain can market share and profits. Drawing from the literature, the following hypothesis is proposed:

H1. The IT infrastructure capacity of an industry network relates positively to the network's global logistics competence.

3.2. Cross-organizational resource integration

Cross-organizational resource integration expands the notion of cross-functional integration beyond a single company to encompass all trading partners in the supply

chain (e.g., [25]). Suppliers, customers, third-party logistics providers, distribution centers, and relevant government agencies all share information and strategic plans to make the chain more efficient and competitive. A resource-based view of the firm [29] sees it as an aggregation of various heterogeneous resources and competencies. The resource-based view of the firm also posits that firms compete on the basis of unique resources that are valuable, rare, difficult to imitate, and non-substitutable by other resources (e.g., [30]). Function capabilities can be upwardly integrated to create cross-functional capabilities such as new product development capabilities, customer relationship maintenance capabilities, and corporate venturing capabilities. We can extend this concept still further to say that firms' capabilities can be integrated into the interfirm capabilities of a business network, such as supply chain capabilities, industry standard establishment capabilities, and knowledge creation capabilities. In this sense, network product innovation capability extends the conventional notion of the resource-based view, in that interfirm partnerships can be seen as a cross-organizational setting to exchange, assemble, integrate, and deploy valued resources that are originally isolated by organizational boundaries. The Internet provides new channels of communication that companies can use to anticipate problems and respond quickly.

Organizational integration is "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment" [31, p. 11]. We extend this concept to cross-organizational integration that goes beyond the integration of resources distributed among partnering firms. Johnson [32] investigates the strategic role of interfirm relationships through strategic integration in a study of industrial equipment distributors, that showed dependence, flexibility, continuity expectations, and relationship age all encouraged the distributor's strategic integration of its supplier relationship. Johnson conceptualizes strategic integration as "connoting a progressive involvement between two firms in a relationship that implies combined resources, expanded joint capabilities, and enhanced competitive positions for the firms involved" [32, p. 5]. In Johnson's view, strategic integration involves intentional adjustment of strategic goals and objectives and strategic planning for competitive resources.

Participating firms can gain from the partnership with increases in shared information, streamlined and efficient transactions, cost savings, technological and process innovation, shortened lead times in product development, joint marketing programs, and shortened response times, all of which contribute to value creation [33]. Broadly defined, the scope of supply chain management should include all value-added activities, including the extraction of raw materials, transportation, the transformation processes, distribution channels and delivery to end users. Supply chain management spans firm boundaries and treats the firms within the value chain as an integrated virtual business entity. Wisner and Tan [15] maintain that the essence of "integrated logistics systems" is to manage inventories through strong partnerships with suppliers and transportation, distribution, and delivery services in order to replace high inventory levels with frequent communication and sophisticated information technologies to provide coordination and synergy. Drawing from the literature, the following hypothesis is proposed.

H2. The level of cross-organizational resource integration of an industry network relates positively to the network's global logistics competence.

3.3. Manufacturing flexibility

Increased environmental uncertainty engenders the need for flexibility to adaptively respond to unpredictable environmental changes [34]. Flexibility enables manufacturers in a global logistics network to respond quickly and efficiently to dynamic environmental and market changes. Manufacturing flexibility has been broadly described as the capability of a manufacturing system to deal with environmental uncertainties [35]. In a global logistics system, manufacturing flexibility is affected by all activities and events along the supply chain, such as supplier defaults on delivery and quality, machine breakdowns, variable task times due to demand volatility, and competitive action [16]. For a manufacturing firm, manufacturing flexibility is the capability of its strategic positioning among different volume/variety trade-offs.

The results from a manufacturing futures survey indicate that firms emphasize manufacturing and design flexibility, customization, and product variety [36]. Flexibility should be a measure of how a manufacturer responds quickly and efficiently to market changes. Although the importance of flexibility for a firm's manufacturing excellence is well recognized, the way to achieve manufacturing flexibility has not been extensively studied. Sethi and Sethi [37] suggest that both infrastructure and organizational factors strongly influence the level of flexibility. Chandrashekar and Schary [38] claim that supply chains can achieve organizational flexibility in two ways: through organic change or through modularity. Narasimhan and Das [16] assert that manufacturing flexibility is influenced primarily by process technology and by strategic sourcing. Manufacturing flexibility can be characterized in terms of range, time, and cost of change [39]. Vickery et al. [40] provide empirical evidence that performance in various dimensions of supply chain flexibility can be directly related to overall firm performance. In a recent study, flexibility was shown to be significantly related to financial and marketing performance. Consequently, the following hypothesis is proposed.

H3. Manufacturing flexibility of an industry network relates positively to the network's global logistics competence.

3.4. Information sharing

Penrose [29] first recognized the role of knowledge in business management, stressing that knowledge is the important intangible resource for the growth of the firm. However, knowledge is difficult to transfer and communicate across organizational boundaries. Inkpen and Crossan [41] point out that for learning strategies to be viable, firms must overcome the ambiguity associated with their partner's skills. The inert nature of knowledge is one of the reasons why a buyer/supplier partnership is a more viable governance structure than an arm's length market transaction. Information sharing refers to the ability to exchange, assemble, integrate, and deploy valuable information across organizational boundaries. By sharing information across organizational and functional boundaries, supply network partners can more precisely estimate market demands, so that market risk and inventory costs can be greatly reduced. Bowersox and Closs [17] advocate that the capability and willingness of a firm's functional areas including engineering, marketing, operations, and logistics to share their critical planning and operational information are prerequisites to internal integration. Similarly, supply network partners

must be willing and able to share both critical information and proprietary strategic resources in order to achieve external integration over the supply chain [42]. As a result, both internal and external information integration are critical to global logistics performance.

Abrahamson and Rosenkopf [43] suggest that firms often lack channels for sharing rich or reliable information with one another because they are unwilling to share such information in the first place. Facilitating information sharing itself does not guarantee successful global logistics effectiveness. The purpose of sharing information, among participating firms within a global logistics system, is to integrate distributed network resources to enhance supply chain effectiveness through communication, cooperation, and coordination. Ongoing healthy interfirm relationships provide both communication channels for sharing valuable information and a strong motivation for doing so. Closs et al. [44] provide empirical evidence that there is a positive relationship between information sharing, integration and overall supply chain performance. There should be effective and timely information sharing at all linkages of the global logistics system, such as the quality and availability of inventory needed from each entity within the supply chain. Drawing on this literature, we hypothesize that information sharing leads to superior global logistics performance.

H4. The level of information sharing in an industry network relates positively to the network's global logistics competence.

3.5. *Asset specificity*

Firms tend to consolidate their cooperative strategy by making substantial investments in the strategic partnership, even when changing environmental conditions would dictate that the alliance should be dissolved [45]. Manufacturers in a global logistics network often depend on the upstream and downstream supply chain partners to gain access to technological know-how and market information. The offering of manufacturing services often requires specific investments and capabilities of the third party, thus raising the transaction specificity of the manufacturing interfirm governance [46]. On the one hand, specific assets can enhance efficiency of interfirm cooperation and integration to achieve greater supply chain performance. Because of their investments in specific assets, manufacturers are easily locked-in to the relationships with their major buyers. On the other hand, Williamson [18] notes that economic exchanges characterized by high uncertainty, small numbers trading, asset specificity, and information asymmetry provide an opportunity for some parties to behave guilefully toward others.

Supply network partners are encouraged to make relationship-specific investments for the purpose of efficient coordination and communication with other members. The benefits of relation-specific investments do not entirely go to the manufacturers who commit to the investments. Bucklin and Sengupta [47] explore the role of asset specificity, uncertainty, and frequency on power imbalances in co-marketing alliances. The relationship between asset specificity and firm performance is not conclusive. Cooperative rent-seeking behavior might generate strategic flexibility that leads to dysfunctional consequences [45]. Greater cooperation increases reciprocal commitments of idiosyncratic and specialized asset investments to the cooperative effort, which, in turn, can jeopardize strategic inflexibility. Therefore, the following hypothesis can be tentatively proposed.

H5. The level of relationship-specific investment in an industry network relates negatively to the network's global logistics competence.

4. Research method

4.1. Data and samples

Manufacturers in Taiwan, generally small or medium size, play an important role in manufacturing and distributing a wide variety of products such as personal computers, electronic devices, and machine tools. Those products are not produced by vertically integrated manufacturers, but through networks of independent specialized manufacturers and these networks operate facilities and logistics systems worldwide. The industry networks of Chinese manufacturers provide a good research setting for managing global logistics competence. The majority of Taiwan's manufacturing companies are involved in global manufacturing business, and they are closely interconnected with each other in various forms of strategic alliances.

Data were gathered through surveys mailed to qualified informants in Taiwan's manufacturers. The first draft of the survey questionnaire derived from the conceptual model and together with a literature review, was presented to a class of 18 Executive MBA students of a prestigious private university. They all worked for manufacturing firms with job positions ranging from vice president, chief information officer, factory manager, to senior engineer. These Executive MBA students were asked to answer all the questions and to provide suggestions on the wording of each question. The survey questions were then modified to ensure that the respondents would clearly understand all of our question items. Before sending out the survey questionnaires, we conducted several telephone interviews with operations managers to ensure that the question items in the survey were appropriate and understandable. Whenever possible, the items in the questionnaire were based on previous studies in the relevant academic literature, with some adjustments for the specific research setting.

The initial sampling frame was a list of companies from the database maintained by the Ministry of Economic Affairs, Taiwan. From this database, we selected manufacturers in electronics, chemicals, and materials with 200 or more employees. After deleting some government-owned and some purely domestic manufacturers from the list, a total of 632 manufacturers were selected. The revised questionnaires were sent to chief production/operation managers. We collected 83 returned surveys from the first mailing. Two weeks after the first mailing, we sent the same questionnaires to the non-respondents and the second mailing yielded another 34 surveys. Of the 117 returned surveys, 104 were complete and used for regression analysis. This represents a response rate of 17 percent. This low response rate is possibly because Chinese managers are unwilling to answer questionnaires from unknown surveyors without guanxi.

5. Results

The research model was operationalized by question items in a five-point disagree–agree Likert scale. Each construct contained at least three question items. A summary of the multiple item constructs and their associated Cronbach's α values is provided in the

Appendix. All variables have been standardized. The Cronbach α value of those question items is 0.828, indicating that the measure is quite reliable. α coefficients of independent variables—IT infrastructure capacity, resource integration, manufacturing flexibility, asset specificity, information sharing, and Guanxi, are 0.79, 0.80, 0.82, 0.81, 0.77, and 0.84, respectively. An α level of 0.7 or above is generally acceptable [48]. α coefficients of all variables are above the acceptable level. We then can represent the scores of each construct with the mean scores of corresponding questionnaire items. Correlation coefficients among constructs in our model are shown in Table 1.

We are not concerned with the problem of collinearity in the consequent regression analysis since none of our variable pairs has a high correlation coefficient. The multiple regression technique seems to be an appropriate method for data analysis. Three regression models are shown in Table 2. Model A includes only the direct effects of five independent variables: IT infrastructure capacity, resource integration, manufacturing flexibility, information sharing, and asset specificity. Of these, only resource integration, asset specificity, and IT infrastructure capacity have significant effects on global logistics competence. Here, the F-value and R^2 are 7.76 and 0.284, respectively. Model B adds guanxi as an independent variable. The F-value and R^2 of regression Model B are 6.53 and 0.288, respectively, indicating that the effect of guanxi is not significant. In fact, the empirical studies do not have consistent results on the effect of guanxi on performance. For example, Chenet al. [49] found that there could be a negative effect of guanxi practices on trust in human resource management. In the third model, the interaction terms between guanxi and the other four independent variables were included. Here, the F-value and R^2 of regression Model C are 6.06 and 0.395, respectively, indicating that the interaction terms significantly improve the explanatory power on global logistics competence. We therefore accept Model C as a better model to explain global logistics competence. A test of the value of the variance inflation factor (VIF) yielded a value less than 1.5 for all the cases, suggesting that multi-colinearity is not a severe problem in our regression models.

It can be seen that adding the direct effect of guanxi (Model B) does not significantly enhance the R^2 value that resource integration positively contributes to global logistics competence and that asset specificity negatively impacts global logistics competences. Furthermore, the positive effect of IT infrastructure capacity on global logistics competence is also significant. However, the effects of information sharing and

Table 1
Correlation coefficients among research variables

	1	2	3	4	5	6	7	8	9	10
Global logistics competence										
Guanxi (GX)	.159									
Resource integration (RI)	.454	.321								
Manufacturing flexibility (MF)	.401	−.037	.441							
Information sharing (IS)	.282	.389	.523	.212						
Asset specificity (AS)	.009	.226	.218	.080	.286					
IT infrastructure capacity (IT)	.336	.168	.386	.290	.207	.285				
GX × RI	−.148	.214	−.134	−.101	−.101	.048	−.039			
GX × MF	−.081	.189	−.109	−.091	.059	.072	.065	.547		
GX × IS	−.329	−.038	−.105	.050	−.193	.059	−.074	.529	−.009	
GX × AS	−.102	.315	.093	.082	.115	.231	.112	.317	.044	.307

Table 2
Three regression models for global logistics competence

	Model A	Model B	Model C
Guanxi (GX)		0.073 ($p = .4542$)	0.118 ($p = .242$)
Resource integration (RI)	0.283* ($p = .011$)	0.260* ($p = .024$)	0.227* ($p = .045$)
Manufacturing flexibility (MF)	0.141 ($p = .141$)	0.166 ($p = .112$)	0.241* ($p = .017$)
Information sharing (IS)	0.100 ($p = .323$)	0.084 ($p = .425$)	0.043 ($p = .669$)
Asset specificity (AS)	−0.210* ($p = .027$)	−0.217* ($p = .024$)	−0.144 ($p = .118$)
IT infrastructure capacity (IT)	0.216* ($p = .024$)	0.214* ($p = .025$)	0.191* ($p = .037$)
GX × RI			0.200^{+} ($p = .078$)
GX × MF			−0.201^{+} ($p = .073$)
GX × IS			−0.317*** ($p = .001$)
GX × AS			−0.144 ($p = .183$)
F value	7.76	6.535	6.064
R^2	0.2837	0.2879	0.3947
N	104	104	104

$^{+}$Significance level at $p \leqslant 0.1$; *significance level at $p \leqslant 0.05$.
**Significance level at $p \leqslant 0.01$; ***significance level at $P \leqslant 0.001$.

manufacturing flexibility are not significant. Those results do not fit perfectly with the literature based on Western management practice. Interaction effects of the culture-specific variable, guanxi, may be needed to link statistical results to the literature. Model C includes interaction effects of guanxi with resource integration, manufacturing flexibility, information sharing, and asset specificity. Here, the R^2 value is significantly improved from 0.28 to 0.39, and the main effects are unchanged for resource integration and IT infrastructure capacity. The main effect of manufacturing flexibility becomes significant, which is consistent with the literature. The negative effect of asset specificity becomes insignificant when including the interaction effects of guanxi culture. The most interesting result of the interaction model is that there is a very high level of negative interaction effects of guanxi and information sharing. This implies that the effect of information sharing is reduced as the guanxi culture strengthens in a Chinese supply network. In an extreme case, when guanxi is intensely used, information sharing can have a negative impact on global logistics competence. Thus, guanxi utilization can be viewed as an informal communication channel, where information is shared through personal contacts, and with only a limited number of important persons. Therefore, in a Chinese manufacturing network a strong guanxi culture can endanger interfirm–information sharing mechanisms and the global logistics competence of the supply network. Guanxi also moderates resource integration and manufacturing flexibility. A strong guanxi culture can undermine the effect of manufacturing flexibility on global logistics competence but it can strengthen the effect of resource integration. When considering guanxi, both the main effect and interaction effect of asset specificity become insignificant. Asset specificity is a very important construct in the Western management literature. Guanxi is a strategic asset that must be carefully managed or it can become a liability [13]. The negative effect of specific asset investment on global logistics competence can be attenuated because of guanxi among managers and owners in a Chinese network. This may suggest that transaction cost analysis should be modified in a guanxi-oriented society.

6. Discussion and conclusion

This research provides an indication of important factors in global logistics competence, especially in the context of Chinese supply networks. Those factors include IT infrastructure capacity, resource integration, manufacturing flexibility, information sharing, and asset specificity. This study finds that cross-organizational resource integration, manufacturing flexibility, and IT infrastructure capacity positively affect global logistics competence. These results are consistent with previous findings in the literature [15]. However, the main effects of information sharing and asset specificity do not significantly affect global logistics competence in the Chinese supply networks. A possible explanation is that the Chinese way of doing business differs from that of Western businessmen and the most important construct in the Chinese society, guanxi, must be taken into account. Recently, some scholars have even considered guanxi as synonymous with bureaucratic corruption in a socialist market economy [50]. Though guanxi itself does not directly affect global logistics competence, it does mitigate the effects of information sharing and manufacturing flexibility, which theoretically have major impacts on global logistics competence. However, guanxi strengthens the effect of resource integration on global logistics competence and asset specificity becomes unimportant when taking guanxi into account. All the above evidence points to an explanation that guanxi in a Chinese society can be a substitute for transaction cost economics in the Western business systems. Inter-organizational governance mechanisms can be better explained by guanxi than by transaction cost analysis. Guanxi can serve as an informal mechanism to coordinate resource utilization across organizational boundaries and as an efficient communication channel that can interfere with other interfirm communication channels. Guanxi also serves as a prioritized coordination mechanism that can disturb formal manufacturing planning. Doing business in China, we must realize that personal guanxi relationships come first [13].

Guanxi culture could interact with information sharing, resource integration, and manufacturing flexibility. These findings are useful for managers dealing with interfirm partnerships and supply chain management. Accelerated by the advancement of new information and communication technologies, global sourcing, global production and global logistics have become a new trend in business practice. Both dot-coms and Old Economy companies are now paying more attention to collaborative logistics, and logistics competence is a new competitive weapon for global firms. Chinese manufacturers are important partners in the construction of an effective global logistics system. Suggestions made in the Western management literature, such as the use of new IT and maintaining manufacturing flexibility are still valid. However, some modifications must also be made to incorporate cultural factors, such as the use of guanxi relationship, which is a common aspect of business practice in Chinese society. Guanxi itself is just a way of doing business and may not improve or deteriorate the effectiveness of business transactions. It can indeed affect the ways firms interact with each other and manage interfirm relationships.

The findings presented in this paper were limited to analyses of self-reported survey data, the causal relationships between those findings and financial performance are beyond the scope of this research. Case studies of network partners on how their logistics systems work and how guanxi culture functions in the logistics systems would provide an informative complementary follow-up to this research. For example, efforts can be made

to understand how information-sharing mechanisms interact with guanxi utilization. The causal relationships between global logistics competence, supply chain effectiveness, and financial performance are also significant topics for future research. Future research should investigate the potential cultural impacts on interfirm partnership and supply chain integration. Further, guanxi as an alternative theory for determining inter-organizational governance mechanisms to transaction cost analysis demands more theoretical and empirical work.

Appendix

Multiple-item constructs and their associated Cronbach's α values

Constructs	Question Items	Cronbach's α
Global logistics competence	Ability to integrate global resources to meet global market Awareness of cross-culture business practices Managing international lead-time risk or uncertainty Knowledge of the location of core information/ experience or competencies worldwide for critical purchased items International negotiation skills and abilities	0.8284
Resources Integration	Having access to each other's resources Complementary in capabilities and resources Achieve synergy work together Participating the planning process of counterparts Sharing proprietary business information	0.7974
IT infrastructure capacity	Compared with our competitors, we use more advanced IT Compared with our competitors, we invest more on management information systems Communicating with our partners using new information and communication technologies Our and partner's MIS systems are compatible and easily connected	0.7854
Manufacturing flexibility	Shorter change-over time from one product to another High manufacturing adaptability Ability to provide rapid response to customer requests Ability to accommodate special or non-routine requests Ability to handle unexpected events	0.8184
	Sharing core process information and know-how	0.7676

Information sharing	Exchanging internal management information timely for each other's planning Sharing information about competitors and environments Sharing internal decisions with the partners that might be affected	
Asset specificity	Investing substantially on assets that are located according to counterpart's requirements and will lose value if the relationship is terminated Investing substantially on physical assets that are special designed according to counterpart's requirements and will lose value if the relationship is terminated Not profitable without the promise of counterpart's business Investing substantially on human resources to maintain the partnership that will lose value if the relationship is terminated	0.8051
Guanxi	Asking favor when needed Having built personal friendship with counterparts beyond business relationship Contacting each other whenever needed without regarding time, position Being willing to accept uncertain requests in the future	0.8375

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