

Examining the benefits of relationship quality and Guanxi in multimodal transport services

Maritime Business Review

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Poti Chaopaisarn
*Department of Industrial Engineering,
Faculty of Engineering, Chiang Mai University, Chiang Mai, Thailand*

Po-Lin Lai
*Department of International Logistics,
College of Business and Economics, Chung-Ang University,
Seoul, South Korea, and*

Sarinya Manowanna
*Department of International Trade and Logistics,
Graduate School, Chung-Ang University, Seoul, South Korea*

Received 20 March 2025
Revised 22 July 2025
30 August 2025
Accepted 31 August 2025

Abstract

Purpose – In the Asian context, the concept of “relationship” is ambiguous, as it goes beyond elements such as time or collaboration commonly found in the academic literature. The purpose of this research is to better understand relationships between multimodal transport services (MTS), logistics service value (LSV), relationship quality (RQ) and Guanxi (GX) on shippers’ business performance (BP).

Design/methodology/approach – A survey was conducted with data collected from the Thai National Shippers’ Council members, and a structural equation model was developed with proposed hypothesized relationships. The proposed empirical model was statistically validated.

Findings – The results have shown that both MTS and LSV show a negative impact on BP when moderated by RQ and GX. This indicates that the involvement of these two factors has a significant influence on shippers’ BP.

Originality/value – The results of this research can provide future researchers and practitioners with insights on understanding the impact of relationships in Asian countries.

Keywords Multimodal transport, Logistics service value, Relationship quality, Business performance, Guanxi

Paper type Research article

1. Introduction

Trade and transport networks have evolved through a series of dynamic developments. Modern transport practices such as multimodal transport service (MTS) and logistics service value (LSV) have emerged as key priorities from a shipper’s perspective, and these in turn have significantly affected the performance of utilised transport systems. Efficient transport and logistics management is considered a powerful source of competitive differentiation, not only in terms of cost savings but also because it enhances the quality of service offered by the provider. Effective and efficient logistic services can enhance shippers’ competitive advantage. Thus, transport and logistics management can be considered as a key success factor in the effectiveness and success of an organisation (Banomyong and Supatn, 2011). Recently, the impact of COVID-19 on global supply chains has led to a renewed focus on resilience and flexibility in multimodal transport systems (Ivanov and Dolgui, 2020).



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Maritime Business Review
Vol. 11 No. 2, 2026
pp. 165-183
Emerald Publishing Limited
e-ISSN: 2397-3765
p-ISSN: 2397-3757

DOI 10.1108/MABR-03-2025-0029

Inevitably, collaborative relationships between shippers and operators have received considerable attention, especially regarding their role in determining the impact of multimodal transport on performance. The term “relationship” in the context of transport has always been a critical pillar in the strategic business environment. Numerous studies have investigated the potential impacts of relationships in terms of efficiency, effectiveness, trust, flexibility, control, performance, fitness and risk (Crosby *et al.*, 1990; Sinkovics and Roath, 2004; Athanasopoulou, 2009). In the Asian context, especially in China or other Asian countries like Thailand, the term “relationship” is an ambiguous business concept, which encompasses more than just elements of long-term business relationships or short-term transactions as found in the Western literature (Davies *et al.*, 1995).

The term Guanxi (GX), briefly translated as personal connections/relationships, is deeply embedded in the mind-set of most Asian people and in every aspect of their personal and organisational interactions. Wong and Chan (1999) described GX as another type of relationship characterised by favour, trust and interdependence, which leads to insider-based decision-making in business transactions. According to Lee and Humphreys (2006), one of the main concerns facing investors in Chinese or culturally alike countries is the historic lack of legal stability or regulatory system and the consequent need to rely on trust-based personal relationships as a means of obtaining resources. Nevertheless, governed by unwritten norms of reciprocity, GX can be an effective tool to improve business performance (BP).

In the context of multimodal transport, the understanding of the impact of GX on BP is fuzzy. The steady rise in trade volumes suggests that new solutions and/or relationships are important issues to be explored. In this manuscript, an in-depth study of multimodal transport and trade implementation behaviour in Thailand is used as an exploratory case study for the understanding of GX and its impact on BP. Logistics and transport are predominantly practice-oriented and solution based with research outcomes that are methodologically shaped by operation research. This study extends the conceptual model originally developed by Chao (2011), which examined these relationships in the Thai shippers’ context. The main objective of this research is to explore the impact of MTS and LSV and their relationships related to shippers’ BP, as evidenced from the Thailand National Shippers’ Council (TNSC) perspective.

2. Literature review

2.1 The practice of multimodal transport

“Multimodal Transport” is a concept that can be defined as the combination of various types of transport modes used in a national or international transport operation, which provides door-to-door services, under the responsibility of one single transport operator. Practically, this particular concept is not new and may even have been practised long before the introduction of this terminology. Until the introduction of containerisation in the 1960s, the physical movement of goods had been through evolutionary changes of innovation in an attempt to achieve efficiency and effectiveness (Hayuth, 1987). As a component of international trade, multimodal transport has generated considerable commercial value for shippers in comparison to other alternative transport systems.

A multimodal service provider that is able to provide a high level of service to its shippers should be able to enhance shippers’ competitive advantage strategy through cost leadership and differentiation (Porter, 1985; Banomyong and Supatn, 2011). Recent studies emphasise the growing role of multimodal transport in enhancing global trade efficiency. Li *et al.* (2023) highlighted that digitalisation and AI-driven logistic solutions are transforming multimodal transport networks, improving operational efficiency and reducing costs.

The categorisation of MTS into Transport, Facilities and Communication and Information was derived through a systematic approach combining theoretical foundation and empirical validation. Given the limited literature specifically addressing MTS, a contextual analysis of white papers from international organisations (UNCTAD, UNESCAP, ADB) was performed alongside logistics service-related journal papers (Lai *et al.*, 2002; Lu, 2003; Yang *et al.*, 2009) to capture the comprehensive scope of transport services within the multimodal framework. The resulting

compiled list of services naturally grouped into three main categories—transport, facilities, and communication and information—which, adapting the work of [Williamson et al. \(1990\)](#), represent the core dimensions portraying multimodal transport operator (MTO) capabilities.

2.2 Relationship quality and *guanxi*

Regardless of the types of businesses or accuracy of service performance, without effective relationships, efforts to manage the flow of materials and information across any type of channel are likely to be unsuccessful ([Lambert et al., 2004](#)). Referring to the previous section, the establishment of a seamless working relationship with transport stakeholders reflects the MTO service quality. Therefore, the development of a positive relationship would allow both shippers and MTOs to obtain a competitive advantage through favourable rates and secured customer bases, respectively ([SLA, 2008](#)). Perhaps one of the most important issues for multimodal transport is the involvement of relationships in the establishment of transport networks and operations. In several service-related studies, the importance of personal interactions or relationships is recognised as an important means of getting satisfied customers ([Athanasopoulou, 2009](#); [Tate, 1996](#); [Crosby et al., 1990](#); [Parasuraman et al., 1985](#)).

In the work of [Crosby et al. \(1990\)](#), RQ is viewed as a higher-order construct composed of at least two general dimensions, trust and satisfaction. In their research, trust is defined as a confident belief that the service provider can be relied upon to behave in such a manner that the long-term interest of the customer will be served. Satisfaction is defined as an emotional state that occurs in response to an evaluation of customer experiences. By using these two dimensions in the measurement of RQ, they have found out that there is a significant influence on the customer's anticipation of future interaction with the service provider. Their results indicate that RQ serves as an indicator of the health and future wellbeing of long-term service sales. From the literature, RQ has long been accepted as an important pillar in management studies ([Sinkovics and Roath, 2004](#); [Athanasopoulou, 2009](#)).

While [Crosby et al. \(1990\)](#) originally conceptualised RQ as comprising trust and satisfaction, subsequent research has expanded this framework to include additional dimensions. [Wang et al. \(2004\)](#) argued that there is no consensus on which dimensions constitute RQ, incorporating customer satisfaction and brand loyalty as key components for maintaining long-term relationships. This study adopts a three-dimensional framework (Trust, Loyalty and Customer Satisfaction) following [Wang et al.'s \(2004\)](#) assertion that customer satisfaction and loyalty are essential components in relationship maintenance, with loyalty serving to strengthen provider-customer relationships and contribute to financial performance.

RQ and GX represent fundamentally different approaches to business relationship formation. While both frameworks focus on establishing successful relational exchanges through trust and commitment, RQ tends to operate within individualistic Western environments through formal agreements and rational decision-making processes, exhibiting limited transferability across contexts ([Athanasopoulou, 2009](#)). In contrast, GX operates within collective Chinese cultural contexts through favoritism and reciprocity mechanisms, demonstrating high transferability and creating privileged access to resources across generations ([Wong and Tjosvold, 2010](#)). GX specifically refers to social connections based on mutual interests that bond partners through reciprocal obligations and the exchange of favors.

This research uses GX as a mediating variable, which explains how intervention works, answering “how does the intervention work”. GX functions as a relationship commitment mechanism developing through social exchange processes, with meta-analytic evidence showing it enhances organisational performance through sequential development stages ([Mackinnon, 2011](#)).

The concept of GX is commonly used as a catalyst of interpersonal relationships. According to the literature, the involvement of “Face”, Favour and Affection has clearly defined its measurable dimensions. The concept of “Face” is an important factor that influences the social dynamics and behaviour of Chinese individuals ([Wong, 2007](#)).

The concept can be described as the building blocks of GX, which requires consistent attention and maintenance. However, similar to the measurement of RQ, there are no standardised measurements for GX (Athanasopoulou, 2009; Wong and Tjosvold, 2010). Nevertheless, many of the measurements found in the literature are perceptual or derived from pragmatist views. In this study, the measurement items were adapted from Lee and Dawes (2005) and Cai *et al.* (2010).

Recently, Zhang *et al.* (2024) have explored the role of GX in contemporary business environments, particularly in China and Southeast Asia. Their findings suggest that GX significantly enhances trust and long-term collaboration, reinforcing its importance in multimodal transport. Moreover, Li *et al.* (2023) argue that digital transformation is reshaping traditional GX dynamics by integrating AI-driven relationship management tools, allowing for more structured and scalable interactions.

2.3 Logistics service value (LSV)

According to Rutner and Langley (2000), LSV has been defined as “meeting customer service requirements while minimising supply chain costs and maximising partners’ profits.” For Mentzer *et al.* (1997), LSV is an important component of customer service, which provides the competitive advantage in the marketplace. According to Kent and Flint (1997), logistics has been a key source of the strategic advantage for firms. Firms are encouraged to understand the importance of material flow integration and how it is linked to value creation as a part of the firm’s objective. To create value, it is crucial for service providers to match the requirements of customers with their capability to provide service. Regarding the value framework of Sweeney and Soutar (2001), Wang *et al.* (2004) adapted the four dimensions of value by replacing “functional value” (price/value for money) with “sacrifice”. Through their customer focus group discussions and exploratory factor results, they have found that the use of monetary terms alone as a single dimension would be insufficient. Other non-monetary factors such as time, effort or energy may play an even more important role than price alone (Zeithaml, 1988). According to Langley Jr and Holcomb (1992), the fundamental nature of service value in the logistics context shares a similar foundation to service value in the marketing context, where service providers are trying to meet or exceed customer requirements through customer services. This manuscript adopts Langley Jr and Holcomb’s (1992) perspective of LSV with value measurements from Wang *et al.* (2004) and Sweeney and Soutar (2001). In terms of the measurement of value, customer perceptions of value are adapted to encapsulate the behavioural aspect of the shippers provided by the service operators.

2.4 Business performance

According to Mentzer and Konrad (1991), BP was defined as an analysis of both effectiveness and efficiency in accomplishing a given task. There are two common performance measurements that are commonly used in academic literature: financial and non-financial measurements (Hudson *et al.*, 2001). However, due to significant differences in the scale and structure of companies from the collected data, using real financial data in BP measurements may generate misleading results Flynn *et al.* (2010). Another type of performance measurement, which consists of similar measurement items to BP, is firm performance. According to Narasimhan and Kim (2002), firm performance is used to evaluate the effect of supply-chain integration on the relationship between diversification and performance. The construct was evaluated through sales growth, market share growth and profitability. It is worth noting that in Narasimhan and Kim’s (2002) research, the measurement items of firm performance are similar to Flynn *et al.* (2010). BP in terms of sales growth and market share growth aspects but lacks financial dimensions. The financial dimension of performance is found to be important because it indicates the well-being of a company’s BP (Brewer and Speh, 2000; Bourne *et al.*, 2002). The selection of appropriate performance measures is challenging due to the complexity and interdependence of supply chains (Flynn *et al.*, 2010). In the current

3. Research hypotheses and methodology

3.1 Research framework and hypotheses

Based on the research objective and the literature review, a research model is proposed and is statistically justified in the following section [Figure 1](#). The integration of RQ and GX as mediating variables in transport studies has previously been proposed by [Chao \(2011\)](#).

In order to understand the current role of RQ and GX in improving BP, research hypotheses were established for analysing the influences of MTS and LSV from shippers' perspectives. Regarding the relationship between MTS and LSV, little published conceptual and empirical evidence is available. By definition, LSV is frequently thought of in the context of something sold or exchanged (i.e. monetary exchange). Considering the MTS as a form of service unit, it can be seen as a concept that is created from an exchange of services between the transport service provider and the shipper ([Rutner and Langley, 2000](#)). Based on the perception of the received services, shippers' perceived value can be regarded as an overall assessment of the MTS with regard to the conceptualisation of value-for-money ([Sweeney and Soutar, 2001](#)). Furthermore, as value is created via operation and services, MTS can be seen as discrete activities that will affect shippers' service experiences. Therefore, in the present study, MTS provided by the MTO will influence the value received by the shipper. Accordingly, this study hypothesises that

H1. MTS has a positive effect on the shipper's LSV.

As multimodal transport operations have become more integrated with logistics, MTOs are challenged to seamlessly link and coordinate their own network of transportation modes, routing options, supply chain coordination, production, storage, finance and distribution functions in order to achieve efficient relationships with their shippers ([Rodinelli and Berry, 2000](#)). A significant body of logistics and transport literature regards relationships as one of the most important criteria in achieving competitive advantages in business or industry ([Crosby et al., 1990](#); [Lambert et al., 2004](#); [Wang et al., 2004](#)). Therefore, if the MTO is capable of providing win-win solutions for shippers' problems, then he or she is more likely to establish a relationship with them. Conceptually, MTS serves as an important means of evaluation for the development of RQ. In other words, the more satisfied that the shippers are with the services, the higher the impact of RQ will be. Thus, the authors argue that a positive impact of the RQ between shippers and MTO is driven by an increased level of MTS. Accordingly, this study hypothesises that

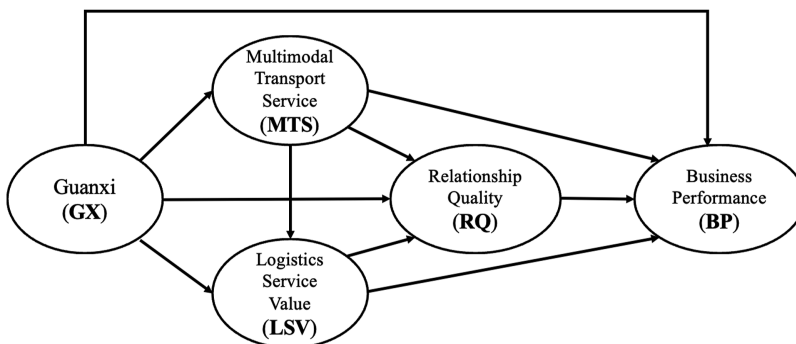


Figure 1. Main research model

H2. MTS has a positive effect on the shipper's RQ.

Although a strong relationship between logistics services and performance has been found over many years (Yang *et al.*, 2009), there is a longstanding debate on the robustness of the item development in the construct itself (Lu, 2003). Referring to the literature of the resource-based view (RBV) theory, there are basic assumptions that shippers should have the capability to effectively make use of services provided by their operator and to further increase their performance. In theory, RBV suggests that superior performance is dependent on how MTS leverages the resources of the service provider (Lai *et al.*, 2002). Deriving from this logic, the ability to properly allocate resources to satisfy the service needs of the shippers will largely determine performance. Regarding the relationship between service capabilities and performance, Shang and Marlow (2005) pointed out that the more satisfied the shippers are with the service operator's service capabilities, the better the company's BP. From a practical perspective, liner shipping companies like Maersk are constantly trying to use their resource advantages, such as their hub and spoke service network, to further exploit scale economies and to improve their BP (Fremont, 2007). Therefore, this study argues that MTS will have a positive effect on BP. Accordingly, this present study hypothesises that

H3. MTS has a positive effect on the shipper's BP.

The key role of service value has been well established in the logistics discipline over the past few studies (Langley and Holcomb, 1992; Rutner and Langley, 2000). Through conceptual and empirical studies, the understanding of value and relationships was grounded in the context of cost reduction through commercial exchange (Ulaga and Eggert, 2006). Some others argue that besides economic exchange, value also portrays dimensions such as customer satisfaction and loyalty (Wang *et al.*, 2004). A number of researchers have conceptualised value creation as a need when developing relationships between parties in competitive environments (Payne and Holt, 2001; Wang *et al.*, 2004; Ulaga and Eggert, 2006). As several previous studies show, service providers must be able to maintain the expected service level to ensure their relationship with the customer (Banomyong and Supatn, 2011; Wang *et al.*, 2004). A possible rationale for this assertion is that, if a transport service provider learns that a target shipper has shown a sign of relationship commitment, they would aim to increase the target shipper's perceived service value through specialised services to better fit their needs. Therefore, the authors argue that if the perceived value of the shipper increases, then his or her RQ with the MTO will also increase. Thus, this study proposes that

H4. LSV of the shipper relates positively to RQ with its MTS providers.

Building on the rationale of H1 (MTS-LSV) and H3 (MTS-BP), value is created through service, which is determined fundamentally by customer's satisfaction (Lambert *et al.*, 2004). Underpinning the transactional perspective of value, if an MTO provided services which exceeded a shipper's expectations, he or she would have a significant influence on the purchasing and repurchasing intention for future service needs (Wang *et al.*, 2004). Building on this assumption, for the MTO to secure the relationship, he or she would have to focus on the value in cost-benefit terms, which would gradually affect shipper's BP (Zeithaml, 1988). As service value is widely described as cognitive trade-offs between perceptions of quality and sacrifice (Wang *et al.*, 2004), this present study hypothesises that

H5. LSV of the shippers relates positively to its BP.

Conceptually, performance metrics are used to measure the consequences of RQ in the business-to-business context (Athanasopoulou, 2009). Lages *et al.* (2005) indicated that RQ is strongly associated with different dimensions of performance. According to Crosby *et al.* (1990), RQ from the customer's perspective relies on the service provider's integrity in constantly providing satisfactory services. As performance is often used to make assumptions of RQ, BP is likely to have an important effect on the evaluation of dyadic encounters between

the service provider and the customer (Zeithaml, 1988). In addition to obtaining non-obstructive performance measures, financial-related items are suggested to increase the robustness and reliability of the measurement in an international context (Neely *et al.*, 2005). Therefore, in this research, the authors argue that an increase in RQ will elevate the level of BP. Accordingly, this present study hypothesises that

H6. A shipper's RQ with its transport service providers has a positive effect on its BP.

Similar to traditional RQ literature, GX has been recently accepted to have a significant relationship with service capabilities such as MTS. However, few studies have examined the relationship between these constructs. In the context of logistics services, if a firm has delivered its promises in providing a certain service for a certain customer, then they are likely to be trusted (Jiang and Prater, 2002). Li and Lin (2006) pointed out that GX can serve as an informal mechanism to coordinate resource utilisation and as an efficient communication channel that may improve the effectiveness of business transactions. If one party fails to follow the rules of reciprocity and equity in a GX-based relationship, he or she will suffer loss of "Face" and be labelled as untrustworthy (Jiang and Prater, 2002). It is noteworthy that these studies have only been conceptualised but are yet to be operationalised. The researchers argue that if a shipper has a good GX with an operator, the shipper will be more satisfied with that particular operator because there will be very little psychological distance between them. Therefore, this present study hypothesises that

H7. Shipper's GX with its transport service provider has a positive influence on MTS performance.

According to Luo and Park (2004), there is a strong tendency that an improvement in GX will lead to a positive RQ between the buyer and seller. Under a corporate culture, GX has a strong emphasis on achieving mutual benefits between business partners through involvement of the use of personal or inter-firm connections to secure favours in the long run (Lee and Humphreys, 2006). Despite the conceptual difference found between GX and RQ, it is arguable that there are significant relationships between them. Even though there are no empirical studies that directly measure the causal relationships in between GX and RQ, some studies related to conceptual causal relationships could be found (Leung *et al.*, 2005). Based on the various dimensions of GX reviewed in the previous section, rational associations in between these two constructs display an extended horizon of relationship levels (Wong and Chan, 1999; Yang and Wang, 2011). In this case, when an individual establishes trust with another individual over a period of time, a certain level of GX will be developed, which would change the quality of the relationship in between each other. To this point, if a shipper positively exercises GX with his or her MTO, trust and loyalty will enhance the RQ between them. In other words, an increase in GX will lead to an increase in RQ. Accordingly, this present study hypothesises that

H8. Shipper's GX with its transport service provider has a positive influence on the RQ in between them.

As the concept of value is created around the context of cost-benefit, the importance of GX in relation to financial affairs will substantially contribute value through better market knowledge and sustainable organisational growth in the long term (Yeung and Tung, 1996). In addition, as value is driven by competition and self-interest, the level of transaction cost may be reduced through a dyad relationship between shippers and service providers (Arias, 1996). GX is essentially an important form of cultural construct that is expected to affect value through obtaining essential assets while retaining its importance in facilitating and smoothing business transactions. In short, if a positive GX has been established, a higher state of value is most likely to occur through possession of better market knowledge, market access, labour and quality. Therefore, the authors argue that a shipper's GX with its

transport provider will have an effect on the value of logistic services. Accordingly, this present study hypothesises that

H9. Shipper's GX with its transport service provider has a positive influence on its received LSV.

Based on the previous section, GX can be visualised as a catalyst for business improvement in both the service and industrial sectors based on the fact that it will significantly reduce the level of perceived uncertainty regarding the business environment, yielding a variety of improved performance outcomes. Furthermore, under a business-to-business dealings environment, long-term interactive relationship, such as GX, is to be stressed for long-term profitability, which will eventually lead to a better BP (Buttery and Wong, 1999; Wong and Tjosvold, 2010). Hence, efforts to establish GX will benefit parties by achieving a higher level of satisfaction and performance. Therefore, this present study hypothesises that

H10. Shipper's GX with its transport service provider has a positive influence on its BP.

3.2 Research methodology

This study employed a questionnaire survey using a seven-point Likert scale as the primary data collection method. The odd-numbered scale provided respondents with a neutral response option for questions they found uncomfortable, ensuring uniformity in statistical analysis. Given the established nature of the constructs examined, scales were adapted from prior research rather than developing new measures, following the most prevalent approach in academic studies for constructs with demonstrated strong psychometric properties (Hair *et al.*, 2010). Structural equation modeling (SEM) was conducted to examine the relationships between factors, as it represents the most appropriate multivariate analytical technique for estimating multiple and interrelated dependence relationships (Hair *et al.*, 2010). SEM handles both observed and latent variables, allowing researchers to manage large numbers of endogenous and exogenous variables as linear combinations of observed variables (Golob, 2003). The analysis employed a two-step SEM method: first assessing the measurement model through confirmatory factor analysis (CFA) and then testing structural relationships among latent constructs. All research hypotheses were analyzed simultaneously using SPSS and AMOS software packages, with the results described in the following section.

3.3 Data collection

In this study, an evaluation of the relationships among MTS, LSV, RQ and GX on shippers' BP was carried out. A research model was then developed to validate these measurement items and to test the relationships between them in the form of a SEM. This study thus uses SEM to analyse the data collected from the 2,782 Thai shippers listed in the Thai National Shippers' Council (TNSC). In total, 289 questionnaires were returned, yielding a response rate of 10.76%, which is considered acceptable (Wagner and Kemmerling, 2010). To examine for nonresponse bias, an extrapolation method was used. The first eighty received questionnaires were compared with the last eighty questionnaires, followed by a series of *t*-tests (two-tailed), which were conducted for all measurement items. The result showed that the two groups are not significantly different from each other at a 95% confidence level. The outcome of the *t*-test suggests that nonresponse bias is not considered as a serious limitation to the data analysis. The results of the structural model have shown that both MTS and LSV have a significant impact on BP through RQ, and GX gives positive support on all of its related paths.

In summary, this paper empirically develops a structural model that demonstrates the significant impact of MTS, LSV, RQ and GX on BP in a multimodal transport context. As a result, 287 questionnaires were collected from the shippers, and two questionnaires were

discarded due to incompleteness. A summary of measurement items used in this research is provided in [Appendix 1](#). Maritime Business Review

4. Empirical analyses

4.1 Descriptive status of respondents

The majority of the respondents were from firms that have been established for more than twenty years (54.2%). Almost 40% of the respondents indicated that the firm had been established for approximately eleven to twenty years. This shows the level of experience and establishment of the business. Regarding the ownership pattern, almost half (46.8%) of the respondents were local firms, while 24.1, 27.8 and 1.3% were foreign-owned firms, foreign-local and others, respectively. The figure also shows that half of the responding firms had fewer than 250 employees (48.8%), while 38% had more than 251 but less than 1,000 employees. Only 10% of the responding firms had more than 1,000 employees. Finally, the results show that 33.5% of respondents reported that their firms' annual revenue was more than 300 million Baht [1]; 13.6% had revenue between 201 and 300 million Baht; 15.8% had revenue between 101 and 200 million Baht; 24.9% had revenue between 10 and 100 million Baht and 12.2% had 10 million Baht or less.

4.2 Validity test

In order to assess the output of the measurement model, a set of criteria was used to evaluate the measurement model validity. According to [Hair et al. \(2010\)](#), a report of χ^2 value and the associated degree of freedom with a ratio of 3 to 1 ($\chi^2/df < 3$) is suggested with at least one absolute fit index and one incremental fit index. In this study, a combination of absolute fit indices was used (χ^2/df , GFI and RMSEA), along with CFI and TLI as the incremental fit index ([Min and Mentzer, 2004](#)). As for scale reliability, CR, AVE and Cronbach's Alpha (α) were reported for measurement reliability. The rule of thumb for the threshold value of CR and α is 0.70 or higher ([Byrne, 2001](#)). However, if the research is in an exploratory phase, then a value slightly below 0.70 would also be acceptable.

The output value of AVE should be equal to or exceed 0.5 based on a reciprocal relationship to the measurement errors. If the measurement errors are low, then the value of AVE should be higher ([Hair et al., 2010](#)). Based on the same criteria, convergent validity can also be tested. A good rule of thumb for convergent validity is that the standardised residual loading estimates need to be statistically significant and their estimates to be at least 0.5 or higher, preferably 0.6 or higher, with composite reliability equal to or more than 0.7 ([Peter, 1981](#)). In order to estimate the relative amount of convergent validity among the items measured, AVE measures were used as the summary indicator of convergence, extracted from the mean variance of the items loading of a construct. If the AVE value is less than 0.5, then it indicates that on average, there are more errors in the items than the variance can explain ([Garver and Mentzer, 1999](#); [Hair et al., 2010](#); [Schumacher and Lomax, 2004](#)).

Furthermore, to assess the extent to which a particular construct is truly distinct from other constructs, discriminant validity was provided to show that the construct is unique and captures phenomena that other measures do not ([Hair et al., 2010](#)). In this research, discriminant validity is examined through every possible pair of latent variables within each construct. [Farrell \(2010\)](#) suggested that parameter estimates for the two factors should be constrained to 1.0 (constrained model) and compared with a freed parameter estimate (unconstrained model). With one drop in degrees of freedom, if the difference of a chi-square value exceeds 3.84, discriminant validity between the two factors is supported ([Lai et al., 2002](#); [Farrell, 2010](#); [Hair et al., 2010](#); [Lu and Yang, 2010](#)). Thus, in this section, descriptive statistics, correlation and convergent reliability are presented in [Table 1](#), and evaluation of overall model fit/uni-dimensionality and scale reliability/convergent validity is illustrated in [Table 2](#).

Table 1. Descriptive statistics, correlation and convergent reliability ($n = 287$)

Factors	No. of items	Mean	SD	CR	AVE	α	MTS	LSV	RQ	GX	BP
<i>MTS</i>	18	4.98	0.79				1.00				
- Transport				0.83	0.50	0.85					
- Facilities				0.84	0.52	0.87					
- Com' & info				0.86	0.61	0.90					
<i>LSV</i>	9	4.69	0.81				0.624*	1.00			
- Functional				0.89	0.77	0.91					
- Social				0.89	0.71	0.88					
- Emotional				0.85	0.66	0.85					
<i>RQ</i>	7	4.67	0.84				0.613*	0.743*	1.00		
- Trust				0.78	0.65	0.77					
- Loyalty				0.74	0.62	0.76					
- Customer satisfaction				0.90	0.77	0.91					
<i>GX</i>	9	4.66	0.86				0.342*	0.435*	0.479*	1.00	
- Importance of GX				0.89	0.82	0.90					
- Face				0.76	0.70	0.83					
- Reciprocal favour				0.78	0.74	0.85					
- Affect				0.77	0.66	0.85					
<i>BP</i>	4	4.71	0.94	0.93	0.77	0.93	0.274*	0.369*	0.399*	0.321*	1.00

Note(s): SD: standard deviation, CR: composite reliability, AVE: average variances extracted, α : Cronbach's alpha
*Correlation is significant at $p < 0.01$

Table 2. Measurement model validity

Validity	Criteria
Overall model fit/Unidimensionality	<i>Absolute Fit Index</i> $\chi^2/df < 3$ GFI > 0.9 RMSEA < 0.08
	<i>Incremental Fit Index</i> CFI > 0.9 TLI > 0.9
Validity/Reliability	<i>Convergent Validity</i> CR > 0.7 AVE > 0.5
	<i>Scale Reliability</i> Cronbach's $\alpha > 0.7$

Note(s): χ^2 : chi-square, df: degree of freedom, GFI: goodness-of-fit, RMSEA: root mean square error of approximation, CFI: comparative fit index, TLI: Tucker-Lewis index, CR: composite reliability, AVE: average variance extracted, α : Cronbach's alpha

Two constructs are identified by nine measured items (LSV and GX), one construct is identified by eighteen measured items (MTS), one construct is identified by seven measured items (RQ) and one construct is indicated by four items (BP). Through CFA, the multivariate assumptions were diagnosed and the measurement scales were validated. The evaluation of the measurement scales revealed that all constructs satisfied the acceptable threshold of more than 0.90 in GFI and CFI of more than 0.90. The CFA results of each individual measurement model suggested that these sets of scales are ready for discriminant validity assessment in [Table 3](#).

[Table 4](#) identifies ten possible pairs of constructs for the assessment of discriminant validity. The result shows that the difference in chi-square values for the constrained and

Table 3. Assessment of CFA

Constructs	Items	χ^2/df	GFI	RMSEA	CFI	TLI
MTS	18	2.28	0.901	0.073	0.931	0.920
LSV	9	1.74	0.962	0.056	0.989	0.983
RQ	7	2.27	0.971	0.073	0.987	0.975
GX	9	2.13	0.963	0.069	0.980	0.966
BP	4	2.75	0.988	0.085	0.996	0.987

Table 4. Assessment of discriminant validity

Pair of constructs	χ^2 (d.f)		χ^2 difference(d.f)		
	Unconstrained model	Constrained model			
MTS vs LSV	23.2	(8)	60.3	(9)	37.1 (1) **
MTS vs RQ	25.6	(8)	59.9	(9)	34.3 (1) **
MTS vs GX	17.9	(13)	63.5	(14)	45.6 (1) **
MTS vs BP	11.8	(13)	72.2	(14)	60.4 (1) **
LSV vs RQ	51.4	(8)	76.3	(9)	24.9 (1) **
LSV vs GX	32.7	(13)	70.9	(14)	38.2 (1) **
LSV vs BP	18.3	(13)	69.9	(14)	51.6 (1) **
RQ vs GX	30.0	(13)	66	(14)	36 (1) **
RQ vs BP	17.6	(13)	63.8	(14)	46.2 (1) **
GX vs BP	19.9	(19)	63.3	(20)	43.4 (1) **

Note(s): *d.f: degree of freedom, ** $p < 0.01$

unconstrained in the entire model exceeds 3.84. According to [Lu and Yang \(2010\)](#), “a significantly lower chi-square value for the model in which the trait correlations are not constrained to unity will indicate that the traits are not perfectly correlated and that discriminant validity can be inferred”. The result provides evidence of discriminant validity. These results suggest uni-dimensionality, scale reliability and discriminant validity are verified and are ready for the structural model.

4.3 Structural model

Goodness-of-fit indicators were used in evaluating the structural model. Several scholars have recommended evaluating the structural model by observing more than one indicator ([Min and Mentzer, 2004](#); [Hair et al., 2010](#)). In this research, five indicators were used, namely χ^2/df , GFI, RMSEA, CFI and TLI. A low χ^2 value would indicate that the model is a good fit. However, it is not without its limitations. If the number of observations exceeds 200, χ^2 would be highly sensitive to sample size. Therefore, to validate a model with a high number of observations, χ^2 value and the associated degree of freedom with a ratio of 3 to 1 ($\chi^2/df < 3$) are recommended to indicate goodness-of-fit ([Hair et al., 2010](#)). Alternatively, GFI was examined among χ^2/df . GFI is a “measure of the relative amount of variance and covariance in sample data that is jointly explained by Σ ” ([Byrne, 2001](#)). A GFI value closer to 1.0 or more than 0.90 indicates a good fit ([Byrne, 2001](#); [Hair et al., 2010](#)). The third criterion used in the evaluation of the structural model was the RMSEA index. RMSEA is an informative criterion, which measures the discrepancy between the observed and estimated covariance matrices per degree of freedom ([Hoe, 2008](#)). An RMSEA value between 0.05 and 0.08 is suggested to indicate an adequate model fit. The fourth criterion was the CFI index. CFI is a non-centrality parameter-

based index that reduces the impact of sample size effects. The suggested cut-off point is 0.90 to indicate a good model fit. The last criterion was the TLI index. TLI compares the normed χ^2 value of the null model with the specified model. An acceptable threshold for this index is 0.90 or greater (Hair et al., 2010). The establishment of these criteria examines the validity and the fitness of the structural model.

4.4 Hypotheses testing results

Individual hypothesised paths in between each construct, which were justified by the literature review, were postulated in the structural model. This process involved the inspection of whether the path coefficients were significant. To test the posited hypotheses in this research, the t-value associated with each parameter was examined. If an estimated t-value is greater than a certain critical ratio value (e.g. $p < 0.001$, t-value = ± 3.29 ; $p < 0.05$ t-value = ± 1.96 ; $p < 0.1$, t-value = ± 1.65) then the null hypothesis (associated estimated parameter equal to zero) would be rejected and the hypothesised relationship is supported. As discussed in the previous section, goodness-of-fit indices were applied to examine whether the model met the necessary requirements. The hypothesised model involved in the examination of the 10 hypothesised paths was conceptually developed in the previous section. Results are presented in Table 5. The integration of RQ and GX as mediating variables in transport studies has previously been proposed by Chao (2011).

The overall structural model yielded a GFI value of 0.907 with the χ^2/df ratio of 1.89. This indicates a good fit between the model and the data. In addition, the CFI and TLI values met the requirements of 0.9 (CFI = 0.963 and TLI = 0.953, respectively). Furthermore, RMSEA demonstrated a value of 0.061, which exceeded the posited cut-off value (< 0.08). In general, the goodness-of-fit indices indicated that the model has exceeded the suggested threshold and can be accepted.

According to Table 5, the result of hypothesis testing revealed that eight out of ten hypotheses were significant. MTS was found to have a significant relationship with LSV (estimate = 0.544, t-value > 3.29) and RQ (estimate = 0.135, t-value > 1.65) but not with BP. LSV was found to have a significant relationship with RQ (estimate = 0.730, t-value > 3.29) but not with BP. RQ was found to have a significant relationship with BP (estimate = 0.445, t-value > 1.96). GX was found to have a significant relationship with MTS (estimate = 0.356,

Table 5. SEM results

Paths	Estimates	S.E.a	t-value	p-value	Results
H1 MTS → LSV	0.544	0.068	7.982	***	Supported
H2 MTS → RQ	0.135	0.072	1.865	0.062*	Supported
H3 MTS → BP	-0.059	0.118	-0.497	0.619†	Not Supported
H4 LSV → RQ	0.730	0.100	7.314	***	Supported
H5 LSV → BP	0.048	0.234	0.204	0.838†	Not Supported
H6 RQ → BP	0.445	0.228	1.967	0.049**	Supported
H7 GX → MTS	0.356	0.067	5.321	***	Supported
H8 GX → RQ	0.089	0.052	1.715	0.086*	Supported
H9 GX → LSV	0.220	0.056	3.956	***	Supported
H10 GX → BP	0.193	0.088	2.200	0.028**	Supported

Note(s): Overall goodness-of-fit statistics $\chi^2/df = 1.89$ ($\chi^2 = 206.3$, $df = 109$); GFI = 0.907; RMSEA = 0.061; CFI = 0.963; TLI = 0.953
a = S.E. is an estimate of the standard error of the covariance
*** = Significant at $p < 0.001$ ($t > \pm 3.29$)
** = Significant at $p < 0.05$ ($t > \pm 1.96$)
* = Significant at $p < 0.1$ ($t > \pm 1.65$)
† = Non-significant

t-value >3.29), RQ (estimate = 0.089, t-value >1.65), LSV (estimate = 0.220, t-value >3.29) and BP (estimate = 0.193, t-value >1.96).

It is noteworthy that based on the result of **H1**, MTS and LSV are significantly positively related based upon the data collected. In line with SLA, UNCTAD and Rutner and Langley (SLA, 2008; UNCTAD, 2001; Rutner and Langley, 2000), the perception of the received value from the shippers is of great influence from the services provided by the MTOs. Additionally, **H2**, which predicted that MTS would have a positive effect on shippers' RQ, was validated. This is in line with the work of Meixell and Norbis (2008), which stated that shippers choose to enhance their relationship with the transport service providers based on the ability to provide necessary services. As mentioned by Crosby *et al.* (1990), the goal of service providers is to convert indifferent customers into loyal customers and to strengthen already strong relationships; the findings of this research have empirically validated this statement within the context of multimodal transport. Thus, MTS serves as an important means of evaluation for the development of relationships.

In contrast, the posited positive relationship between MTS and BP was not supported (**H3**). One noteworthy observation is that the indirect effect (0.22) of MTS on BP was higher than the direct effect (0.049). The indirect effects of MTS → BP were MTS → RQ → BP and MTS → LSV → RQ → BP. This could be explained by the fact that, without a positive level of RQ or LSV, the establishment of relationships between MTS and BP would be invalid. According to Crosby *et al.* (1990), dyadic relationships are usually an interfering factor between a customer's BP and the satisfaction of service capability from the service providers. In response to this finding, it could be concluded that MTS has a positive effect on the shipper's BP through the impacts of RQ and LSV.

Hypothesis 4, which posited that LSV of the shippers relates positively to RQ with its transport service providers, was supported. In contrast, the predicted positive relationship between LSV and BP was not supported (**H5**). One noteworthy observation is the result exhibited for **H4**, that the scale of influence of LSV on RQ is relatively larger than all of the estimated paths (0.730 significant at $p < 0.001$). In line with Lin (2007), service providers must be able to maintain the expected service level to ensure their relationship with the customer. Therefore, through these empirical measures, LSV has a significant impact on RQ. However, LSV of the shippers was not verified to be positively associated with BP. This finding is unexpected because there is evidence that a higher level of service can have a direct impact on customers' financial performance through higher revenue as well as lower cost (Wang *et al.*, 2004). The indirect effect (0.252) of LSV with BP proposed a stronger impact than the direct effect (0.037). The indirect effect of LSV → BP was LSV → RQ → BP. This novel finding is supported by the work of Zeithaml (1988), who stated that value would gradually affect BP through securing a positive relationship. It is worth mentioning that LSV → BP falls in a similar result with MTS → BP, which were both not supported with direct effects but embed a strong indirect effect through RQ.

The testing result of **H6** is consistent with the work of Lages *et al.* (2005), which indicated that RQ is strongly associated with different dimensions of performance. **Hypotheses 7 to 10** convincingly argue the significance of GX, as a catalyst of interpersonal relationships, affecting almost every realm of life, from politics to business and from officialdom to street life (Lee and Dawes, 2005). In this research, there was sufficient evidence to demonstrate that MTS, RQ, LSV and BP are positively associated with GX. GX is identified as an asset in the corporate culture at the firm level, which stimulates the use of personal relationships to elevate the results of firm-to-firm level relationships (Szeto *et al.*, 2006). In retrospect, GX plays a very important role in several management practices, which encourage trust and loyalty at a personal level (Lee and Dawes, 2005).

5. Results

Firstly, to the best of the authors' knowledge, this investigation was a novel effort to operationalise the concept of multimodal transport in a holistic manner and to test the said

concept against LSV, RQ and BP through a statistical approach. Secondly, this study employed rigorous analytical techniques, such as SEM, to examine a common social phenomenon through a proposed hypothetical model. The analysis process described and practiced in this study can provide guidance to other researchers who could potentially use similar research techniques. Furthermore, this study dealt with the issues of measurement model fitness through theoretical justifications with practical explanations. For managers, the above-cited findings provide organisations with a tool for evaluating their situation with regard to areas of service value and relationships in multimodal transport operations. This study highlights the importance of understanding the impact of relationships on multimodal transport operation, as well as provides guidance as to which area shippers must improve if they wish to improve their BP.

Thirdly, the model has included a direct positive relationship between service value and BP, and the present study is observed as one of the few studies that disagree with this relationship (Wang *et al.*, 2004). According to the measurement model utilised in this research, two non-significant relationships were found, namely, the impact of MTS on BP and the impact of LSV on BP. Several scholars have pointed out that the more satisfied the shippers are with the services provided by the operators, the higher will be the achievement of BP. Deriving from this logic, this study argued that MTS would have a positive effect on shippers' BP. A noteworthy observation was that the RQ had a prerequisite role in predicting the level of impact between MTS and BP. This suggests that the effect of MTS and shippers' BP varied depending on the level of RQ. When it comes to the effects of LSV on BP, LSV does not have a significant impact on BP. According to the work of Zeithaml (1988), customer perceived value would gradually affect BP through securing a positive relationship over a period of time. A sizeable number of respondents are from small- to medium-sized firms, which place considerable emphasis on the "relationship" factor in operating their businesses. In this study, LSV was hypothesised to have a positive impact on shippers' BP. As with the relationship between MTS and BP, if RQ is involved, the hypothesised path between LSV and BP will be supported. Furthermore, GX was statistically proven to be an important factor, which could affect shippers' BP directly or through obtaining essential assets in facilitating and smoothing business transactions. The findings of the study thus support the arguments that both RQ and GX have a significant impact on shippers' BP.

In this study, RQ and GX were successfully incorporated within the structural model, and the results clearly indicate that the level of BP could mainly be driven by the level of relationship rather than by service or value. The impact of both MTS and LSV on BP was greatly dependent upon the level of RQ. This was evidenced by the level of the indirect effect of MTS to BP and LSV to BP, which was substantially greater than the direct effect. In practice, it is suggested that transport service providers should try to understand the importance of relationships when providing services for their customers and shippers should use these key measurements as selection criteria for their service providers.

Lastly, with recognition of a lack of transport and logistics studies attempting to utilise GX as a construct, this study not only contributes to the multimodal transport literature by demonstrating the significant influence of the concept but also provides empirical evidence in explaining a possible mechanism of relationship between customers and service providers within the Asian context. However, theoretical and empirical work suggests that in a non-Western environment, firms may behave differently. In this study, a statistical methodology was applied to empirically support the statement above. Another interesting finding of this study is that GX, as an effective institutional force, does not have a complete effect on BP. A low but significant level of relationship exists between GX and RQ. From a managerial perspective, shippers are suggested to be cautious and not completely operate their business based on GX alone.

A negligible weight of reliance on RQ needs to be incorporated in order to avoid certain conflicts caused by GX. This has demonstrated how shippers differentiate RQ and GX. This also suggests that GX may suffer from its own limits. Similar to Gu *et al.* (2008), the potential

negative consequences of GX include personal indebtedness by executives, a domino effect when firms within the GX network fail, and collective blindness when the market environment changes. In summary, organisations should not blindly use GX as their key decision-making factor.

6. Conclusions and discussion

The focus on multimodal transport as an important issue in logistics has been long recognised in previous studies (Banomyong and Beresford, 2001; Islam *et al.*, 2005). Its role has been increasingly recognised in the international transport, which has an incremental impact on the global trade and the economy. The involvement of RQ has been a significant influence on BP. The concept of GX is considered a very important social structure in almost every realm of life, from politics to business and from officialdom to street life (Lee and Dawes, 2005). The empirical result of the SEM-based model analysis revealed that the hypothesised structural model had obtained a good fit. These findings were considered as a significant step in the context of multimodal transport, which converts conceptualised concepts into statistically tested hypotheses. It was worth noting that from the shippers' perspective, the two types of relationships were highly regarded as significant factors in multimodal transport operations. In addition, the significance of these two types of relationship factors exceeds the importance of MTS and LSV with regard to shippers' BP measurement.

This study is not without its limitations. Firstly, it includes only the shippers' standpoint, and additional research should test the proposed model from both the shippers' and the MTOs' perspectives concurrently. Therefore, caution should be exercised in attempting to generalise the findings presented here. Secondly, the application of the model could be taken in other geographical areas to cross-validate these research findings. Such cross-validation against other geographical locations would increase confidence in the research model in terms of the extent to which it can be generalised. Thirdly, the list of shippers obtained from the TNSC was selected due to time and budget constraints. Alternative longer lists of shippers, such as the list of shippers collected from the Department of Export promotion, Thailand, could be purchased and used in questionnaire distribution in order to test the consistency of the findings. However, it should be used with caution, as the membership qualification criteria may impact the potential finding. With a greater number of potential respondents (16,141 listed exporters in 2011), other methodological approaches such as multi-group analysis could be adopted to investigate differences across various industrial sectors, between geographical locations, or by size of firm. Lastly, postal questionnaires were used to collect data, and the respondents were asked to approximately rate their own BP. Actual BP data, such as financial figures, would act as a cross-check and therefore increase the robustness of the model. However, this has always been a common limitation found in most survey-based research. Despite the limitations, the authors strongly believe that this study can still provide valuable insights from the current sample of respondents and contributes significantly to the literature.

Note

1. One Baht = 0.03136 US Dollar (www.xe.com, accessed on August, 1, 2025)

Supplementary material

The supplementary material for this article can be found online.

References

- Arias, J.T.G. (1996), "A relationship marketing approach to guanxi", *European Journal of Marketing*, Vol. 32 Nos 1/2, pp. 145-156.

- Athanasopoulou, P. (2009), "Commentary: relationship quality: a critical literature review and research agenda", *European Journal of Marketing*, Vol. 43 Nos 5/6, pp. 583-610, doi: [10.1108/03090560910946945](https://doi.org/10.1108/03090560910946945).
- Banomyong, R. and Beresford, A.K.C. (2001), "Multimodal transport, the case of Laotian garment exporters", *International Journal of Physical Distribution and Logistics Management*, Vol. 31 No. 9, pp. 663-685, doi: [10.1108/09600030110408161](https://doi.org/10.1108/09600030110408161).
- Banomyong, R. and Supatn, N. (2011), "Selecting logistics providers in Thailand: a shippers' perspective", *European Journal of Marketing*, Vol. 45 No. 3, pp. 419-437, doi: [10.1108/030905611111107258](https://doi.org/10.1108/030905611111107258).
- Bourne, M., Neely, A., Platts, K. and Mills, J. (2002), "The success and failure of performance measurement initiatives: perceptions of participating managers", *International Journal of Operations and Production Management*, Vol. 22 No. 11, pp. 1288-1310, doi: [10.1108/01443570210450329](https://doi.org/10.1108/01443570210450329).
- Brewer, P.C. and Speh, T.W. (2000), "Using the balanced scorecard to measure supply chain performance", *Journal of Business Logistics*, Vol. 21 No. 1, pp. 75-93.
- Buttery, E.A. and Wong, Y.H. (1999), "The development of Guanxi framework", *Marketing Intelligence and Planning*, Vol. 17 No. 3, pp. 147-154.
- Byrne, B.M. (2001), *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*, Lawrence Erlbaum Associates, Mahwah, NJ.
- Cai, S., Jun, M. and Yang, Z. (2010), "Implementing supply chain information integration in China: the role of institutional forces and trust", *Journal of Operations Management*, Vol. 28 No. 28, pp. 257-268, doi: [10.1016/j.jom.2009.11.005](https://doi.org/10.1016/j.jom.2009.11.005).
- Chao, P. (2011), "The impact of multimodal transport service value and relationships on business performance: the Thai shippers' perspective", PhD thesis, Cardiff University.
- Crosby, L.A., Evans, K.R. and Cowles, D. (1990), "Relationship quality in service selling: an interpersonal influence perspective", *Journal of Marketing*, Vol. 54 No. 54, pp. 68-81, doi: [10.1177/002224299005400306](https://doi.org/10.1177/002224299005400306).
- Davies, H., Leung, T.K.P., Luk, S.T.K. and Wong, Y.-H. (1995), "The benefits of guanxi: the value of relationships in developing the Chinese market", *Industrial Marketing Management*, Vol. 24 No. 24, pp. 207-214, doi: [10.1016/0019-8501\(94\)00079-c](https://doi.org/10.1016/0019-8501(94)00079-c).
- Farrell, A.M. (2010), "Insufficient discriminant validity: a comment on Bove, Pervan, Beatty, and Shiu (2009)", *Journal of Business Research*, Vol. 63 No. 63, pp. 324-327, doi: [10.1016/j.jbusres.2009.05.003](https://doi.org/10.1016/j.jbusres.2009.05.003).
- Flynn, B.B., Huo, B. and Zhao, X. (2010), "The impact of supply chain integration on performance: a contingency and configuration approach", *Journal of Operation Management*, Vol. 28 No. 1, pp. 58-71, doi: [10.1016/j.jom.2009.06.001](https://doi.org/10.1016/j.jom.2009.06.001).
- Fremont, A. (2007), "Global maritime networks: the case of Maersk", *Journal of Transport Geography*, Vol. 15 No. 15, pp. 431-442, doi: [10.1016/j.jtrangeo.2007.01.005](https://doi.org/10.1016/j.jtrangeo.2007.01.005).
- Garver, M.S. and Mentzer, J.T. (1999), "Logistics research methods: employing structural equation modeling to test construct validity", *Journal of Business Logistics*, No. 20, pp. 33-57.
- Golob, T.F. (2003), "Structural equation modeling for travel behaviour research", *Transport Research Part B*, Vol. 37 No. 37, pp. 1-25, doi: [10.1016/s0191-2615\(01\)00046-7](https://doi.org/10.1016/s0191-2615(01)00046-7).
- Gu, F.F., Hung, K. and Tse, D.K. (2008), "When does guanxi matter? Issues of capitalisation and its dark sides", *Journal of Marketing*, Vol. 72 No. 72, pp. 12-28, doi: [10.1509/jmkg.72.4.012](https://doi.org/10.1509/jmkg.72.4.012).
- Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010), *Multivariate Data Analysis: A Global Perspective*, Prentice Hall, NJ.
- Hayuth, Y. (1987), *Intermodality: Concept and Practice*, Lloyd's of London Press, London.
- Hoe, S.L. (2008), "Issues and procedures in adopting structural equation modelling technique", *Journal of Quantitative Methods*, Vol. 3 No. 1, p. 76.

- Hudson, M., Smart, A. and Bourne, M. (2001), "Theory and practice in SME performance measurement systems", *International Journal of Operations and Production Management*, Vol. 21 No. 8, pp. 1096-1115, doi: [10.1108/eum000000005587](https://doi.org/10.1108/eum000000005587).
- Islam, D.M.Z., Dinwoodie, J. and Roe, M. (2005), "Towards supply chain integration through multimodal transport in developing economies: the case of Bangladesh", *Maritime Economics and Logistics*, Vol. 7 No. 4, pp. 382-399, doi: [10.1057/palgrave.mel.9100144](https://doi.org/10.1057/palgrave.mel.9100144).
- Ivanov, D. and Dolgui, A. (2020), "A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0", *Production Planning and Control*, Vol. 31 Nos 11-12, pp. 853-866.
- Jiang, B. and Prater, E. (2002), "Distribution and logistics development in China: the revolution has begun", *International Journal of Physical Distribution and Logistics Management*, Vol. 32 No. 9, pp. 783-798.
- Kent, J.L., Jr and Flint, D.J. (1997), "Perspectives on the evolution of logistics thought", *Journal of Business Logistics*, Vol. 18 No. 2, pp. 15-29.
- Lages, C., Lages, C.R. and Lages, L.F. (2005), "The RELQUAL scale: a measurement of relationship quality in export market ventures", *Journal of Business Research*, Vol. 58 No. 58, pp. 1040-1048, doi: [10.1016/j.jbusres.2004.03.001](https://doi.org/10.1016/j.jbusres.2004.03.001).
- Lai, K.H., Ngai, E.W.T. and Cheng, T.C.E. (2002), "Measures for evaluating supply chain performance in transport logistics", *Transportation Research Part E*, Vol. 38 No. 38, pp. 439-456, doi: [10.1016/s1366-5545\(02\)00019-4](https://doi.org/10.1016/s1366-5545(02)00019-4).
- Lambert, D.M., Knemeyer, A.M. and Gardner, J.T. (2004), "Supply chain partnerships: model validation and implementation", *Journal of Business Logistics*, Vol. 25 No. 2, pp. 21-42, doi: [10.1002/j.2158-1592.2004.tb00180.x](https://doi.org/10.1002/j.2158-1592.2004.tb00180.x).
- Langley, C.J., Jr and Holcomb, M.C. (1992), "Creating logistics customer value", *Journal of Business Logistics*, Vol. 13 No. 2, pp. 1-27.
- Lee, D.Y. and Dawes, P.L. (2005), "Guanxi, trust, and long-term orientation in Chinese business markets", *Journal of International Marketing*, Vol. 13 No. 2, pp. 28-56, doi: [10.1509/jimk.13.2.28.64860](https://doi.org/10.1509/jimk.13.2.28.64860).
- Lee, P.K.C. and Humphreys, P.K. (2006), "The role of guanxi in the supply management practices", *International Journal of Production Economics*, No. 106, pp. 450-467.
- Leung, T.K.P., Lai, K.-H., Chan, R.Y.K. and Wong, Y.H. (2005), "The role of xingyong and guanxi in Chinese relationship marketing", *European Journal of Marketing*, Vol. 39 Nos 5/6, pp. 528-559.
- Li, P.-C. and Lin, B.-W. (2006), "Building global logistics competence with Chinese OEM suppliers", *Technology in Society*, Vol. 28 No. 3, pp. 333-348, doi: [10.1016/j.techsoc.2006.06.003](https://doi.org/10.1016/j.techsoc.2006.06.003).
- Li, J., Wang, H. and Zhao, X. (2023), "Integration of multimodal transport systems in Urban logistics", *Journal of Transport Geography*, Vol. 102, 103456.
- Lin, W.B. (2007), "The exploration of customer satisfaction model from a comprehensive perspective", *Expert Systems with Applications*, Vol. 33 No. 1, pp. 110-121.
- Lu, C.S. (2003), "The impact of carrier service attributes on shipper-carrier partnering relationships: a shipper's perspective", *Transportation Research Part E*, Vol. 39 No. 39, pp. 399-415, doi: [10.1016/s1366-5545\(03\)00015-2](https://doi.org/10.1016/s1366-5545(03)00015-2).
- Lu, C.S. and Yang, C.S. (2010), "Safety leadership and safety behaviour in container terminal operations", *Safety Science*, Vol. 48 No. 2, pp. 123-134, doi: [10.1016/j.ssci.2009.05.003](https://doi.org/10.1016/j.ssci.2009.05.003).
- Luo, Y. and Park, S.H. (2004), "Multiparty cooperation and performance in international equity joint venture", *Journal of International Business Studies*, Vol. 35 No. 35, pp. 142-160, doi: [10.1057/palgrave.jibs.8400072](https://doi.org/10.1057/palgrave.jibs.8400072).
- MacKinnon, D.P. (2011), "Integrating mediators and moderators in research design", *Research on Social Work Practice*, Vol. 21 No. 6, pp. 675-681, doi: [10.1177/1049731511414148](https://doi.org/10.1177/1049731511414148).
- Meixell, M.J. and Norbis, M. (2008), "A review of the transportation mode choice and carrier selection literature", *The International Journal of Logistics Management*, Vol. 19 No. 2, pp. 183-211, doi: [10.1108/09574090810895951](https://doi.org/10.1108/09574090810895951).

- Mentzer, J.T. and Konrad, B.P. (1991), "An efficiency/effectiveness approach to logistics performance analysis", *Journal of Business Logistics*, Vol. 12 No. 1, pp. 33-61.
- Mentzer, J.T., Rutner, S.M. and Matsuno, K. (1997), "Application of the means-end value hierarchy model to understanding logistics service value", *International Journal of Physical Distribution and Logistics Management*, Vol. 27 No. 9, pp. 630-643, doi: [10.1108/09600039710188693](https://doi.org/10.1108/09600039710188693).
- Min, S. and Mentzer, J.T. (2004), "Developing and measuring supply chain management concepts", *Journal of Business Logistics*, Vol. 25 No. 1, pp. 63-99, doi: [10.1002/j.2158-1592.2004.tb00170.x](https://doi.org/10.1002/j.2158-1592.2004.tb00170.x).
- Narasimhan, R. and Kim, S.W. (2002), "Effect of supply chain integration on the relation between diversification and performance: evidence from Japanese and Korean firms", *Journal of Operations Management*, Vol. 20 No. 3, pp. 303-323, doi: [10.1016/s0272-6963\(02\)00008-6](https://doi.org/10.1016/s0272-6963(02)00008-6).
- Neely, A., Gregory, M. and Platts, K. (2005), "Performance measurement system design: a literature review and research agenda", *International Journal of Operation and Production Management*, Vol. 25 No. 12, pp. 1228-1263.
- Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1985), "A conceptual model of service quality and its implication for future research", *Journal of Marketing*, Vol. 49 No. 4, pp. 41-50, doi: [10.1177/002224298504900403](https://doi.org/10.1177/002224298504900403).
- Payne, A. and Holt, S. (2001), "Diagnosing customer value: integrating the value process and relationship marketing", *British Journal of Management*, Vol. 12 No. 2, pp. 159-182, doi: [10.1111/1467-8551.00192](https://doi.org/10.1111/1467-8551.00192).
- Peter, J.P. (1981), "Construct validity: a review of basic issues and marketing practices", *Journal of Marketing Research*, Vol. 18 No. 2, pp. 133-145.
- Porter, M.E. (1985), *Competitive Advantage*, Free Press, NY.
- Rondinelli, D. and Berry, M. (2000), "Multimodal transportation, logistics, and the environment: managing interactions in a global economy", *European Management Journal*, Vol. 18 No. 4, pp. 398-410, doi: [10.1016/s0263-2373\(00\)00029-3](https://doi.org/10.1016/s0263-2373(00)00029-3).
- Rutner, S.M. and Langley, C.J., Jr (2000), "Logistics value: definition, process and measurement", *The International Journal of Logistics Management*, Vol. 11 No. 2, pp. 73-82, doi: [10.1108/09574090010806173](https://doi.org/10.1108/09574090010806173).
- Schumacher, R.E. and Lomax, R.G. (2004), *A Beginner's Guide to Structural Equation Modeling*, 2nd ed., Lawrence Erlbaum Associates, Mahwah, NJ.
- Shang, K.-C. and Marlow, P.B. (2005), "Logistics capability and performance in Taiwan's major manufacturing firms", *Transportation Research Part E*, Vol. 41 No. 4, pp. 217-234, doi: [10.1016/j.tre.2004.03.002](https://doi.org/10.1016/j.tre.2004.03.002).
- Sinkovics, R.R. and Roath, A.S. (2004), "Strategic orientation, capabilities, and performance in manufacturer 3-pl relationships", *Journal of Business Logistics*, Vol. 25 No. 2, pp. 43-64, doi: [10.1002/j.2158-1592.2004.tb00181.x](https://doi.org/10.1002/j.2158-1592.2004.tb00181.x).
- SLA (2008), "Multimodal transport: the practitioner's definitive guide/Singapore logistics association with Cheong Yun Wan", in *Consultation with Stanley Lim and Thomas Sim*, SNP International Publishing, Singapore.
- Sweeney, J.C. and Soutar, G.N. (2001), "Consumer perceived value: the development of a multiple item scale", *Journal of Retailing*, Vol. 77 No. 7, pp. 203-220, doi: [10.1016/s0022-4359\(01\)00041-0](https://doi.org/10.1016/s0022-4359(01)00041-0).
- Szeto, R., Wright, P.C. and Cheng (2006), "Business networking in the Chinese context: its role in the formation of guanxi, social capital and ethnical foundations", *Management Research News*, Vol. 29 No. 7, pp. 425-438, doi: [10.1108/01409170610690880](https://doi.org/10.1108/01409170610690880).
- Tate, K. (1996), "The elements of a successful logistics partnership", *International Journal of Physical Distribution and Logistics Management*, Vol. 26 No. 3, pp. 7-13, doi: [10.1108/09600039610115045](https://doi.org/10.1108/09600039610115045).
- Ulaga, W. and Eggert, A. (2006), "Value-based differentiation in business relationships: gaining and sustaining key supplier status", *Journal of Marketing*, Vol. 70 No. 1, pp. 119-136, doi: [10.1509/jmkg.70.1.119.qxd](https://doi.org/10.1509/jmkg.70.1.119.qxd).

- UNCTAD (2001), *Implementation of Multimodal Transport Rules*, UNCTAD, UNCTAD/SDTE/TLB/2.
- Wagner, S.M. and Kemmerling, R. (2010), "Handling nonresponse in logistics research", *Journal of Business Logistics*, Vol. 31 No. 2, pp. 357-381, doi: [10.1002/j.2158-1592.2010.tb00156.x](https://doi.org/10.1002/j.2158-1592.2010.tb00156.x).
- Wang, Y., Lo, H.P., Chi, R. and Yang, Y. (2004), "An integrated framework for customer value and customer-relationship-management practice: a customer-based perspective from China", *Managing Service Quality*, Vol. 14 Nos 2/3, pp. 169-182.
- Williamson, K., Spitzer, D.M. and Bloomberg, D.J. (1990), "Modern logistics systems: theory and practice", *Journal of Business Logistics*, Vol. 11 No. 2, pp. 65-68.
- Wong, M. (2007), "Guanxi and its role in business", *Chinese Management Studies*, Vol. 1 No. 4, pp. 257-276, doi: [10.1108/17506140710828532](https://doi.org/10.1108/17506140710828532).
- Wong, Y.H. and Chan, R.Y.-K. (1999), "Relationship marketing in China: guanxi, favouritism and adaptation", *Journal of Business Ethics*, Vol. 22 No. 22, pp. 107-118, doi: [10.1023/a:1006077210425](https://doi.org/10.1023/a:1006077210425).
- Wong, A. and Tjosvold, D. (2010), "Guanxi and conflict management for effective partnering with competitors in China", *British Journal of Management*, Vol. 21 No. 21, pp. 772-788, doi: [10.1111/j.1467-8551.2010.00690.x](https://doi.org/10.1111/j.1467-8551.2010.00690.x).
- Yang, Z. and Wang, C.L. (2011), "Guanxi as a governance mechanism in business market: its characteristics, relevant theories, and future research directions", *Industrial Marketing Management*, Vol. 30, pp. 492-495.
- Yang, C.C., Marlow, P.B. and Lu, C.S. (2009), "Assessing resources, logistics service capabilities, innovation capabilities and the performance of container shipping services in Taiwan", *International Journal of Production Economics*, Vol. 122 No. 1, pp. 4-20, doi: [10.1016/j.ijpe.2009.03.016](https://doi.org/10.1016/j.ijpe.2009.03.016).
- Yeung, I.Y.M. and Tung, R.L. (1996), "Achieving business success in Confucian societies: importance of guanxi (connections)", *Organizational Dynamics*, Vol. 25 No. 2, pp. 54-65, Autumn 1996, doi: [10.1016/s0090-2616\(96\)90025-x](https://doi.org/10.1016/s0090-2616(96)90025-x).
- Zeithaml, V.A. (1988), "Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence", *Journal of Marketing*, Vol. 52 No. 52, pp. 2-22, doi: [10.1177/002224298805200302](https://doi.org/10.1177/002224298805200302).
- Zhang, C., Moosmayer, D., Wang, M. and Ohana, M. (2024), "Managing Chinese suppliers' sustainability performance: the double-edged role of guanxi governance", *Industrial Marketing Management*, Vol. 118, pp. 189-199.

Further reading

- Banomyong, R. (2000), "Multimodal transport in South East Asia: a case study approach", PhD thesis, Department of Maritime Studies and International Transport, Cardiff University.
- Campisi, D. and Gastaldi, M. (1996), "Environmental protection, economic efficiency and intermodal competition in freight transport", *Transportation Research Part C*, Vol. 4 No. 4, pp. 391-406, doi: [10.1016/s0968-090x\(96\)00021-6](https://doi.org/10.1016/s0968-090x(96)00021-6).
- Kiong, T.C. and Kee, Y.P. (1998), "Guanxi bases, Xinyong and Chinese business networks", *British Journal of Sociology*, Vol. 49 No. 1, pp. 75-96, doi: [10.2307/591264](https://doi.org/10.2307/591264).
- UNCTAD (1995), *Multimodal Transport Handbook*, UNCTAD, Geneva.

Corresponding author

Po-Lin Lai can be contacted at: polin@cau.ac.kr