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Abstract

Purpose – Anchoring on configuration theory, the purpose of this paper is to evaluate how supply chain relationship quality (SCRQ) differs across firm characteristics (FC) in the maritime logistics industry. In addition, it utilises transactional cost theory to establish the relationship between SCRQ and supply chain performance (SCP).

Design/methodology/approach – The data were obtained from a survey with 205 maritime logistics service players (shipping firms, shippers and freight forwarders) in Singapore. MANOVA and *t*-test analyses are used to examine the difference in SCRQ (i.e. trust and commitment) across FC which includes firm types and ownership types. Thereafter, structural equation modelling is employed to examine the influence of SCRQ on SCP.

Findings – The results indicate that the effects of trust and commitment on SCRQ vary significantly. It was also found that trust as an aspect of SCRQ has a significant impact on SCP, whereas commitment does not.

Research limitations/implications – As the field data were obtained from only one industry, future replication of the findings to other industries should consider industry-specific factors, if applicable.

Practical implications – It is suggested that maritime logistics service players should carefully manage trust and commitment to simultaneously enable SCP. By identifying the various aspects of FC that contribute to SCRQ, maritime logistics service providers could devise appropriate strategies for different customer segments more effectively.

Originality/value – This study expands current supply chain research by linking two dimensions of SCRQ in relationship marketing with SCP in supply chain management. It is also one of the first empirical attempts to explore the role of FC in the linkage between SCRQ and SCP in the maritime logistics industry.

Keywords Asia, Supply chain performance, Supply chain management, Mixed method,
Firm-specific characteristics, Supply chain relationship quality, Maritime logistics industry

Paper type Research paper

1. Introduction

The maritime logistics industry plays a critically important role in facilitating global commerce as more than 90 per cent of the world's trade in terms of volume is carried by sea (IMO, 2016). The industry is a complex system with many players and interdependent relationships both horizontally and vertically (Caschilli and Medda, 2012). The industry plays a pivotal role in global supply chains today (Panayides, 2006). This is effectuated by the disintegration in the manufacturers' supply chain to leverage on national comparative advantages (Williamson, 2008). The resulting outsourcing and offshore production practices

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lengthen physical distribution and invoke greater participation from the maritime logistics industry (Notteboom and Rodrigue, 2008). Increasingly, manufacturers are recognising logistics as a source of competitive advantage, which can be acquired from closer collaboration with their logistic service partners (Lavie, 2006) upon which trust and commitment are built. It was noted that the maritime logistics industry functions as a disseminator of strategic information (Hsu, 2013). The growing contribution of the maritime logistics industry towards global supply chains is matched with the popularisation of maritime logistics in the recent literature (Panayides and Song, 2013).

For the past decades, shipping firms have consolidated their supply chain both horizontally and vertically by means of merger and acquisition (Fusillo, 2006). However, this trend was noted to be on the decline and the emphasis has now shifted to supply chain integration (SCI) through the adoption of cooperative and collaborative structures, mechanisms and processes (Frémont, 2009). Presently, greater level of coordination and collaboration are observed among actors in the maritime logistics chain with the introduction of multimodal transport operator (Frémont, 2009), fourth-party logistics (Tezuka, 2011), and collaborative instruments, such as partnerships, alliances, joint-ventures and vessel-sharing agreements (Evangelista and Morvillo, 2000). SCI in the maritime logistics industry is linked with numerous organisational benefits (Tseng and Liao, 2015). For instance, it is linked with efficiency gains due to greater economies of scale and reduction in transaction costs (Panayides and Cullinane, 2002). It also improves the overall quality of shipping services due to wider economies of scope (Heaver, 2002). In addition, many scholars generally agreed that the efficiency of supply chains can be improved through the integration with maritime logistics service providers (Naim *et al.*, 2006; Chen and Lee, 2008; Yang *et al.*, 2014).

Most SCI studies in the maritime logistics industry have focussed on the tangible aspects concerning product, information and financial flow (Seo *et al.*, 2015, Tseng and Liao, 2015; Yang *et al.*, 2014; Yuen and Thai, 2016a, b). However, very little attention has been paid to the quality of the relationships between members of the maritime logistics industry and its impact on supply chain performance (SCP). According to Yuen and Thai (2017), the lack of trust and commitment in the maritime logistics industry, which are components of supply chain relationship quality (SCRQ), was identified as one of the key factors preventing firms from collaborating or obtaining the full benefits of SCI. Therefore, the current paper aims to complement existing supply chain management research in the maritime logistics industry with a specific focus on relationship marketing.

Amid intensified competition, more and more logistics service providers are adopting relationship marketing as an alternative to existing mass marketing, which requires huge investment to reach to as many potential customers as possible (PWC, 2016). The objectives of this paper are therefore twofold. First, anchoring on configuration theory, it examines whether the level of SCRQ differs across firm characteristics (FC) such as firm types and ownership types. Second, grounded on transactional cost theory, the paper investigates the influence of SCRQ on SCP in the maritime logistics industry.

The rest of the paper proceeds as follows. In the next section, we describe the key components in the conceptual framework, followed by a review of the previous literature. Then, we illustrate the structure of the measurement model used to formulate each construct designed in the conceptual model. Further, we present the methodology followed by the results. Finally, we discuss the findings and offer conclusions including theoretical and managerial implications, limitations and future research directions.

2. Theoretical background and research hypotheses

To reiterate, the objectives of this paper are to analyse and explain the difference in SCRQ across FC which include firm types and ownership types, and to examine the relationship between SCRQ and SCP.

This section first provides a review of the contemporary research pertaining to relationship marketing in the maritime logistics industry and its relationship with FC (Section 2.1). Subsequently, the components of SCRQ and SCP are defined (Section 2.2). Thereafter, theories and hypotheses are proposed (Section 2.3).

2.1 Relationship marketing and FC in the maritime logistics industry

Research on relationship marketing has emerged in the current literature (Morgan and Hunt, 1994; Ural, 2007). Although studies of relationship marketing oriented to customers have adopted various perspectives of analysis, only a few have examined the impact of FC on relationship marketing constructs such as commitment, communication, trust, satisfaction and relationship quality (Rajaobelina and Bergeron, 2009; Heide and John, 1990; Morgan and Hunt, 1994; Brock, 1998; Ireland and Webb, 2007). In addition, Tan *et al.* (2002) found that customer relationship importance, relationship characteristics (frequency of use and duration of the relationship), customer demographic characteristics (age and gender) and type of service product have an impact on relationship strength.

Based on the previous studies, a large stream of literature has identified FC as organisational context (Ward and Dagger, 2005; Kogut and Zander, 1993), ownership type (Zander and Kogut, 1995; Kogut, 1988), knowledge connection (Mowery *et al.*, 1996), ownership equity (Inkpen, 2000). When specifically focussing on the FC or demographic characteristics in the supply chain, there are only a few studies on the link between manufacturers and logistics service providers (for instance, Pak and Park, 2004; Knemeyer *et al.*, 2003) rather than among other tiers of the supply chain (Knemeyer and Murphy, 2005; Lemoine and Skjoett-Larsen, 2004).

With regard to FC in the maritime logistics industry, although logistics service has some distinctive features, logistics service customers share a similar process in buying services with an industrial buyer. From the perspective of shippers who directly deal with shipping lines due to their large amount of cargo, they can be seen as an industrial buyer since they buy logistics services primarily for their own use. The term industrial buyer is defined as "a customer who buys goods or services to re-sell to firms or organisation customers, or product services" (Wu, 2013). Meanwhile, freight forwarders are also viewed as an industrial buyer since they re-sell services to small- and medium-sized shippers. The service sale in the maritime logistics industry is conducted by a contract between a shipping firm, also known as a shipping line (carrier) that provides shipping services and a shipper that demands for shipping services, i.e. a shipper or a freight forwarder. Traditionally, shippers are likely to directly buy shipping services from shipping firms or indirectly buy shipping services through freight forwarders. In the latter case, a freight forwarder who is appointed by a shipper buys shipping services.

Based on the previous literature, this study employs a two-items scale of FC developed by Sheth (1973) and Ward and Dagger (2005), in which the items are designed to capture the type of firm (shipping firm, freight forwarder, shipper) based on the key tripartite relationship among these players, and the type of ownership (local firm, foreign firm) given the difference in shipping logistics networks covered by these firms. In this respect, this study is significant as it is one of the earliest trials to investigate the influence of FC on SCRQ in the maritime logistics industry.

2.2 Supply chain relationship quality and supply chain performance

Previous research has suggested that a link exists among relationship quality, behavioural intentions and performance in the marketing literature (Wahab *et al.*, 2011; Bagozzi, 1995). Numerous studies have shown relationships among trust, commitment and behavioural intensions. For instance, as a service provider takes actions to build trust, the perceived risk with which a service provider is reduced, enabling consumers to form an affective link with

that provider (Lopez *et al.*, 2006). Also, Mayer *et al.* (1995) and Makoba (1993) noted that trust and commitment are important in encouraging future exchanges.

The SCRQ has increasingly become a dominant factor in determining the success or failure of firms (Morgan and Hunt, 1994; Lotfi *et al.*, 2013). This is especially valid in service industries such as the maritime logistics industry where the main "product" is the service whose quality might be perceived subjectively depending on the relationship between a firm and its customers. However, only a few empirical and theoretical studies have examined this issue in the literature of SCRQ in the maritime logistics industry. Among these, Panayides and So (2005) examined the influence of relationship orientation and its impact on logistics service quality and performance. Panayides and So (2005) concluded that superior relationship quality with suppliers has a reinforcing effect on the relationship between internal operant resources and retailers' market performance. Another study investigated the SCRQ concept which encompasses the key relational dimensions of trust, adaptation, communication and cooperation (Beitelspacher *et al.*, 2012). In addition, several studies of SCRQ noted that, in an existing relationship, all of the dimensions (trust, adaptation, communication and cooperation) are positively correlated and are indicators of SCRQ (Naude and Buttle, 2000; Mohr and Spekman, 1994; Monczka *et al.*, 1995; Waheed and Gaur, 2012). Hence, this study defines SCRQ as the degree to which both parties in a relationship are engaged in an active, long-term working relationship and this construct is operationalized employing the two most frequently used indicators, which are trust and commitment.

2.2.1 Trust. Ellram and Krause (1994) argued that trust can be developed by creating an atmosphere in which supply chain members willingly exceed the minimal requirements of a relationship to increase the likelihood of success for the whole supply chain. Ireland and Webb (2007) and Moorman *et al.* (1993) defined trust in supply chain as the willingness to rely on a supply chain partner. Meanwhile, Sahay (2003) noted that trust can enhance third-party relationship effectiveness through sharing the benefits, burdens and risks associated with a particular arrangement. In addition, other authors regarded trust as a critical relationship capital that facilitates cooperative activities among supply chain partners (Moore, 1998; Nahapiet and Ghoshal, 1998; Adler and Kwon, 2002). Based on such studies, researchers have also attempted to expand and apply their findings. For example, Yeung *et al.* (2009) suggested that mutual trust and adaptation are central to a more sophisticated approach in managing SCRQ. Fynes, Voss and De Búrca (2005) also demonstrated the impact of trust on innovativeness and SCP.

2.2.2 Commitment. Several studies defined commitment as a desire to maintain a relationship (Panayides and Lun, 2009; Moorman *et al.*, 1993). Other definitions see commitment as a pledge of continuity between parties, the sacrifice or potential for sacrifice if a relationship ends, or the absence of competitive offerings (Morgan and Hunt, 1994; Dwyer *et al.*, 1987). Although the concept of commitment has many interpretations among scholars, Anderson and Weitz (1992), Morgan and Hunt (1994) and Moorman *et al.* (1993) stated that commitment exists when one party believes that a relationship is important and warrants maximum effort to maintain or enhance it. Numerous studies recognised that commitment is an exchange of partners' enduring desire to maintain a valued relationship (Morgan and Hunt, 1994; Anderson and Weitz, 1992; Moorman *et al.*, 1993).

Therefore, this paper defines that, following the definition by Ruyter *et al.* (2001), relationship commitment refers to the desire to continue a business partnership and the willingness to make effort to ensure long-term continuity of that relationship.

2.2.3 Supply chain performance. Effective management of supply chains plays an important role in gaining competitive advantage for firms (Ramasamy *et al.*, 2006; Martin and Ryals, 1999; Bülent, 2008; Beamon, 1999). Many studies in the literature have defined SCP as product responsiveness, time to market, market share index, customer satisfaction, financial performance, return on assets (ROA), sales growth, the percentage of revenues

from new products, growth in sales, return on sales, growth in return on sales, growth in profit, growth in market share, return on investment (ROI) (Spillan *et al.*, 2013; Skjoett-Larsen, 1999; Flynn *et al.*, 2010; Swink *et al.*, 2007; Narasimhan and Kim, 2002; Droge *et al.*, 2004; Fynes, Voss and De Búrca, 2005; Rosenzweig *et al.*, 2003; Germain and Iyer, 2006). Some researchers, including Cousins and Menguc (2006), Bartlett *et al.* (2007) and Lotfi *et al.* (2013) investigated supply chain competitive capabilities and/or performance such as product quality, delivery, cost, customer service, marketing technology, differentiation, reliability, process flexibility. Kim (2009) concluded that there is no consensus regarding how SCP is to be measured, which suggests differences in strategic visions of the potential of SCI and supply chain management. Based on previous studies in the maritime logistics literature (Ozdemir and Hewett, 2010; Carr and Pearson, 1999; Fynes, De Bobcat and Voss, 2005), this paper adopts the balanced scorecard approach (Bartlett *et al.*, 2007; Fabbe-Costes and Jahre, 2008; Gunasekaran and Ngai, 2003) when selecting SCP indicators which include total cost reduction, ROI, ROA, growth in profit, growth in market share and growth in sales.

2.3 Theories relating to FC, SCRQ and SCP

This study aims to formulate the complex relationship between the factors: FC (which is associated with types of firm and ownership), SCRQ (which is constructed using indicators of trust and commitment) and SCP. The antecedents and consequences of SCRQ in the maritime logistics industry are depicted in the following proposed model (see Figure 1). The subsequent sub-sections discuss the theories that link these factors.

2.3.1 Configuration theory: linking the effects of FC on SCRQ. According to configuration theory, variables of strategy, structure and environment interact to form common gestalts, archetypes or configurations (Flynn *et al.*, 2010). The theory states that it is possible to have more than one successful organisational configuration, resulting in a taxonomy of configurations adopted by firms to compete in a market (Cao *et al.*, 2015).

Configuration theory has been widely applied in management studies to explain for the diversity of strategies, structure and environment resulting in business excellence. For instance, in the context of supply chain management, Flynn *et al.* (2010) showed that there are four taxonomies of SCI that underlies the structures of competition. In marketing, Vorhies and Morgan demonstrated that firms can employ any of the three strategic types to improve their marketing effectiveness; prospector strategy, analyser strategy, and defender strategy. Each strategy has its own advantages and disadvantages, and has to be carefully chosen by businesses to remain competitive.

To the authors' knowledge, very few studies that anchored on configuration theory have applied FC as taxonomies to explain the differences in the implementation or effectiveness of a strategy. The current paper argues that FC fits into the definition of configuration theory as it relates to the structure of firms, which is a key variable that explains the configuration of firms (Flynn *et al.*, 2010).

There has been some research in the literature on the impact of FC or demographic characteristics on relationship marketing constructs, such as relationship investment,

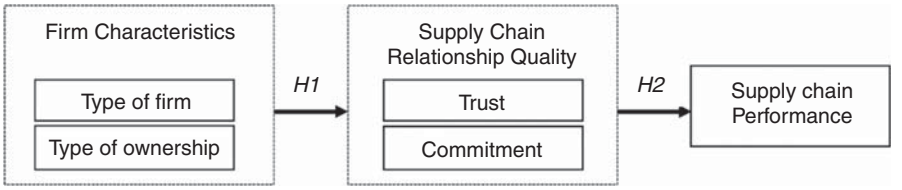

Figure 1.
Conceptual framework

communication, trust and satisfaction (e.g. Kaplan and Norton, 2001; Huo, 2012; Smith, 1998; Bolton, 1998). However, less attention has been paid to the study on the influence of FC on SCRQ. We consider the possible existence of the relationship between FC and SCRQ by anchoring on configuration theory which could explain the differences in SCRQ depending on FC or firm structure.

In this context, the current paper argues that the perceived importance or configuration of SCRQ varies with the structure of the firm which refers to FC (i.e. firm types and ownership types). For instance, regarding firm types, freight forwarders as compared to shipping companies will need to compensate for their lack of assets (i.e. ships, containers), which can be perceived as a disadvantage by shippers, by strengthening SCRQ, i.e. trust and commitment. With reference to ownership types, foreign firms as compared to local firms will place greater emphasis on strengthening SCRQ with their partners. Operating in a foreign environment, which is perceived to be riskier for foreign firms due to larger uncertainties and differences in culture, they would emphasise more on trust and commitment with their partners so as to reduce such risks when operating in another country (Attig *et al.*, 2016).

The following sub-hypotheses are therefore proposed:

H1a. There are significant differences between firm types as far as perceived trust is concerned in the maritime logistics industry.

H1b. There are significant differences between firm types as far as perceived commitment is concerned in the maritime logistics industry.

H1c. There are significant differences between ownership types as far as perceived trust is concerned in the maritime logistics industry.

H1d. There are significant differences between ownership types as far as perceived commitment is concerned in the maritime logistics industry.

2.3.2 Transaction cost theory: linking the effects of SCRQ on SCP. Grounded on transaction cost theory, the current paper argues a positive relationship between SCRQ and SCP. Transaction cost theory holds that apart from paying market prices for a product or service, there are additional costs associated with a transaction. Such costs could be related to transaction costs, contracting costs, coordination costs and search costs. These costs should be considered by firms when making a purchasing decision, and not just the market prices and one of the options to reduce such costs is by establishing inter-organisational trading relationships (Heide, 1994).

Existing studies posit that building long-term relationships through fostering trust and commitment with partners by investing in transaction-specific assets can minimise switching cost and mitigate the threat of opportunism exhibited by supply chain partners (Lee *et al.*, 2007). In this context, the presence of transaction-specific assets such as dedicated terminals, dedicated warehouse, or any other pooled resources ties supply chain partners in a long-term relationship which compels greater commitment and trust. This could subsequently reduce transaction costs that are associated with searching, negotiating and monitoring a product or service for every single transaction (Leuschner *et al.*, 2013).

A variety of studies on relationship quality imply that trust and commitment to the relationship are key factors that determine the firm's performance and competitive advantage (Ward and Dagger, 2005; Wahab *et al.*, 2011; Ozdemir and Hewett, 2010; Morgan and Hunt, 1994; Carr and Pearson, 1999; Panayides and Lun, 2009). In addition, Fynes, De Bobcat and Voss (2005) found that trust and commitment directly affect loyalty to suppliers. Lotfi *et al.* (2013) also affirmed the influence of relationship orientation in third-party logistics and its impact on logistics service quality and performance.

Therefore, we can consider the possible existence of a direct relationship between SCRQ and SCP, and thus the following sub-hypotheses were put forward:

H2a. SCP is significantly influenced by trust in the maritime logistics industry.

H2b. SCP is significantly influenced by commitment in the maritime logistics industry.

3. Research methodology

The survey instrument and measurement constructs utilised in this study was developed based on the literature (see Table I). The construct "SCRQ" is measured by indicators indicating the firm's ability to balance the two factors, trust and commitment (Sanzo *et al.*, 2003; Panayides and So, 2005). "Performance" is defined as the level of returns on assets, growth in market share, growth in sales (Carter and Rogers, 2008; Goncz *et al.*, 2007). Based on the conceptual model, a questionnaire covering each of the constructs studied was designed. After a review of previous literature and in-depth interviews with five practitioners from five container shipping lines in Singapore, the step-by-step stages of questionnaire design were conducted. Reflecting the result of in-depth interviews, the instrument was modified to enhance clarity. Consequently, the final survey instrument appropriately represented the content of the constructs used in the present investigation. The indicators were all measured using a five-point Likert scale where 1 indicates "Strongly Disagree" and 5 denotes "Strongly Agree".

Frequency analysis, factor analysis of items and also Cronbach's α test were conducted to ensure that the combination of attributes possessed internal consistency. The multivariate analysis of variance (MANOVA) and *t*-test were also conducted to analyse the mean differences in SCRQ with respect to firm types and ownership types using SPSS 21.0. Meanwhile, the relationship between SCRQ and SCP was tested using the structural equation modelling (SEM) analysis using AMOS 21.0. As multivariate data analysis approaches were used to analyse the data, the minimum sample size that was deemed to be suitable for most of the analyses should be ten times as large as the number of variables in the study (Brush *et al.*, 2000). As shown in Table I, there are 16 variables in the model.

We followed a random sampling procedure and a sample of 205 cases is considered acceptable for providing stable factor solutions (Sam and Hoshino, 2013). The sampling

Constructs	Variables	Source
Trust	A1. SC partners keep their promises to my company	Morgan and Hunt (1994), Smith (1998), Bolton (1998), Tony Ward and Tracey S. Dagger (2005), Grayson and Ambler, Sazali Abdul Wahab *et al.* (2011), Zahra Lotfi *et al.* (2013)
	A2. SC partners are genuinely concerned that our business succeeds	
	A3. SC partners keep our best interests in mind	
	A4. SC partners consider our welfare as their own	
	A5. SC partners are trustworthy	
Commitment	A6. We are very committed to relationship	
	A7. We intend to maintain indefinitely	
	A8. We continue working with SC partners	
	A9. We genuinely enjoy our relationship with SC partners	
	A10. We like being associated with SC partners	
Supply chain performance	A11. Total cost reduction	V. Emre Ozdemir and Kelly Hewett (2010), Carr and Pearson (1999), Salvador *et al.*, Photis M. Panayides and Y.H. Venus Lun (2007), B. Fynes, S. de Búrca and C. Voss (2005)
	A12. Return on investment	
	A13. Return on assets	
	A14. Growth in profit	
	A15. Growth in market share	
	A16. Growth in sales	

Table I. Construct measurement

frame for this study was obtained from 285 samples from the member directory of Singapore Shipping Association. The member directory of Singapore Logistics Association was also used to extract member companies with business portfolio involving importing and exporting by sea, and thus having their shipment transported through ports. This led to the selection of another 364 companies in the category of cargo owners and freight forwarders, making the total samples in the mailing list to be 649 for this study. After mail-out, 244 questionnaires were completed and returned. Among these, however, 39 questionnaires were discarded due to incomplete information, resulting in an effective response rate of 31.6 per cent.

The detailed sample characteristics are shown in Table II. Respondents varied in ownership types (local firm, 78.0 per cent; foreign firm, 22.0 per cent) and firm types (shipping firm, 26.3 per cent; freight forwarder, 42.4 per cent; shipper, 31.3 per cent).

4. Results and discussion

4.1 Measurement of variables

Confirmatory factor analysis (CFA) was performed to confirm the factor structure of the SCRQ and SCP scales. The CFA was primarily applied to establish reliability and validity of the measurement items. The CFA procedure investigates the model's goodness of fit, the magnitude of the individual relationships, and the hypothesised paths. However, this statistic is sensitive to sample size and model complexity, and thus other measures of fit that compensate for sample size were also considered, including the goodness of fit index (GFI), adjusted goodness of fit index (AGFI), root mean square residual (RMR), Tucker-Lewis index (TLI), comparative fit index (CFI), and normed χ^2 (χ^2/df). The recommended criteria for the acceptance of model are listed in Table III. The CFA results demonstrated good model fit ($\chi^2 = 76.147$, df = 26, $\chi^2/\text{df} = 2.93$, $p = 0.00 < \alpha = 0.05$; GFI = 0.924, AGFI = 0.868, RMR = 0.049, TLI = 0.940, CFI = 0.957).

In general, all item loadings are significant, with CR values ranging from 9.58 to 19.04. Moreover, the smallest standardized loading is 0.56, above the recommended minimum of 0.50 (Bagozzi *et al.*, 1991). Therefore, the constructs exhibit adequate convergent validity.

Table II. Demographic distribution of individuals in the sample

Variable	Sample	%
Position		
Senior management	85	41.5
Middle management	95	46.3
Lower management	15	7.3
Specialist/administrative/clerical staff	10	4.9
Working duration (years)		
1–5	80	39.0
6–10	25	12.2
11–15	36	17.6
16–20	37	18.0
More than 20	27	13.2
Type of ownership		
Local firm	160	78.0
Foreign firm	45	22.0
Type of firm		
Shipping company	54	26.3
Freight forwarder	87	42.4
Shipper	64	31.3

Constructs	Variables	Standardized loadings	CR	SMCs	Cronbach's α	AVE	CCR
Trust	A5	0.894	–	0.799	0.916	0.853	0.946
	A2	0.908	19.041	0.824			
	A3	0.856	16.986	0.733			
Commitment	A6	0.994	–	0.989	0.780	0.664	0.849
	A7	0.730	15.084	0.533			
	A10	0.560	9.579	0.314			
Performance	A15	0.560	–	0.313	0.793	0.773	0.907
	A11	0.764	8.333	0.584			
	A12	0.995	9.571	0.989			

Notes: $\chi^2 = 76.147$, df = 26, $\chi^2/\text{df} = 2.93$, $p = 0.00 < \alpha = 0.05$; GFI = 0.924, AGFI = 0.868, RMR = 0.049, TLI = 0.940, CFI = 0.957

Table III. CFA and scale reliability

Table III presents the measurement items, their standardized loadings and CR values. The values of the squared multiple correlations (SMC) range from 0.31 to 0.98, which indicates a moderate to good reliability. The fit of the measurement model was assessed using significant indicator loadings, construct composite reliability (CCR) and average variance extracted (AVE). Both the CCR and AVE represent the convergent validity of the measures with possible values between zero and one. Convergent validity exists when CCR are greater than 0.7 and AVE are greater than 0.5 (Fornell and Larcker, 1981). The statistical assessment indicated that items A2, A3 and A5 from the scale of "trust", items A6, A7 and A10 from the scale of "commitment", and items A11, A12 and A15 from the scale of "performance" be considered as candidates for removal to improve measurement model fit. The reliability of all factors was calculated using the cronbach's α. The cronbach's α of trust, commitment and performance are 0.92, 0.78 and 0.79 which are acceptable. A cronbach's α value of greater than or equal to 0.7 is considered acceptable for the factor to be reliable (Hair *et al.*, 2006).

The discriminant validity was examined by comparing the AVE values with the squared correlations of each pair of constructs. Ideally, the AVE values should exceed the squared correlations values (Fornell and Larcker, 1981). As seen in Table IV, the square-root AVE of each construct satisfies this criterion, hence providing evidence for discriminant validity.

4.2 Hypotheses testing

This research comprises two sets of hypotheses. The first set (*H1a-H1d*) is to examine the differences in the level of SCRQ with respect to FC which includes firm type and ownership type. Since firm type comprises three sub-categories, MANOVA was employed to test for mean differences in SCRQ among shippers, freight forwarders and shipping lines. On the other hand, ownership type only comprises two sub-categories. Therefore, *t*-test was employed to test for mean differences in SCRQ between local and foreign firms. The second set (*H2a* and *H2b*) is to examine the influences of SCRQ dimensions (i.e. trust and commitment) on SCP. SEM was applied to estimate the relationships.

Constructs	Commitment	Trust	Performance
Commitment	*0.66*		
Trust	0.64	*0.85*	
Performance	0.01	0.06	*0.77*

Notes: The italic diagonal values represent AVE; the off-diagonal values are the square of the correlations among the constructs

Table IV. Discriminant validity analysis

MANOVA was conducted to determine if SCRQ significantly differs with firm types. The results are displayed in Table V while Figure 2 displays the significant mean differences in SCRQ among shippers, freight forwarders and shipping lines. MANOVA allows us to conduct tests of differences involving multiple response variables between two or more groups (Scheiner and Gurevitch, 2001). This technique explicitly takes into account the fact that the two dependent variables, i.e. trust and commitment, may be correlated.

As shown in Table V, significant mean differences in trust and commitment were found among the three types of firm (shipping lines, freight forwarders and shippers) with a Wilks' $\lambda = 0.900$, F (4, 402.000) = 5.45, $p < 0.001$, power to detect the effect was 0.975. The results show that both trust ($F = 7.426$, $p = 0.001$) and commitment ($F = 9.814$, $p = 0.000$) were statistically different at the 0.01 level among the three types of firm. Thus, hypotheses *H1a* and *H1b* were supported. This finding is consistent with configuration theory which suggests that structure, which in this case, refers to the types of firms, determine the configuration of SCRQ. As shown in Table V, it can be seen that freight forwarders (mean = 3.743) perceived SCRQ to be more important than shipping lines (mean = 3.488) and shippers (mean = 3.297). This finding is expected given that freight forwarders do not own much assets (e.g. ships and containers), which can be perceived as a disadvantage by

SCRQ	Type of firm	Sample	Mean	SE	Sum of square	Mean square	F	p
Trust	Shipping firm	54	3.488	0.720	7.524	3.762	7.426	0.001*
	Freight forwarder	87	3.743	0.597				
	Shipper	64	3.297	0.838				
Commitment	Shipping firm	54	3.543	0.535	8.444	4.222	9.814	0.000**
	Freight forwarder	87	3.862	0.481				
	Shipper	64	3.401	0.907				

Tests	Test value	F	Hypothesis df	Error df	p	Noncent parameter	Observed power
Pillai's trace	0.100	5.339	4	404.000	0.000**	21.525	0.972
Wilks' λ	0.900	5.453	4	402.000	0.000**	21.810	0.975

Notes: Key to significance tests *$p < 0.01$; **$p < 0.001$

Table V.
MANOVA Results of SCRQ

Figure 2.
Estimated marginal means of relationship quality

shippers. In this regard, establishing SCRQ with their partners could compensate for their lack of assets and therefore, be viewed to be more important by freight forwarders.

Given the significance of the overall test, we conducted *post hoc* tests to examine the differences among the types of firm. Table VI summarises the results of the Sheffé's and Tukey's HSD tests. The results show that three pairs out of six possible combinations of the two dependent variables (trust and commitment) across the three types of firm were significantly different ($p < 0.05$). With regards to trust, there is a significant difference between freight forwarders and shippers with the value of 0.001 ($p < 0.01$), whereas the differences between shipping firms and freight forwarders ($p = 0.021$), and between freight forwarders and shippers ($p = 0.000$) in relation to commitment were also supported, respectively ($p < 0.05$ for both).

We examined *H1c* and *H1d* with *t*-test analysis. The sample was split into two, a local firm group consisting of 160 responses, and a foreign firm group consisting of 45 responses. Results of the *t*-test showed that there were statistically significant differences (at the 90 per cent confidence level) between these groups. Thus, we accept *H1c* and *H1d* for trust and commitment. Table VII shows the *t*-test analysis for the types of ownership. This finding is again consistent with configuration theory where structure, which in this case, refers to ownership types, determines the configuration of SCRQ. Table VII shows that local firms perceived building trust and commitment with their partners to be more important than foreign firms. This indicates that in light of increased competition from foreign players, it is imperative that local firms forge stronger SCRQ with their partners. The finding that foreign firms did not perceive building trust and commitment with their supply chain partners to be more important than local firms is interesting and can be context-specific, given that Singapore is a traditional international maritime hub where there has been the existence of foreign maritime logistics firms for a long period of time.

H2a and *H2b* were examined by using SEM. The structural model with the SCRQ and SCP is shown in Figure 3. Results of the SEM indicate an adequate model fit with the data

RQ	(I) Type of firm	Level of significance Shipping firm	Freight forwarder	Shipper
Trust	Shipping firm		0.119 (0.098)*	0.351 (0.317)
	Freight forwarder	0.119 (0.098)*		0.001** (0.001)**
	Shipper	0.351 (0.317)	0.001** (0.001)**	
Commitment	Shipping firm		0.021** (0.015)**	0.504 (0.471)
	Freight forwarder	0.021** (0.015)**		0.000*** (0.000)***
	Shipper	0.504 (0.471)	0.000*** (0.000)***	

Notes: Results of Turkey HSD are in parenthesis. Key to significance tests *$p < 0.1$; **$p < 0.005$; ***$p < 0.001$

Table VI.
MANOVA statistics and firm types

Variables	*n*	Mean	SD	*t*-value	df	Sig.
Trust						
Local firm	160	3.58	0.714	1.728	203	0.085
Foreign firm	45	3.37	0.785			
Commitment						
Local firm	160	3.68	0.706	1.704	203	0.090
Foreign firm	45	3.48	0.575			

Note: Significance at 0.1 level

Table VII.
Independent samples *t*-tests

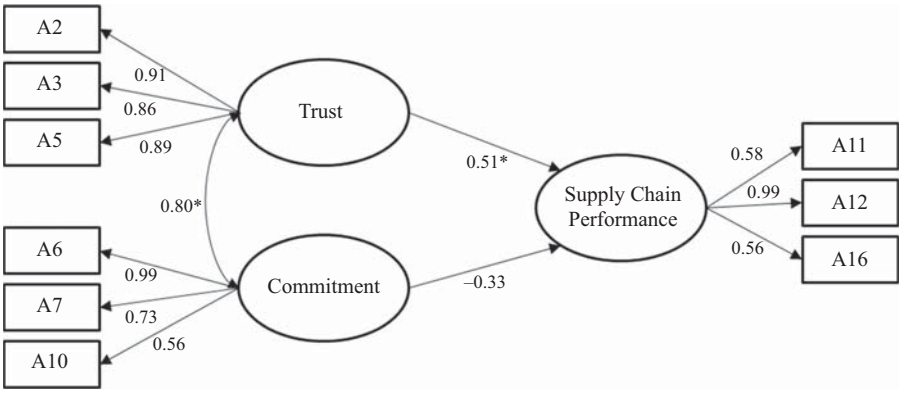

Figure 3.
Final causal model

Notes: Model fit statistics: $\chi^2 = 76.147$, df = 26, χ^2/df = 2.775, GFI = 0.924, AGFI = 0.868, CFI = 0.957, TLI = 0.940, RMR = 0.049. All coefficients are standardized. *p<0.01

($\chi^2 = 76.147$, df = 26, χ^2/df = 2.775, GFI = 0.924, AGFI = 0.868, CFI = 0.957, TLI = 0.940, and RMR = 0.049).

The hypothesised relationships were tested using their associated standardized regression coefficient and t-values. Results of hypothesis testing are shown in Table VIII. Specifically, trust has a positive and significant influence on SCP (coefficient = 0.517, t-values = 3.791, at $p < 0.01$) but commitment does not (coefficient = −0.379, t-values = −2.904).

5. Conclusion

5.1 A summary of findings

This paper has described the antecedents of SCRQ and its consequences in the maritime logistics industry, more exactly between the maritime logistics service providers and their logistics service users. A questionnaire survey of 205 logistics service providers and users (shipping firms, shippers and freight forwarders in Singapore) was conducted. MANOVA and t-test analyses were used to analyse the differences in SCRQ (trust and commitment) according to FC (firm types and ownership types). SEM was employed to test the impact of SCRQ on SCP. With this in mind, we assessed the relevant literature on the relationship between FC, SCRQ and SCP, which resulted in six sub-hypotheses. The result of each hypothesis is as follows.

First, FC was confirmed as the antecedent which has a significant impact on SCRQ for both trust and commitment. Previous studies have suggested that a link exists between FC and SCRQ. However, there is a lack of such evidence in the maritime logistics industry. It has been validated in this study that the link between FC and SCRQ (Ward and Dagger, 2005; Knemeyer *et al.*, 2003; Knemeyer and Murphy, 2005) is consistent with previous research, with the present research shows the support for *H1a-H1d* and confirms the positive relationship between FC and SCRQ. The support for *H1a* and *H1b* demonstrates

Table VIII.
Results of hypothesis testing

Hypothesised path	Standardized regression coefficient	t-values	Results
Performance ← Trust	0.517	3.791*	Accepted
Performance ← Commitment	−0.379	−2.904*	Rejected

Note: *$p < 0.01$

that there is a significant difference between types of firm (shipping firm, freight forwarder and shipper) in relation to trust and commitment of SCRQ. In addition, the support for *H1c* and *H1d* shows that there is a significant difference between types of ownership (local firm and foreign firm) in relation to trust and commitment of SCRQ. These results imply that maritime logistics service providers should have differentiated customer-oriented attitudes and behaviours depending on various customer profiles. They should maintain their relationships with their customers to meet their needs and customise their service offerings.

Second, we examined the impact of SCRQ on SCP. Our findings indicate that SCRQ has a positive impact on SCP. Previous research has suggested that a link exists between perceived SCRQ and SCP. Specifically, Lotfi *et al.* (2013) and Panayides and So (2005) found that SCRQ has increasingly become a dominant factor in determining the success or failure of firms. In this connection, our findings provide support for the *H2a* that there is a positive relationship between trust and SCP. However, contrary to the results of Panayides and So (2005), there is no significant link between commitment and SCP tested in *H2b*. The rejection of *H2b* may be explained by customer's preferred opportunistic behaviours such as short-term low freight rate over long-term commitments. In this respect Huo (2012) found that manufacturers' normative relationship commitment to both suppliers and customers has significant and positive influences on SCP. This means that normative relationship commitment is helpful in enhancing the performance of the whole supply chain. However, the manufacturers' instrumental relationship commitment to suppliers or customers has no significant effect on SCP. Thus, it is difficult for logistics service providers and users to cooperate within the supply chain. This finding is in line with previous studies (Lotfi *et al.*, 2013; Sanzo *et al.*, 2003; Panayides and So, 2005). Hence, normative relationship commitment is much more effective than instrumental relationship commitment in enhancing SCP. Logistics service providers should therefore make best effort to improve normative relationship commitment for better cooperative behaviours, less conflicts among partners, and finally, improved long-term SCP (Huo, 2012).

5.2 Theoretical implications

This paper enriches the existing knowledge of supply chain management and integration in the maritime logistics industry by focussing on the relationship marketing aspect. Specifically, it enhances a better nomological understanding of the connections between FC, SCRQ and SCP which have not been well-studied in the maritime logistics industry.

This paper extends configuration theory to the context of SCRQ. In particular, it highlights the importance of FC, which is a configuration variable that influences how maritime logistics service players of different firm types and ownership types develop their level of SCRQ. This paper is one of the few studies that consider FC as a configuration variable in management studies. In this way it contributes to enrich the extant knowledge on the application of configuration theory in a service-oriented industry such as maritime logistics.

The results of this research imply that the structure of a firm has bearings on the perceived importance of SCRQ. For instance, with regards to firm types, freight forwarders perceive SCRQ to be significantly more important as compared to shipping firms and shippers. Freight forwarders, which are associated with small amount of physical assets, mainly function as an agent and rely on providing integrated, value-added logistics services such as door-to-door deliveries including customs and import-export documentation. Such services are largely generic which are suitable to all shippers. As a result, freight forwarders can differentiate their services by building stronger relationships with their partners through developing SCRQ. In a similar vein, local firms perceive SCRQ to be significantly more important as compared to foreign firms. As such, the differences in the importance of SCRQ across FC are consistent with configuration theory which suggests the various taxonomies or strategies that can be adopted by firm to compete in a market.

The positive relationship between SCRQ and SCP hypothesised in this paper was also strengthened with the introduction of transaction cost theory. Transaction cost theory holds that there are many costs associated with a transaction apart from paying for the price of a product or service. Such costs may arise from searching, negotiating, switching, inspecting and contracting. The existing literature suggests that improving SCRQ through fostering trust and commitment can reduce costs that are linked to a transaction. Consistent with the theory, the results of this study show that enhancing trust, i.e. a component of SCRQ improves SCP which is associated with total cost reduction, ROI, ROA, growth in profit, growth in market share and growth in sales.

5.3 Managerial implications

First, the results of this research indicate that there are differences between FC categories in relation to SCRQ. These findings suggest that the application of supply chain relationship marketing in the maritime logistics industry relating to the business types or ownership types needs more specific and discriminating attention from researchers and practitioners. From the managerial perspective, this finding suggests that maritime logistics service providers need to understand which FC category is the most important to customers as these will ultimately drive the strength of the SCRQ to be developed between the maritime logistics service providers and their service users. Hence, it will be beneficial for practitioners facing tough resource-allocation problem to increase integration with supply chain partners through relationship marketing activities. This is especially applicable to container shipping lines whose container transportation service has become very much a commodity in recent years. Investment in SCRQ corresponding to categorised FC can therefore facilitate the design and implementation of differentiation strategies which in turn may create competitive advantage for firms in the maritime logistics industry.

Second, this research represents an important step in testing and understanding the dynamics of the relationship between SCRQ and SCP in the maritime logistics industry. As such, it contributes to the limited research exploring the effect of SC relationship trust and commitment on SCP. Results from this research show that perceived trust has a positive impact on SCP while perceived commitment does not. The managerial implications of these results are thus quite straightforward. Managers in the logistics service sector may be confident of high returns for promoting and encouraging organisational learning and for building customer relationships (Panayides, 2007) so that mutual trust can be developed between them and their customers. Thus, logistics service providers that value the critical importance of long-term relationships with their service users should enjoy an environment where the potential for opportunistic behaviour is at the minimum. From the managerial perspective, trust and normative relationship commitment are vital determinants of SCRQ, which in turn influences SCP. This is especially important in a service industry such as maritime logistics.

5.4 Limitations and future research

There are various limitations of this work which lead us to propose future research directions. First, the hypotheses have only been tested in the maritime logistics industry in Singapore, which limits the external validity of the results. Hence, one should be cautious in generalising the findings across other industry sectors or countries. In addition, other measurement scales or methods, such as system dynamics and fuzzy theory, could also be applied to decrease the variance of measurement results in the questionnaire survey.

Second, although earlier studies indicated that SCRQ includes four dimensions of trust, commitment, adaptation, communication and cooperation, in this research we examined SCRQ as a construct of only two dimensions of trust and commitment. Although previous research indicated that trust and commitment are primary components of relationship

quality (Makoba, 1993; Morgan and Hunt, 1994), we suggest that the relationships between the research variables with all SCRQ dimensions be analysed in future studies, in order to determine possible differences in the influence of various SCRQ dimensions on SCP.

Third, we have considered only FC as the antecedents of SCRQ. However, the customer–company identification can also be treated as an antecedent of SCRQ in future research. Future research could examine four transaction-type differences including shipping firm–shipper, shipping firm–freight forwarder, freight forwarder–shipper, and freight forwarder–freight forwarder relationships. Such study could reveal and elaborate possible barriers to effective buyer–seller relationships in supply chains. It is therefore expected that findings in this research will serve as a spring-board for and stimulate further investigation in this research domain.

Finally, this research is only limited to the liner shipping industry. Future research could consider extending the validity of the results by comparing them with the liquid and dry bulk shipping sectors.

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