【Articles】

How will digitalization enhance retailers' competitiveness? Focus on supplier relationships

デジタル化で小売の競争力はいかに強化されるのか？
―サプライヤーとの関係を中心に―

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Contents

(Abstract)

This study explores the relationship between retail information systems and the quality of supplier relationships. Retail information systems were analyzed separately for the information technology used in supplier relationships (supplier-IS) and customer relationships (customer-IS). Hypotheses were tested using structural equation modeling of data collected through a questionnaire survey of Japanese retailers. The analysis results revealed that customer-IS is more relevant than supplier-IS, and that the quality of the relationship needs to be analyzed by elemental decomposition. Retailers trying to raise competitive advantage by collecting and utilizing customer data through information and communications technology often focus on customer relations; however, this study suggests that both customer and supplier relations must be considered. This discovery will be effective for customer relationship management and multi-channel retailing and for enhancing omni-channelization strategy building and social media utilization, which has recently gained momentum.

Keywords: Customer-IS; Supplier-IS; Relationship Quality; Merchandising; Retailer

1. Introduction

To interact with their customers, retailers have been increasingly using information and communications technology (ICT) (Sanders, 2008; Grewal et al., 2011; Peltier et al., 2013; Thatte et al., 2013; Renko and Druzijanic, 2014; Zerbino et al., 2018; Ying et al., 2021). As interaction has implications on exchange and communication, this study defines digitalization as ICT utilization for customer interaction. Hence, we define digitalization strategy as the means to achieve a competitive advantage through digitalization. More than 20 years ago, digitalization of retailers aimed at interaction with customers had already begun in customer relationship management (CRM) and multi-channel retailing (Zhang et al., 2010; Zerbino et al., 2018; Ying et al., 2021). The digitalization strategy of retailers continues to evolve as smart devices become ubiquitous and social media technology develops further (Grewal et al., 2017; Ratchford et al., 2022).

Can interest and investment in the digitalization strategy of retailers produce results that match expectations? In CRM research, utilization of the CRM system has enhanced customer satisfaction and royalties, but there is skepticism regarding its relevance to competitive advantages (Hendricks et al., 2007; Schumanna et al., 2014). Unless these problems are resolved, it is difficult to acquire competitive advantages. These limitations cause difficulty for retailers in decision making with respect to digitalization strategies. To resolve this problem, we must explore new possibilities in a digital strategy. Thus, this study focuses on aspects where customer data gathered through digitalization positively work for supplier relations.

Most existing research on the effect of digitalization in retail focuses on its effect on cus-

tomer relations (Ratchford et al., 2022). However, retailers achieve their competitive advantage by enhancing customer and supplier relations. Previous studies on B2B marketing suggest that digitalization, such as the integration of information systems among businesses, promotes cooperation and joint innovation with suppliers, which in turn improves competitive advantage (Dong et al., 2009; Zhao et al., 2011; Thatte et al., 2013; Ganbold et al., 2021). Nevertheless, not many studies have considered how retailers' use of information systems for consumer relations affects their relationships with suppliers.

Customer data gathered on the retail side include information about each customer's purchasing behavior, such as time of purchase and products purchased. Therefore, retailers can collect and analyze these data through digitalization to understand the latest trends of customers regarding their purchasing behavior (Peltier et al., 2013; Renko and Druzijanic, 2014; Zerbino et al., 2018; Ying et al., 2021). As suppliers do not have direct access to these data, retailers can use these customer data to improve their relationships with suppliers and gain a competitive advantage based on this relationship. Therefore, the following research question can be considered:

Can digitalization improve supplier relations and enhance competitive advantage?

With respect to retailers and digitalization strategies, to raise practical implications, it may be necessary to clearly reflect the retail characteristics in hypothesis model construction and analysis. Most studies on the effect of digitalization note that digitalization facilitates retailers' interaction with consumers and enhances retailers' marketing capabilities, which increases competitive advantage (Zerbino et al., 2018; Ying et al., 2021; Ratchford et al., 2022). This insight is crucial to utilizing digitalization and can be highly generalized, which may be why retail characteristics are often overlooked.

The behavioral characteristics of manufacturers and retailers are obviously different from each other. Manufacturers communicate with their customers through their products and create their product brands. Meanwhile, retailers communicate with their customers through their stores and create their store brands (Sethuraman and Gielens, 2014). While product development is the primary resource for manufacturer competitiveness, merchandising (such as assortments) is the primary resource for retailer competitiveness, as they do not engage in product development.

With respect to the aforementioned factors, this study 1) focuses on customers and suppliers' relations, 2) gives sufficient consideration to retail characteristics, and 3) conducts a questionnaire survey and applies the structural equation modeling technique.

2. Conceptual Framework

2.1. Retail Characteristics, Merchandising Capability, and Information Systems

Retail Characteristics

Compared to manufacturers, the most common characteristics of retailers are the source of competitive advantage and organizational structure. Making comparisons with manufacturers is an effective approach to highlight the distinctive characteristics of retail companies, and the merchandise that increases their competitive advantage. While manufacturers achieve competitive advantage by making a fixed set of products, retailers achieve competitive advantage by providing services that involve assorting a wide variety of products that are available in the market (Alderson, 1957; Dawson, 2000; Mantrala et al., 2009). In merchandising, to ease assortment planning and product sourcing, retailers require the cooperation of suppliers. Supplier relations, as a basis for competitive advantage, seem to be more affected than other industries such as manufacturing.

The complexity of organizational structure is a characteristic of retailers. While the retailers who seek to grow their business operate multiple stores to overcome geographical constraints, manufacturers usually take on the form of a single-unit organization. However, retailers take on the form of a multi-unit organization that consists of the head office and stores (Chang and Harrington, 2000).

Merchandising Capability

The retail characteristics seem to suggest that two points need to be considered when constructing and analyzing the hypothesis model—one is to focus on merchandising capability (MDC). Merchandising requires various tasks, such as assortment planning, sourcing, and promotion (Lambert, 1979; Lumpkin, 1985; Pettigrew et al., 2005; Chaudhuri and Ligas, 2009; Thatte et al., 2013), but the task of each department is different. Although there is a difference depending on whether it is a centralized structure or a decentralized structure, assortment planning is undertaken by the buyer department, sourcing by the logistics department, and promotion by the shop management department or store in general.

Therefore, in addition to the capabilities of each department in-charge, communication between functions (that is, between functions in headquarters or between head office and store) is required. Furthermore, collaborating with suppliers requires merchandising, so the communication activity required to execute merchandising becomes complicated. As MDC seems to be an important factor in considering the competitive advantage of retailing, the study incorporates it in constructing and analyzing hypothetical models.

Information Systems

The next consideration for the hypothetical model of this study is to focus on two types of information systems that take place at retail sites. One is an information system for supplier

relationship (hereafter, supplier-IS)(Rai et al., 2006; Dong et al., 2009; Zhao et al., 2011; Ganbold et al., 2021). Supplier-IS aims to integrate information processes with suppliers to ensure smooth and accurate communication and to increase procurement efficiency. Further, it is expected to simultaneously save operational costs and improve inventory management efficiency. The other is an information system that is utilized for the purpose of communication with customers (hereafter, customer-IS) (Sanders, 2008; Grewal et al., 2011; Peltier et al., 2013; Renko and Druzijanic, 2014; Zerbino et al., 2018; Ying et al., 2021; Ratchford et al., 2022). A typical customer-IS is CRM. In CRM, it is expected to maintain relationships with customers and collects and analyzes customer data and uses them to solve marketing problems.

2.2. Relationship Quality

We attempt to understand supplier relations in terms of relationship quality. For this study, we adopt trust, commitment, and communication as the core components of relationship quality and evaluate their impact on MDC. Since Dwyer et al. (1987), relationship quality research has explored the topic from a broad perspective, based on multiple dimensions (trust, commitment, satisfaction, communication, conflict, power, bonds, adaptation, fairness, etc.) (Ulaga and Eggert, 2006; Fang et al., 2011; Change et al., 2012; Sheu, 2015; Casidy and Nyadzayo, 2019; Najafi-Tavani et al., 2022). Regarding dimensions, there is a tendency to select components according to the research purpose; there does not appear to be a fixed analysis framework. However, many studies have adopted trust and commitment as major dimensions, and they tend to add other variables according to their research purpose. In numerous studies, satisfaction has also been adequately analyzed, and while it can be considered a major dimension, it is often analyzed as customer satisfaction. As this study does not analyze retail customer satisfaction, we disregard it as a major dimension.

Similar to previous studies, this study considers communication as a dimension of relationship quality (Fynes et al., 2004; Lages et al., 2005; Richard et al., 2007), as communication problems are important for the retailer's competitive advantage. Figure 1 represents the research framework. We build a hypothetical model based on this basic concept for investigating the research question.

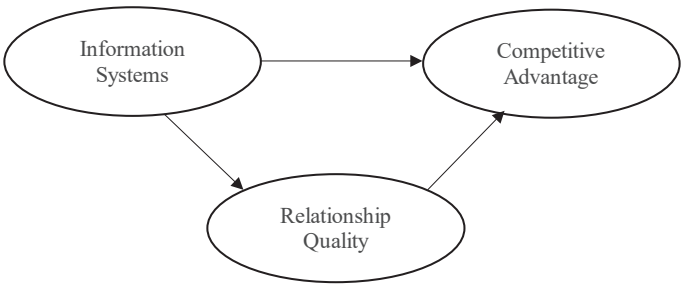

Figure 1. Research framework

3. Hypothesis

3.1. Information Systems and Merchandising Capability

Supplier-IS oversees business process integration with information flow (Rai et al., 2006; Dong et al., 2009; Zhao et al., 2011; Ganbold et al., 2021). Supplier-IS involves the minimization of communication and coordination effort between activities (Sikora and Shaw, 1998; Volkoff et al., 2005; Zhao et al., 2011; Ganbold et al., 2021). Often, communication efficiency is particularly mentioned as an effect of supplier-IS in supply chain management (SCM) research. Studies show that it also enhances relationships quality, competitive advantage, and financial outcomes. Mohr and Spekman (1994) list accuracy, timeliness, adequacy, and credibility as elements that enhance the quality of communication. Supplier-IS enables them to share information precisely and in real time—this means that the efficiency of communication in the supply chain (SC) is increased (Cachon and Fisher, 2000; Croson and Donohue, 2003; Hendricks et al., 2007; Zhao et al., 2011). This improvement can reduce forecasting, planning errors (Hendricks and Singhal, 2003), and order-to-fulfillment cycle time (Cachon and Fisher, 2000; Croson and Donohue, 2003; Hendricks et al., 2007; Dong et al., 2009; Zhao et al., 2011). Increasing the communication efficiency of SC means increasing responsiveness to the market (Ettlie and Reza, 1992; Dong et al., 2009; Zhao et al., 2011; Ganbold et al., 2021). Supplier-IS is expected to increase assortment planning and sourcing capabilities, especially among merchandising-related tasks. Thus, we predict

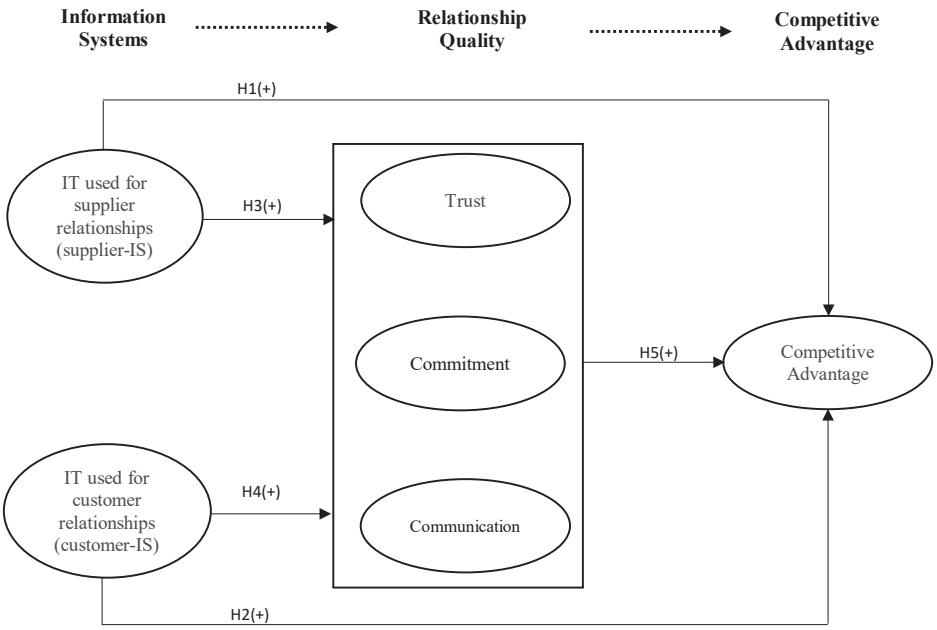

Figure 2. Hypothesis model

H1: Supplier-IS enhances retailers' competitiveness advantage.

While supplier-IS is expected to increase competitive advantage as in hypothesis 1, customer-IS may also increase retail's competitive advantage in a mature market. As markets mature, consumer needs become more diverse and short-cycle. This makes it difficult to predict consumer needs in this market environment. There is a limit to the extent to which conventional information systems can handle this problem, and it is expected that customer relationship information systems, including big data, will be utilized to solve this problem. Customer data collected from CRM activities, such as loyalty programs, contain information on who bought what product, when, and by whom, and these data can be analyzed to understand customer attributes (Sanders, 2008; Grewal et al., 2011; Peltier et al., 2013; Renko and Druzijanic, 2014; Zerbino et al., 2018; Ying et al., 2021). Based on customer attributes, more accurate market segmentation is possible, which is expected to increase product planning capability (Capizzi and Ferguson, 2005; Ferguson and Hlavinka, 2006; Liu et al, 2013). In addition, the promotion capability is expected to increase, as it would be possible to discriminately propose attractive products to each target based on customer attribute information (Cigliano et al. 2000; Lemon and Wangenheim, 2009; Grewal et al. 2011). From this relationship, the following hypothesis can be derived:

H2: Customer-IS enhances retailers' competitiveness advantage.

3.2. Information Systems and Relationship Quality

As mentioned in the previous section, we take trust, commitment, and communication as the dimensions of relationship quality. Trust is formed by an assurance of the fulfillment of promises (Dwyer et al., 1987). Anderson and Narus (1990, p. 45) defined trust as "the firm's belief that another company will perform actions that will result in positive actions for the firm, as well as not take unexpected actions that would result in negative outcomes for the firm." The definition of trust involves two dimensions: credibility and benevolence (Moorman et al., 1992; Doney and Cannon, 1997). Credibility focuses on the reliability of a partner's words, while benevolence focuses on the partner's prosperity and pursuit of joint interests.

Commitment has been defined as "an enduring desire to maintain a valued relationship" (Moorman et al., 1992, p. 316). If commitment is formed, not only will we strive to maintain relationships, but we will also avoid changing our partners even if our partner's rivals present a far more valuable offer (Ulaga and Eggert, 2006). As this relationship becomes future-oriented, special investment in assets is undertaken with partners (Anderson and Weitz, 1992). Commitment is similar to trust as it motivates collaboration with partners; however, it focuses on long-term relationships.

Communication is defined as "the formal and informal sharing of meaningful and timely information between firms" (Anderson and Narus, 1990, p. 44). Morgan and Hunt (1994) argued that frequent and timely communication is important for solving conflicts and matching recogni-

tion and expectations among companies. However, Mohr and Spekman (1994) cited accuracy, timeliness, adequacy, and credibility as elements that improve the quality of communication. Naturally, insufficient communication is prone to conflict, so effective communication is indispensable for collaboration with partners to succeed (Monczka et al., 1995).

When supplier-IS is in place, it means a greater degree of interaction and cooperation between companies and improved quality of communication (Håkansson, 1982). Supplier-IS enables them to share information precisely and in real time (Cachon and Fisher, 2000; Croson and Donohue, 2003; Hendricks et al., 2007; Dong et al., 2009; Zhao et al., 2011; Ganbold et al., 2021). Improvement of communication efficiency of SC by supplier-IS seems to enhance both benevolence and credibility trusts. Coordinated planning and flow of materials and information among SC partners can mitigate the bullwhip effect (Lee at al., 1997). Mitigation of the bullwhip effect by supplier-IS increases the benevolence trust for retailers to directly contribute to the supplier's financial outcomes. However, supplier-IS increases the visibility of information (Lehtonen et al., 2005; Williams et al., 2013), and this visibility is expected to increase credibility confidence in patrons. If there is benevolence and credibility trusts, commitment is promoted. Thus, we predict

H3: Supplier-IS enhances suppliers' relationship quality.
H3a: Supplier-IS enhances suppliers' trust quality.
H3b: Supplier-IS enhances suppliers' commitment quality.
H3c: Supplier-IS enhances suppliers' communication quality.

Customer-IS enhances SC suppliers' relationship quality in terms of the attractiveness of information and communication efficiency. First, we consider the attraction of information as customer data—in the form of customer characteristics on purchasing behavior—captured by ICT retailers (e.g., Sanders, 2008; Grewal et al., 2011). Therefore, retailers with customer data can conduct accurate and multi-faceted segmentation, which enhances their planning capabilities (Capizzi and Ferguson, 2005; Ferguson and Hlavinka, 2006; Renko and Druzijanic, 2014). In addition, retailers with such information can promote different products by target customer (Lemon and Wangenheim, 2009; Grewal et al., 2011). In this situation, retailers can generate information appealing to suppliers.

Information is useful for decision making concerning inventory and production quantities, such as inventory information. Information is also useful for product development and advertisement strategy (e.g., information on brand switching or whether the manufacturer's new product was purchased by the intended target or not). Attractive information can be a resource of power, while simultaneously drawing out cooperation from the other party (Harris et al., 2003; Hald et al., 2009; Peltier et al., 2013; Cui and Wu, 2016).

We expect the efficiency of communication in the SC to be enhanced by the customer-IS. In retailing, the role of boundary spanning with suppliers is often the task of the buyer department. Therefore, when a supplier intends to obtain market information from a retailer, the

supplier must go through the individual in-charge of the buyer department. Market information is accumulated in multiple divisions (stores, head office, store operation department, information department, or merchandise department) through various channels. Customer-IS has the effect of summarizing customer information scattered within the retail organization, and improving communication efficiency with suppliers even outside the organization. Thus, we predict

H4: Customer-IS enhances suppliers' relationship quality.
H4a: Customer-IS enhances suppliers' trust quality.
H4b: Customer-IS enhances suppliers' commitment quality.
H4c: Customer-IS enhances suppliers' communication quality.

3.3. Relationship Quality and Competitiveness Advantage

Social psychology defines cooperation as the behavioral manifestation of trust (Deutsch, 1949). The cooperative relationship between retailers and suppliers implies that they manifest trust for each other. Trading partners with trust tend to exhibit a higher degree of cooperativeness and commitment builds cooperation in relationships (Kumar et al., 1995; Lancastre and Lages, 2006). The more committed the partners, the longer this cooperation lasts. Higher cooperativeness increases the speed of decision making in SC (Soosay et al., 2008).

Finally, cooperativeness, in this sense, means achieving a common goal with trading partners and joining forces to solve problems that are presented to them (Helper, 1991; Morgan and Hunt, 1994; Wilkinson and Young, 2002). The lack of common goals is one of the inhibitors of collaboration in planning and sourcing (Chung and Leung, 2005). While companies with cooperativeness are expected to be able to learn from each other efficiently, such interorganizational learning can become a source of competitive advantage for each company (e.g., Vickery et al., 2003; Ulaga and Eggert, 2006). Thus, trust enhances supplier cooperativeness, and motivates the pursuit of joint interests with partners. The more the commitment in SC, the stronger these intentions are—this means that supplier cooperation can be obtained in MD as well.

However, information sharing at the SC enhances the visibility of information, which increases information transparency (Lehtonen et al., 2005). More collaborative planning is promoted with higher transparency and visibility (Holweg, 2005). Increasing the speed of information sharing in the SC means that the speed of decision making and responsiveness to customers also increases. Thus, we predict

H5: Retailer's competitiveness advantage rises as the level of suppliers' relationship quality improves.
H5a: Retailer's competitiveness advantage rises as the level of suppliers' trust quality improves.
H5b: Retailer's competitiveness advantage rises as the level of suppliers' commitment quality

improves.

H5c: Retailer's competitiveness advantage rises as the level of suppliers' communication quality improves.

4. Method

4.1. Sample and Data Collection

A questionnaire survey for Japanese retailers was conducted to verify the hypotheses. The questionnaires were sent to the senior managers of the departments of business planning, information systems, and sales planning at retailers, which included both listed and unlisted companies. Of the 6494 candidates, 926 senior managers responded (14.3% response rate). If cases where the survey was sent to multiple departments of the same company and multiple responses were received, the data was averaged (simple average).

The respondents were from general merchandise stores (13.7%), convenience stores (6.3%), grocery and food specialized stores (20.5%), non-food specialty stores (38.7%), department stores (14%), and independent retail stores (42%). We excluded respondents who listed their industry as "other" because they were likely to be employed by wholesalers and trading companies. We checked missing values and analyzed 335 samples.

4.2. Measurement

Measures were used according to existing research for reliability and validity as far as possible. Regarding independent variables, the supplier-IS is measured by three variables according to Dong et al. (2009) and Zhao et al. (2011). With customer-IS, utilization of customer data through CRM system was adopted as the surrogate variable, as the CRM system data should be the most utilized "big data" in retail. According to the annual report of a Japanese grocery chain store, 79.3% of Japanese retailers have adopted a CRM system as of 2012. As this is assumed to be a straightforward measure of customer interaction information systems in existing research, the three variables were adopted according to Zander and Kogut (1995), Gupta and Govindarajan (2000), Susan et al. (2010), and Huang and Wang (2013).

Regarding relationship quality, the study used major items—Gansen (1994) and Morgan and Hunt (1994) for trust, Anderson and Weitz (1992) and Gansen (1994) for commitment, and Heide and John (1992) and Morgan and Hunt (1994) for communication. With respect to competitive advantage, we focused on MDC, which is an important factor that enhances the ability of assortment, a traditional resource of competitive advantage. MDC consists of three capabilities: assortment planning, sourcing, and promotion capabilities.

To continuously achieve attractive assortment, retailers need to appropriately select and purchase products that will attract customers, which may be termed as assortment planning capability (e.g., Lambert, 1979; Lumpkin, 1985). In addition, retailers must form inventories to ensure that products are available for purchase when customers need a required quantity (e.g., Pettigrew et al., 2005; Thatte et al., 2013). In this context, inventories must be constantly

maintained at the proper level, which may be termed as sourcing capability. Furthermore, even if retailers have succeeded in procuring appealing products, they are futile without customer awareness of these products. Therefore, retailers are required to effectively communicate product and pricing information, besides implementing effective bargain and discount strategies (e.g., Ailawadi and Keller, 2004; Grewal et al., 2011). This form of communication requires the right mixture of media and marketing messages, which may be termed as promotion capability. Based on these existing studies on MDC, we created three items for MDC.

We implemented procedures recommended by Podsakoff et al. (2003) for avoiding common method bias and found no concerns. Then, we conducted an exploratory factor analysis for all variables (principal factor analysis, no rotation), and six factors were extracted that had an eigenvalue over 1.0. The contribution rate of the first factor was 26.8%; therefore, it did not constitute a majority. Hence, it was determined that the common method bias was not significant for these samples.

4.3. Reliability and Validity

A confirmatory factor analysis for all variables (maximum likelihood method and promax rotation) was conducted. As the relative χ^2 = 1.72 ($\chi 2$ = 178.526, df = 66, p < .01), the model goodness of fit is within the tolerable range (Carmines and McIver, 1981). In addition, CFI = .976 (>.920) and RMSEA = .046 (<.08) were favorable, considering that the number of data samples was 335 (over 250) and the number of observed variables was 17 (between 12 and 30, inclusive) (Hair et al., 2013).

Table 1. Construct measures and CFA results

Constructs	Indicators	Factor Loading	Mean	SD	α	CR
IT used for supplier relationships (supplier-IS) (1=strongly disagree, 7=strongly agree)	Your company's database is highly integrated with the databases of your customers and business partners	0.79	3.84	1.12		
	Your company's information system is effectively integrated with the systems of your suppliers	0.86	3.93	1.34	0.89	0.76
	Your company's operational procedures are highly integrated with the operational procedures of other companies that are in cooperative relationships with your company	0.91	3.86	1.25		
IT used for customer relationships (customer-IS) (1=strongly disagree, 7=strongly agree)	Your company is using the same data processing system throughout the organization for gathering data through the CRM system	0.79	4.60	1.48		
	Your company applies the same know-how throughout the organization for analyzing the data that have been acquired through the CRM system	0.94	4.12	1.39	0.92	0.74
	Your company adopts the same procedure throughout the organization for using the data that have been acquired through the CRM system	0.96	4.20	1.44		

Trust (1=strongly disagree, 7=strongly agree)	Your company can trust suppliers about conventions	0.87	5.54	0.76		
	Your company trusts suppliers regarding protecting our confidentiality obligation	0.78	5.49	0.84	0.86	0.86
	Your company believes that suppliers are doing business as professionals	0.81	5.44	0.79		
Commitment (1=strongly disagree, 7=strongly agree)	Your company emphasizes maintaining ongoing business relationship with suppliers	0.84	5.85	0.85		
	Your company emphasizes the fact that the supplier has past transaction records	0.68	4.97	1.11	0.84	0.82
	Your company emphasizes that you can continue to trade suppliers	0.87	5.65	0.85		
Communication (1=strongly disagree, 7=strongly agree)	Your company has a method by which to obtain useful information from other companies that are in cooperative relationships with your company	0.72	5.25	0.70		
	Your company has any opportunity to exchange expert knowledge with the employees of other companies that are in cooperative relations with your company	0.78	5.18	0.82	0.78	0.78
Competitive Advantage (1=strongly disagree, 7=strongly agree)	Your company's sales and sales promotion capabilities (compared within the industry that concerns your company's core business)	0.74	4.36	1.09		
	Your company's product procurement capability (compared within the industry that concerns your company's core business)	0.76	4.62	0.96	0.77	0.77
	Competitiveness of the products that your company sells in terms of their product quality (compared within the industry that concerns your company's core business)	0.68	4.67	0.95		

With respect to reliability, Cronbach's α for all constructive concepts were over .70 (.75–.92), and composite reliability for all constructive concepts were over .60 (Table 1) (Baggozi and Yi, 1988). Regarding validity, the path coefficients from the latent variables to the observed variables all surpassed .50 ($p < .01$), and the AVE of each constructive concept was over .50 (.52–.80) (Fornell and Larker, 1981; Bagozzi and Yi, 1988), except for one constructive concept.

Table 2. Correlations matrix

Constructs	AVE	1	2	3	4	5	6
1 Supplier-IS	0.69						
2 Customer-IS	0.73	0.32					
3 Trust	0.73	0.26	0.28				
4 Commitment	0.64	0.05	0.27	0.53			
5 Communication	0.57	0.29	0.35	0.52	0.31		
6 Competitive advantage	0.80	0.15	0.16	0.15	0.13	0.28	

In terms of discriminant validity, it was confirmed that the AVE of each constructive concept exceeded the squared correlation coefficient between the different constructive concepts (Fornell and Larker, 1981), as shown in Table 2.

5. Results

To evaluate the proposed model fit, $\chi 2$/df and the combination of CFI and RMSEA were used based on Carmines and McIver (1981) and Hair et al. (2013), respectively. As the score of each indicator showed that the fit of the model was good (χ^2/df. = 2.945, CFI = .932, and RMSEA = .076), the model was used to verify the hypotheses.

The paths that are significant are those between supplier-IS and trust (H3a), supplier-IS and communication (H3c), customer-IS and trust (H4a), customer-IS and commitment (H4b), customer-IS and communication (H4c), and communication and MDC (H5c). Consequently, hypotheses 3a, 3c, 4a, 4b, 4c, and 5c were supported, while hypotheses 1, 2, 3b, 5a, and 5b were not supported (Figure 3, Table 3).

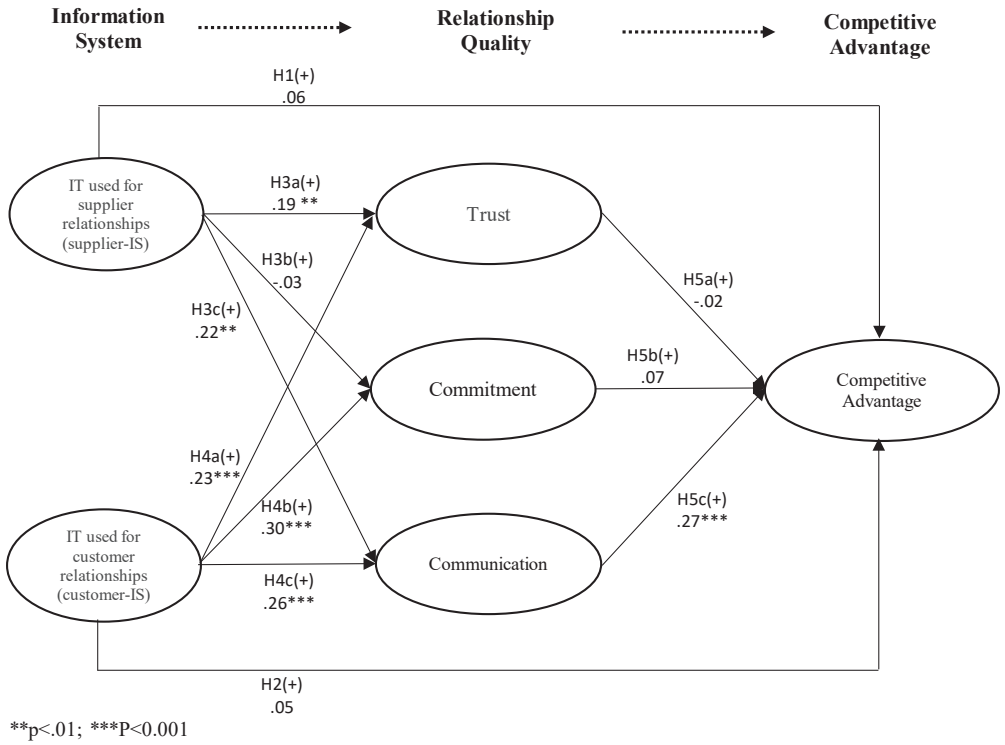

Figure 3. Results

Table 3. Hypothesis testing

Hypothesis	Path directions	Estimate	SE	t-value	Hypothsis testing result
H1	Supplier-IS → CA	0.04	0.05	0.78	Not Supported
H2	Customer-IS → CA	0.03	0.05	0.71	Not Supported
H3a	Supplier-IS → trust	0.12	0.04	3.23**	Supported
H3b	Supplier-IS → commitment	-0.02	0.04	-0.52	Not Supported
H3c	Supplier-IS → communication	0.19	0.03	3.24**	Supported
H4a	Customer-IS → trust	0.13	0.03	4.00***	Supported
H4b	Customer-IS → commitment	0.18	0.04	4.94***	Supported
H4c	Customer-IS → communication	0.12	0.03	3.73***	Supported
H5a	Trust → CA	-0.02	0.08	-0.31	Not Supported
H5b	Commitment → CA	0.07	0.07	1.01	Not Supported
H5c	Communication → CA	0.39	0.11	3.76***	Supported

**p<.01; ***P<0.001

6. Discussion and Conclusion

6.1. Discussion

In CRM research, the utilization of the CRM system has enhanced customer satisfaction and loyalties (Mithas et al., 2005; Leenheer, and Bijmolt; 2008) , but there is some skepticism regarding its relevance to competitive advantages (Hendricks et al., 2007; Schumanna et al., 2014). We examined how retailers can leverage customer-IS, such as CRM, to gain a competitive advantage. To this end, we focused on the aspects where retailers' use of customer-IS has increased their competitive advantage as a result of enhanced relationships with suppliers. We expected that the effects of customer-IS would become clearer through comparison with supplier-IS.

Hypotheses 1 and 2 were not supported, suggesting that the introduction of information systems alone does not increase the competitive advantage of retailers. There are factors that mediate or moderate the relationship between information systems and competitive advantage. The results of hypotheses 3, 4 and 5 indicate that information systems tend to increase competitive advantage by mediating relationship quality with suppliers, which answers our research question. However, careful interpretation of the results of hypotheses 5a, 5b, and 3b is required.

Information systems enhance the competitive advantage of retailers through the mediation of communication, while trust and commitment were not observed to work in this way. This result does not imply that there is no relationship between trust and competitive advantage, or commitment and competitive advantage. Cooperative relationship can increase firms' mutual profitability (Anderson & Weitz, 1992) through product differentiation and creation of barriers

to competitor's advantage (Dwyer et al., 1987). The higher the level of trust and commitment, the more cooperative the relationship (Dwyer et al., 1987; Morgan & Hunt, 1994). The results of hypotheses 5a and 5b suggest that there may be a third factor, such as a mediating or moderating factor.

It should also be noted that hypothesis 3b was not supported. The antecedents of commitment include a variety of concepts, such as business network connection, interdependence (Clarke, 2006), and value (Ulaga & Eggert, 2006). A good relationship is necessary to implement and utilize information systems with suppliers. The more the supplier-IS operates, the stronger the business network connection and interdependence. Therefore, commitment is also expected to be stronger. However, as hypothesis 3b was not supported, it is possible that supplier-IS weakens commitment in the retail industry.

6.2. Implications

This study provides theoretical implications for relationship quality and negative aspects of relationship. Existing studies on SC reveal that information systems among firms deepen cooperative relationships. However, when we separated the relationship quality components and looked at the relationship between the two types of information systems, we found that there are different relationships among the relationship quality components. Customer-IS was found to be more effective in enhancing relationship quality than supplier-IS. Furthermore, supplier-IS deepens trust and promotes communication but has no effect on commitment. This suggests that future discussion on relationship quality should always take this heterogeneity into account.

Many studies that focus on the negative aspects of relationships, such as Villena et al (2011) and Day et al (2013), problematize the link between relationships and outcomes. Our research suggests that there are still research questions regarding the negative aspects of the link between relationships and antecedents as well. Supplier-IS is frequently utilized in SCM; from the standpoint of social exchange, it is believed that the commitment among companies becomes stronger with enhanced SCM. However, as SCM progresses, relational inertia may arise, resulting in a dilution of commitment. Research needs to be conducted to clarify the conditions under which antecedents that are expected to strengthen commitment weaken it.

Additionally, this study provides practical implications for retailers' digital strategies. Retailers trying to raise competitive advantage by collecting and utilizing customer data through ICT often focus on customer relations. This study suggests that both customer and supplier relations must be considered. This discovery has relevance for CRM and multi-channel retailing, and for enhancing omni-channelization strategy building and social media utilization, which has recently gained momentum (Verhoef et al., 2015; Ying et al., 2021; Ratchford et al., 2022).

6.3. Limitations and Future Research

This study has certain limitations. To analyze the relationship quality, we included trust, com-

mitment, and communication, but power relationships must also be incorporated into the analysis. Cooperation from suppliers can be received in both cooperative and power relationships. As it is difficult to collect customer data directly, they have the potential to be a powerful resource for suppliers.

Another limitation of this study is that customer-IS was measured only by CRM. Retailers' use of information technology for consumer relationships is not limited to CRM alone, but also includes multi-channel, omni-channel, SNS, AI, and many others. These may work heterogeneously in relation to relationship quality. Therefore, future research should take into account the diversity and heterogeneity of information systems.

This study suggests that attention needs to be paid to the heterogeneity of trust and commitment. In relationship marketing research, trust and commitment are representative concepts of relationships. It has been said that the correlation between these two concepts is high (Morgan and Hunt, 1994). However, a positive correlation was found between supplier-IS and trust, but no significant correlation was found for commitment. Investigating the third factor between supplier-IS and commitment may provide insight into understanding commitment.

Furthermore, a third factor may exist between relationship quality and competitive advantage. Although this study analyzed information system as an antecedent of trust and commitment, future research to examine utilization of the information system as a mediating or moderating factor is needed.

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References

Ailawadi, K. L. and Keller, K. L. (2004) "Understanding retail branding: conceptual insights and research priorities," *Journal of Retailing*, Vol. 80, pp. 331-342.

Alderson, W. (1957) *Marketing Behavior and Executive Action*, Richard. Irwin, Inc.

Anderson, E. W. and Weitz, B. (1992) "The use of pledges to build and sustain commitment in distribution channels," *Journal of Marketing Research*, Vol. 29, No. 1, pp. 18-34.

Anderson, J. C. and Narus, J. A. (1990) "A model of distributor firm and manufacturer firm working partnerships," *Journal of Marketing*, Vol. 54, No. 1, pp. 42-58.

Bagozzi, R. P. and Yi, Y. (1988) "On the Evaluation of Structural Equation Models," *Journal of the Academy of Marketing Science*, Vol. 16, No. 1, pp. 74-94.

Cachon, G. P. and Fisher, M. (2000) "Supply chain inventory management and the value of shared information,"

Management Science, Vol. 46, No. 8, pp. 1032-1048.

Capizzi. M. and Ferguson. R. (2005) "Loyalty trends for the twenty-first century," *Journal of Consumer Marketing*, Vol. 22, pp. 72-80.

Carmines, E. G. and McIver, J. P. (1981) "Analyzing Models with Unobserved Variables," in Bohrnstedt, G. W. and Borgatta, E. F. (eds.), *Social Measurement: Current Issues*, Sage Publications, pp. 65-115.7

Casidy, R. and Nyadzayo, M. (2019) "Drivers and outcomes of relationship quality with professional service firms: An SME owner-manager perspective," *Industrial Marketing Management*, Vol. 78, pp. 27-42.

Chang, M. H. and Harrington, J. E. (2000) "Centralization vs. Decentralization in a Multi-Unit Organization: A Computational Model of a Retail Chain as a Multi-Agent Adaptive System," *Management Science*, Vol. 46, No. 11, pp. 1427-1440.

Chang, M. L., Cheng, C. F. and Wu, W. Y. (2012) "How Buyer-Seller Relationship Quality Influences Adaptation and Innovation by Foreign MNCs' Subsidiaries," *Industrial Marketing Management*, Vo. 41, pp. 1047-1057.

Chaudhuri, A. and Ligas, M. (2009) "Consequences of Value in Retail Markets," *Journal of Retailing*, Vol. 85, No. 3, pp. 406-419.

Chung, W. W. C. and Leung, S. W. F. (2005) "Collaborative planning, forecasting and replenishment: a case study in copper clad laminate industry," *Production Planning and Control*, Vol. 16, No. 6, pp. 563-574.

Cigliano. J., Georgiadis, G., Pleasance, D. and Whalley, S. (2000) "The price of loyalty," *The McKinsey Quarterly*, pp. 68-77.

Clarke, N. (2006) "The relationships between network commitment, its antecedents and network performance," *Management Decision*, Vol. 44, No. 9, pp. 1183-1205.

Croson, R. and Donohue, K. (2003) "Impact of POS data sharing on supply chain management," *Production and Operations Management*, Vol. 12, No. 1, pp. 1-11.

Cui, A. S. and Wu, F. (2016) "Utilizing customer knowledge in innovation: antecedents and impact of customer involvement on new product performance," *Journal of the Academy of Marketing Science*. Vol. 44, pp. 516-538.

Day, M., Fawcett, S. E., Fawcett, A. M. and Magnan, G. M. (2013) "Trust and relational embeddedness: Exploring a paradox of trust pattern development in key supplier relationships", *Industrial Marketing Management*, No. 42, pp. 152-165.

Dawson, J. (2000) "Viewpoint: retailer power, manufacturer power, competition and some questions of economic analysis," *International Journal of Retail & Distribution Management*, Vol. 28, No. 1, pp. 5-8.

Dong, S., Xu, S. and Zhu, K. (2009) "Information Technology in Supply Chains: The Value of IT - Enabled Resources Under Competition," *Information Systems Research*, Vol. 20, No. 1, pp. 18-32.

Deutsch, M. (1949), "A theory of cooperation and competition," *Human Relations*," Vol. 2, No. 2, pp. 129-151.

Doney, P. M. and Cannon, J. P. (1997) "An Examination of the Nature of Trust in Buyer-Seller Relationships," *Journal of Marketing*, Vol. 61, No. 2, pp. 35-51.

Dwyer. F. R., Schurr. P. H. and Oh. S. J. (1987) "Developing buyer-seller relationship," *Journal of Marketing*, Vol. 51, No. 2, pp. 11-27.

Fang, S. R., Chang, Y. S. and Peng, Y. C. (2011) "Dark side of relationships: A tensions-based view," *Industrial Marketing Management*, Vol. 40, pp. 774-784.

Ferguson, R. and Hlavinka, K. (2006) "Loyalty trends 2006," *Journal of Consumer Marketing*, Vol. 23, No. 5, pp.

292-299.

Fornell, C. and Larcker, D. (1981) "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, Vol. 18, No. 1, pp. 39-50.

Fynes. B., de Búrca. S. and Marshall. D. (2004) "Environmental uncertainty, supply chain relationship quality and performance," *Journal of Purchasing and Supply Management*, Vol. 10, No. 4, pp. 179-190.

Ganesan, S. (1994) "Determinants of Long-term Orientation in Buyer-Seller Relationships," *Journal of Marketing*, Vol. 58, No. 2, pp. 1-19.

Ganbold, O., Matsui, Y. and Rotaru, K. (2021) "Effect of information technology-enabled supply chain integration on firm's operational performance," *Journal of Enterprise Information Management*, Vol. 34, No. 3, pp. 948-989.

Grewal, D., Ailawadi, K. L., Gauri, D., Hall, K. and Kopalle, P. (2011) "Innovations in retail pricing and promotions," *Journal of Retailing*, Vol. 87, pp.43-52.

Grewal, D., Roggeveen, A. L. and Nordfält, J. (2017) "The Future of Retailing," *Journal of Retailing*, Vol. 93, No. 1, pp. 1-6.

Gupta, A. and Govindarajan, V. (2000) "Knowledge Management's Social Dimension," *MIT Sloan Management Review*, Vol. 42, No. 1, pp. 71-80.

Hair, J., Black, W., Babin, B., Anderson, R. (2013) *Multivariate Data Analysis: Pearson New, International*, Pearson Education Limited, Essex.

Håkansson, H. (1982). *International Marketing and Purchasing of Industrial Goods. An Interaction Approach*. Chichester: John Wiley & Sons.

Hald, K. S., Cordon, C. and Vollmann, T. E. (2009) "Towards an understanding of attraction in buyer–supplier relationships," *Industrial Marketing Management*, Vol. 38, No. 8, pp. 960-970.

Harris, L. C., O'Malley, L. and Patterson, M. (2003) *Professional Interaction: Exploring the Concept of Attraction,* Sage Publications, London.

Heide, J. B. and John, G. (1992) "Do Norms Matter in Marketing Relationships?" Journal of Marketing, Vol. 56, pp. 32-44.

Helper, S. R. (1991) "How much has really changed between US automakers and their suppliers," *Sloan Management Review*, Vol. 32, No. 4, pp. 15-28.

Hendricks, K. B. and Singhal, V. R. (2003) "The effect of supply chain glitches on shareholder value," *Journal of Operations Management*, Vol. 21, pp. 501-522.

Hendricks, K. B., Singhal, V. R. and Stratman, J. K. (2007) "The impact of enterprise systems on corporate performance: A study of ERP, SCM, and CRM system implementations," *Journal of Operation Management,* Vol. 25, pp. 65-82.

Holweg, M. (2005) "An investigation into supplier responsiveness: Empirical evidence from the automotive industry," *The International Journal of Logistics Management*, Vol. 16, No. 1, pp. 96-119.

Huang, M. H. and Wang, E. T. G. (2013) "Marketing Is from Mars, IT Is from Venus: Aligning the Worldviews for Firm Performance," *Decision Sciences*, Vol. 44, No. 1, pp. 87-125.

Kumar, N., Scheer, L. K. and Steenkamp, J. B. E. M. (1995), "The Effects of Supplier Fairness on Vulnerable Resellers," *Journal of Marketing Research*, Vol. 32, No. 1, pp. 54-65.

Lages. C., Lages. C. R. and Lages. L. F. (2005) "The RELQUAL scale: a measure of relationship quality in

export market ventures," *Journal of Business Research*, Vol. 58, No. 8, pp. 1040-1048.

Lancastre, A. and Lages, L. F. (2006), "The relationship between buyer and a B2B e-marketplace: cooperation determinants in an electronic market context," *Industrial Marketing Management*, Vol. 35, pp. 774-789.

Lambert, Z. V. (1979) "An investigation of older consumers' unmet needs and wants at the retail level," *Journal of Retailing*, Vol. 55, No. 4, pp. 35-57.

Lee, H., Padmanabhan, P. and Whang. S. (1997) "The bullwhip effect in supply chains," *Sloan Management Review*, Vol. 38, pp. 93-102.

Leenheer, J. and Bijmolt, T. H. A. (2008) "Which retailers adopt a loyalty program?" *Journal of Retailing and Consumer Services*, Vol. 15, pp. 429-442.

Lemon, K. H. and Wangenheim, F. V. (2009) "The reinforcing effects of loyalty program partnerships and core service usage. A longitudinal analysis," *Journal of Service Research*, Vol. 11, No. 4, pp. 357-370.

Lehtonen, J. M., Småros, M. and Holmström, J. (2005) "The effect of demand visibility in product introductions," *International Journal of Physical Distribution & Logistics Management*, Vol. 35, No. 2, pp. 101-115.

Liu, H., Ke, W., Wei, K. K. and Hua, Z. (2013) "Effects of supply chain integration and markete orientation on firm performance," *International Journal of Operations & Production Management*, Vol. 33, No. 3, pp. 322-346.

Lumpkin, J. R., Greenberg, B. A. and Goldstucker, J. L. (1985) "Marketplace needs of the elderly," *Journal of Retailing*, Vol. 61, No. 2, pp. 75-105.

Mantrala, M. K., Levy, M., Kahn, B. E., Fox, E. J., d, Gaidarev, P., Dankworth, B. and Shah, D. (2009) "Why is Assortment Planning so Difficult for Retailers? A Framework and Research Agenda," *Journal of Retailing*, Vol. 85, pp. 71-83.

Mithas, S., Krishnan, M. S. and Fornell, C. (2005) "Why do customer relationship management applications affect customer satisfaction?" *Journal of Marketing*, Vol. 69, No. 3, pp. 201-209.

Mohr. J. and Spekman. R. (1994) "Characteristics of Partnership Success: Partnership Attributes, Communication Behavior, and Conflict Resolution Techniques," *Strategic Management Journal*, Vol. 15, No. 2, pp. 135-152.

Monczka, R. M., Callahan, T. J. and Nichols, E. L. (1995) "Predictors of relationships among buying and supplying firms," *International Journal of Physical Distribution & Logistics Management*, Vol. 25, No. 10, pp. 45-59.

Moorman, C., Zaltman, G. and Deshpande, R. (1992) "Relationships between providers and users of market research: The dynamics of trust within and between organizations," *Journal of Marketing Research*, Vol. 29, pp. 314-328.

Morgan, R. M. and Hunt, S. (1994) "The commitment-trust theory of relationship marketing," *Journal of Marketing*, Vol. 58, No. 3, pp. 20-38.

Najafi-Tavani, S., Sharifi, H., Naude, P. and Parvizi-Omran, E. (2022) "The impact of alternative financial supply chain management practices on supply risk: A relationship quality and buyer relative power perspective," *Industrial Marketing Management*, Vol. 100, pp. 112-126.

Peltier, J. W., Zahay, D. and Lehmann, D. R. (2013) "Organizational Learning and CRM Success: A Model for Linking Organizational Practices, Customer Data Quality, and Performance," *Journal of Interactive Marketing*, Vol. 27, pp. 1-13.

Pettigrew, S., Mizerski, K. and Donovan, R. (2005) "The three "big issues" for older supermarket shoppers," *Journal of Consumer Marketing*, Vol. 22, No. 6, pp. 306-312.

Podsakoff, P. M and Organ, D. W. (1986) "Self-reports in Organizational Research," *Journal of Management*, Vol. 12, No. 4, pp. 531-544.

Rai. A., Patnayakuni. R. and Seth. N. (2006) "Firm Performance Impacts of Digitally Enabled Supply Chain Integration Capabilities," *MIS Quarterly,* Vol. 30, No. 2, pp. 225-246.

Ratchford, B., Soysal, G., Zentner, A. and Gauri, D. K. (2022) "Online and offline retailing: What we know and directions for future research," *Journal of Retailing*, Vol, 98, pp. 152-177.

Renko, S. and Druzijanic, M. (2014) "Perceived usefulness of innovative technology in retailing: consumers' and retailers' point of view," *Journal of Retail and Consumer Services*, Vol. 21, No. 5, pp. 836-843.

Richard, J. E., Thirkell, P. C., and Huff, S. L. (2007) "An examination of customer relationship management (CRM) technology adoption and its impact on business-to-business customer relationships," *Total Quality Management & Business Excellence*, Vol. 18, No. 8, pp. 927-945.

Sanders, N. R. (2008) "Pattern of information technology use," *Journal of Operations Management*, Vol. 26, No. 3, pp. 349-367.

Schumanna, J. H., Wünderlich, N.V. and Evanschitzky, H. (2014) "Spillover Effects of Service Failures in Coalition Loyalty Programs," *Journal of Retailing*, Vol. 90, No. 1, pp. 111-118.

Sethuraman, R. and Gielens, K. (2014) "Determinants of Store Brand Share", *Journal of Retailing*, Vol. 90, No. 2, pp. 141-153.

Sheu, J. B. (2015) "Power shifts and relationship quality improvement of producer–retailer green channel dyads under government intervention," *Industrial Marketing Management*, Vol. 50, pp. 97-116.

Sikora. R. and Shaw. M. (1998) "A multi-agent framework for the coordination and integration of information systems," *Management Science*, Vol. 44, No. 11, pp. 65-78.

Soosay, C. A., Hyland, P. W. and Ferrer, M. (2008) "Supply chain collaboration: capabilities for continuous innovation," *Supply Chain Management: An International Journal*, Vol. 13, No. 2, pp. 160-169.

Susan, S., Fiorito, M. G. and Amanda, C. (2010) "Technology: advancing retail buyer performance in the twenty-first century," *International Journal of Retail & Distribution Management*, Vol. 38, pp. 879-893.

Thatte, A. A., Rao, S. S. and Ragu-Nathan, T. S. (2013) "Impact of SCM practices of a firm on supply chain responsiveness and competitive advantage of a firm," *Journal of Applied Business Research*, Vol. 29, No. 2, pp. 499-530.

Ulaga, W. and Eggert, A. (2006) "Value-based differentiation in business relationships," *Journal of Marketing*, Vol. 70, No. 1, pp. 119-136.

Verhoef, P. C., Kannan, P. K. and Inman, J. J. (2015) "From multi-channel retailing to omni-channel retailing: introduction to the special issue on multi-channel retailing," *Journal of Retailing*, Vol. 91, No. 2, pp. 174-181.

Vickery, S. K., Jayaram, J., Droge, C. and Calantone, R. (2003) "The effects of an integrative supply chain strategy on customer service and financial performance," *Journal of Operations Management,* Vol. 21, No. 5, pp. 523-539.

Villena, V. H., Revilla, E. and Choi, T. Y. (2011) "The dark side of buyer–supplier relationships: A social capital perspective," *Journal of Operations Management*, No. 29, pp. 561-576.

Volkoff, O., Strong, D. and Elmes, M. (2005) "Understanding enterprise system-enabled integration," *European Journal of Information Systems,* Vol. 14, No. 2, pp. 110-120.

Wilkinson, I. and Young, L. (2002), "On cooperating: firms, relationships and networks," *Journal of Business*

Research, Vol. 55, No. 2, pp. 123-133.

Williams, B. D., Roh, J., Tokar, T. and Swink, M. (2013) "Leveraging supply chain visibility for responsiveness: The moderating role of internal integration," *Journal of Operations Management*, Vol. 31, pp. 543-554.

Ying, S., Sindakis, S., Aggarwal, S., Chen, C. and Su, J. (2021) "Managing big data in the retail industry of Singapore: Examining the impact on customer satisfaction and organizational performance," *European Management Journal*, Vol. 39, No. 3, pp. 390-400.

Zander, U. and Kogut, B. (1995) "Knowledge and the Speed of the Transfer and Imitation of Organizational Capabilities," *Organization Science*, Vol. 6, No. 1, pp. 76-92.

Zerbino, P., Aloini, D., Dulmin, R. and Mininno, V. (2018) "Big Data-enabled Customer Relationship Management: A holistic approach," *Information Processing and Management*, Vol. 54, No. 5, pp. 818-846.

Zhang. J., Farris, P. W., Irvin. J. W, Kushwaha. T, Steenburgh. T. J. and Weitz. B. A. (2010) "Crafting Integrated Multichannel Retailing Strategies," *Journal of Interactive Marketing,* Vol. 24, No. 2, pp. 168-180.

Zhao, X., Huo, B., Selen, W. and Yeung, J. J. Y. (2011) "The impact of internal integration and relationship commitment on external integration," *Journal of Operations Management*, Vol. 29, p. 17-32.

(要旨)

本研究は，小売の情報システム活用とサプライヤー関係との関連性を探るものである。小売の情報システム活用がサプライヤー関係の質と小売競争優位を高める関係について，2つの情報システム，サプライヤー関係において使われる情報システム（supplier-IS）と顧客関係において使われる情報システム（customer-IS）で分けて比較を行った。仮説は，日本の小売業者を対象に集めたデータに対して構造方程式モデリングを使って検証した。分析の結果，3つの関係質（信頼，コミットメント，コミュニケーション）の中で，コミュニケーションが競争優位を高めることと，サプライヤーとの関係質に対して customer-IS が supplier-IS より全体的に関連性が高いことが確認された。特に，supplier-IS とコミットメントの間に正の相関がない結果に対して，customer-IS とコミットメントの間に有意な正の相関が確認された。この結果は，顧客関係のみではなく，サプライヤーとの関係質の向上のためにも customer-IS が活用されることを意味する。この発見は，customer-IS の活用においてさまざまな側面を考慮した戦略意思決定が求められることを示唆するものである。