

**Real-time information sharing adaptation and exploring intra-service industry
differences: Malaysia as an emerging market**

Abstract

Differences in business practices and preferences are vital for understanding specific industries, particularly in relation to downstream operations in emerging markets. This study explores the real-time information sharing (RTIS) effect on downstream operations in three service sub-sectors operating under the category of SMEs: wholesale and retail, food and beverages, and accommodation. Information processing theory is employed to analyse the differences in adaptation and perceived benefits of RTIS for customers from the perspective of 221 middle-level managers from Malaysia, as an emerging market. **An empirical framework based on the primary data is then developed and the analysis was carried out using Smart PLS.** The path modelling results indicate that overall RTIS is significantly associated with customer purchase behaviour (PB) in the presence of customer orientation (CO) that plays two mediating roles. Furthermore, RTIS with customer PB and post-purchase behaviour in the presence of CO is more effective in the wholesale and retail and food and beverages sub-sectors than in the accommodation sector. The theoretical and practical implications of this research are also discussed.

Keywords: Real-time information sharing, Emerging Markets, Customer orientation and purchase behaviour, Service industry and industry 4.0

1. Introduction

The service industry contributes more than half of GDP to major global economies and technology plays a pivotal role to its development and offerings. The innate characteristics of service operations (i.e., presence of customer while consuming the service, intangibility, perishability, and non-evidentially) and receivers (i.e., differences in personality, expectations, and situations in which the consumer uses the service) create challenges for service providers in enhancing customer inspiration, customer satisfaction, and customer loyalty (Ramanathan, Subramanian and Vijaygopal, 2017; Rasouli et al., 2018; Cruz-Cárdenas et al., 2019). The provision of services is frequently characterised by the co-terminal relationship between production and consumption (Hill, 1999). Zeithaml, Parasuraman and Berry (1990) stated that a service perspective involves “doing things right the first time”. In a competitive environment, service providers try their best to provide the right (best) service each time to ensure the repeated input and output of both customers and service providers. Customer inputs may be time and efforts, monetary expenses, while customer outputs may be image building or service performance. Service provider inputs may be time and effort, while outcomes can be positive word of mouth, customer retention, and monetary gains (De Ruyter and Wetzels, 2000). All inputs and outputs vary according to type and operation. Word of mouth may be among the most effective tool (Berman, 2016). Studies suggested that consumers’ purchase decisions can be influenced by their relatives, friends, and colleagues (Markovic et al., 2018; Zhang, Liang and Qi, 2020). Word of mouth power of market mavens can increase both the effectiveness of referral programs and the return on new customer acquisition investments (Ma, Zhang and Wang, 2017; Walsh and Elsner, 2012).

Each service sub-sector has its own characteristics that distinguish it from others. Different industries have different controls in relation to technology, uncertainty, and competition, and thus individual firms in different sectors face different types of challenges (Russo and Fouts, 1997). Organisations with superior service quality are market leaders in terms of sales and long-term customer loyalty and retention (e.g., Hamilton et al., 2017). Gilbert and Veloutsou (2006) argued that customers’ expectations are derived from their accumulated contacts with services provided in all walks of life. Göbel and Zwick (2012)

contended that differences across sectors are due to variations in the specific processes and operations employed. They also claimed that the absence of physically demanding product methods and a greater involvement of more psychologically demanding methods is a key characteristic of the service industry. Thus, it is essential for modern tech-oriented businesses to understand how different industry contexts and sectors result in different relationships between tactical activities such as service quality management and overall performance outcomes (Bolton, Lemon and Verhoef, 2004), particularly in emerging markets (Cruz-Cárdenas et al., 2019). Extant research across a wide range of industrial sectors points to a high degree of heterogeneity both between and within service sectors (i.e., Chamberlin, Doutriaux and Hector, 2010; Freel, 2003; Tether, 2003). Winsted (1999) conducted research on restaurant and medical sectors and found that authenticity is more important for professional services while courtesy and promptness are more important for generic services. Bozeman and Su (2015) also found differences in sectors regarding public service motivation.

Businesses in service sectors, typically small enterprises, may use new technologies to increase the efficiency of the service production process as well as to improve the quality of the final goods and services they offer (Castellacci, 2008). Service-based industries use information to service their customers directly (Kraemer, Gibbs, and Dedrick, 2005), which is viewed as a strategic tool (rather than just for recording transactions) (Meadows and Dibb, 2012; Raffoni et al., 2018). Castellacci (2008) emphasised improvements in the timeliness of quality information and claimed that quality information needs to be used at all levels within the organisation. Compared with the manufacturing sector, service delivery demands a high degree of communication skills and social interactions. Penetration of the Internet as a communication and information sharing medium in the consumer market is growing and possesses high potential (Galipoglu et al., 2018). The intangible and information-based characteristics of services inherently give a predominant role to the use and production of ICTs (Barras, 1986; Barrett et al, 2015; Evangelista, 2000).

Information technology is often considered as a vital functional requisite and a competitive ingredient for service firms. It changes the whole structure of a system in terms of its organisation, operational routine, and its market interface (i.e., Cruz-Cárdenas et al., 2019). To become competitive, companies must cope effectively with continuous and

unexpected changes. The capability to respond swiftly and effectively (time-based competition) to satisfy customer needs has thus become a defining characteristic of competitiveness (Dowlatshahi and Cao, 2006). Seib, Fischer, and Najman (2009) explained that service firms are more cloud adaptive and data-insensitive than manufacturing firms. “The Cloud” has emerged as an architectural innovation (Henderson and Clark, 1990) for possible data transmission and is a logical continuation of specific information and communication technology services. Haug, Kretschmer and Strobel (2016) found that cloud applications could provide a competitive advantage for businesses. They also conducted a rigorous quantitative analysis of financial and wholesale sectors and found adaptiveness in relation to cloud computing differs widely across the sub-sectors. They also found that the retail business is generally domestic oriented; however, wholesale retail tends to operate at a global scale and therefore faces a much greater challenge in terms of organising the international flows of both information and goods.

Parsons (1983) and Sung (2015) described information technology as ‘the new competitive weapon’ while Porter and Millar (1985) and Cao, Duan, and Cadden (2019) discussed information as a source of competitive advantage. Chamberlin, Doutriaux, and Hector (2010) argued that the implementation of ICT and satisfied customers are two important standard business imperatives that drive the success of businesses. Akman and Mishra (2015) stressed the importance of comparing and contrasting different components of service encounters across industries.

Zeithaml et al. (2002) have acknowledged for future research on e-service quality that should address questions on the importance of different dimensions and perceptual attributes to overall electronic service quality and its consequences. Therefore, contemporary businesses need to understand how different industry sectors and contexts lead to different relationships between tactical activities such as service quality management and overall performance outcomes through cloud computing (Bolton et al., 2004). Given that the concept of cloud computing is very broad, care should be taken to discover which elements of cloud computing firms implement (e.g., IaaS, SaaS, PaaS, or even more fine-grained aspects) (Haug, Kretschmer and Strobel, 2016), and such technologies in emerging markets are getting more attention to be explored (Radosevic et al., 2019).

In terms of real-time information sharing (RTIS) through SaaS, customer expectations can be built on the accumulation of other customers' service experiences, which can then be used to gauge current service quality. RTIS provides an impression of the authenticity of a specific service provider and motivates the customer to use such an app or information in their next service encounter. However, there have been few studies conducted on differences in technological adaptation for RTIS across sub-sectors of the service industry (see Appendix – A). In Malaysia, RTIS is new in service sub-sectors to share updated and saved information with customers regarding daily routine operations and performances i.e., average delivery time each day/week, customer satisfaction each day/week, and so on. The current study focuses on the wholesale and retail, food and beverages, and accommodation sub-sectors. These sub-sectors contribute 18% to the service sector, or 72.9% to the final service category and 33.1% to the overall service industry (Ministry of Finance Malaysia, 2017), demonstrating the importance of these sectors in emerging markets.

In this exploratory and empirical study, we contribute to the literature by specifically focusing on differences in the adaption and benefits of RTIS for customers from the perspective of middle-level managers in the three sub-sectors. Second, this study enriches literature on differences in service sub-sectors. Third, it contributes to incremental theory building in relation to Information processing theory (IPT) by evaluating the differences in RTIS and benefits. Fourth, it tests a framework to elucidate the relationship between perceived behaviour regarding RTIS and customer orientation (CO), perceived purchase behaviour (PB), and perceived repurchase behaviour (RB). The implications for emerging markets are provided.

The remainder of this paper is organised as follows. Section 2 reviews existing studies and develops hypotheses based on the adaptation of SaaS technology to share information as a service (in the form of RTIS), and the mediating effects of CO on PB and RB. Section 3 describes the methodology adopted for the study. Section 4 presents our empirical results. Section 5 discusses the findings and draws final conclusions, including the potential limitations and possible avenues for future studies.

2. Theoretical background and review of literature

2.1. Information processing theory

The framework model developed and tested in this paper is based on IPT. Information processing in organisations is generally defined as the gathering of data, the transformation of data into information, and the communication and storage of information (e.g., Campos, Trucco and Huatuco, 2018; Galbraith 1973; Srinivasan and Swink, 2018). According to Galbraith (1977), firms should increase their information processing capacities to sustain or attain a competitive advantage. For example to achieve superior firm performance, both supply chain dynamism and information processing capacity must increase simultaneously (Zhou and Benton Jr, 2007). However, in terms of the adoption of technology, managers may become overwhelmed by functions and technical features, making them prone to neglect complementary capabilities and assets required to fully exploit technological potentials (Kim, Lee and Gosain, 2005).

Horizontal information systems are dependent on Internet technology which offers a variety of actors, including those behind the service and those using the service. HIS differs from traditional information systems in terms of how businesses handle typical support for different communities in the organisation or between organisations (Braa and Rolland, 2000). Galbraith (1973) claims that modern organisations face uncertainty due to insufficient information. Similarly, customers also face uncertainty due to a lack of information on business offerings, especially in the service industry (i.e., Flynn, Koufteros and Lu, 2016; Waters, 1989). In this context, HIS enable businesses to focus more on people and their preferences and develop trust by sharing real-time information and conveying their managerial philosophy to facilitate their PB. In perspective of emerging market, countries are transforming from pre-industrial economy towards a modern industrial economy. Therefore, IPT also provides direction to enhance the operations with latest technology. Fildes and Hastings (1994) emphasised that information processing is a means for resolving uncertainty, a notion that is applicable to customers as they receive the latest information about business performance and make their purchase choices. A second point of interest concerns the variation in businesses regarding sharing real-time information with customers. The

theoretical underpinnings of IPT were therefore used in this study to empirically examine the implications of RTIS in operations. The hypothesised model is depicted in Fig 1.

2.2. SaaS and middle level managers in organizations

Cloud computing refers to an original network service paradigm that provides a large number of data-centric network applications and a model that delivers computer services over the Internet to businesses (e.g., Wu et al., 2018; Subramanian and Abdulrahman, 2017). A concept of SaaS involves providing a vital contribution to software development and delivery that in turn facilitate information sharing and business operations (Turner, Budgen, and Brereton, 2003). The adoption of SaaS model among financial and professional services retail firms have been found very aggressive (Chang, 2018; Lian, 2015). Others suggest that SaaS is considered as next wave of technological opportunity from the perspective of value proposition and can be easily administered to resellers (Wohl, 2010).

According to Gattiker and Carter (2010) Managers often act as the final authority and “mediate” information in determining the outcome of complicated decisions (Gattiker and Carter, 2010). Others advocate the importance of manager’s perception for accurate decisions, as inaccurate scanning may lead to an organisational failure or crisis (Starbuck, Greven, and Hedberg, 1978). In a similar vein, Weiss and Wittmann (2018) argued that relying on managers’ perceptions including situational factors (stress and emotion), dispositional factors (cognitive structures, styles, intelligence and motivation) might cause variations, which in turn create a gap between objective and perceived environmental conditions in businesses. Numerous other studies have also demonstrated manager’s perceptions and the importance of scanning business opportunities (Rafique, Hameed and Agha, 2018; Weiss and Wittmann, 2018).

Bower (1970) was first to underline the significant role played by middle managers as agents of change in modern organisations. Quinn (1985) acknowledged the valuable contributions of middle managers and their crucial roles that they play in fostering communication to reveal their business priorities. Furthermore, Burgelman (1983a) clarified

the key role of middle managers in shaping the strategic agenda of their businesses by influencing the type and intensity of the entrepreneurial activities conducted by the firm.

In medium-sized businesses, superior performance can be achieved by managing the middle level manager's attitudes and behaviours (Mair and Thurner, 2008). Furthermore, Collier, Fishwick and Floyd (2004) reported middle level managers' involvement is associated positively with the more adaptive strategy development process that is focussed by shared vision. This focus is coherent with the growing recognition of middle level manager's key role in promoting or stifling corporate entrepreneurship efforts (Burgelman, 1983b; Essex, Subramanian and Gunasekaran, 2016; Olsson, Aronsson and Sandberg, 2017).

2.3. Customers' purchasing behaviour and real-time information sharing

The firm's real time information sharing behaviour can have effects on marketing, sales, operations, technological developments, and production strategies (e.g., Mahmassani and Jayakrishnan, 1991; Costa, Soares and de Sousa, 2016). Scholars have long argued that information-sharing can play a significant role in enhancing customers' PB (Kim and Ko, 2012; Ahsan and Rahman, 2016). Wohl (2010) asserted that firm's could exploit applications of SaaS with different design philosophies, which may require different marketing plans. Several studies have articulated evidence for the positive impact of RTIS on PB (e.g., Jansen, Sobel and Cook 2011; Allon and Bassamboo, 2011; Yu et al., 2017). RTIS have also found to be positively linked to customer's encouragement to become involved in the RB of certain services/products (Song and Zinkhan, 2008; Lankton, McKnight and Thatcher 2014; Rapaccini and Visintin 2015; Ghouri and Mani, 2019) Thus, the following hypotheses were formulated:

H_{1a}: There is a positive linkage between downstream real time information sharing and purchase behaviour.

H_{1b}: There is a positive direct linkage between downstream real time information sharing and repurchase behaviour.

2.4. Real-time information sharing and customer orientation

Vasarhelyi and Greenstein (2003) argued that the process of “electronisation of business” should integrate and absorb business processes, as consequent changes direct business practices more toward customers. Others have argued the importance of CO through timely information sharing with customers. For instance, Jeang and Hong’s (2007) research have shown linkage of how information sharing with customers enhances the value chain of businesses. Hammer (2004) proposed that service businesses should aim on customer focussed operational innovation which means achieving high performance via existing modes of operations. i.e., filling orders, developing products, providing customer service or any other activity that an enterprise performs. Organisations can thus use the Internet to improve customer relationships by extending easier information access and developing greater flexibility in responding to customer information requests (Shi et al., 2019; Ulmer, Heilig and Voß, 2017). Similarly, research has shown that people anticipate and enjoy service oriented technological innovations because of enhanced value addition it brings (Bardhan et al., 2010). RTIS process provides customers enhanced value and intimacy (Allmendinger and Lombreglia, 2005). The rapid, interactive access to large amounts of dynamic information when responding to customer queries, enabled by the Internet, has shown customers’ improved relationships (Hoffman, Novak and Chatterjee, 1995; Moss, 2017; Ghouri and Mani, 2019;). Accordingly, the following hypothesis was proposed:

H₂: There is a positive direct linkage between downstream real time information sharing and customer orientation.

2.5. Customer orientation and purchase behaviour

MacKenzie and Lutz (1989) argued that ‘timely information’ impacts customer’s attitudes, behaviours and experiences. Firms can therefore focus more time and effort on enhancing the quality of existing services, creation of new business opportunities, and improving working relationships with their customers (Chang, 2018). Syaekhoni, Alfian, and Kwon (2017) suggested that customer PB, several customer-related factors, such as shopping habits, can act as an alternative to influence customer decision making. Others have

emphasised on providing an effective service and enhancing perceptions of service quality by effective management of customer expectations (Parasuraman, Berry and Zeithaml, 1991; Boulding et al. 1993). Gustafsson, Johnson and Roos (2005) postulated that RB is facilitated by situational and reactional triggers. CO can impact the effectiveness and outcomes of their selling (interactions) with customers (Poddar, Donthu, and Wei, 2009; Bateman and Valentine, 2015). Macintosh and Lockshin (1997) also contended that consumers' trust in a business and its employees/ stakeholders creates positive relationships leading to repeat purchase intentions. In the marketing literature, behaviour and intentions are considered as two separate constructs and entities. Further, the relationship between the concepts of purchase and repurchase have been shown very closely in other studies (Bagozzi and Yi, 1989; Ghouri and Mani, 2019; Kim and Hunter, 1993). Hence, the following hypothesis was proposed:

H_{3a}: There is a positive direct linkage between customer orientation and purchase behaviour

H_{3b}: There is a positive direct linkage between customer orientation and repurchase behaviour

Lambert, Cooper and Pagh (1998) argued that information adds value for customers and information that fulfils the customer needs are first priority of current organizations. It strengthens the bonding between organization and customers (Rowley, 2002; Schweitzer, Hofmann and Meinheit, 2019). On the other hand, Newberry, Klemz and Boshoff (2003) explained that allocation of resources to achieve the greatest return for the businesses requires understanding and addressing potential patrons who are most likely to purchase in the near term. Bode, Lindemann and Wagner (2011) described that customer-oriented people prefer to spend money on specific brand. Ghouri and Mani (2019) discussed that RTIS facilitates the PB of the customers. Extant literature shows the relationship between RTIS, CO, PB, and RB, therefore, we hypothesize as follows:

H_{3c}: Customer orientation positively mediates the relationship between downstream real time information sharing and purchase behaviour.

H_{3d}: Customer orientation positively mediates the relationship between downstream real time information sharing and repurchase behaviour

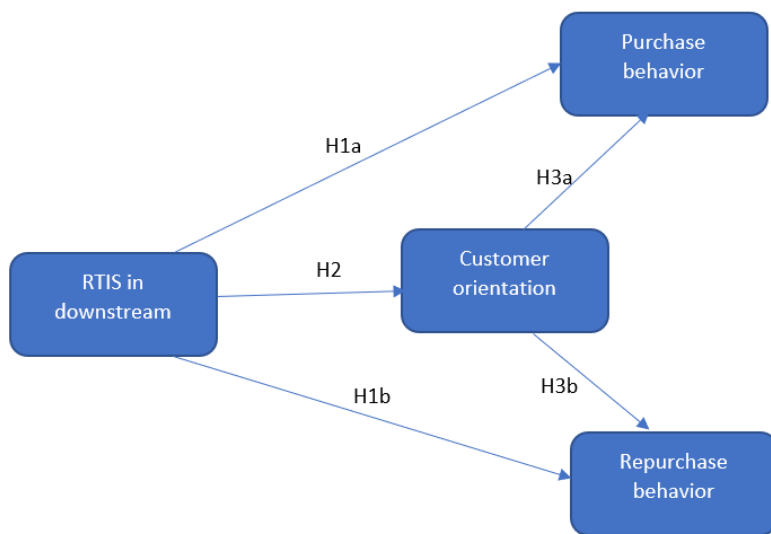


Fig 1. Hypothesised model depicting RTIS relationships in downstream operations

2.6. Differences in intra-service industries

Each business has different characteristics that distinguish it from other businesses. Contemporary firms therefore need to understand how different contexts and industry sectors create different relationships between tactical activities such as service quality management and overall performance outcomes (Bolton, Lemon and Verhoef, 2004). Some businesses perform differently regarding the influence of technology usage, usefulness, and attitudes towards use in both the public and private sector (Akman and Mishra, 2015). Parasuraman, Zeithaml and Berry (1994) found differences in industries with regard to the link between service quality and behavioural intentions.

Several studies in the 1980s identified inter-industry differences (e.g., Levin et al., 1987; Mansfield, 1985): few have shown the different methods and processes used by organisations in different industry sectors (e.g., Bartram et al., 1995; Zibarras and Woods, 2010). Cronin and Taylor (1992) found considerable differences in the relationship between satisfaction and repurchase intentions among the four service industries of dry cleaning, pest control, banking, and fast food. Bretschneider and Wittmer (1993) explained differences in

adaptation to microcomputer technology in different sectors. The influence of satisfaction and loyalty intentions on shareholder value varies by industry. For example, such variation was found between the retail trade, accommodation, and food services in North America (Russo and Fouts, 1997).

Desai, Wright, and Fletcher (1998) investigated the implementation of database management in both retail and travel industries. They found that both industries are more likely to gain a competitive advantage from investing in information technology than businesses in the financial services industry. Winsted (1999) studied different aspects of service in medical and restaurant service sub-sectors in the USA and Japan. They established that: i) 'authenticity' in service is more important in the medical sub-sector than the restaurant sub-sector in both countries; ii) 'Caring' in service is more important in the medical sub-sector than the restaurant sub-sector in the USA, while the reverse is the case in Japan; iii) 'Control' in service is more important in the restaurant sub-sector than the medical sub-sector in the USA; iv) 'Courtesy' in service is more important in the restaurant sub-sector than the medical sub-sector in both countries; v) 'Personalisation' in service is more important in the medical sub-sector than the restaurant sub-sector in the USA, while the reverse is the case in Japan; and vi) 'Promptness' in service is more important in the restaurant sub-sector than the medical sub-sector in both countries.

De Ruyter and Wetzels (2000) found that an apology in service recovery has an effect on trust in the bank and the dining cafe but not for the other two service sub-sectors: the hairdresser and the department store. Gronholdt, Martensen, and Kristensen (2000) conducted research on the telecommunication, retail banks, supermarkets, soft drink, and fast food sub-sectors of Denmark, and provided insight into the differences in pricing and branding across sub-sectors. Conversely, academics in universities are more involved in citing US industry patents than industrial scientists (e.g., Narin, Hamilton, and Olivastro, 1997; Pavitt, 1984).

Miozzo and Soete (2001) found that finance and telecommunications sub-sectors typically make heavy use of information and communications technologies developed by other advanced sectors to increase the efficiency of the productive process and the quality of their services, whereas the transport and wholesale trade sub-sectors have a significantly smaller

capability in this respect. Lennon and Harris (2002) found that comparatively few retail and travel sites were set up to receive questions and comments via email and comparatively few technology companies offer a toll-free number. Gilbert and Veloutsou (2006) suggested that differences in satisfaction may be indicative of an unequal level of service quality provided in these sub-sectors.

Johnsen and McMahon (2005) also found that cross-industry differences in financing behaviour exist even after controlling for other relevant influences on SME financing choices such as enterprise size, business age, profitability, growth, asset structure, and risk. Trabold, Heim, and Field (2006) identified dimensions that frequently differed across e-retailing sectors, including price perceptions, ease of returns and refunds, and privacy experience. Abor (2007) observed that SMEs in the agriculture, pharmaceutical, and medical industries have a greater need for both long-term and short-term debt whilst SMEs in information, communication, wholesale, and retail sectors prefer short-term debt. Power differences in monitoring across critical stakeholders and the influence of the state also account for divergence in corporate social responsibility behaviours across industries (Campbell, 2007).

Similarly, Daveri and Maliranta's (2007) work differentiate between the Finnish electronics sector, the machinery and equipment industry and the forest industry. They supported this distinction by assuming that the usage of information and communication technologies leads to a stronger increase in productivity among young employees than older employees. They concluded that the impact of age-related factors is inversely u-shaped for the electronics industry while increasing in the two more traditional sectors. Chen (2009) also found that differences in regions and countries can explain the variation in service industry performance. Lallemand and Rycx (2009) divided a sample of Belgian firms into sectors with high and low information and communication technology intensity based on aggregate sector specific information. They contended that enough cognitive skills and the possibility to adjust quickly and flexibly to new forms of work organisation are critical for the intensive usage of communication and information technology. In addition, they claim that these characteristics decline more sharply with age than other personal characteristics.

Chamberlin, Doutriaux and Hector (2010) investigated similarities and differences in rates of innovation between 34 Canadian service sectors. Meadows and Dibb (2012) found

that firms offering professional services express more positive views than both financial services firms and government/public organisations. Yaokumah (2014) identified significant differences in information security governance implementation among financial institutions, utility companies, information technology, and oil and gas service sub-sectors. Based on sub sectoral differences, Galindo-Rueda and Verger (2016) classified industries into five groups: high, medium-high, medium, medium-low, and low RandD intensity. Thus, service activities appear to be somewhat polarised in terms of RandD intensity. Haug, Kretschmer and Strobel (2016) concluded that wholesaling, and financial services are the most cloud adaptive service sectors, while the retail trade and regulated, state-dominated industries such as education, social services, and health are the least likely to be cloud adaptive firms. Domeher, Musah and Hassan (2017) illustrated the difference in the financing gap between the hospitality and retail sub-sectors.

Based on these findings, the following hypotheses were proposed:

H4_a: The relationship between downstream real time information sharing and purchase behaviour in the presence of customer orientation differs among wholesale and retail, food and beverages, and accommodation sub-sectors.

H4_b: The relationship between downstream real time information sharing and repurchase behaviour in the presence of customer orientation differs among wholesale and retail, food and beverages, and accommodation sub-sectors.

3. Methodology

This study was explanatory in nature as it explored the empirical relationship among RTIS, CO, PB, and RB. A quantitative approach was adopted whereby the variables were measured through a survey and data were collected in numerical form. Scholars have recommended quantitative research method as the most suitable way to: address research problems examining the perceptions of a large group of individuals regarding a phenomenon, test hypotheses, test theories, and examine the correlation between different variables and measures. Creswell and Clark (2017) believed that quantitative research also enables

researchers to gather data from a large sample and is less time consuming than qualitative research.

3.1. Research design

Research design is a vital step in all research that involves the progression of important decisions regarding the level, purpose, manipulation, control, and location of the study (e.g., Hair et al., 2015). It also facilitates the construction of a checklist of activities and procedures to accomplish the aims and objectives of the research and enable researchers to test the research hypotheses. A correlational research design is one of the most useful designs in quantitative approach as it helps to examine whether an increase or decrease in one variable will affect another variable (e.g., Lodico, Spaulding, and Voegtler, 2010). In this study, the aim was to examine the direct, indirect and moderated relationship between RTIS, CO, PB, and RB. **Therefore, a correlational research design was used as this will enable the findings to be generalised to a larger population. The data collected from the middle level managers of SMEs of three provinces of Malaysia i.e., Selangor, Perak, and Kedah.**

The target population for this study were drawn from SME Corporation Malaysia directory. According to the SME Corp Malaysia (2015), firms that employ 75 or fewer workers are characterised as SMEs. In line with Asia-Pacific Economic Corporation's SMEWG Strategic Plan for 2017–2020, their main concern is to improve the competitiveness and innovation of SMEs (SMEMCorp Malaysia, 2017). These concerns can be addressed by demonstrating serious involvement in e-commerce initiatives and reducing technological gaps. Because 87.9% of the SME sector in Malaysia consists of service providing companies, the target population for this research comprised sub-sectors operating in the service industry – i.e., wholesale and retail, food and beverage, and accommodation. The prime reasons for selecting these sectors were (i) the urgent need for insights on RTIS from these sectors, (ii) the contribution of these sectors to the overall service category (72.9%) and to the overall service industry (33.1%) (Ministry of Finance Malaysia, 2017).

The data was collected from the middle level managers who were directly involved in customer operations. Middle level managers used to be in close contacts with the customers and customer care operations, and customer dealing personnel of the organization.

Additionally, they also play a part of strategic goal of the organisation. After excluding invalid responses, a final sample of 221 (out of 313 = 70.61%) valid responses were used to conduct our analysis. Table 1 presents the demographic characteristics for this sample.

Table 1. Demographic characteristics of middle-level managers

Category		Numbers	%
Gender	Male	137	61.99
	Female	84	38.01
Education	Attended school	2	0.90
	Diploma	64	28.96
	Degree	123	55.66
	Masters	32	14.48

3.2. Development of Instrument

The objective of the current study was to generalise the findings to a larger population; therefore, measurement scales were taken from existing valid, reliable and standardised sources. These were analysed for content validity and their suitability in a Malaysia and middle level manager context with the help of an expert panel. This panel consisted of academicians and practitioners who verified the contextualised psychometric properties of the proposed instrument. Their suggestions were then incorporated into the questionnaire, which was finalised for data collection.

The research questionnaire was divided into three sections. The first contained items eliciting personal information from the respondents such as their names. The second section comprised items measuring the variables (see Appendix - B). These were adopted from valid, reliable and generalised sources. The scale for RTIS was adopted from Benlian and Hess (2011) and Gewald and Dibbern (2009). The scale for CO was adopted from Narver and Slater (1990). The scale for PB was adopted from Dodds, Monroe, and Grewal (1991). Finally, the scale for RB was adopted from Parasuraman, Zeithaml and Malhotra (2005). Responses to all items were given on a Likert scale ranging from 1 to 5, where 1 was the lowest value and 5 was the highest value. Prior to the commencement of the survey, respondents were assured that their personal data would be kept confidential by the researcher. A common-method

variance test guideline was used to avoid variations in responses caused by the instrument rather than respondents' actual predispositions (i.e., Podsakoff et al., 2003).

Maximum likelihood estimation and a multiple indicator approach were used to minimise any bias effects (i.e., Anderson and Gerbing, 1984; 1988). To test the hypothesised relationship among the constructs, SmartPLS 3 software was used. Specifically, a measurement model was created, followed by a structural model (SEM) to examine the proposed structural relationships among the constructs. The researcher ensured the anonymity of respondents during the data collection process. Moreover, respondents were reminded that participation was voluntary and that they could withdraw their data at any stage. Finally, to ensure they felt comfortable while answering the questions respondents were told there was no right and wrong answer to any of the questions and they were under no time pressure to complete the questionnaire.

Figure 2 depicting the two mediation models.

The first mediation model is $= c1 + a1 \times b1$

The second mediation model is $= c1 + a2 \times b2$

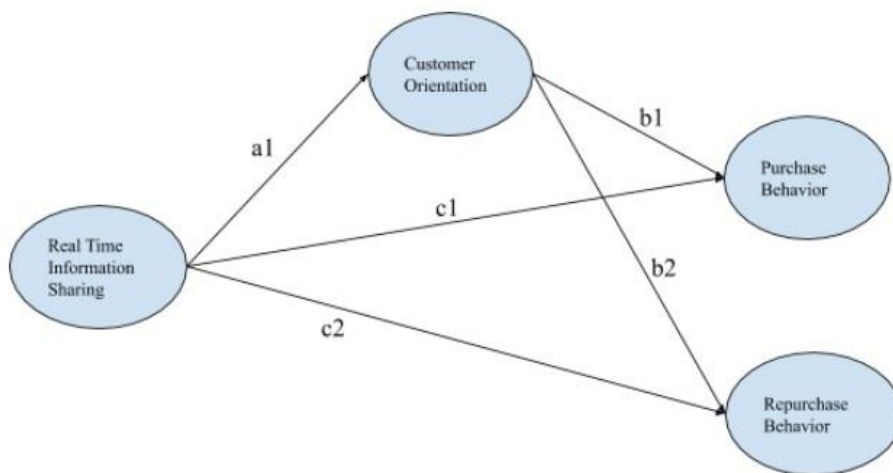


Figure-2: Mediation models

We employed Independent t-test method to check the non-response bias by using and comparing first 25 respondents and the last 25 respondents on all variables (i.e., Armstrong & Overton, 1977). The results revealed that there was no significant difference between the early and late respondents which depicts non-response bias. Additionally, we adopted marker variable approach to check the common method bias. We included unrelated variable (i.e. self

efficacy) from current study in correlation analysis of the model as the marker variable (Lowry & Gaskin, 2014). The correlation values to the marker variable were fall into low (MV -> PPB = .027) to moderate (MV -> PBRTIS = .60); thus, the likelihood of common methods bias is low.

4. Results

The following results were generated using SmartPLS 3 software to validate the hypothesised model. The following table presents the outer loadings, Cronbach's Alpha, composite reliability, and average variance extracted (AVE) value for each factor. As per the criteria, the values of outer loadings and AVE values must be greater than 0.5 to ensure the convergent validity of the hypothesised constructs (Hair et al., 2016).

4.1. Convergent and discriminant validity

Convergent validity is one of the most pivotal indicators of validity in psychometrics. It was assessed using Cronbach's alpha (CA) and composite reliability (CR) in the measurement model. In the methodological literature, convergent validity is determined if Cronbach's Alpha is greater than 0.7 (Nunally, 1978) and the value for composite reliability value is greater than Cronbach's Alpha value for the respective construct (Hair et al., 2016). As shown in Table 2, the Cronbach's Alpha for all the constructs are greater than 0.7 and the values for composite reliability value are greater than the respective Cronbach's Alpha coefficients. This certifies the reliability of the scales and ensures the convergent validity of the hypothesised constructs.

Table. 2. Results of the measurement model

Construct	Item	Loading	CA	CR	AVE
Real-time information sharing	RTIS1	0.774			
	RTIS2	0.758	0.73	0.832	0.553
	RTIS3	0.76			
Customer orientation	CO1	0.845			
	CO2	0.857	0.825	0.871	0.537
	CO3	0.806			
Purchase behaviour	CO5	0.565			
	PB1	0.668	0.783	0.853	0.538
	PB2	0.757			
Repurchase behaviour	RB1	0.736			
	RB2	0.778	0.816	0.867	0.523
	RB3	0.828			

Table 3 presents the Fornell-Larcker Criterion used to test the discriminant validity of the hypothesised model. As per the criteria, the square root of average variance extracted for a construct has to be greater than the correlations with any other construct (Fornell-Larcker, 1981).

Table 3. Fornell-Larcker criterion for discriminant validity

	RTIS	CO	PB	RB
Real-time information sharing (RTIS)	0.744			
Customer orientation (CO)	0.367			
Purchase behaviour (PB)	0.46	0.363	0.733	

Repurchase behaviour (RB)	0.437	0.409	0.37	0.723
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As shown, the average variance extracted is greater than the respective correlations among the constructs: therefore, discriminant validity is ensured.

Table 4. Heterotrait-Monotrait Ratio (HTMT)

	RTIS	CO	PB	RB
Real-time information sharing (RTIS)		0.473	0.599	0.557
Customer orientation (CO)			0.443	0.45
Purchase behaviour (PB)				0.476
Repurchase behaviour (RB)				

The HTMT values in Table 4 provide another measure of discriminant validity. As per the recommendations of Gold, Malhotra, and Segars (2001), the HTMT value of the constructs has to be less than 0.9 to satisfy discriminant validity. In the results shown in Table 4, the HTMT values of all the constructs are below this threshold; which implies there is no issue regarding discriminant validity.

4.2. Blindfolding test and coefficient of determination

Table 5 shows the results for predictive relevance (Q^2) and coefficient of determination (R^2). In variance-based SEM, Q^2 values equal to or below zero show weak predictive relevancy while values above 0.35, 0.15 and 0.02 show that the exogenous construct has large, medium and small predictive relevancy, respectively. A blindfolding test was performed and the values of all constructs were above zero, which indicated accurate predictive relevancy. The R-square value of the reflective constructs was also described. In the current case, the R^2 values of CO, PB, and RB show low to moderate explanation of variance in the overall model (Henseler, Ringle, and Sinkovics, 2009).

Table 5. Predictive relevance and coefficient of determination

Construct	Q ²	R ²
Customer orientation	0.066	0.131
Purchase behaviour	0.125	0.249
Repurchase behaviour	0.123	0.256

4.3. Path analysis and results

Figure 2 shows the results of the path analysis performed using SmartPLS 3 software. These show that the path from RTIS to PB and RB is significant (as their P value is less than 0.05), while the rest of the paths are insignificant.

Table 6. Path results for the model

Effects	Beta	Standard Error	T Value
<i>Direct Effects</i>			
RTIS -> PB	0.377	0.077	4.88***
RTIS -> RB	0.331	0.066	4.995***
RTIS -> CO	0.367	0.061	6.021***
CO -> PB	0.225	0.075	3.001**
CO -> RB	0.288	0.071	4.06***
<i>Indirect Effects</i>			
RTIS -> CO -> PB	0.108	0.032	2.559**
RTIS -> CO -> RB	0.138	0.028	3.769***
<i>Total Effects</i>			
RTIS -> PB	0.485	0.064	7.158***
RTIS -> RB	0.469	0.06	7.248***

Note: statistically significant at *** ($p < 0.01$), and ** ($p < 0.05$)

The first part of the first hypothesis posits a direct and positive relationship between downstream real time information sharing and purchase behaviour. The results show a beta value between CO and PB of 0.377, which is significant ($p < 0.001$) and positive. Therefore, H_{1a} is supported and RTIS and PB are significantly and positively related. The second part of the first hypothesis posits a direct and positive relationship between downstream real time information sharing and repurchase behaviour. The results show a beta value between CO and RB of 0.331, which is significant ($p < 0.001$) and positive. Therefore, H_{1b} is supported and RTIS and RB are positively related.

Table 6 also depicts the direct, indirect, and total relationship between RTIS, PB, and RB through CO. The second hypothesis posits that the direct relationship between downstream real time information sharing and customer orientation is significant and positive. The results show a beta value between RTIS and CO of 0.367, which is significant ($p < 0.001$) and positive. Therefore, H₂ is supported and it can be concluded that organisations which share downstream RTIS are more customer focused.

The third hypothesis posits a direct and positive relationship between customer orientation and purchase behaviour. The results show a beta value between CO and PB of 0.225, which is significant ($p < 0.001$) and positive. Therefore, H_{3a} is supported and it can be concluded that CO leads to positive PB. Similarly, the hypothesis posits a direct and positive relationship between customer orientation and repurchase behaviour. The results show a beta value between CO and RB of 0.288, which is significant ($p < 0.001$) and positive. Therefore, H_{3b} is supported and it can be concluded that CO leads to positive RB.

In addition, the relationship between RTIS and PB through CO is significant ($p < .001$) with a beta value of 0.108. This implies that CO significantly mediates the positive relationship between RTIS and PB. Therefore, H_{3c} is supported and it can be concluded that RTIS and RB are positively related. The relationship between RTIS and RB through CO is also significant ($p < .001$) with a beta value of 0.138. This indicates that CO significantly mediates the positive relationship between RTIS and RB. Therefore, H_{3d} is supported and it can be concluded that RTIS and RB are positively related.

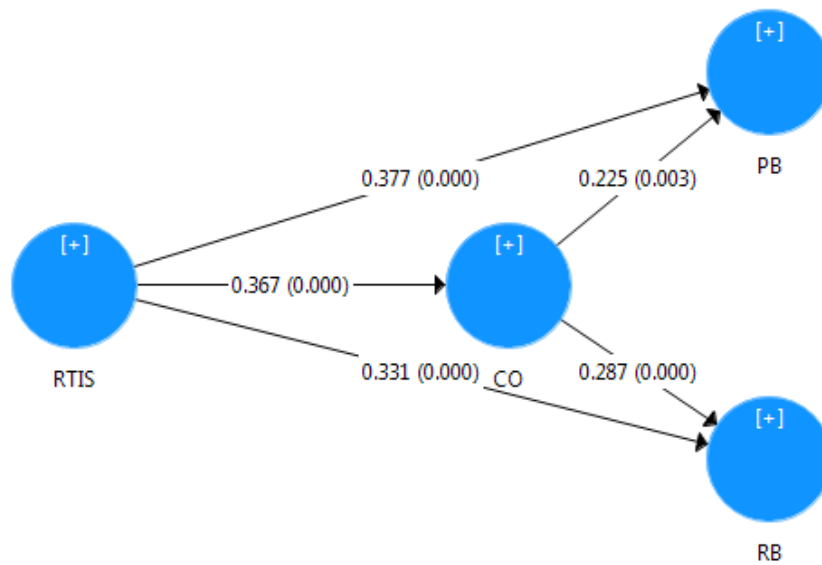


Fig 2: Empirical model showing relationship between RTIS, PB, CO and RB

Figure 2 presents a graphical representation of the tested model using SmartPLS 3 software. This depicts the hypothesised constructs and their relationships, along with their beta values and associated P values.

The first part of the fourth hypothesis predicted the relationship between real time information sharing and purchase behaviour through customer orientation across sub-sectors of the service industry. The results in Table 7 show that the difference between the beta values of food and beverages vs wholesale is 0.006, which is insignificant ($p > 0.001$). Second, the difference between the beta values of food and beverages vs accommodation is 0.197, which is significant ($p < 0.001$). Finally, the difference between the beta values of wholesale and retail trade vs accommodation is 0.203, which is significant. Thus, the relationship between RTIS and PB through CO varies across sub-sectors of service industry in that the accommodation sector differs significantly from the other two sectors. Therefore, H_{4a} is partially supported.

Table 7. Multi-group analysis between service industry sectors

	Delta B	Delta B
Delta B	(Food and beverages - accommodation)	(Retail and wholesale trade - accommodation)

(Food and beverages - Retail and wholesale trade)			
RTIS -> PB	0.006	0.197***	0.203***
RTIS -> RB	0.003	0.163***	0.159***

The second part of the fourth hypothesis predicts the relationship between real time information sharing and repurchase behaviour through customer orientation across sub-sectors of the service industry. The results in Table 7 show that the difference between the beta values of food and beverages vs wholesale is 0.003, which is insignificant ($p > 0.001$). Second, the difference between the beta values of food and beverages vs accommodation is 0.163, which is significant ($p < 0.001$). Finally, the difference between the beta values of wholesale and retail trade vs accommodation is 0.159, which is significant. Thus, the relationship between RTIS and RB through CO varies across sub-sectors of service industry in that the accommodation sector differs significantly from the other two sectors. Consequently, H_{4b} is partially supported.

5. Discussion and Conclusion

Gilbert and Veloutsou (2006) emphasised the application in intra-service sectors of customer service improvement and measurement in downstream operations, which may expand the existing understanding of differences in sub-sectors to enhance the literature on the service industry (Stanworth, 2012). Cloud computing (SaaS) has the potential to improve efficiency in the service sector by sharing real-time information with customers in an industry 4.0 era. Service businesses therefore need to improve the timeliness with which quality information is provided. More important, quality information needs to be used at all levels within an organisation. Conversely, the RTIS concept is not implemented with customers in all service sub-sectors and there is a lack of research on the adaptation and benefits of the RTIS concept in wholesale and retail, food and beverage, and accommodation sub-sectors from the perspectives of middle level managers. According to Busom and Vélez-Ospina (2017),

one of the traits of information is its quality and value to the user/consumer; however, this remains uncertain until it is consumed. Literature on the service sector does not clearly depict the intensity of the benefits after adaptation of RTIS – for instance, whether all three sectors gain similar or dissimilar benefit(s) (i.e., PB and RB). **Comparison between sub sectors reveal the extent of behaviour of the businesses about the RTIS and customer facilitation. Therefore, the present study explored the relationship between RTIS, CO, and PB and RB from the perspectives of middle level managers.** The results showed that the overall relationship between RTIS and PB and RB in the presence of CO is more effective in the wholesale and retail and food and beverages industries than the accommodation industry. These results support the theoretical framework upon which the hypotheses were based. All other relationships were insignificant among all three sub-sectors. **Results also depicting that RTIS also enhance the PB which also align with the IPT.**

5.1 Main Contributions

This study contributes to the existing literature in following ways. First, it tested the differences in adaptation and possible benefits of RTIS in three sub-sectors: i) wholesale and retail, ii) food and beverage, and iii) accommodation, which together contribute 33.1% to the overall service industry in Malaysia. The differences in these sub-sectors have never previously been analysed; therefore, the findings add to the body of knowledge on technology adaptation in service sub-sectors from the perspective of middle level managers. **It also shows the businesses behaviour about RTIS and customer facilitation. Second, the results show how RTIS can be effectively used to benefit businesses using the principles of IPT. As IPT proposes that data sharing could provide the competitive advantage. Third, in the milieu of IPT, all three sub-sectors are willing to invest in RTIS technology but the perceived benefits vary according to the operations and environment of the specific sub-sector. Therefore, information technology investment varies from business to business and ultimately it provides weight on the efficiency on the operations. The theoretical framework employed also provides insights into the adaptation of technology and the possible benefits arising from this. Additionally, middle level managers, who are a critical resource for businesses, shared their opinion on the adaptation of SaaS in business operations (Prahalad and Hamel, 2006). CO is**

consequence of RTIS and antecedent of PB and RB. Therefore, information sharing should consist of specific aspects of business which could enhance frequency of purchase i.e. average order delivery time, quality of food etc.

All three sub-sectors in this study are involved in physical infrastructure services, which provides room for improvisation through involvement in service innovation (e.g., Busom and Vélez-Ospina, 2017). Adaptation to technology in order to share real-time information with customers is therefore considered a strategic tool (Meadows and Dibb, 2012). The results show that middle managers perceived the RTIS in the accommodation sub-sector to be weakly associated with customer purchase compared to the other two sub-sectors. The possible reason for this is that customers use more time in service receiving proximity, and experience more attributes in the accommodation sub-sector i.e., hotel personnel behaviour, room management, maintenance and utilities, food and beverage service, cleaning and laundry, security, quality environmental management controls, information and telecommunications technologies, computer equipment, and kitchens. Hence, businesses in the accommodation sub-sector need to manage each experience attribute and must try their best to achieve the expectations related to each experience attribute to ensure customers stay for a specific time. Therefore, if any of the experience attributes fail to fulfil these expectations, which vary from customer to customer, the ratings on the RTIS app will deteriorate. Conversely, wholesale and retail and food and beverage sub-sectors manage less customer time and there are fewer experience attributes. The other possible reason for this difference is that the wholesale and retail sub-sector is a more cloud adaptive service (Haug, Kretschmer, and Strobel, 2016; Ramanathan et al., 2017). Furthermore, Castellacci (2008) characterised the food and beverages sub-sector as involving more technological content than the accommodation sub-sector. Therefore, wholesale and retail and food and beverages sub-sectors are primarily recipients of advanced knowledge and can implement SaaS to share their current information and enhance the PB and RB. This study also showed that, in the wholesale and retail and food and beverages sub-sectors, the RTIS provides an impression about the authenticity of a specific service provider, which motivates customers to use such an app or information in their next service encounter.

5.2 Policy implications

Finally, policy makers should focus closely on the specific (sub)sectors that implement the respective technology to achieve the industry 4.0 goal. This technology adaptation would be one more step to facilitate the availability of limited open data of private organizations. As shown in this study, not all businesses that belong to specific (sub)sectors can adapt new technologies due to their business mission, type, or operational complexity. Government encourages businesses or (sub)sectors to share the special needs they have that can be fulfilled by technology or to suggest technology that can enhance efficiency or solve a specific issue. Real time information sharing with customers is also align with the Malaysia consumer protection act 1999 that information should facilitates the customers. It is also recommended that one specific department could share the customised new information regarding technological upgrades based in the needs of the (sub)sector.

5.3 Limitations and future research

The findings presented in this paper represent an initial effort towards understanding the pathway taken by service sectors to achieve the industry 4.0 goal. Despite its important quantitative and practical contributions, this research has several limitations that provide opportunities for future research. First, this study focused on three different sub-sectors. Future research should therefore incorporate other service sectors to obtain more detailed and insightful results. Second, the respondents were all middle level managers. Future studies should therefore explore a similar model for the upper management level personnel (CEO/ directors) to obtain a broader perspective. **Third, the future studies could be conducted to find what type of information customers want to see on their screen from the businesses. It could provide more deep and concise information about possible content sharing about business operations. Finally, the characteristic(s) of respondents i.e., age, education could be explored to provide different perspectives on the adaptation of technology in businesses and for policy making.**

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Appendix – A:

Paper detail	Theory	Constructs/ topics	Population/ Industry/ company	Industry/ Organization	Statistical technique	Findings
Ghouri and Mani (2019)	Relational view theory and theory of information sharing	Real-time information sharing; Customer orientation; Overall purchase behavior	middle-level managers	Service Industry	Partial least square	Real-time information sharing is the key determinant of customer purchase behavior
Yu, Roy, Quazi, Nguyen, and Han (2017)	Self-regulation framework	Perceived website quality; Interactivity; Satisfaction; Attitude; Stickiness; Word of mouth	graduate and undergraduate students	Online Retail industry	Structural equation model	Sharing of information in the IoT context would indirectly affect word of mouth through the construct of e-satisfaction.
Ahsan and Rahman (2016)	Fairness theory	Six operational level returns service determinants	Operations managers	Retail Industry	Interview	Returns services dimensions are the way in which returns services are handled through interaction, and the outcome of service delivery i.e purchase intention, increase sales.
Rapaccini and Visintin (2015)	-	Potential value in use of the product; perceived risk in use of the product	This study took help from manufacturing companies personnel to finalized the proposed framework	-	Review paper	Timely customer support is value facilitating services, in that it help customers create value for themselves in isolation from the provider.
Lankton, McKnight and Thatcher, (2014)	Expectation Disconfirmation Theory	Technology trusting expectations; Technology trusting disconfirmation; Technology trusting performance; Technology satisfaction;	Business undergraduates students	Computer software (Microsoft Access)	Partial least square	Technology-trust concepts should be applied to different types of strategic information systems like open source software, knowledge

		Technology trusting intention; Usage continuance intention				collaboration systems, and dashboard systems.
Kim and Ko (2012)	-	Perceived activities; Value equity; Relationship equity; Brand equity; Customer equity; Purchase intention	Customers of luxury fashion goods	Luxury fashion brands	Structural equation model	Luxury brand information sharing activities perceived by consumers were significantly efficacious to luxury fashion brands' future profits.
Allon and Bassambo (2011)	-	Retailer behavior; Customer behavior	Retail industry	-	Theorem	Information received by customers not always work. It needs specific situation/ condition/ offering to remain effective.
Jansen, Sobel, and Cook (2011)	human information processing	Being connected; Being engaged	Millennials	Social media users	Descriptive and cluster analysis	Youth demographic has complex ecommerce information behaviours that call for nuanced approaches in advertising, marketing, or other areas of information targeting and that the traditional web advertising model may not be an appropriate information dissemination method.
Song and Zinkhan (2008)	Telepresence theory and Interactivity theory	Number of clicks; Response time; Message type; Perceived interactivity; Satisfaction; Loyalty; Attitude, Quality	Undergraduate students	Webstore	MANOVA and MANCOVA	Fast response and transmission of related messages might be crucial for enhancing perceived communication. Additionally, when

						customers communicated with firms, the personalization of the seller's message was a crucial aspect of interactivity.
Lee and Whang (2000).	-	Inventory; Sales; Order status; Sales forecast; Production and delivery schedule; Other information sharing	-	-	Review paper	Companies must develop capabilities to utilize the shared information in an effective way and enhance sales.
Mahmassani and Jayakrishnan, (1991)	Traffic theory	in-vehicle information system; , traffic system performance	Highway drivers	-	Simulation experiment	The fraction of users equipped with in-vehicle navigation and real-time information systems improves conditions in overall traffic system performance

Appendix – B: Questionnaire items

Item Description

We perceive benefits of downstream real-time information sharing (RTIS)
Adopting a real-time information-sharing application has many advantages.
A real-time information-sharing application is a useful instrument for increasing operational excellence.
Overall, we consider the adoption of real-time information-sharing to be a useful strategic option.

Customer Orientation (CO)

We are strongly committed to our customers.
We look for ways to create value in our products.
We closely monitor our level of commitment in serving customers' needs.
Our business objectives are driven by customer satisfaction.
We closely focus on after-sales service.

Perceived Purchase Behaviour (PPB)

The likelihood of customers purchasing our product(s) is:
The probability that customers consider buying the product(s) is:

Perceived Repurchase Behaviour (PRB)

Customers like to continue purchasing our product(s).
It is likely that customers continue to purchase these product(s) in the future.
Customers intend to continue purchasing our products in the future.
