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Author(s): Ghouri, Arsalan Mujahid; Akhtar, Pervaiz; Haq, Mirza A.; Mani, Venkatesh; Arsenyan, Gayane; Meyer, Martin

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Real-time information sharing, customer orientation, and the exploration of intra-service industry differences: Malaysia as an emerging market

Arsalan Mujahid Ghouri¹

¹Faculty of Management and Economy,
Universiti Pendidikan Sultan Idris, Proton City, 35900,
Tanjung Malim, Perak, Malaysia

¹Montpellier Business School, 2300,
Avenue des Moulins, 34185,
Montpellier Cedex 4, France.

email: arsalan.ghouri@ymail.com

*Pervaiz Akhtar²

²University of Aberdeen Business School, University of Aberdeen
King's College

Aberdeen AB24 5UA, UK

²Imperial College London
London SW7 2BU, UK

Pervaiz_khan972@hotmail.com

Mirza A. Haq

Iqra University, Pakistan

amin.ulhaq@iqra.edu.pk

Mani Venkatesh

Montpellier Business School,
2300, Avenue des Moulins, 34185,
Montpellier Cedex 4, France.

email: m.venkatesh@montpellier-bs.com

Gayane Arsenyan

Imperial College London

London SW7 2BU, UK

Russian-Armenian (Slavonic) University

123 H.Emin, 0012 Yerervan, Armenia

Converse Bank, CJSC

26/1, Vazgen Sargsyan, 0012 Yerervan, Armenia

Email: gayane.arsenyan20@imperial.ac.uk

Martin Meyer|PhD,

University of Aberdeen Business School, University of Aberdeen

Aberdeen AB24 5UA, UK

martin.meyer@abdn.ac.uk

&

University of Vaasa, School of Technology and Innovations

martin.meyer@uwasa.fi

*Author for correspondence

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 effects of real-time information sharing (RTIS) on downstream operations in three service sub-sectors that are dominated by small and medium-sized enterprises (SMEs) - wholesale & retail, food & beverages, and accommodation. Drawing on information processing theory, we examine the differences in the adoption and perceived benefits for customers of RTIS through a survey of 221 middle-level managers from Malaysia. Our findings indicate that, overall, RTIS is significantly associated with customer purchase behavior (PB) in the presence of customer orientation (CO) that plays a two-fold mediating role in purchase and repurchase behavior. Our results also point to sectoral differences. RTIS—with customer PB and post-purchase behavior in the presence of CO—is more effective in the wholesale & retail and food & beverages sub-sectors than in accommodation. The article concludes with a discussion of theoretical and practical implications.

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

1. Introduction

The service industry contributes more than half of the GDP of major global economies, and technology plays a pivotal role in its development and offerings. The innate characteristics of service operations (i.e., the service being consumed in the presence of the customer, 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 terms of enhancing customer inspiration, satisfaction, and loyalty (Ramanathan et al., 2017; Cruz-Cárdenas et al., 2019). Certain industries could even face more challenges during crises like the Covid-19 pandemic, and the use of technology for real-time assessments plays a significant role in providing better services and saving communities (Cruz-Cárdenas et al., 2019; Stephany et al., 2020). Services are linked by the co-terminal relationship between production and consumption. Zeithaml, Parasuraman and Berry (1990) stated that a service perspective involves doing right things from beginning. In a competitive environment, service providers try their best to deliver the right (best) service every time in order to ensure the repeated input and output of customers. Customer inputs can be linked to time spent, efforts made, and monetary values, while customer outputs are related to receiving better services (De Ruyter and Wetzels, 2000). All inputs and outputs vary according to business types and their operations. Word of mouth may be among the most effective tools (Berman, 2016), along with appropriate technologies that link with a real-time data-driven approach to understanding customer orientation (CO) (Cruz-Cárdenas et al., 2019; Stephany et al., 2020). Studies suggested that consumer purchase decisions can be influenced by their relatives, friends, colleagues, and the technology used to spread the message (Zhang, Liang, and Qi, 2020).

Each service sub-sector has its own distinguishing characteristics. Different industries have different controls in relation to technology, uncertainty, and competition; thus, individual firms in different sectors face a variety of challenges. Organizations that provide superior service quality are market leaders in terms of sales and long-term customer loyalty and retention (Russo and Fouts, 1997; Hamilton et al., 2017). Gilbert and Veloutsou (2006) argued that customer expectations stem 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 ones 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 generate different relationships between tactical activities—such as service quality management—and overall performance outcomes, particularly in emerging markets. Emerging markets may utilize their market power and networks to harness expertise, information can play a key role in this interlink (Boso, Debrah, and Amankwah-Amoah, 2018; Cruz-Cárdenas et al., 2019; Amankwah-Amoah et al. 2019; Osei et al., 2019). In Malaysia for example as an emerging market, the rapid development of information technology offers multiple benefits and the usefulness technology provides a stronger impact on attitude and advertising towards utilizing latest technology (Jan 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. This calls for more cross-sector research on the real-time information and data-driven approaches aimed at understanding consumer behavior (e.g., Chamberlin, Doutriaux, and Hector, 2010; Cruz-Cárdenas et al., 2019; Stephany et al., 2020).

Businesses in service sectors, and typically small enterprises, may use new technologies to increase the efficiency of their service production process as well as to improve the quality of final goods and services they offer (Castellacci, 2008). Service-based industries use information to deal with their customers directly (Kraemer, Gibbs, and Dedrick, 2005), which is viewed as a strategic tool rather than just one suited to record transactions (Raffoni et al., 2018). Castellacci (2008) emphasized improvements in the timeliness of quality information. More specifically, he claimed that it needs to be applied at all levels within an organization, particularly in the real-time processing of big data and in getting insights to be used for instantaneous decision-making in activating effective links between companies and their customers, whose purchasing and related behavior depend on the information they are provided (Jabbar, Akhtar, and Dani, 2019). Compared with goods, the delivery of services requires higher levels of communication skills and social interactions. The penetration of the Internet—as a communication and information sharing medium—in the consumer market is growing and holds strong potential. The intangible and information-based characteristics of

services inherently assign a predominant role to the use and availability of IT infrastructure and resources suited to process real-time data and information (e.g., Galipoglu et al., 2018; Jabbar et al., 2019). For service firms, information technology is often considered as a vital functional requisite and a competitive factor. It changes the whole structure of a system in terms of its organization, operational routines, and market interface (e.g., Cruz-Cárdenas et al., 2019). To become competitive, companies must deal effectively with the continuous and unexpected changes brought about by modern technologies. The ability to swiftly and effectively satisfy customer needs (time-based competition) 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 ones. 'The Cloud' has emerged as an architectural innovation for data transmission and is a logical extension of specific information and communication technology services. Haug, Kretschmer, and Strobel (2016) found that cloud applications could provide businesses with a competitive advantage. They also conducted a rigorous quantitative analysis of the financial and wholesale sectors and found that adaptiveness in relation to cloud computing differs widely across sub-sectors. They also found that, whereas retail businesses are generally domestically oriented, wholesalers tend to operate on a global scale and therefore face much greater challenges in terms of organizing international flows of both information and goods. Besides having different effects, different real-time technological applications may be utilized in business-to-business and business-to-consumer operations (or across different sectors), which calls for more research to see whether technology can be used as a 'new competitive weapon' (Sung, 2015; Cao, Duan, and Cadden, 2019; Jabbar et al., 2019). Therefore, contemporary businesses need to understand how different industry sectors and contexts give rise to different relationships between tactical activities, such as service quality management, and overall performance outcomes through the application of modern technologies, such as cloud computing and complex data processing techniques (Bolton, Lemon, and Verhoef, 2004; Jabbar et al., 2019; Stephany et al., 2020).

Few studies have been conducted on the differences in the technological adoption of real-time information sharing (RTIS) across service industry sub-sectors. This applies particularly to emerging markets (see Appendix – A). In Malaysia, RTIS has only recently been

adopted in the services sub-sectors to share up to date information with customers in relation to daily routine operations and performances—i.e., average daily/weekly delivery times, daily/weekly customer satisfaction, and so on. This study focuses on the wholesale & retail, food & beverages, and accommodation sub-sectors, which 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 their importance in emerging markets and the need to conduct research in the relative domain (Boso et al., 2018; Amankwah-Amoah et al. 2019; Osei et al., 2019; Radošević et al., 2019).

We thus contribute to the literature in four ways. First, by specifically focusing on the differences in the adoption and benefits of RTIS for customers from the perspective of middle-level managers in the three sub-sectors. Second, by enriching the literature on the differences in service sub-sectors. Third, by contributing to incremental theory building in relation to Information Processing Theory by evaluating the differences in RTIS and benefits. Fourth, by testing a framework suited to elucidate the relationships (and their implications) between RTIS and CO, PB, and RB in the emerging market of Malaysia.

The remainder of this paper is organized as follows. Section 2 reviews the existing studies and develops hypotheses based on the adoption of SaaS technology to share information as a service (in the form of RTIS), and on 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 this study's potential limitations and possible avenues of research for future studies.

2. Theoretical background and hypotheses

2.1. Information processing theory, cloud computing, and managers

The framework model developed and tested in this paper is based on information processing theory (IPT). In organizations, the processing of information generally involves the gathering of data, their transformation into information, and the communication and storage of such information (e.g., Srinivasan and Swink, 2018). It is believed that, in order to sustain or attain a competitive advantage, firms should increase their information processing capacities. 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 the complementary capabilities and assets required to fully exploit any technological potential (Kim, Lee, and Gosain, 2005).

Horizontal information systems (HISs) are dependent on internet-based technologies that involve a variety of actors, including those providing the service and those using it. HISs differ from traditional information systems in terms of how businesses handle typical support for the different communities in the organization or between organizations (Braa and Rolland, 2000). Research has shown that modern organizations face uncertainty due to insufficient information. Similarly, customers face uncertainty due to a lack of information on business offerings, especially in the service industry (e.g., Flynn, Koufteros, and Lu, 2016). In this context, HISs enable businesses to focus more on people and their preferences and to develop trust by sharing real-time information and conveying their managerial philosophy to influence consumer purchase behavior (PB). From the perspective of emerging markets, countries are shifting from pre-industrial economies towards modern industrial ones. Therefore, IPT also provides direction aimed at enhancing operations with the latest technology. Srinivasan and Swink (2018) emphasized how information processing is a means to resolve uncertainty and this may change their strategy fit towards future that earlier highlight by other researchers (e.g., Khanna, Palepu, and Sinha, 2005; Khanna and Palepu, 2010). It is a notion that is applicable to customers, as they receive the latest information about business performance and make their purchase choices accordingly. A second point of interest concerns the variations found among businesses in regard to sharing real-time information with customers.

According to Gattiker and Carter (2010) managers often act as the final authority and ‘mediate’ information in determining the outcome of complicated decisions. Others advocate the importance of managers’ perceptions in making accurate decisions, as inaccurate scanning may lead to organizational failure or crisis. In a similar vein, Weiss and Wittmann (2018) argued that relying on managers’ perceptions—including situational (stress and

emotion), and dispositional factors (cognitive structures, styles, intelligence, and motivation)—may cause variations, which, in turn, create gaps between the objective and perceived environmental conditions in businesses. Numerous other studies have also focused on managers' perceptions and on the importance of scanning business opportunities (Rafique, Hameed, and Agha, 2018; Weiss and Wittmann, 2018).

2.2. Hypotheses, main framework

Cloud computing (software as a service/SaaS, platform as a service/PaaS, and infrastructure as a service/IaaS) 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). The concept of SaaS involves making a vital contribution to software development and delivery that, in turn, facilitates information sharing and business operations (Takahashi and Kadobayashi, 2015). The adoption of a SaaS model among financial and professional services retail firms has been found to be very aggressive (Chang, 2018). Others view SaaS as the next wave of technological opportunity for RTIS from the perspective of value proposition; as such, it can be easily administered to resellers, with positive effects on multiple outcomes (Wohl, 2010).

The RTIS behaviors of firms can have effects on marketing, sales, operations, technological developments, and production strategies (e.g., Ghouri and Mani, 2019; Costa, Soares, and de Sousa, 2016). Scholars have long argued that information-sharing can play a significant role in enhancing customer PB (Kim and Ko, 2012; Ahsan and Rahman, 2016). Wohl (2010) asserted that firms could exploit SaaS applications 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., Allon and Bassamboo, 2011; Yu et al., 2017). RTIS has also been found to be positively linked encouraging customers to become involved in the repurchase behavior (RB) of certain services/products (Rapaccini and Visintin 2015; Ghouri and Mani, 2019). Thus, the following hypotheses are formulated:

H1_a. There is a positive correlation between downstream real-time information sharing and purchase behavior.

H1_b. There is a positive correlation between downstream real-time information sharing and repurchase behavior.

Vasarhelyi and Greenstein (2003) argued that the 'electronization of business' process should integrate and absorb business processes, as consequent changes direct business practices more toward customers. Others have argued the importance of influencing CO through the timely sharing of information. For instance, Jeong, and Hong (2007) showed how sharing information with customers enhances the value chain of businesses. Hammer (2004) proposed that service businesses should aim at customer focused 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 performed by an enterprise. Organizations can thus use the Internet to improve customer relations by making it easier to access information and developing greater flexibility in responding to customer information requests (e.g., Ulmer, Heilig, and Voß, 2017). Similarly, research has shown that people anticipate and enjoy service-oriented technological innovation because of the enhanced value addition it brings (Bardhan et al., 2010). RTIS processes provide customers with enhanced value and intimacy (Allmendinger and Lombreglia, 2005). The rapid interactive access to large amounts of dynamic information enabled by the Internet in response to customer queries has resulted in improvements in customer relations (Moss, 2017; Ghouri and Mani, 2019). Accordingly, the following hypothesis is proposed:

H2. There is a positive correlation between downstream real-time information sharing and customer orientation.

Rohm, Kaltcheva, and Milne (2013) argued that 'timely information' impacts customer attitudes, behaviors, and experiences. Firms can therefore dedicate more time and effort to enhancing the quality of their existing services, creating new business opportunities, and improving their working relationships with their customers (Chang, 2018). Syaekhoni, Alfian, and Kwon (2017) suggested that customer PB and several customer-related factors, such as shopping habits, can act as an alternative to influence customer decision making.

Others have emphasized the provision of effective services and the enhancement of perceptions of service quality through the effective management of customer expectations (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 firms' selling interactions with customers (Bateman and Valentine, 2015). Macintosh and Lockshin (1997) also contended that consumer trust in a business and its employees/stakeholders creates positive relationships that lead to repeat purchase intentions. In the marketing literature, behaviors and intentions are considered as two separate constructs and entities. Further, other studies have shown the relationship between the concepts of purchase and repurchase to be a very close one (Bagozzi and Yi, 1989; Ghouri and Mani, 2019). Hence, the following hypotheses were formulated:

H3_a. There is a positive correlation between customer orientation and purchase behavior

H3_b. There is a positive correlation between customer orientation and repurchase behavior

Yang and Tsai (2019) confirmed the mediating impact of CO between cross-functional integration and innovative performance. The authors defined cross-functional integration as interaction, communication, information sharing, or coordination across functions. Tseng and Liao (2015) argued that market orientation (CO) mediates the relationship between the implementation of IT (enhancement of the information flow with stakeholders) and firm performance. A customer-oriented culture emphasizes the use of information and the understanding of customer needs in order to satisfy them (Wang, Zhao and Voss, 2016). Reed, Goolsby, and Johnston (2016) also envisaged CO (as external market orientation) in internet organizational culture as a mediator between the organizational listening environment and employee performance.

Lambert, Cooper, and Pagh (1998) argued that information adds value for customers as it aids in the fulfillment of their needs, which should be the first priority of organizations. It strengthens the bonds between organizations and customers, thus attaining CO, which that can play a central role in achieving positive customer outcomes (Rowley, 2002; Schweitzer, Hofmann and Meinheit, 2019). Additionally, Newberry, Klemz, and Boshoff (2003)

explained that the allocation of resources aimed at achieving the greatest return for businesses requires understanding and addressing those potential patrons who are most likely to purchase in the near term. Bode, Lindemann, and Wagner (2011) described how customer-orientation causes people to prefer spending their money on specific brands. Ghouri and Mani (2019) discussed how RTIS influence the PB of customers. The extant literature shows the relationships between RTIS, CO, PB, and RB. However, little research has been conducted on the mediating role played by CO between RTIS and PB or RB. Therefore, based on the literature and links discussed, we formulate the following hypotheses:

H3_c: Customer orientation mediates the correlation between downstream real-time information sharing and purchase behavior.

H3_d: Customer orientation mediates the correlation between downstream real-time information sharing and repurchase behavior

2.3. Hypotheses, differences in intra-service industries

Each business has its own distinctive characteristics. Contemporary firms therefore need to understand how different contexts and industry sectors bring about the establishment of different relationships between tactical activities, such as service quality management, and overall performance outcomes (Bolton et al., 2004). In both the public and private sectors, some businesses perform differently in relation to the influence of the usage and usefulness of, and attitudes toward technology (Akman and Mishra, 2015). Parasuraman, Zeithaml, and Berry (1994) found industry-related differences with regard to the link between service quality and behavioral intentions.

Few studies have focused on the different methods and processes used by organizations in different industry sectors (Zibarras and Woods, 2010). Cronin and Taylor (1992) found considerable differences in the relationship between satisfaction and repurchase intentions among the four service industry sectors of dry cleaning, pest control, banking, and fast food. Bretschneider and Wittmer (1993) explained the differences found in the adoption of microcomputer technology in different sectors. The influence of satisfaction and loyalty intentions on shareholder value varies between industry sectors; for example, 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 the retail and travel industries. They found that these industries are more likely than financial services to gain a competitive advantage from investing in information technology. Winsted (1999) studied different aspects of service in the medical and restaurant sub-sectors in the USA and Japan. They established that: i) in both countries, 'authenticity' in service is more important in the medical sub-sector than in the restaurant one; ii) in the USA 'caring' is more important in the medical sub-sector than in the restaurant one, while the reverse is the case in Japan; iii) in the USA, 'control' is more important in the restaurant sub-sector than in the medical one; iv) in both countries, 'courtesy' is more important in the restaurant sub-sector than in the medical one; v) in the USA, 'personalization' is more important in the medical sub-sector than in the restaurant one, while the reverse is the case in Japan; and vi) in both countries 'promptness' is more important in the restaurant sub-sector than in the medical one.

De Ruyter and Wetzels (2000) found that an apology in service recovery has an effect on trust in the banking and dining café sectors, but not in the hairdressing and department store ones. Gronholdt, Martensen, and Kristensen (2000) conducted research on Denmark's telecommunication, retail banks, supermarkets, soft drink, and fast food sub-sectors, and provided insights into the differences in pricing and branding across sub-sectors. Miozzo and Soete (2001) found that the finance and telecommunications sub-sectors typically make heavy use of the information and communications technologies developed by other advanced sectors to increase the efficiency of their productive processes and the quality of their services; conversely, 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 had been set up to receive questions and comments via email and comparatively few technology companies offered a toll-free number. Gilbert and Veloutsou (2006) suggested that differences in satisfaction may be indicative of the unequal level of service quality provided in these sub-sectors.

Johnsen and McMahon (2005) also found that there are cross-industry differences in financing behaviors 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 the 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 behaviors across industries (Campbell, 2007).

Similarly, Daveri and Maliranta (2007) differentiated between Finland's electronics sector, machinery and equipment industry, and 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. 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 regional and national differences can explain variations in service industry performance. Based on aggregate sector specific information, Lallemand and Rycx (2009) divided a sample of Belgian firms into sectors with high and low information and communication technology intensity. They contended that adequate cognitive skills and the possibility to adjust quickly and flexibly to new forms of work organization are critical for the intensive usage of communication and information technology. In addition, they claimed that these personal characteristics decline more sharply than others with age.

Chamberlin et al. (2010) investigated the similarities and differences found in rates of innovation between 34 Canadian service sectors. Meadows and Dibb (2012) found that those firms that offer professional services express more positive views than both financial services firms and government/public organizations. Yaokumah (2014) identified significant differences in the implementation of information security governance among the financial, utility, information technology, and oil and gas service sub-sectors. Based on sub-sectorial differences in research and development (R&D) intensity, Galindo-Rueda and Verger (2016) classified industries into five groups: high, medium-high, medium, medium-low, and low. Thus, service activities appear to be somewhat polarized in terms of R&D intensity. Haug et

al. (2016) concluded that the wholesale and financial service sectors are the most cloud adaptive, while the retail and regulated, state-dominated industries such as education, social services, and health are the least likely to be cloud adaptive. Domeher, Musah, and Hassan (2017) illustrated the differences that exist in terms of financing between the hospitality and retail sub-sectors. Based on these findings, the following hypotheses were formulated:

H4_a. In the presence of customer orientation, the correlation between downstream real-time information sharing and purchase behavior varies between the wholesale & retail, food & beverages, and accommodation sub-sectors.

H4_b. In the presence of customer orientation, the correlation between downstream real-time information sharing and repurchase behavior varies between the wholesale & retail, food & beverages, and accommodation sub-sectors.

The hypothesized model is depicted in Fig 1. The justification for the knowledge gap and our contribution is encapsulated in Appendix – A, which presents a detailed table showing the applied theories, relevant constructs, populations, industries, methodological techniques, and findings. In addition to the literature discussed, the table clearly demonstrates that there is a significant knowledge gap on RTIS and the outputs linked with it, thus providing the justification for the current study. Figure 2 provides the two mediation models, illustrating the direct and indirect effects.

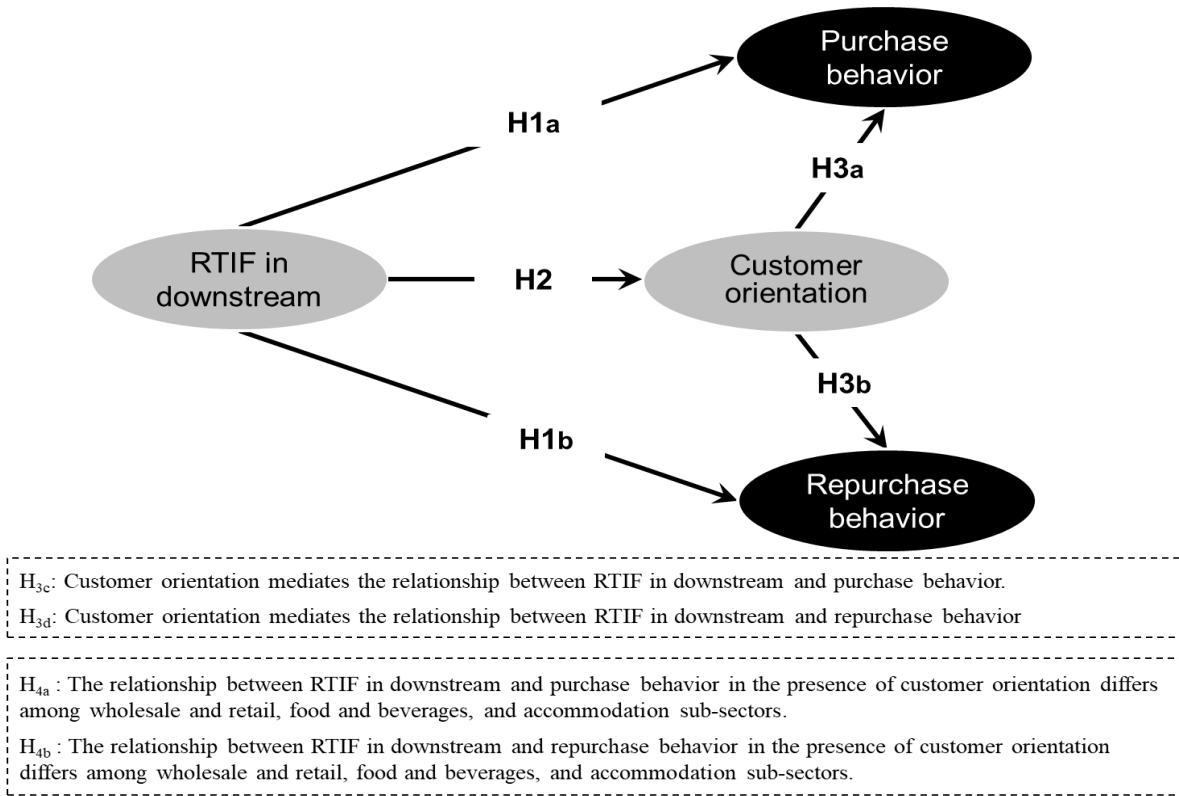


Fig 1. Framework, RTIS in downstream operations, others constructs and hypotheses

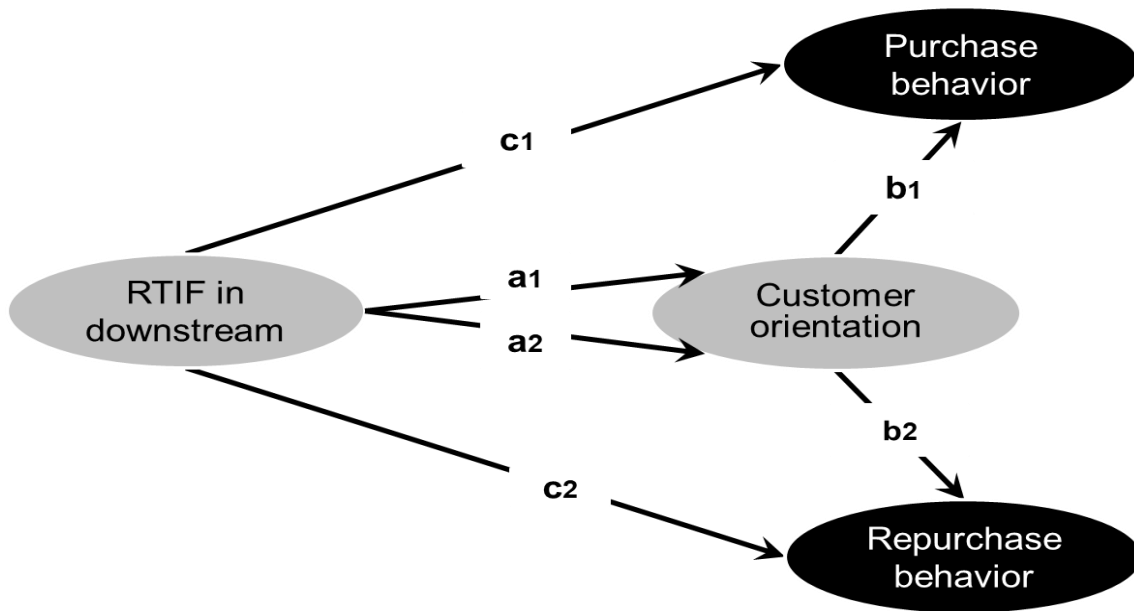


Fig 2. Mediation models, the central role of customer orientation

3. Methodology

A quantitative approach was adopted whereby the variables were measured through a survey and the data were collected in numerical form. Scholars have recommended the

quantitative research method as one of the most suitable ways to address research problems—i.e., to test hypotheses, test theories, and examine the correlation between different variables and measures—linked to the perceptions of a large group of individuals in regard to a phenomenon. Creswell and Clark (2017) and Hair et al. (2016) believed that quantitative research also enables researchers to gather data from a large sample to address specific questions. Research designs and related aspects need to be selected carefully as part of an overall methodology.

3.1. Research design

Research design is a vital step in all those studies that involve a progression of important decisions regarding their level, purpose, manipulation, control, and location. It also facilitates the construction of a checklist of the activities and procedures involved in the accomplishment of the aims and objectives of the research, and enables researchers to test the research hypotheses. A correlational research design is one of the most useful in quantitative approach, as it helps to determine whether an increase or decrease in one variable will affect another (e.g., Lodico, Spaulding, and Voegtler, 2010; Hair et al., 2016). As the aim of this study was to examine the direct, indirect, and mediated relationships between RTIS, CO, PB, and RB, a correlational research design was used as this assisted in testing the hypotheses integrated in our framework, which was built based on the literature discussed in earlier sections.

The sample population for this study was drawn from the SME Corporation Malaysia directory 2015, which characterizes as SMEs firms that employ 75 or fewer workers—in line with the Asia-Pacific Economic Corporation's SMEWG Strategic Plan for 2017–2020, the main concern of which is to improve the competitiveness and innovation of SMEs (SMEECorp Malaysia, 2016) by encouraging serious involvement in e-commerce initiatives and reducing any technological gaps. As 87.9% of Malaysia's SME sector consists of companies in the service industry, the sample population for this research was drawn from its sub-sectors—i.e., wholesale & retail, food & beverage, and accommodation. The prime reasons for the selection of these sectors were: (i) the need to gain insights into RTIS and other constructs for these sectors and the knowledge gap identified; and (ii) the contribution made by these

sectors (72.9%) to the overall service category, which plays a significant role and to the overall service industry (33.1%) (Ministry of Finance Malaysia, 2017).

The data were collected from mid-level managers of SMEs from three provinces of Malaysia—i.e., Selangor, Perak, and Kedah—who were directly involved in customer operations. They had been identified as the best suited respondents as they had relevant knowledge both in theory and in practice. As they are involved in customer care operations, and work with the customer service personnel of their organizations, mid-level managers are normally in close contact with their firms' customers. Additionally, they also play a part in achieving the strategic goals of their organizations. A survey questionnaire was sent out to potential respondents. A total of 313 responses were received. After excluding the invalid ones, a final sample of 221 valid responses (70.61%) was used to conduct our analysis. Table 1 presents the demographic characteristics for this sample.

Table 1. Demographic characteristics of mid-level managers and companies involved

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
	Master's degree	32	14.48
SME type	Wholesale & retail	57	25.79
	Food & beverages	80	36.20
	Accommodation	84	38.01

3.2. Development of the Instrument

One of the objectives of this study was to produce findings that could be generalized to larger populations or other sectors; therefore, the measurement scales were taken from valid, reliable, and standardized existing sources. These were analyzed for content validity and for suitability to the Malaysian and mid-level manager contexts with the help of an expert panel consisting of academicians and practitioners, who verified the contextualized psychometric properties of the proposed instrument. Their suggestions were then

incorporated into the questionnaire, which was finalized for data collection together with the literature and applied statistical techniques. The research questionnaire was divided into three sections. The first contained items eliciting personal information from the respondents—such as their titles, education, and other general employment characteristics. The second section comprised items measuring the variables (see Appendix B). 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). The responses to all items were graded on a Likert scale ranging from 1 to 5, where 1 was the lowest value and 5 was the highest value for the items graded. Prior to the commencement of the survey, the respondents were assured that their personal data would be kept confidential by the researcher. To reduce bias, a common-method variance test and other guidelines were used to avoid any variations in responses caused by the instrument rather than by the respondents' actual predispositions (Ullah, Akhtar, and Zaefarian, 2018).

To test the hypothesized relationships among the constructs, a measurement model was created, followed by a structural model (in what is collectively called structural equation modeling—SEM). The researcher ensured the anonymity of respondents during the data collection process. Moreover, the respondents were reminded that their participation was voluntary and that they could withdraw their data at any stage. Finally, to ensure that they felt comfortable while answering the questions, the respondents were told that the questions did not have any right and wrong answers and they were under no time pressure to complete the questionnaire.

We employed the Independent t-test method to check for non-response bias by comparing first and last 25 respondents on all variables (Armstrong and Overton, 1977). The results revealed no significant difference between the early and late respondents, which depicts no non-response bias. Additionally, we adopted a marker variable approach to check for common method bias. As the marker, we included an unrelated variable (i.e., self-efficacy) drawn from a current study on model correlation analysis (Lowry and Gaskin, 2014; Ullah et

al., 2018). The correlation values of the marker variable ranged from low (MV -> PPB = .027) to moderate (MV -> PBRTIS = .60); thus confirming a low likelihood of common methods bias.

4. Results

The following results were generated using SEM to validate the hypothesized model. Table 2 presents the loadings, Cronbach's Alpha, composite reliability, and average variance extracted (AVE) values for each factor. To meet the criteria to ensure the convergent validity of the hypothesized constructs, the values of the loadings and AVE needed to be greater than 0.5 (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 through Cronbach's alpha (CA) and composite reliability (CR) in the measurement model. In the methodological literature, convergent validity is determined if the values of Cronbach's Alpha are greater than 0.7 (Nunally, 1978) and those of composite reliability are higher than those of Cronbach's Alpha for each construct (Hair et al., 2016). As shown in Table 2, all the Cronbach's Alpha and their respective composite reliability values were found to satisfy the above criteria. This certified the reliability of the scales and ensured the convergent validity of the hypothesized constructs.

Table 2. Results of the measurement model

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

Table 3 presents the Fornell-Larcker Criterion used to test the discriminant validity of the hypothesized model. As per the criterion, the square root of a construct's AVE has to be greater than that construct's correlations with any other (Fornell-Larcker, 1981). As shown, the AVE values (along the diagonal) satisfy the criterion: therefore, discriminant validity is ensured.

Table 3. Fornell-Larcker criterion for discriminant validity

Construct	RTIS	CO	PB	RB
Real-time information sharing (RTIS)	0.744	-	-	-
Customer orientation (CO)	0.367	0.733	-	-
Purchase behavior (PB)	0.460	0.363	0.733	-
Repurchase behavior (RB)	0.437	0.409	0.370	0.723

The HTMT values in Table 4 provide another measure of discriminant validity. As per the recommendations of Gold, Malhotra, and Segars (2001), to satisfy discriminant validity, the HTMT values of the constructs need to be lower than 0.9. In the results shown in Table 4, the HTMT values of all the constructs satisfy this criterion; which implies that there are no issues in regard to discriminant validity.

Table 4. Descriptive statistics and Heterotrait-Monotrait Ratio (HTMT)

Construct	Mean	S.D	RTIS	CO	PB	RB
Real-time information sharing (RTIS)	3.84	1.67	-	-	-	-
Customer orientation (CO)	3.96	2.10	0.473	-	-	-
Purchase behavior (PB)	3.01	1.76	0.599	0.443	-	-
Repurchase behavior (RB)	3.22	2.17	0.557	0.450	0.476	-

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 that are equal to zero or negative show weak predictive relevancy, while values that are higher than 0.35, 0.15, or 0.02 show that the exogenous construct has large, medium, or small predictive relevancy, respectively. A blindfolding test was performed and the values of all constructs were found to be positive, which indicated predictive relevancy. The R^2 values of the reflective constructs were also described. In the current case, the R^2 values of CO, PB, and repurchase behavior indicate low to moderate explanation of the 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 behavior	0.125	0.249
Repurchase behavior	0.123	0.256

4.3. Path analysis and results

Table 6 shows the results of the path analysis performed using SEM, which show that the path from RTIS to PB and RB is significant (as their p-value is lower than 0.05), along others significant coefficients.

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

Table 6 also depicts the direct, indirect, and total correlation between RTIS, PB, and RB through CO. The second hypothesis posits that the direct correlation between downstream real-time information sharing and customer orientation is significant and positive. The results show a beta value of 0.367 between RTIS and CO, which is again significant ($p < 0.001$) and positive. Therefore, H_2 is supported and it can be concluded that those organizations that share downstream RTIS are more customer focused.

The third hypothesis posits a direct correlation between customer orientation and purchase behavior. The results show that the beta value between CO and PB is significant (0.225, $p < 0.05$). Therefore, H_{3a} is supported and it can be concluded that CO leads to positive PB. Similarly, the hypothesis posits a direct correlation between customer orientation and repurchase behavior. The results show a beta value of 0.288 between CO and RB ($p < 0.001$). Therefore, H_{3b} is also supported.

In addition, the correlation between real-time information sharing and purchase behavior through customer behavior is significant, with a beta value of 0.108, although it is less strong than the direct correlation between RTIS and PB. This implies that CO significantly mediates the positive correlation between RTIS and PB. Therefore, H_{3c} is supported and it can be concluded that RTIS and RB are positively correlated. The correlation 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 correlation between RTIS and RB. Therefore, H_{3d} is supported and it can be concluded that RTIS and RB are positively correlated.

The first part of the fourth hypothesis predicted that the correlation between real time information sharing and purchase behavior mediated by customer orientation would vary across the sample sub-sectors of the service industry. The results in Table 7 show that the difference between the beta values of food & beverages vs. wholesale is 0.006, which is not significant ($p > 0.001$). Second, the difference between the beta values of food & beverages vs. accommodation is 0.197, which is significant ($p < 0.001$). Finally, the difference between the beta values of wholesale & retail trade vs. accommodation is 0.203, which is significant. Thus, the correlations between RTIS and RB through CO vary across the sample sub-sectors of service industry, in that the accommodation sector differs significantly from the other two. Therefore, H4_a is partially supported.

Table 7. Multi-group analysis between service industry sectors

	Delta β (food and beverages – retail and wholesale trade)	Delta β (food and beverages – accommodation)	Delta β (retail and wholesale trade – accommodation)
RTIS -> PB	0.006	0.197***	0.203***
RTIS -> RB	0.003	0.163***	0.159***

*** Highly significant (p -value < 0.01)

The second part of the fourth hypothesis predicts that the correlation between real time information sharing and repurchase behavior mediated by customer orientation would vary across the sample sub-sectors of the service industry. The results in Table 7 show that the difference between the beta values of food & beverages vs. wholesale is 0.003, which is not significant ($p > 0.001$). Second, the difference between the beta values of food & beverages vs. accommodation is 0.163, which is significant ($p < 0.001$). Finally, the difference between the beta values of wholesale & retail trade vs. accommodation is 0.159, which is significant. Thus, the correlation between RTIS and RB mediated by CO varies across the sample sub-sectors of service industry in that the accommodation sector differs significantly from the other two. Consequently, H4_b is partially supported.

5. Discussion and Conclusion

This study examined the effects of real-time information sharing in downstream operations on purchase behavior and repurchase behavior as well as the mediating role

played by customer orientation. Three service sub-sectors were investigated - wholesale & retail, food & beverages, and accommodation. Gilbert and Veloutsou (2006) emphasized the application to service sub-sectors of customer service improvement and measurement in downstream operations. As Stanworth (2012) points out, this may expand our understanding of the differences found in sub-sectors and thus enhance the literature on the service industry. Technologies, such as cloud computing (SaaS), have the potential to improve the efficiency of the service sector by enabling the sharing of real-time information with customers in the industry 4.0 era. Service businesses therefore need to improve the timeliness with which they provide quality information. More importantly, quality information needs to be used at all levels within an organization. Our research sheds light on a specific aspect as the real-time information sharing concept is not implemented with customers in all service sub-sectors. More specifically, this contribution we have sought to address the relative lack of research on the adoption and benefits of the real-time information sharing concept in the wholesale & retail, food & beverage, and accommodation sub-sectors (Cruz-Cárdenas et al., 2019; Jabbar et al., 2019; Stephany et al., 2020) as well as a lack of research on emerging markets (Boso et al., 2018; Amankwah-Amoah et al. 2019; Osei et al., 2019; Radosevic et al., 2019). According to Busom and Vélez-Ospina (2017), two of the traits of information are its quality and value to the user/consumer; however, such traits remain uncertain until information is consumed. The literature on the service sector does not clearly depict the intensity of the benefits stemming from the adoption of real-time information sharing—for instance, whether all three sectors gain similar benefit(s), i.e., purchase behavior and repurchase behavior. A comparison between sub-sectors revealed the extent to which businesses engage in real-time information sharing and customer facilitation. Therefore, this study explored the correlation between real-time information sharing, customer orientation, purchase behavior, and repurchase behavior from the perspectives of mid-level managers, who play a key role in their firms' operations.

The results point to industry differences. We found that the overall correlation between real-time information sharing, purchase behavior, and repurchase behavior in the presence of customer orientation is more effective in the wholesale & retail and food & beverages industries than it is in the accommodation industry. These results support the

theoretical framework upon which the hypotheses were based, along with other hypotheses that have significant links. All other correlations were found to be not significant among all three sub-sectors. Furthermore, our findings suggest that real-time information sharing also enhances purchase behavior, which is also aligned with information processing theory.

5.1 Contributions and policy implications

This study contributes to the existing literature in the following ways. First, it tested the differences in the adoption and possible benefits of real-time information sharing in three sub-sectors: i) wholesale & retail; ii) food & beverage; and iii) accommodation, which together contribute 33.1% to the overall service industry in Malaysia. The differences in these sub-sectors had not previously been analyzed; therefore, this study's findings add to the body of knowledge on the adoption of technology in service sub-sectors from the perspective of mid-level managers. This study also shows the businesses' behaviors in relation to real-time information sharing and customer facilitation. Second, the results show how real-time information sharing can be effectively used to benefit businesses in relation to the principles of information processing theory, which proposes that data sharing could provide a competitive advantage. Third, although, in the milieu of information processing theory, all three sub-sectors are willing to invest in real-time information sharing technology, the perceived benefits vary according to the operations and environment of each specific sub-sector. Therefore, investment in information technology varies from business to business and, ultimately, provides weight on the efficiency on the operations. The theoretical framework employed also provides insights into the adoption of technology and the potential benefits arising from it. Additionally, mid-level managers, who are a critical resource for businesses, shared their opinion on the adoption of SaaS in business operations (Prahalad and Hamel, 2006). Customer orientation is a consequence of real-time information sharing and an antecedent of purchase behavior and repurchase behavior. Therefore, information sharing should be related to the specific aspects of business that could enhance the frequency of purchase and repurchase transactions.

The three sub-sectors examined in this study are involved in physical infrastructure services, which provide room for improvisation through involvement in service innovation (e.g., Busom and Vélez-Ospina, 2017) and in the use of modern technologies for real-time

information sharing in order to gain actionable insights into specific sectors or operations (Cruz-Cárdenas et al., 2019; Jabbar et al., 2019; Stephany et al., 2020). The adoption of technology aimed at sharing real-time information with customers is therefore considered a strategic tool (Meadows and Dibb, 2012; Jabbar et al., 2019). The results show that mid-managers perceived the real-time information sharing in the accommodation sub-sector to be more weakly associated with customer purchase than in the other two sub-sectors. A possible reason for this is that customers spend more time in close proximity of the service, and experience more of the attributes of the accommodation sub-sector—i.e., hotel personnel behavior, room management, maintenance and utilities, food & beverage service, cleaning and laundry, security, quality environmental management controls, information and telecommunication technologies, computer equipment, and kitchens. Hence, in the accommodation sub-sector, businesses need to manage all experience attributes and try their best to meet the expectations related to each to ensure that customers stay for a specified time. Therefore, should any of the experience attributes fail to fulfill expectations, which vary from customer to customer, the ratings of the real-time information sharing app would deteriorate. Conversely, the wholesale & retail and food & beverage sub-sectors involve less customer time and present fewer experience attributes. The other possible reason for this difference is that the wholesale & retail sub-sector is more cloud-adaptive (Haug et al., 2016; Ramanathan et al., 2017). Furthermore, Castellacci (2008) characterized the food & beverage sub-sector as involving more technological content than the accommodation one. Therefore, the wholesale & retail and food & beverage sub-sectors are primary recipients of advanced knowledge and can implement SaaS to share their current information and enhance their customers' purchase behavior and repurchase behavior. In particular, in crises like Covid-19, real-time information sharing could be very useful and effective in making timely decisions (Stephany et al., 2020). This study also demonstrated that, in the wholesale & retail and food & beverages sub-sectors, real-time information sharing provides an impression about a service provider's authenticity, which motivates customers to use it again.

Finally, policy makers should focus closely on the specific sub-sectors that implement technology to achieve industry 4.0 goals. This adoption of technology would be a step in the right direction to facilitate the availability of relevant data for private organizations. As shown

in this study, due to their business mission, types, or operational complexities, not all businesses that belong to specific sub-sectors can adopt new technologies. The Malaysian government encourages businesses to share any special needs they have that could be met by technology, or to suggest any technology that may enhance efficiency or solve specific issues. Real-time information sharing with customers is also aligned with the Malaysian consumer protection act 1999 provision for information aimed at facilitating customers. To avoid being inundated by data and their related complexities, companies and managers should establish specific departments for their business intelligence and real-time information sharing. This will allow their organizations to truly reap the benefits of big data technologies and related insights in regard to enabling effective decision making linked to consumer behavior.

5.2 Limitations and future research

The findings presented in this paper represent an initial effort toward understanding the pathway taken by the service sector to achieve industry 4.0 goals. Despite its important quantitative and practical contributions, this study has several limitations that provide opportunities for future research. First, it only focused on three sub-sectors. Future research could therefore incorporate other service sectors to produce more detailed and insightful results. Second, the respondents were all mid-level managers. Future studies could therefore explore a similar model for upper management level personnel (CEOs/directors) to produce a broader perspective and viewpoint that may be incorporated at the operational level. Third, future studies could aim at identifying the type of information customers want to receive from businesses, which can trigger their purchase and repurchase decisions. This could provide deeper and more concise information about possible business operation content sharing. Finally, the characteristic(s) of the respondents—i.e., age/regional groups—could be explored to provide different perspectives on the adoption of technology in businesses and related policy making.

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Appendix A:

Key studies linked with the developed Framework

Paper detail	Theory	Constructs/ topics	Population	Industry	Techniques	Findings
Ghouri and Mani (2019)	Relational view theory and theory of information sharing	Real-time information sharing; customer orientation; overall purchase behavior	Mid-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 Internet of Things 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 the use of a product; perceived risk in the use of a product	This study was helped by manufacturing companies personnel to finalize the proposed framework	-	Review paper	Timely customer support is a value that facilitates services, in that it helps 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; technology trusting intention; usage continuance intention	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 collaboration systems, and dashboard systems.
Kim and Ko (2012)	-	Perceived activities; value equity; relationship equity; brand equity; customer	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.

		equity; purchase intention				
Allon and Bassamboo (2011)	-	Retailer behavior; customer behavior	Retailers	Retail-industry	Theorem	Information received by customers does not always work. It needs specific situations/conditions/offerings to remain effective.
Jansen, Sobel, and Cook (2011)	human information processing	Being connected; being engaged	Millennials	Social media users	Descriptive and cluster analysis	The youth demographic has complex ecommerce information behaviors that call for nuanced approaches in advertising, marketing, or other areas of information targeting, and 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 communicate with firms, the personalization of the seller's message is 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 their 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

Real-time Information Sharing (RTIS)

We perceive the benefits of downstream real-time information sharing.

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 customer needs.

Our business objectives are driven by customer satisfaction.

We closely focus on after-sales service.

Purchase Behavior (PB)

The likelihood of customers purchasing our product(s) is:

The probability that customers will consider buying our product(s) is:

Repurchase Behavior (RB)

Customers like to continue purchasing our product(s).

It is likely that customers will continue to purchase our product(s) in the future.

Customers intend to continue purchasing our products in the future.
