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Technology readiness of B2B firms and AI-based customer relationship management capability for enhancing social sustainability performance

Muhammad Sabbir Rahman [a], Surajit Bag [b], Shivam Gupta [c], Uthayasankar Sivarajah [d,*]

[a] School of Business and Economics, Department of Marketing and International Business, North South University, Bashundhara, Dhaka 1229, Bangladesh
[b] Institute of Management Technology, Ghaziabad, Raj Nagar, Ghaziabad, Uttar Pradesh 201001, India
[c] Department of Information Systems, Supply Chain Management & Decision Support, NEOMA Business School, 59 Rue Pierre Taittinger, 51100 Reims, France
[d] School of Management, University of Bradford, Richmond Road, Bradford BD7 1DP, United Kingdom

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ABSTRACT

This study contributes to the extant literature by empirically investigating the influence of Business-to-Business (B2B) firms' technology readiness on information technology capability and artificial intelligence-based customer relationship management (AI-CRM) and finally, on relationship performance and social sustainability performance. We leverage primary data from 217 samples and examine the firm's social sustainability performance. Drawing on the paradigm of dynamic capability view, we found that a B2B firm's technology readiness has a positive relationship with information and communication technology and AI-CRM capability. Information and communication technology capability also has a positive and significant relationship with AI-CRM capability. B2B firms' relationship performance has a significant and positive relationship with social sustainability performance. A key finding of this study is that a B2B firm's information and communication technology capability mediates between technology readiness and AI-CRM capability. Additionally, industry dynamism also moderates the link between information and communication technology capability and AI-CRM capability.

1. Introduction

In this fourth industrial revolution era, data is the key to achieving success, and these data are generally large data sets mostly gathered in unstructured form (Dubey et al., 2020). Businesses have made significant progress in the last decade with the introduction of the fourth industrial revolution (I4.0) (Telukdarie et al., 2018). I4.0 technologies improve information sharing and supply chain visibility (Gunasekaran et al., 2017). Advanced information and communication technologies have taken business-to-business (B2B) firms to the next level with embedded big data analytics and artificial intelligence (AI) capability (Gupta et al., 2020; Bag et al., 2021a; Bag et al., 2021b; Bag and Rahman, 2021; Chung et al., 2021). The exploration of Chatterjee et al. (2021d) demonstrates that artificial intelligence-supported customer relationship management (AI-CRM) systems can be of paramount significance for B2B firms in this fourth industrial revolution era to remain sustainable in their respective industry. Implementation of AI-CRM also requires a combination of various resources and firm capabilities, and this can be achieved through collaboration and cooperation (Teece et al., 1997). According to Lee (2004), firms must adapt to technological changes or they will not survive in long run. Therefore, industrial firms must check their technological readiness for fourth industrial revolution technologies (Samaranayake et al., 2017). Technology readiness requires the input of several key resources to further develop information and communication technology capability (ICT) (Gupta & George, 2016).

Moreover, in this fast-changing world, customer preferences and tastes evolve rapidly, which creates huge difficulties for firms. Changing customer behavior leads to quickly outdated products and services, which requires changing the operating process and introducing innovative products and services to satisfy customers (Dubey et al., 2020). Therefore, firms need to build technological capability to develop AI-CRM capability for adapting to this changing business environment.

Meanwhile, customer relationship management (CRM) integrates and examines client data produced from the formal and casual relationships among partners in the network, including service providers and clients (Zablah et al., 2004; Bag et al., 2021c). Firms' AI-driven customer relationship management (CRM) capability is a vital aspect

* Corresponding author.
E-mail addresses: rahman.sabbir@northsouth.edu (M.S. Rahman), surajit.bag@gmail.com (S. Bag), shivam.gupta@neoma-bs.fr (S. Gupta), u.sivarajah@bradford.ac.uk (U. Sivarajah).

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of competitiveness that enables firms to understand their customers' changing preferences and optimize their relationship performance (Herman et al., 2021; Saura et al., 2021) due to the successful effects of adopting the traditional approach of CRM in the B2B context (Fotiadis & Vassiliadis, 2017). In recent times, firms have shown considerable interest in applying AI-CRM tools with built-in predictive analytics and machine learning, such as account-based marketing (ABM) platforms like Demandbase, Terminus, HubSpot, Salesforce Einstein, Hootsuite, etc. to enhance their relationship performance (Dooley, 2020; Dixit, 2022). Indeed, the outcome of relationship performance results in sustainable social performance (Edwin Cheng et al., 2021; Vesal et al., 2021). Stakeholders will notice a company's sustainable social performance once they understand how it releases its production processes, manufactures safe and environmentally friendly products, uses resources, and takes sustainable steps for the betterment of society (Zadek, 2004; Tate et al., 2010; Mani et al., 2018).

Additionally, implementing intelligent digital systems is an essential driver of the B2B manufacturers and services enterprise. This environment of digitalization has given a new shape to the Internet of Things (IoT) that allows firms and their respective communities to understand and perform effectively real-world activities (Mora Cortez & Johnston, 2017). For example: by using data streaming on the Internet, B2B firms can improve the control of information flows and develop accurate interpretation, manage waste, monitoring cost, loss, and profit (Johnston, 2014). In the current literature gaps in the scholastic works still exist about the digitalization of B2B business firms. There is a lack of empirical evidence related to the effect of technology readiness on ICT capability and AI-CRM to understand the relationship performance for achieving social sustainability performance (Mora Cortez & Johnston, 2017; Foltean et al., 2019; Möller et al., 2020; Ledro et al., 2022). Thus, there is a lack of research in the B2B context to understand and validate the impact of B2B firms' capability in terms of technology readiness, ICT, and AI-CRM on relationship performance to achieve social sustainable performance and this study is unique in integrating these dimensions into the framework of the existing social sustainable performance literature. Therefore, it is very important that firms develop AI-CRM capabilities to effectively engage customers in this fourth industrial revolution era. The most interesting part of the AI-CRM application is that it can be effectively used to develop CRM strategies for different segments (Chatterjee et al., 2021d). Although the studies by Chatterjee et al. (2021d), Singh and Santos (2022), Itani et al. (2022), and Peruchi et al. (2022) contribute significantly to the AI-CRM literature, they do not cover social sustainability performance. In this digital age, every firm is trying to adapt to technological changes and strengthen its CRM capability by investing in advanced ICT technologies for greater visibility in the market (Vesal et al., 2021). AI-CRM systems generate information that gives customers a perception of buyer firms' social sustainability. This information can be immensely helpful in creating social sustainability programs that can enhance the social sustainability of partner organizations in the supply chain network (Sroufe & Gopalakrishna-Remani, 2019). However, this area is under-researched and requires further examination.

The importance of data-driven CRM systems is on the rise. Although the literature has indicated the antecedents for AI-CRM, studies examining the capabilities required for building AI-CRM capability in theory-driven, large-scale, quantitative, and empirical studies are relatively scarce, and to fill the gap we aim to answer the questions below:

RQ1. What are the effects of B2B firms' technology readiness, ICT capability, and AI-CRM capability on social sustainability performance?
RQ2. What is the effect of industry dynamism on the path of joining ICT capability and AI-CRM capability?

The current study is important as it examines a very important area (i.e., CRM) in the domain of B2B marketing management. B2B businesses include industrial buying and selling. It is very important that every B2B firm understands its industrial clients' needs and identifies any uncertainty in order to develop technology readiness to build AI-CRM capability that in turn could enhance relationship performance and finally social sustainability performance.

Based on the empirical analysis of primary data collected from 217 managers of different B2B firms in South Africa, the present study contributes to the existing customer relationship management and social sustainability literature in the B2B context. The study identifies the important mediating mechanisms (firms' information communication technology capability) that optimize firms' dynamic capabilities, such as AI-driven customer relationship management, through which relationship performance drives socially sustainable performance. This study also provides the moderating effect of industry dynamism in order to understand the effect of ICT capability on AI-driven customer relationship management. The hypotheses are drawn based on dynamic capability view and presented in Section 2. This study uses data from B2B industrial firms in South Africa. The methodology is presented in Section 3 and then the proposed hypotheses are tested using covariance-based structural equation modeling in Section 4. The discussion is provided in Section 5. Limitations and future research is presented in Section 6. Conclusions are drawn from the empirical study in the final section.

2. Theoretical underpinnings

2.1. Dynamic capability view (DCV)

The resource-based view (RBV) (Barney, 2001) posits that a firm's ability to control resources and competencies that are valued, uncommon, imperfectly imitable, and non-substitutable gives it a persistent competitive edge. Dynamic capability view (DCV) is an offshoot of RBV.

DCV is a popular theory and widely used in management research to explain capability building in this dynamic business environment (Wilson & Daniel, 2007; Wang et al., 2007; Ahmad Zaidi & Othman, 2014; Bag & Rahman, 2021). Dynamic capabilities (DC) emerged from the school of strategic management literature and it analyzes the competitive advantage of firms working in environments where technology evolves rapidly (Teece et al., 1997; Teece, 2007; Chowdhury & Quaddus, 2017). Firms avail themselves of dynamic capabilities by continuously building, adapting, and reconfiguring internal and external competencies by applying advanced technology to connect with their customers and fostering relationship performance to achieve sustainable performance (Teece et al., 1997; Zhu & Kraemer, 2002). Dynamic capabilities help firms to develop sensing, seizing, and reconfiguring capacities to adapt them without difficulty to the changing business environments (Teece, 2007). DCV suggests that the business environment is dynamic. Firms, therefore, acquire and deploy resources to respond to market variance over time (Eisenhardt & Martin 2000; Makadok 2001). Capabilities are also dynamic, as they can assist firms to implement competitive strategies by considering the fact of changing market conditions by combining and transforming available resources in a novel and alternative way (Morgan et al., 2009; Eriksson, 2014).

2.2. Model building

Prior studies have suggested that firms need to spend substantial resources on information communication technology to support AI-CRM systems to achieve marketing capabilities by deploying CRM tools to improve relationship performance (Wang & Kim, 2017). Thus, building on this logic, we argue that the technology readiness of B2B firms will help build AI-CRM capability while ICT capability plays a mediating role. For this, technology readiness and ICT are lower-order capabilities that lead to the development of a higher-order capability i.e., AI-CRM capability. Since firms operate in a highly volatile environment, we have used industry dynamism as a contextual factor and operationalized it as a moderation variable between ICT and AI-CRM capability.

Secondly, AI-CRM helps B2B firms sense opportunities and threats seize new prospects related to the market, and further address customers through newer products/services, finally helping them to reconfigure their business to adapt to technological changes (Morgan & Slotegraaf, 2012; O'cass & Ngo, 2012; Wali et al., 2016). AI-CRM helps improve relationship performance and enhances social sustainability performance (Prior & Keränen, 2020; Ronaghi & Mosakhani, 2022). The theoretical model is presented in Fig. 1. The theoretical model is grounded in DCV since AI-CRM is conceptualized as a DC since it is rooted in changing routines, for instance, showing creativity in technology readiness and working toward developing ICT capability. In these dynamic business situations, success will depend on how quickly and effectively a firm can realign its unique resources and competencies to take advantage of opportunities and meet market demands.

2.3. Hypotheses development

2.3.1. Technology readiness and information and communication technology capability (ICT)

There is an extensive literature gap between developed and developing countries in terms of B2B firms' technology readiness (Saif et al., 2022). Lee (2001) suggested that more focus is required on building ICT capability since ICT capability gears firms to adapt to changing business environments and gain a competitive advantage (Napitupulu et al., 2018). ICT capability involves developing abilities to create and use new applications. This requires complete knowledge of the business, product, and services related to the firm and its partner firms' processes to develop ICT infrastructure to run their new applications (Vize et al., 2013). Regular training and continuing education on digital technologies provide the desired results in terms of productivity improvement. B2B firms need to invest money in advanced ICT training and in building the technological infrastructure for the effective application of new technologies like AI-CRM (Chatterjee et al., 2020; Chatterjee et al., 2021d). Hence, resources must be well facilitated and decision-makers must carefully monitor this, learn the natural elements and reconfigure and change their assets in the right manner to develop competencies (Sunday & Vera, 2018). Therefore, we hypothesize:

H1: Technology readiness of B2B firms has a positive relationship with ICT capability.

2.3.2. Technology readiness of B2B firms and AI-CRM capability

The technology readiness of firms is important to embrace emerging Industry 4.0 (I4.0) technologies (Telukdarie et al., 2018). Chatterjee et al. (2019) mentioned that data and AI are two key requirements for enabling digital CRM actions in the firm. Examples of such smart systems include "dynamics 365 for customer insights". This system is capable of performing predictive analytics on customer data sets. Some more examples of companies offering AI-CRM tools as cited by Chatterjee et al. (2019) are Zoho, SugarCRM, and Salesforce. Chatterjee et al. (2019) further mentioned that firms face infrastructure-related challenges while adopting AI-CRM tools and these challenges can be overcome with a readiness strategy and effective training. Chatterjee et al. (2021b) also claimed that "design and development of the AI-CRM-KM tool", "support of the immediate manager", "adequate training and readiness", "business value addition", "adequate security mechanism", "developing a privacy policy for the AI-CRM-KM", "simplicity of the new AI-CRM-KM system", "supporting legal requirements" and "ease of use" are nine key factors that are essential for the adoption of an AI-integrated CRM-KM system. Therefore, from the evidence of the above-mentioned literature, we can see that adequate training and readiness influence an important role in AI-CRM. In line with that, we argue that the technology readiness of organizations is important for building AI-CRM capability. Therefore, we hypothesize:

H2: Technology readiness of B2B firms has a positive relationship with AI-CRM capability.

2.3.3. Information and communication technology capability and AI-CRM capability

ICT capability requires integration with several (tangible and intangible) resources to build a competitive advantage (Akter et al., 2020). In addition, firms' learning is a very important dimension that includes information gathering, securing information, information diffusion, and data-based decision-making to build new competencies. Furthermore, firms should reconfigure and further transform resources to reap the full benefits in turbulent times (Sunday & Vera, 2018). This is

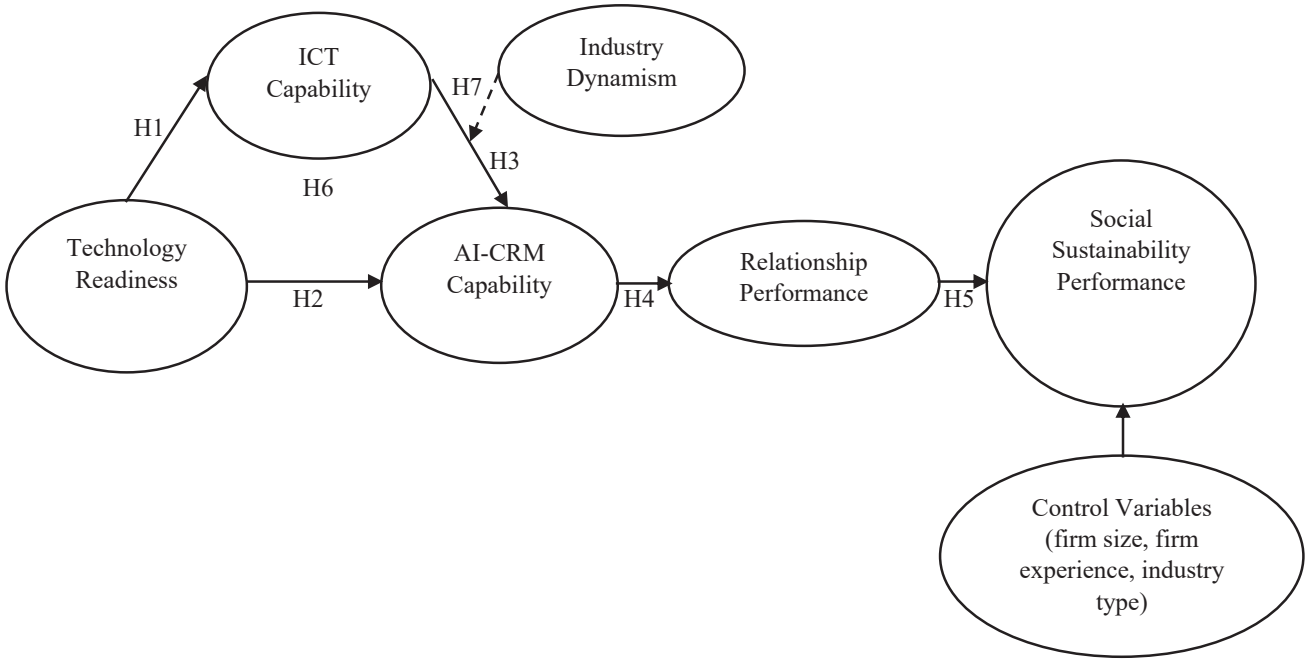

Fig. 1. Theoretical framework (Source: Authors' conceptualization using DCV).

important for building ICT, which in turn will lead to the development of AI-CRM capability (Chatterjee et al., 2021d). Therefore, IT facilities are important for smooth operations and services. Moreover, the establishment of an operative and flexible IT planning process along with industrial partners is necessary for building AI-CRM capability. In addition, it is vital that B2B firms create a climate that is supportive of their industrial partners to try out new and better ways of using ICT (Bharadwaj, 2000; Weill & Vitale, 2002; Stoel & Muhanna, 2009; Lu & Ramamurthy, 2011). Hence, we hypothesize:

H3: ICT capability has a positive relationship with AI-CRM capability.

2.3.4. AI-CRM capability and B2B firms' relationship performance

The availability of data in this I4.0 era is powering AI-based applications like CRM and providing low-cost tailor-made services for each customer segment (Chatterjee et al. (2021d)). Bag et al. (2021a) claimed that big data analytic-powered artificial intelligence systems aid firms in the creation of customer knowledge, user knowledge, and external market knowledge. Therefore, AI-CRM systems can be useful in identifying important customers, and predicting and making investments in long-term relationships. This will help to enhance the relationship performance as the B2B partners (supplier firm and buyer firm) will want to remain associated and interact regularly to explore potential business opportunities.

Chatterjee et al. (2021c) suggested that CRM quality and satisfaction have a considerable impact on employees' views and inclinations to embrace AI-enabled CRM solutions. According to Wernerfelt (1984), the resource-based view (RBV) states that when firms have resources that are not easily available, valuable, and not easy to duplicate, this leads to a greater competitive advantage and better sustainable performance. Jap (1999) further stretches the RBV framework to explain inter-firm relationships. Higher performance is achieved when the partner firms invest time, resources, and knowledge to build capabilities in the supply chain (Dyer & Singh, 1998). Firms' relationship-specific resources, knowledge-sharing practices, complementary assets and capabilities, and effective governance practices are the foundations of inter-firm competitive advantage (Dyer & Singh, 1998). Zhang et al. (2020) claimed that big data analytical intelligence has a positive relationship with mass customization capability and enhances CRM performance. In line with the paradigm of DCV, we argue that AI-CRM capability is a source of B2B inter-firm competitive advantage, as it will provide valuable information for making key B2B business decisions. However, the association between AI-CRM capability and B2B firms is under-researched, and hence, we hypothesize:

H4: AI-CRM capability has a positive relationship with B2B firms' relationship performance.

2.3.5. B2B firms' relationship performance and social sustainability performance

Social sustainability is becoming extremely important in this digital era (Bai et al., 2020). Social sustainability problems occur when firms do not treat their employees and partners fairly, allow improper labor conditions in factories, tolerate a lack of health and safety matters in the workplace, and lack corporate social responsibility, diversity, and product responsibility practices (Mani et al., 2018). The literature indicates that investment in relationships leads to better social sustainability performance (Awan et al., 2018) or improvement in a sustainable society (Bai et al., 2020). Strong business relationships among B2B firms will result in the alignment of interests and thus the alignment of sustainable development goals. This will be demonstrated by an increased focus on societal responsibility (Mani et al., 2018; Kapitan et al., 2019) such as decent working conditions and economic growth, lower inequalities, and the promotion of justice, peace, and inclusive societies (Bai et al., 2020). However, the association between B2B firms' relationship performance and social sustainability performance lacks empirical investigation. Hence, we hypothesize:

H5: B2B firms' relationship performance has a positive relationship with social sustainability performance.

2.3.6. Mediation effect of information and communication technology

According to Parasuraman (2000), technology readiness is the willingness of humans to adapt and further apply new technologies. The underlying mechanism involves some enablers and inhibitors that shape the human mind to make the decision to use the latest technology. Therefore, a positive perception of the technology brings comfort whereas a negative perception will lead to discomfort and unwillingness to use the technology (Parasuraman, 2000). Positive thinking and novelty are important drivers of technology readiness (Lin et al., 2007). Zeithaml et al. (2002) argued that technology readiness is positively related to the tendency to engage with new technology. Chatterjee et al. (2021d) claimed that AI-CRM systems are very effective in managing the relationships with customers in the network. First, AI-CRM creates a positive perception among employees and users, second, it triggers innovativeness, third, it gives comfort when using this type of system for better information management, and lastly, it offers better security, which enables technology readiness as a whole. Technology readiness is very important for adapting to technological changes in the fourth industrial revolution and we must not forget that technology readiness leads to ICT capability building, which will in turn lead to the development of AI-CRM capability. However, the mediating role of information and communication technology capability, which increases the technology readiness of B2B firms to achieve AI-CRM capability has not been thoroughly studied. Hence, we hypothesize:

H6: Technology readiness of B2B firms under the mediation effect of ICT capability is positively related to AI-CRM capability.

2.3.7. Moderating effect of industry dynamism

When an industry is highly dynamic, there is a fear of losing profits and market share, unless firms adapt to the changes and match existing resources with capabilities to explore various growth prospects (Larrañeta et al., 2014; Chung et al., 2021). Farjoun & Levin (2011) stated that researchers use industry dynamism to capture the degree, recurrence, and capriciousness of changes in the market. Strategic management literature indicates that complexity, munificence, and dynamism are the main factors that influence firms (Dess & Beard, 1984). Firms face challenges because of fluctuations in the availability of resources that are important to sustain operations, which is a question of industry dynamism. Therefore, industry dynamism is associated with the rate of variation and level of volatility and turmoil in the business surroundings (Farjoun & Levin, 2011). In order to survive in such a changing environment, modern firms develop dynamic capabilities (Teece, 2007). Previous studies have already operationalized industry dynamism as a moderating variable (e.g., Ruigrok et al., 2013; Larrañeta et al., 2014; Bag et al., 2021b). However, the moderating effect of industry dynamism on the relationship between ICT capability and AI-CRM capability has not been the focus of previous researchers. Hence, we hypothesize:

H7: Industry dynamism moderates the relationship between ICT capability and AI-CRM capability.

3. Research methods

B2B firms in South Africa are growing fast (Bughin et al., 2016; Ocloo et al., 2020). A UNCTAD (2018) report revealed that the African region is showing quality progress in multiple vital indicators related to B2B-relevant business. The adoption of new technology by firms has predominantly improved B2B firms in countries like South Africa (Evans, 2019). Bughin et al (2016) report that in South Africa, consumers are

considered above the middle class according to Organization for Economic Co-operation and Development (OECD) standards and collectively spend an additional $174 billion per year on housing, consumer goods, education, and transportation services by 2025. While South African consumer data has resulted in significant business strategy moves for many firms, the relatively fast-growing business-to-business (B2B) sector is one of the most significant spenders in this region. For instance, firms in this African region spent almost $2.6 trillion in 2015, with 40 % in Nigeria and South Africa, while B2B spending is expected to rise to $3.5 trillion by 2025, 50 % of which will be spent on materials, 16 % on capital goods and the rest on the services sector (finance, transportation, and telecommunications) (Molla & Licker, 2004; Gono et al., 2016; Rodrik, 2018; Boso et al., 2019; Oguji & Owusu, 2021). Fifty percent of large firms in Africa are based in South Africa. This study was therefore conducted in various provinces in South Africa, where researchers collected data from employees working in the manufacturing sector involving B2B business practices in that region.

3.1. Sampling and data collection process

This study used a survey questionnaire to gather data from the employees of B2B industrial goods manufacturers. The sampling framework included various industry participants to enrich the generalizability of the findings. The data collection of this research consisted of various phases. The first phase applied the scientific process to select the questionnaire items, and in the next phase, the survey questionnaire was operationalized for its final use in the field.

The first phase was covered between December 2020 and January 2021. This phase was divided into two parts. In the first part of this phase, the researchers asked five senior academicians and also five senior managers of B2B firms to express their views and suggest required adjustments regarding the measurement items related to each construct [*B2B firms' technology readiness (B2BTR), information and communication technology capability (ICT), industry dynamism (IND), relationship performance in B2B firms (RP), artificial intelligence-based customer relationship management (AICRM), social sustainability performance (SSP)*] selected from the previous literature. Based on the feedback given by the experts, the researchers adjusted the wordings in the instrument.

Furthermore, in the second stage of instrument validation, we conducted a pilot study among 45 employees from different firms operating in business markets to examine the internal consistency and validity of the measurement items. The results reflect satisfactory Cronbach's alpha (α) values for all the study constructs ranging between 0.798 and 0.863. This confirms that all the items are valid for measuring the latent constructs in the proposed questionnaire. Therefore, the researchers identified no additional concerns from the results of the pilot study.

Hence, the questionnaire was operationalized for the primary survey to collect data from B2B firms (Appendix A1). The researchers chose 650 B2B firms from the Ezee-Dex database of South African businesses using a simple random sampling technique. Once the researchers specified potential respondents, they were contacted online and the study's objectives were clearly explained to them. The researchers issued reminders via follow-up emails and requests from peers as suggested in the literature to increase the response rate (So et al., 2019). The data collection started in February 2021 and was completed by August 2021. At the end of August 2021, the researchers received only 217 completed responses, denoting a 33.38 % response rate from the targeted firms. The demographic profile of the employees of B2B firms who contributed to this survey is shown in Table 1.

Table 1
Demographic particulars (n = 217).

Demographic details	Description	Numbers	Percentage
Age Group	20–30	12	5.53 %
	31–40	54	24.88 %
	41–50	118	54.38 %
	51–60	25	11.52 %
	Above 60	8	3.69 %
Educational Qualifications	Postgraduate	117	53.92 %
	Graduate	92	42.40 %
	Diploma	8	3.69 %
Designation	CEO/President/Owner/ Managing Director	9	4.15 %
	CIO/Technology Director	8	3.69 %
	Senior VP/VP	4	1.84 %
	Head of Business Unit or Department	22	10.14 %
	Senior Manager	112	51.61 %
	Manager	34	15.67 %
	Junior Manager	2	0.92 %
	Data Analyst	10	4.61 %
	Data Scientist	14	6.45 %
	Consultant	2	0.92 %
No. of Employees in your Organization	50–300	25	11.52 %
	301–500	46	21.20 %
	501–1000	105	48.39 %
	More than 1000	41	18.89 %
Age of the Organization (Years)	Above 20	159	73.27 %
	10 to 20	58	26.73 %
	Less than 10	0	0.00 %
Nature of Business Activities	Agriculture and allied industrial products	3	1.38 %
	Automobiles and allied manufacturers	63	29.03 %
	Information technology	22	10.14 %
	Biotechnology product manufacturers	9	4.15 %
	Industrial chemical manufacturers	23	10.59 %
	Cement manufacturers	2	0.92 %
	Industrial electronics product manufacturers	29	13.36 %
	Industrial fabric manufacturers	32	14.75 %
	Metals and mining	5	2.30 %
	Steel mill	29	13.36 %
Firm Size	Small	9	4.15 %
	Medium	62	28.57 %
	Large	146	67.28 %

3.2. Procedure & measurement

A Google form-based questionnaire was prepared with a total of 36 items distributed under each relevant construct. As discussed in the conceptual framework, B2B firms' technology readiness (B2BTR) (6 items) adapted from Vize et al. (2013) and information and communication technology capability (ICT) (5 items) adapted from the research of Bharadwaj (2000), Ross et al. (1996), and Lu & Ramamurthy (2011). To measure industry dynamism (IND), the study used four items adapted from Dubey et al. (2020). Relationship performance in B2B firms (RP) consisted of five items adapted from the research of Sirdeshmukh et al. (2002), Kumar et al. (1995), Hewett & Bearden (2001), Cannon & Perreault (1999) and Lages et al. (2008). The construct of artificial intelligence-based customer relationship management (AICRM) was measured using nine items adapted from the research of Chatterjee et al. (2021d). Finally, social sustainability performance (SSP) consisted of seven items adapted from the research of Mani et al. (2018) and Kapitan et al. (2019). The study applied a 7-point Likert scale for all questions where "7" reflected "strongly agree" and "1" reflected "strongly disagree". This scale was used because it is essential to consider the number of points to be operationalized, making sure that the same number of points is applied to all measurement items to successfully analyze the data via structural equation modeling (SEM) (Nanna & Sawilowsky, 1998; Hair et al., 2010). The previous study mentioned that using a seven-point rather than a five-point (or less) scale leads to more accurate responses that are easier for the researchers to use with a good reproduction of a respondent's actual assessment of the study variables, improving respondent stimuli and resulting in lesser measurement errors (Wakita et al., 2012; Joshi et al., 2015; Awang et al.,

2016). This is also in line with several existing B2B studies, for instance by Mauldin et al. (2006), Schultz et al., (2012), Gligor et al. (2021), and Zhou et al. (2021), that have successfully utilized seven-point Likert scale.

3.3. Control variables

In the present research, we control three variables, i.e., firm size, firm experience, and industry type, which have been used in the previous studies and which may influence B2B firms' social sustainability performance (Guo et al., 2018; Vesal et al., 2021). For instance, firm size is measured as the number of permanent staff, and the firm experience was assessed by the total time period the business has operated since it first started its sales operation. In addition, an industry type was also considered as one of the control variables since we selected B2B firms involved in different business activities. The outcomes show that no control variables significantly influenced B2B firms' social sustainability performance.

3.4. Test of method bias and endogeneity

The study minimizes the common method bias effect in the data by collecting data from multiple respondents (e.g., Podsakoff et al., 2003; Foss et al., 2013; Bag et al., 2022). This study adopted preventive measures by randomly distributing the items in the survey questions, which makes it difficult to easily understand the guided causal relationship, and by reassuring respondents of their anonymity so that they could answer the questions confidently without the fear of being identified. Contributors were told that no response to the survey questions is essentially correct or incorrect (Podsakoff et al., 2003). However, to further control for the common method bias effect, respondents were informed about the confidentiality of their responses and that the results would be used for research and academic publication purposes only (Slotegraaf & Atuahene-Gima, 2011).

In addition, to further validate the common method bias effect on the collected data set, this study also applied a statistical test through the operationalization of the marker variable (MV) as recommended by Lindell & Whitney (2001) and Podsakoff et al. (2003). In this analysis, we adopted an MV of the industry type, which is considered to be conceptually not connected to at least one of the variables in the model (e.g., B2B firm's technology readiness). The results of the data analysis suggest that there is no significant difference between the base model [χ^2 (429) = 616.86 and the alternative model χ^2 (412) = 590.16, chi-square difference: χ^2 (26) = 21.26, *n.s.*). Therefore, we can confirm that the addition of this MV does not change the significance levels of the study variables and CMB is unlikely to distort the hypothesized relationships in the proposed conceptual model.

The study tested the potential threat of non-response bias by comparing respondents and non-respondents in terms of firm size, experience, and industry type. The results from the *t*-test revealed that no statistical difference existed between the demographic details of respondents and non-respondents. In addition, the statistical results also revealed that there was no significant variance between early (147) and late responses (70) across the B2B firms, proving that non-response bias was not a concern in this work (Mentzer & Flint, 1997).

The study also examined the potential endogeneity issue (Damali et al., 2016). For instance, endogeneity may be a problem because of the reverse causality between the independent variables (IV) and the dependent variable (DV), which means that DV causes IV (Antonakis *et al.,* 2014). The study develops hypotheses and a conceptual framework based on DCV, which does not support the condition of reverse causality – that B2B firms' social sustainability performance (SSP) causes change/predicts B2B firms' technology readiness (B2BTR), information and communication technology capability (ICT), industry dynamism (IND), artificial intelligence-based customer relationship management (AICRM), and relationship performance in B2B firms (RP).

In addition, numerous authors such as Antonakis et al. (2014) and Guide & Ketokivi (2015) also agree that CMB could result in endogeneity issues. Therefore, this study applied the various tests discussed in the previous section to assess CMB in our data set. We reached the conclusion that there was no CMB issue in our data set. As the study used cross-sectional data, it reduced the chance of causality. Each item under the study variables was adapted from the literature (Damali *et al.,* 2016). Finally, the study also applied the strategy of considering control variables as recommended by Antonakis et al. (2014) to avoid potential endogeneity problems.

3.5. Data analysis method

The study performed descriptive statistics using SPSS 22.0 to identify missing data and relevant outliers and to check normality. Descriptive statistics were also performed to understand the frequency, percentage, and relevant average values of the respondents' demographic data. Therefore, to assess the measurement model and examine the respective psychometric properties of the scale, the study applied confirmatory factor analysis (CFA) by using AMOS 20. In this data analysis phase, the researchers examined the measurement model goodness-of-fit measures via absolute fit measures, incremental fit measures, parsimonious fit measures, and comparative fit index (Reuterberg & Gustafsson, 1992; Hurley et al., 1997; Hoyle, 2000; Gatignon, 2010). Then, the study applied structural equation modeling (SEM) to test whether the B2B firms' technology readiness (B2BTR), information and communication technology capability (ICT), artificial intelligence-based customer relationship management (AICRM), and relationship performance in B2B firms (RP) to predict social sustainability performance (SSP), through which the nomological validity and proposed relationship were also examined (Luo, 2002; Gallagher et al., 2008; Hair et al., 2014).

The researchers applied Hayes' PROCESS macro-Model 4, recommended by Hayes (2013) to test the mediating effect of information and communication technology capability (ICT) in the relationship between B2B firms' technology readiness (B2BTR) and artificial intelligence-based customer relationship management (AICRM). Finally, whether this indirect path (i.e., B2BTR → ICT → AICRM) is conditional upon B2B firms' industry dynamism (IND) was tested through PROCESS Model 14 as suggested by Hayes (2017) and Hayes & Rockwood (2017).

4. Data analysis

4.1. Measurement model validation

We conducted confirmatory factor analysis (CFA) to assess the measurement model along with psychometric competence among the study constructs (i.e., B2B firms' technology readiness-B2BTR, information and communication technology capability-ICT, relationship performance in B2B firms-RP, B2B firms' industry dynamism-IND, artificial intelligence-based customer relationship management-AICRM and social sustainability performance-SSP). The results from the CFA analysis also show that all the fit measures (absolute fit, incremental fit, parsimonious fit, and the comparative fit index) were found satisfactory (see Table 2). For instance, the study examined absolute fit measures by examining the values of GFI (goodness-of-fit index), AGFI-adjusted GFI, RMSEA (root mean square error of approximation), and RMSR (root mean square residual). The results of indicators such as GFI and AGFI values are greater than 0.90. Hence, the values of RMSEA and RMSR are also satisfactory (<0.051) and confirm the absolute fit of the measurement model.

In addition, the corresponding values of the relative fit index (RFI) (0.924), the comparative fit index (CFI) (0.957), the Tucker-Lewis index (TLI) (0.948), and the normed fit index (NFI) (0.928) are above the thresholds and meet the incremental fit of the measurement model (see Table 2). The study applied two fit indices, i.e., the parsimony goodness-of-fit index (PGFI) and the parsimonious normed fit index (PNFI) to

Table 2
Goodness-of-fit measures for CFA analysis.

Name of Fit Measures	Assessment Criteria	Minimum threshold Value Applied	Values obtained	Remarks
Absolute Fit	CMIN/DF	≤ 5	2.276	**Meet threshold level** (CMIN/DF: Marsh & Hocevar, 1985; Roh et al., 2005) (GFI, AGFI, RMSR: MacCallum & Hong, 1997; Tabachnick & Fidell, 1996; Doloi et al., 2012) (RMSEA: McQuitty & Wolf, 2013)
	GFI	≥ 0.90	0.937	
	AGFI	≥ 0.90	0.915	
	RMSR	≤ 0.08	0.051	
	RMSEA	≤ 0.08	0.051	
Incremental Fit	RFI	≥ 0.90	0.924	**Meet threshold level** (RFI, TLI, NFI, CFI: Tabachnick & Fidell, 1996; Doloi et al., 2012; Anglim & Grant, 2014)
	TLI	≥ 0.90	0.948	
	NFI	≥ 0.90	0.928	
	CFI	≥ 0.90	0.957	
Parsimonious Fit	PGFI	≥ 0.70	0.728	**Meet threshold level** (PGFI, PNFI, PCFI: Marsh & Hau, 1996; Singh, 2009; Teo et al., 2013)
	PNFI	≥ 0.70	0.739	
	PCFI	≥ 0.70	0.758	

Notes: Goodness-of-Fit Index –GFI, Adjusted Goodness-of-Fit Index –AGFI, Root Mean Square Residual-RMSR, Root Mean Square Error of Approximation –RMSEA, Relative Fit Index –RFI, Tucker-Lewis Index-TLI, Normed Fit Index –NFI, Comparative Fit Index –CFI, Parsimonious Goodness of Fit Index –PGFI, Parsimonious Normed Fit Index –PNFI, Parsimonious Comparative Fit Index –PCFI.

justify parsimonious fit measures and overcome the likely problems related to absolute and incremental measures. All of these indices are above 0.50 and considered satisfactory (see Table 2).

The reliability score of the individual scales and the respective factor loadings of the six constructs are shown in Table 3. The resulting CFA model demonstrates an excellent fit for the data with adequate factor loadings under each item. Specifically, all the factor loadings are also statistically significant and above 0.60 on intended constructs and all the values of Cronbach's alphas (α) exceed the minimum criteria (≥0.80). The outcomes reflecting unidimensionality have been established in this measurement model.

Moreover, the study also examined the goodness-of-fit measures of the measurement model by following the recommendation of Fornell & Larcker (1981) (see Table 3). Based on Fornell & Larcker's (1981) validity determination criteria, the data confirm convergent validity, as all the corresponding values of composite reliability for the construct exceeded 0.70, and the average variance extracted was greater than 0.50. In order to establish discriminant validity, the values of AVE (average variance extracted), MSV (maximum shared variance), and ASV (average squared shared variance) were compared. The results from the data revealed that the values of AVE > MSV, AVE > ASV, and all the values of AVE of latent constructs are higher than the squared correlations between the latent variable and all other variables. Above all, the results from the CFA analysis confirm that all the measures and the measurement model are valid and reliable for further analysis.

4.2. Structural model analysis

The study applied structural equation modeling (SEM) to test the proposed conceptual model of the study (see Fig. 1). Before testing the structural relationship among the variables, the study assesses the goodness-of-fit measures of the structural model. The results of the main effects model indicate an excellent fit of the data, which are above the threshold levels prescribed in past research [$\chi^2 = 319.88$, df = 279, χ^2/df = 1.146, $p < 0.01$; GFI = 0.942, AGFI = 0.917, CFI = 0.959; TLI = 0.949; SRMR = 0.051; and RMSEA = 0.051) (MacCallum *et al.,* 1997; McQuitty, 1997; Hu & Bentler, 1999).

The results from standardized estimates were operationalized for the path analysis with the maximum likelihood discrepancy estimation method by using AMOS 20.0 (Arbuckle, 2011; Paradis et al., 2013) (see Fig. 2 & Table 4). All the respective paths for the factor loadings were significant at $p < 0.001$. This means the results supported all the items that contribute to explaining their assigned factors (i.e., B2B firms' technology readiness, information and communication technology capability, relationship performance in B2B firms, B2B firms' industry dynamism, artificial intelligence-based customer relationship management, and social sustainability performance).

The full structural model achieved satisfactory level of explanatory power, as shown in Fig. 2. As stated by Cohen (1992) and R^2 above 0.26 or 26 % indicates a satisfactory effect. In this case, the paths explored whether B2BTR had a positive and significant relationship to ICT (R^2 = 0.282, β = 0.309). The paths also explored whether B2BTR and ICT had a positive and significant relationship with AICRM (R^2 = 0.263, β = 0.427, β = 0.273). The latent variable AICRM was around 33.28 %, indicating that the AICRM was explained by the influencer variable of 33.28 % while the remaining 63.72 % was explained by other relevant factors. In this case, the paths explored whether AICRM had a positive and significant relationship to RP (R^2 = 0.332, β = 0.389). Meanwhile, the SSP construct had an R^2 of around 53.29 %, indicating that the variables of influencers and RP could affect the SSP by around 53.29 %. On the other hand, the rest was explained by other factors not included in the research model. Hence, the relationship between RP and SSP is significant and positive (R^2 = 0.532, β = 0.469). The results from Table 4 present the standardized regression weights estimated in the SEM model, while Fig. 2 depicts the standardized results. The results support all the direct hypotheses (H1, H2, H3, H4, and H5).

4.3. Test of mediation

The study applied Model 4 as recommended by Hayes' (2013) PROCESS macro to examine the direct and mediation effect of ICT between B2BTR and AICRM, which is a computational tool that simplifies the test of mediation of observed variables with a regression path analysis tool using ordinary least squares. The results of the relationship between B2BTR, ICT capability, and AICRM show that B2B firms' technology readiness (B2BTR) is likely to influence information and communication technology capability (ICT capability) and engage in B2B firms' artificial intelligence-based customer relationship management (AICRM). The results showed that B2BTR had a positive influence on ICT capability and AICRM, controlling for firm size, firm experience, and industry type. B2B firms' ICT capability also had a direct effect on AICRM (refer to Table 5), after controlling for firm size, firm experience, and industry type.

Furthermore, mediation analysis was also conducted by applying the bootstrapping method, indicating that the effect of firms' B2BTR on AICRM is mediated by ICT capability. As presented in Table 6, the 95 % confidence interval of the indirect effect of B2BTR on AICRM through ICT capability ranged from 0.053 to 0.319, with a coefficient of the indirect effect of 0.186, SE = 0.029. H6 was therefore supported.

Table 3
Assessment of the measurement model.

CN	Mean	SD	L	α	CR	AVE	MSV	ASV	B2BTR	ICT	RP	IND	AICRM	SSP
B2BTR	4.49	1.005		0.874	0.887	0.571	0.228	0.196	**0.755**					
B2BTR1			0.701											
B2BTR2			0.629											
B2BTR3			0.852											
B2BTR4			0.756											
B2BTR5			0.734											
B2BTR6			0.839											
ICT	4.58	1.189		0.862	0.878	0.592	0.376	0.275	0.339	**0.769**				
ICT1			0.696											
ICT2			0.752											
ICT3			0.827											
ICT4			0.780											
ICT5			0.786											
IND	4.53	1.086		0.897	0.905	0.704	0.229	0.183	0.426	0.387	**0.839**			
IND1			0.832											
IND2			0.853											
IND3			0.869											
IND4			0.802											
RP	4.59	1.043		0.862	0.879	0.594	0.287	0.193	0.403	0.406	0.429	**0.770**		
RP1			0.708											
RP2			0.847											
RP3			0.725											
RP4			0.804											
RP5			0.762											
AICRM	4.63	1.039		0.898	0.914	0.514	0.337	0.271	0.473	0.379	0.406	0.392	**0.716**	
AICRM1			0.682											
AICRM2			0.652											
AICRM3			0.625											
AICRM4			0.803											
AICRM5			0.816											
AICRM6			0.702											
AICRM7			0.742											
AICRM8			0.691											
AICRM9			0.717											
SSP	4.79	0.873		0.875	0.886	0.528	0.376	0.259	0.425	0.362	0.432	0.406	0.401	**0.726**
SSP1			0.651											
SSP2			0.754											
SSP3			0.717											
SSP4			0.747											
SSP5			0.662											
SSP6			0.726											
SSP7			0.818											

Notes: **CN:** Construct's Name, **SD:** Standard Deviation, **L:** Loadings, **α:** Cronbach's Alpha, **CR:** Composite Reliability, **AVE:** Average Variance Extracted, **MSV:** Maximum Shared Variance, **ASV:** Average Squared Shared Variance, B2B firm's technology readiness (B2BTR), information and communication technology capability (ICT), relationship performance in B2B firms (RP), B2B firm's industry dynamism (IND), artificial intelligence-based customer relationship management (AICRM), social sustainability performance (SSP).

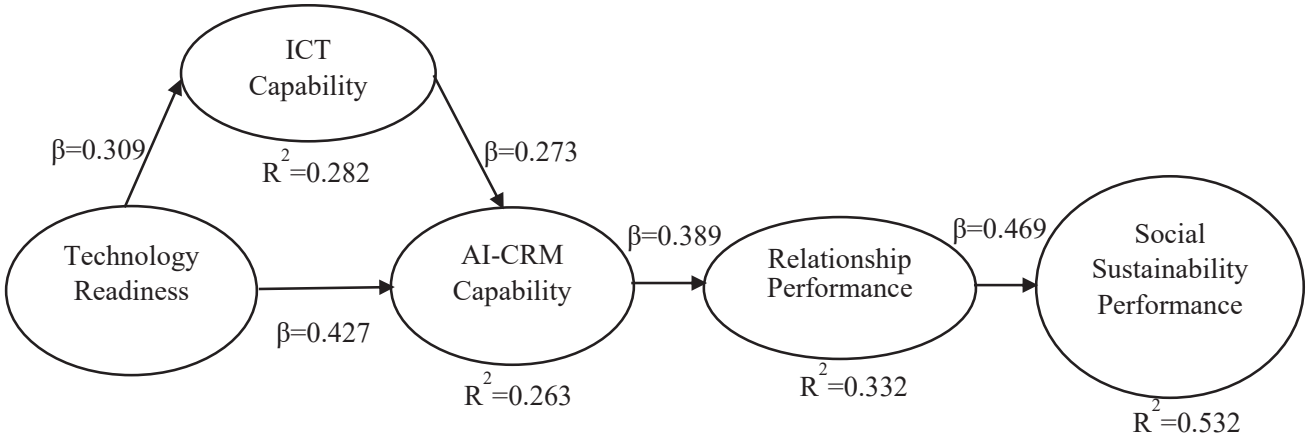

Fig. 2. Structural model (SEM output).

4.4. Test of moderated mediation

The study applied Model 14 of Hayes' (2013) Process macro to examine the moderated IND meditation in the relationship between ICT capability and AICRM. The condition of moderated mediation is attained when the conditional indirect effect of firms' B2BTR on AICRM

Table 4
Standardized regression weights.

Hypotheses	Path	Estimate	P
H1	B2BTR → ICT	0.309	***
H2	B2BTR → AICRM	0.427	***
H3	ICT → AICRM	0.273	***
H4	AICRM → RP	0.389	***
H5	RP → SSP	0.469	***

Notes: *** = 0.01 or less.
Notes: B2B firm's technology readiness (B2BTR), information and communication technology capability (ICT), relationship performance in B2B firms (RP), artificial intelligence-based customer relationship management (AICRM), social sustainability performance (SSP).

Table 5
Test of mediation.

Construct's Relationship	Estimate (β)	CR (t)	SE
B2BTR → AICRM	0.427*	8.211	0.052
Mediation relationship model 1: **B2BTR → ICT → AICRM**	0.203*	5.205	0.039
B2BTR → AICRM**	0.397*	4.563	0.087
B2BTR → ICT	0.254*	4.703	0.054
ICT → AICRM			

Note(s): *Significant at 0.05 level; B2B firm's technology readiness (B2BTR), information and communication technology capability (ICT), Artificial intelligence-based customer relationship management (AICRM), CR: Critical Ratios; and SE: Standard Error; **indicates a direct effect of the independent variable (B2BTR) on the dependent variable (AICRM) in presence of mediating variable (ICT).

Table 6
Estimate of the indirect effect.

Construct's Relationship	Estimate (β indirect)	t(SE)	LP	UP	Sig
B2BTR → ICT → AICRM	0.186	6.413 (0.029)	0.053	0.319	0.000

Note(s): t: *t*-value; SE: Standard Error (in parentheses); LP: Lower Percentile; UP: Upper Percentile; and Sig: Significance.

through B2B firms' ICT capability differs in terms of IND. The results shown in Table 7 proved that a significant interaction between the ICT capability and IND in predicting the AICRM and firms' B2BTR has different conditional indirect effects on the AICRM via ICT capability at high and low levels of the moderator (i.e., IND) (Guarana & Hernandez, 2016). In line with that, the results from hierarchical regression (Aiken and West, 1991) show that the moderating effect of IND on the relationship between B2B firms' ICT capability and AICRM is significant. This means that the interaction between ICT capability and IND was also significant in predicting AICRM ($\beta_{ICT*IND} = 0.253$, $p < 0.01$), which demonstrates that a positive and significant relationship between ICT capability and AICRM can be more robust for those with strong B2B firms' IND and thus supporting hypothesis H7 (Fig. 3).

In addition, the results from moderation analyses based on Hayes's (2013) PROCESS macro for SPSS also revealed that the indirect effect of B2BTR on AICRM via B2B firms' ICT capability is weakest at the lowest level of IND and strongest at the highest level of IND (see Table 7 and Fig. 3). The findings also indicate that B2BTR affects AICRM and is connected to B2B firms' ICT capability, which states that the indirect effect of B2BTR on AICRM via B2B firms' ICT capability is conditional on IND. This proves hypothesis H7 (see Table 7 and Fig. 3).

Table 7
Moderated mediation test.

Constructs and Steps			Outcome variable (AICRM)	
Step one: Controls				
Firm Size			0.091	
Firm Experience			0.071	
Industry Type			0.082	
Step two: main effects of predictor variables B2B firm's information and communication technology capability (ICT)			0.297**	
Step three: Effect of the moderator (industry dynamism -IND) B2B firm's information and communication technology capability (ICT) – Artificial intelligence-based customer relationship management (AICRM)			0.149*	
Step four: Interaction effect- **ICT*IND**			0.253**	
Values of moderator industry dynamism (IND)	Conditional indirect effect	Bootstrap SE	Lower CI	Upper CI
Mediator 1: B2B firm's information and communication technology capability (ICT)				
−1 SD	0.179	0.076	0.046	0.219
M	0.227	0.094	0.147	0.290
−1 SD	0.276	0.107	0.178	0.362

Note(s): *p < 0.05, **p < 0.01; Outcome variable: AICRM; Criterion Variable: ICT; Mediator: ICT; CI: Confidence.
Interval; and SE: Standard Error.

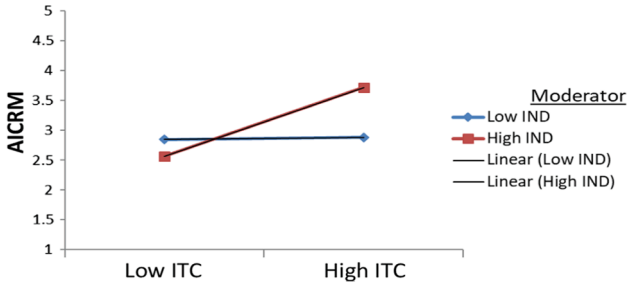

Fig. 3. The moderating role of industry dynamism (IND) in B2B firms' information and communication technology capability (ICT) ***[note: Low ICT is (-1 SD) and High ICT is (+1 SD)]***, - artificial intelligence-based customer relationship management (AICRM) relationship.

5. Discussion

This study empirically investigates the concept of B2B firms' technology readiness, AI-based CRM capability for relationship performance, and social sustainability by developing a theoretical framework. Inspired by the philosophy of dynamic capability view, the present study has already addressed RQ1 and RQ2 by developing a theoretical framework to understand the technology readiness of B2B firms and AI-based CRM capability for enhancing social sustainability performance by developing direct effects, mediating effects, and conditional moderating effects to test the hypotheses. The prime theoretical contribution of the present study, therefore, lies in the theoretical and empirical explanation of the causal and mediating relationship between B2B firms' technology readiness, the firm's ICT capability, and the AI-based CRM of the firm based on conditional moderating effects of B2B firms' industry dynamism.

The results from the data analysis revealed that all seven hypotheses formulated for this research were supported. The results indicate a significant positive relationship between B2B firms' technology readiness and the firm's ICT capability and AI-based CRM. Hence, the study supports the first and second hypotheses and confirms the findings of the previous investigation in the context of B2B firms that suggested a significant influence between technology readiness and ICT capability; and

technology readiness and AI-based CRM (Kogut & Zander, 1992; Saura et al., 2021; Baabdullah et al., 2021). This research also examines the B2B relationship performance concept for examining the B2B business relationships, which in turn influence B2B firms' social sustainability performance.

The results from the empirical evidence show a significant relationship between B2B relationship performance and socially sustainable performance indicating that inter-firm relationships are vital and new trends in the present business environment for achieving social sustainable performance (Cox et al., 2004; Lefaix-Durand et al., 2005; Huang et al., 2022). Empirical findings also support the relationship between B2B firms' ICT capability, AI-based CRM, and relationship performance, and finally, B2B firms' relationship performance and social sustainability performance are significant and positive, and support the third, fourth, and fifth hypotheses. It also confirms the findings of the previous investigation as well (Martínez-López and Casillas, 2013; Paschen et al., 2020; Han et al., 2021; Bag et al., 2021b).

The role of technology readiness of B2B firms under the mediation effect of ICT capability is also positively related to AI-CRM capability. Empirical studies confirm the findings and emphasize the presence of B2B firms' ICT capability, which is an important construct to consider in the relationship between the technology readiness of B2B firms and AI-CRM capability (Obal & Lancioni, 2013; Lipiäinen, 2015; Nguyen et al., 2022). The study results also emphasized the need to include industry dynamism as a moderating variable in the relationship between B2B firms' ICT capability and AI-based CRM capability, which is supported by previous studies such as those of Ruigrok et al. (2013), Larrañeta et al. (2014) and Bag et al. (2021).

In the field of technology orientation of firms and AI-based CRM capability for enhancing relationship performance for social sustainability, several scholars have already discussed B2B firms' need to emphasize the importance of technology, industry dynamism, and AI-based CRM capability to achieve strong relationships and social sustainability and the present study contributes significantly from the empirical findings (Vize et al., 2013; Kapitan et al., 2019; Blut & Wang, 2020; Chatterjee et al. 2021a, d).

The goal of manufacturing B2B firms is to operate in a competitive environment by adapting to the consequence of operational uncertainty due to the Covid-19 pandemic and sustaining their business and enhancing their relationships with their respective partners in order to achieve social sustainability performance. However, the extant literature has also failed to extensively discuss the significance and enablers of technology-driven orientation for B2B firms that enhance technology readiness by assessing the role of B2B firms' ICT capability in the relationship between B2B firms' technology readiness and AI-based CRM. The present research closes the literature gap, particularly in relation to AI-based CRM and relationship performance in B2B firms, by empirically investigating a model that mixes several critical lower-order capabilities of B2B firms to develop AI-CRM capability and subsequently attain social sustainability performance. This study clearly explains the elements and approaches that help B2B firms to understand and realize the importance of firm's resources by configuring them into the B2B firm's dynamic capabilities in practice for superior strategies that influence B2B firms' social sustainability performance. The empirical findings from all the hypotheses are in line with the dynamic capability view in the B2B context. B2B firms should modify functional capabilities by combining, developing, and reconfiguring their internal and external resources to respond to the fluctuating situation to address social sustainability expectations and improve firms' economic, environmental and social competencies both on the local and global levels (Zhang & Wu, 2017).

Above all, this study bridges the gap between theory and practice by highlighting the lower-order capabilities (e.g., ICT capability) that managers should focus on to develop higher-order capabilities (AI-based CRM capability). Future business processes will be dominated by AI, and therefore it is essential that firms leverage data-driven decisions for customer management (Wang & Wang, 2020) and apply AI-CRM tools to improve relationships and social sustainability performance. In turn, the strategy will definitely improve the B2B firm's local and global reputation. Firms that will not adapt to technological changes will not remain sustainable and will perish in the long run. This research study clearly sends a message to B2B firms that they should focus on three important dimensions in this turbulent business environment; firstly, developing AI-based CRM capability, secondly, investing in relationships, and thirdly, focusing on sustainability performance. The world will enter the fifth industrial revolution by 2050, where AI will be an integral part of every system. B2B firms must gear up now to adapt to this fourth industrial revolution and gradually shift to the fifth industrial revolution over time.

5.1. Theoretical contributions

The results of the present study provide significant contributions to the B2B literature. Existing studies have only focused on B2B firms' ICT as a singular entity (Liu et al., 2008; O'cass and Ngo, 2012; Guo et al., 2018; Ritter & Pedersen, 2020). Considering the firm's technology readiness, ICT, and industry dynamism as exogenous antecedents to analyze the AI-based CRM of B2B firms to enhance relationship performance has strengthened the social sustainability performance model. The present research advances the understanding of ICT by applying AI-based CRM systems. This study also provides empirical evidence on the impacts of industry dynamism's role on AI-based CRM systems. In this way, the present research provides an empirical reference for academics and management to understand the importance of AI-based CRM to successfully achieve social sustainability in the B2B context.

The study tests the model using dynamic capability theory and the unique contribution of this study is the empirical investigation of the paths (Fig. 2). Previous studies have demonstrated that AI-based CRM improves organizational performance (Zhang et al., 2020; Chatterjee et al., 2021d; Olan et al., 2022). However, our study further extends the AI-based CRM literature by showing that dynamic capabilities also improve social sustainability performance.

On the other hand, this study also empirically demonstrates the impact of B2B firms' ICT on firms' AI-based CRM while explaining the underlying conditional moderated-mediation processes of industry dynamism in connection with B2B firms' technology readiness and ICT as technology capability, providing a new theoretical contribution. The present research has indicated the moderating effect of industry dynamism on the underlying mediating mechanism of B2B firms' ICT between B2B firms' technology readiness and AI-based CRM in a single holistic model by extending social sustainability performance.

Above all, the application of dynamic capabilities enables B2B firms to use AI-based CRM to leverage their existing information technology resources to capture new strategic relationship opportunities and remain competitive in the business environment by achieving social sustainability performance (Teece et al., 1997; Desai et al., 2007; Cherkasova & Zainullina, 2020).

5.2. Practical implications

The findings from this research suggest that the technology readiness of B2B firms has a positive relationship with information and communication technology capability (ICT). Here, the key takeaway point for managers of B2B firms is to be conscious of technological readiness. No progress in the development of ICT capabilities will be made unless employees and channel members devote time and effort to technology readiness. Digital technologies must be incorporated into daily operations and marketing tasks by managers. Regular employee training on digital technologies that highlight the advantages needs to receive more attention.

The second finding shows that the technology readiness of B2B firms has a positive relationship with AI-CRM capability and the third finding

shows that information and communication technology capability (ICT) has a positive relationship with AI-CRM capability. Managers need to understand that technology readiness and ICT capabilities are organizational capabilities or zero-order capabilities that will aid in building a first-order capability or DC i.e., AI-CRM capability. Managers must keep in mind that a company can develop a DC if it can mix, construct, and reconfigure its technology readiness and ICT capabilities in response to a changing business situation. Here, the key takeaway point for managers would be to stay updated with the latest technological innovations in the ICT field and further develop ICT infrastructure in line with the latest technological trends. Lastly, adopting flexible IT planning systems jointly with suppliers and customers is essential.

The fourth finding shows that AI-CRM capability has a positive relationship with B2B firms' relationship performance. AI-CRM is a DC that will assist the B2B company in adapting to the ever-changing business environment. It can support marketers in every typical manual work, including managing calendars, scheduling meetings, making phone calls, taking records, and following up. Therefore, managers need to align business strategies with AI-CRM goals. Also, access to data is necessary to execute AI-CRM; therefore, the focus is required on developing a data-driven culture. B2B firms can more effectively gather, store, manage, and organize interactions with the help of AI-CRM systems, which are strong data aggregation tools. Long-lasting customer relationships are fostered by improved management and automated client outreach. AI-based CRM capability improves relationship performance, which means that managers need to learn to use AI-based CRM in the right way to categorize important customers and partners for providing customized services to fulfill their needs and demands.

According to Day (2000), the investment in CRM is evident and concerns the top management. The findings from this research provide essential insight to the managers of B2B firms that, in the short run, firms may not reap the benefits of AI-based CRM systems, but optimizing them will provide higher returns in the future. Hence, managers should trust AI-CRM systems for B2B relationship management.

The fifth finding shows that B2B firms' relationship performance has a positive relationship with social sustainability performance. Managers need to understand that investing in relationship rents is going to have positive repercussions on society. When firms jointly work with supply chain partners in developing sustainable marketing programs it will produce a good outcome. Therefore, managers need to consider the impact on local communities while making B2B marketing decisions. Moreover, managers need to respect labor laws and enhance working conditions for providing a safe and healthy environment to the employees. Managers must maintain a good relationship with stakeholders and never show any kind of abusive behavior towards the employees or local communities.

The sixth finding shows that the technology readiness of B2B firms under the mediation effect of information and communication technology capability is positively related to AI-CRM capability. Managers need to clearly understand that ICT capability is assisting technology readiness to develop AI-CRM capability. Hence, managers must never ignore the importance of ICT capability. Managers need to develop be creative and develop some new routines in order to develop ICT capabilities.

Lastly, the research finding indicates that industry dynamism moderates the relationship between ICT capability and AI-CRM capability. Managers need to understand that the higher the industry dynamism, the greater the influence of ICT capability on AI-based CRM capability. It reflects that firms need to focus more on the DC i.e., AI-CRM capability in dynamic situations. With the recent trends such as faster technological change, shifts in manufacturing and labor markets, the population shift from villages to cities in developing nations, and climate change it is extremely important that managers of B2B firms focus their attention on developing the DC i.e., AI-CRM capability to evolve in this changing environment. Hence, the new capabilities must be operationalized by managers who must create and carry out a plan to incorporate them into the existing organizational procedures. Finally, managers need to ensure that the process continues if they want to firm to adapt to the changing demands and win over competitors.

6. Limitations and future research directions

DCV has some limitations that must be considered while interpreting the findings. Many academics argue that managers' conscious efforts to acquire and strengthen dynamic capabilities (DCs') may not be beneficial because DCs have frequently been represented in research as abstract capabilities. Second, there is no standard measurement procedure to measure DCs'. We have also used cross-sectional data like past studies and further tested the theory. However, long-term and time-series data are needed to quantify the evolution of DC and its impact on relationship performance and social sustainability performance. Hence, future researchers can design their studies accordingly. In the context of B2B firms' social sustainability performance, the authors argue that the present research efforts complement a few areas of inquiry, such as harnessing technology, data analytics, and relationship value suggested by Mora Cortez & Johnston (2017) and Lilien (2016). Future research also may focus on other areas such as B2B customer journey and relationship value, marketing or finance matter, and their impact on revenue growth by focusing on a specific industry context by emphasizing B2B firms' social sustainability performance.

Future research endeavors can also apply innovation capability, B2B customer journey and B2B relationship value, data analytics capability with advanced technology and revenue growth to determine the challenges for implementing B2B firms' social sustainability performance. Above all, the present study applied the proposed theoretical framework testing through the data collected from a specific emerging market (South Africa) in a B2B context. To address this limitation, future research also can use other different emerging country's B2B contexts, such as Latin America (Fastoso & Whitelock, 2011); India (Nyadzayo et al., 2018), and Malaysia (Boniface et al., 2012) and analyze data separately or integrated into a comparative regional study by applying the same proposed theoretical framework for further generalization.

7. Conclusion

Every firm considers its marketing and sales department and its customers and business partners to be of central importance because they are the lifeline of any firm. The findings of this research indicate that customer relationship management is an important activity involved in the downstream part of the supply chain where the focal firm develops relationships with industrial dealers and wholesalers and industrial customers in the supply chain network. In this fourth industrial revolution, firms are benefitting from data-driven decision-making and AI-CRM has shown huge potential in improving customer management. The literature reveals that AI-CRM can improve a firm's performance, but the literature on developing lower-order capabilities that can be helpful in building AI-CRM capability in B2B firms lacks investigation. In addition, its connection with social sustainability has been under-researched, if researched at all. The current study provides interesting insights based on an analysis of data collected from B2B firms. The findings reveal that the technology readiness of B2B firms in this fourth industrial revolution era is positively related to AI-CRM capability while ICT capability demonstrates a partial mediating role. Industry dynamism is found to act as a contextual variable under the association of information and communication technology capability and AI-CRM capability. In addition, it was found that AI-CRM capability improves relationship performance among B2B firms, which ultimately improves social sustainability performance. In other words, firms willing to improve social sustainability performance must aim to build AI-CRM capability.

CRediT authorship contribution statement

Muhammad Sabbir Rahman: Writing – original draft, Methodology, Formal analysis. **Surajit Bag:** Writing – original draft, Formal analysis, Data curation, Conceptualization. **Shivam Gupta:** Visualization, Validation, Software, Resources, Project administration. **Uthayasankar Sivarajah:** Supervision, Resources, Project administration, Methodology.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A1. Operationalization of constructs

Construct	Items	Items	Adapted from
B2B Firm's Technology Readiness (B2BTR)	B2BTR1	Digital technologies generate a perception of productivity improvement among industrial manufacturing firms	Vize et al. (2013)
	B2BTR2	Using digital technologies at work is giving better results compared to the use of manual techniques a few years back	
	B2BTR3	Digital technologies provide better flexibility at work	
	B2BTR4	Our firm has adopted advanced digital technologies beforehand than our competitors	
	B2BTR5	Our firm provides regular training on digital technologies to employees and demonstrates the benefits	
	B2BTR6	Our firm has invested a huge amount in building the technological infrastructure for the effective application of data-driven AI-CRM	
Information and Communication Technology Capability (ICT)	ICT1	We have ICT facilities for smooth operations/services	Ross et al. (1996); Bharadwaj (2000); Weill & Vitale (2002); Stoel & Muhanna (2009); Lu & Ramamurthy (2011)
	ICT2	Our firm has established an operative and flexible IT planning process along with our industrial partners	
	ICT3	Our firm constantly keep our industrial partners updated with new information technology innovations	
	ICT4	Our firm creates a climate that is supportive to our industrial partners to try out new ways of using the best use of ICT	
	ICT5	My firm's business operations are shifting toward digital technologies	
Industry Dynamism (IND)	IND1	Rapid obsoleting of our products and services are a big concern for our firm	Dubey et al. (2020)
	IND2	Our firm launch new products and services on a regular basis	
	IND3	Our firm revises the standard operating process from time to time	
	IND4	The buying behaviour of our customers is changing rapidly	
Relationship Performance in B2B Firms (RP)	RP1	Our firm has policies that reflect respect for their industrial customers	Kumar et al. (1995); Cannon & Perreault (1999); Hewett & Bearden (2001); Sirdeshmukh et al. (2002); Lages et al. (2008)
	RP2	We need to stay ad a faithful supply chain partner to our industrial clients because we have pride in being related to an organisation that acclimatizes to technological changes	
	RP3	In our relationship, we share confidential information with our industrial partners as they also sharer reliable information with us	
	RP4	We interact regularly with our existing industrial partners	
	RP5	If we had to do the business again, we would still choose to connect with our existing industrial partners	
Artificial intelligence-based customer relationship management (AICRM)	AICRM1	Customary testing of AI-CRM is critical to look at its suitability	Chatterjee et al. (2021d)
	AICRM2	Quality AI-CRM execution for B2B relationship management enhances the pleasure level	
	AICRM3	B2B firms' strategies are aligned with AI-CRM objectives	
	AICRM4	We have access to data sets for the actual execution of AI-CRM in customer management	
	AICRM5	Our firm has been able to integrate AI-CRM with our global IT system	
	AICRM6	We feel that our AI-CRM system will be able to handle the increasing pressures related to customer enquiries	
	AICRM7	I have faith in the operation of AI-CRM for improving the social sustainability and ultimately, the reputation of our organisation	
	AICRM8	I am sure that AI-CRM has given us an edge over competitors who are not using such systems	
	AICRM9	I trust that AI-CRM for B2B relationship management has led to improvement in our market shares	
Social Sustainability Performance (SSP)	SSP1	We are focusing on social sustainable practices and related actions sincerely	Mani et al. (2018); Kapitan et al. (2019)
	SSP2	We have developed plans for improving social sustainability	
	SSP3	Our business decisions are made considering the impact on local communities	
	SSP4	We warrant suitable labour working environments	
	SSP5	We have a stringent policy for the prevention of child and forced labour	
	SSP6	We sustain stringent watch on labour rights abuses	
	SSP7	We don't discriminate against people looking at their age, sex, race, religion, etc.	

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Muhammad Sabbir Rahman (PhD) is an Associate Professor in the Department of Marketing and International Business at North South University (NSU), School of Business & Economics. He received his PhD from International Islamic University Malaysia (IIUM) from the Department of Business Administration. His research focuses on service quality, consumer behavioural research and buyer-supplier relationship, supply chain process optimization, and business excellence.

Surajit Bag (Ph.D.) is an Associate Professor at the Institute of Management Technology, Ghaziabad, India. He holds two Ph.D.'s in Logistics and Supply Chain Management from the University of Johannesburg, South Africa, and the University of Petroleum & Energy Studies, India. He has more than eleven years of industry experience. His areas of research interest are industrial supply chain automation, industry 4.0, buyer-supplier relationship, supply chain process optimization, and business excellence.

Shivam Gupta (Ph.D.) is a Professor at NEOMA Business School, France. Skilled in statistics, cloud computing, big data analytics, artificial intelligence, and sustainability. He has published several research papers in reputed journals and has been the recipient of the International Young Scientist Award by the National Natural Science Foundation of China (NSFC) in 2017 and the winner of the 2017 Emerald South Asia LIS award.

Uthayasankar Sivarajah (Ph.D.) is a Professor of Technology Management and Circular Economy and the Dean of the School of Management at the University of Bradford, UK. He enjoys interdisciplinarity research and teaching focusing on the use of emerging digital technology by businesses and organizations for the betterment of society. He is the Deputy Editor of the Journal of Enterprise Information Management and has published over 70 scientific articles in leading peer-reviewed journals and conferences. His research tackling societal challenges such as energy-efficient digital currencies, consumer behaviour, and reduction of waste has featured in reputable media publications such as The World Economic Forum, BBC Yorkshire, and The Conversation.