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**Impact of CRM strategy on relationship commitment and new product
development: mediating effects of learning from failure**

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Abstract

Despite all the benefits that customer relationship management (CRM) offers to companies, various studies show high rates of failure when implementing CRM schemes. This study aims to explain how CRM can capitalize on the notion of learning behavior from failures in order to improve the relationship building and innovation performance in high technology ventures. Questionnaire survey data were collected from 234 CEOs and General Managers from ICT firms based in Beijing, Shanghai and Hangzhou, China. Subsequently, both hierarchical linear regression and SEM was conducted to test the hypothesized relationships. Findings show that CRM positively affects both NPD and commitment to long-term relationships and confirm that learning behaviour from failure mediates the main effects of CRM, which consists of strategic and market orientation foci, in combination with internal marketing and knowledge management. Specifically, although all four aspects of CRM are important to NPD, knowledge management is of particular importance.

Keywords: CRM, relationship management, learning behaviour from failure, long-term relationship, new product development.

1. Introduction

CRM (customer relationship management) is a concept that uses customer knowledge and systems technologies to help firms maintain profitable relationships (Chang et al., 2014; Kumar et al., 2019; Soltani and Navimipour, 2016; Yan et al., 2020). It integrates market knowledge and disseminates information inside organisations (Li and Mao, 2012; Payne and Frow, 2005), creating a coherent and fast-moving unit that responds rapidly to market needs (Bull, 2010; Kim, 2006; Hsieh et al., 2011). CRM-enabled relationships empower firms to learn what customers want through continuous interaction, which generates a significant income flow that arises from cross-sales and up-selling, eventually leading to sustainable competitive advantage (Gopal and Cline, 2007; Khodakarami and Chan, 2014; Nelson et al., 2020; Wang et al., 2016).

However, despite all of the benefits that CRM offers to companies, an urgent problem facing both academics and managers in the fields of management science, information systems and marketing is how CRM expenditure can be more effectively and consistently translated into meaningful business relationships and profits (Foss et al., 2008). Scholars increasingly find that there are challenges associated with the practices and behaviour of managements implementing CRM (Frow et al., 2011; Klaus and Edvarsson, 2014). For example, some scholars have noted concerns towards firms' use of customer tracking systems, considered as both necessary to gain market knowledge, but also perceived to induce information mishandling and customer discrimination (e.g., Boulding et al., 2005; Fang et al., 2011; Garrido-Moreno and Padilla-Meléndez, 2011).

To date, there is limited empirical evidence aimed at understanding how to overcome the pitfalls of CRM and transform these into key factors for successful CRM implementation (e.g., Araújo et al., 2018). This highlights a research gap in the study of the combined effects of organisational CRM abilities and outcomes, which affect the success of relationship management (Hallikainen et al., 2020; Udunuwara et al., 2019; Villena *et al.*, 2011). This paper aims to fill the research gap by connecting a multi-dimensional CRM concept to learning behaviour from failure, new product development (NPD) and commitment to long-term relationships. Specifically, our conceptual model posits a dual emphasis on firms' outcomes as relevant criteria for effective CRM via the mediating effect of learning behaviour from failure. We thus identify that learning behaviour from failure is particularly important for firms employing CRM for NPD and long-term relationship orientation.

The concept of learning from failure requires more attention for two primary reasons. First, learning from failure is a crucial internal knowledge resource that, in combination with the knowledge acquired from a CRM system, may enhance firms' ability to successfully implement an NPD strategy. Second, few studies have focused on a comprehensive framework that explores CRM, organisation management, failures, customer relationships and NPD in a single study. Little is known about how relationship management works in the context of CRM failure remains unanswered and how firms and policymakers are able to learn from failures caused by such practices (e.g., e.g., Araújo et al., 2018; Mele, 2011). The present study explicitly explores these areas empirically, contributing new knowledge to CRM literature.

The rest of the paper is presented as follows: Next, we develop the hypothesized research model. This is followed by tests of our hypotheses and the results of our research. We end our debate with the conclusion, wherein we discuss findings and their managerial and theoretical implications.

2. Theoretical Background and Hypothesis Development

2.1 Learning behaviour from failure

Learning behaviour from failure refers to particular processes, which may give firms the ability to learn from failure by (a) detecting and correcting errors, and (b) by challenging and exploring their underlying causes (e.g., Carmeli, 2007). It is considered a dynamic process that involves utilising trial and error to increase understanding of a specific situation (Huber, 1991), thus acquiring important new knowledge (Yu et al., 2014). Proactive action from the organisational level is a prerequisite to learn from failure, as it entails a process by which knowledge is shared that leads to improvement and change (McGrath, 1999; Yu et al., 2014b). Learning behaviour from failure can, therefore, be regarded as a unique element of organisational learning and, to the best of our knowledge, has not been previously studied in the context of CRM (Nguyen and Tu, 2015).

We propose that with CRM, firms are able to identify a failure by detecting errors and correcting mistakes swiftly, using the acquired information to explore their underlying causes, thus stimulating learning behaviour from failure. Combined with the multi-dimensional integration of CRM, namely, strategic planning (Sin et al., 2005; Yan et al., 2020), customer-centric orientation (Reinartz et al., 2004), internal marketing (Richards and Jones, 2008) and knowledge management (Jayachandran et al., 2005; Yan et al., 2020),

improved CRM implementation and performance may be evidenced. *Strategic planning* refers to a development and implementation process, that is, a course of action or direction that an organisation should take to achieve its objectives (Dibb and Meadows, 2004; Yan et al., 2020). *Customer-centric orientation* is defined as a resourced and organised strategy that aims to segment, interact, satisfy and build long-term relationships with the customers (Boulding et al., 2005). *Internal marketing* is considered any form of marketing that focuses on changing employees' attention to internal activities to successfully implement marketing plans (Ballantyne, 2003). *Knowledge management* is defined as the process of capturing, managing and transmitting knowledge through the organisation and across the organisational boundary (Von Krogh et al., 2000). These dimensions have recently been validated by separate studies, such as Winer (2001) and Jaber (2012). In addition, appendix A illustrates the latest papers published regarding the notion of CRM. How the above relationships interrelate with learning from failure in a high technology context is explored in the next sections.

2.2 CRM, NPD and long-term commitment

CRM entails an organisation's distribution of resources to nurture relationships within their supply chain, such as with customers, suppliers and governments (Sheth et al., 2008). The resource-based view (RBV) suggests that sufficient information and resources are key drivers to NPD breakthrough (Mascitelli, 2000). In this study, we measured CRM as a higher-order construct consisting of four sub-dimensions: strategic planning, customer-centric orientation, internal marketing, and knowledge management. With CRM, firms constantly operate across key competitive aspects (strategic and market foci, internal marketing and

knowledge management) to integrate resources via internal accumulation or collection from the external market (Day, 1994). Research shows that inter-firm relations, arising from CRM systems, influence knowledge transfer and learning (Guthrie, 2005). Jansen et al. (2006) suggested that relationships appear to be important antecedents of innovation strategies due to synergy and sharing of development costs.

CRM refers to “customers’ interactions with the firm and among themselves evolve” (Zhang, 2019, p. 731) and use “to support or enable service work in order to deliver service efficiently and to meet customer needs effectively, thus improving customer satisfaction” (Hsieh et al., 2011, p. 3) towards the products and services. Yan et al. (2020) refer CRM “to a centralization of marketing management for NPD, while ‘PDM’ refers to a centralization of technology management ... and improves firms’ ability to respond to market opportunities and external threats. CRM impacts on NPD for two main reasons (i) supports a better alignment of customer needs which decreases the number of failure rates of new products and increases financial returns by increasing high-quality higher customer acceptance-levels (Ernst, 2002; 2011; Henard and Szymanski, 2001). (ii) Management of customer relationships is a prerequisite for customer segmentation regarding their possible influence on NPD. The main feature of CRM is to distinguish among customize marketing activities and customer segments which is related to the value co-creation process (Payne and Frow, 2005; Reinartz et al., 2004). However, in the context of a new product, CRM aim is to recognize and interrelate with the customer segments regarding the task which can be defined as *customer segment value management* (Ernst, 2011). To upsurge new product performance, valuable customers’ necessities are needed (Gruner and Homburg, 2000).

China, which is currently undergoing a transition economy, with an underdeveloped institutional framework, is a context wherein local and central government together control considerable sections of the market's resources to maintain their influence on the economy (Child, Chung, and Davies, 2003). Therefore, firms with strong connections to important stakeholders are more likely to possess the best means of obtaining approvals, licenses, funding, information and other resources that may be influential in warranting the success of an innovation strategy (Li and Atuahene-Gima, 2001). Further, relationships with customers and suppliers provide important information on their needs and purchasing behaviour, which in turn, can translate into vital market knowledge, contributing to the development of innovative products and services (Nguyen and Mutum, 2012; Xin and Pearce, 1996). In transition economies, the importance of managerial relationships and ties to an organisation's success is immanent (Li and Zhang, 2007; Zhang, 2019). Therefore, firms with limited resources or little established connections with external organisations (Tsui and Ferh, 1997) tend to devote significant effort in developing and enhancing relationships with customers, suppliers and government officials because such relationships foster favourable attitudes towards their commercial affairs. Li and Atuahene-Gima (2001) explained that relationships represent a unique type of managerial connection in transition economies; consequently, firms often commit great effort and resources to build relationships for their importance to a firm's success. Whilst relationships substitute the lack of formal infrastructure in China; firms develop these relationships to reduce uncertainty and obtain access to information and scarce resources (Podolny and Baron, 1997) to improve their business performance (Peng and Luo, 2000; Xin and Pearce, 1996). With the emphasis on relationships in China, high

technology firms often rely on such relationships to gain further resources, information and technology financing. The government can, in return provide support through institutional devices and regulatory regimes (Luo, 2003) that directly contribute to firms' NPD stimuli and core competitiveness (Li and Atuahene-Gima, 2001). Surprisingly, the effect of relationships arising from components of CRM (strategic planning, customer-centric orientation, internal marketing, and knowledge management) on firms' NPD performance remains unclear. Thus, our research framework is developed based on the premise that CRM and its inherent approach to relationships with stakeholders and processes positively influence firms' innovation strategies. This led us to our first hypothesis.

H1a: CRM components (H1a1) strategic planning, (H1a2) customer-centric orientation, (H1a3) internal marketing, and (H1a4) knowledge management are positively related to NPD in high technology ventures.

To shape opportunities for NPD, firms must collect information across 'local' and 'distant' markets and technologies (Nelson and Winter, 1982). Such behaviour is in line with a CRM strategy characterised by the co-creation of value and relationship building that arises from continued search, discovery, experimentation and risk-taking (March, 1991).

Relationships (e.g., client and supply-chain partnerships) may be considered an external resource that firms desire the most (March, 1991), as firms gain knowledge and resources needed for improved performance, leading to sustained incentives and profits. Moreover, building relationships not only enhances the depth of search for innovations but also creates the potential for merging resources and abilities (Hallikainen et al., 2020; Levinthal and March, 1993). Also, CRM, "i.e., the use of information technology for implementing

relationship marketing strategies has become one of the key enablers for relationship marketing” (Hallikainen et al., 2020, p. 91).

For instance, once firms attain sufficient technological knowledge from relationships with suppliers, they will be able to incorporate the use of new raw materials and upgrade production processes, enabling the development of innovative products and services (Aiman-Smith and Green, 2002). Furthermore, acquiring market knowledge from relationship partners provides organisations with vital information about effective manufacturing procedures, efficient distribution channels and customers’ preferences (Dannels, 2002; Tian et al., 2013), leading to better development of new products that satisfy the demand of the market. Overall, such knowledge encourages firms to maximise their capacity and expertise in novel and effective ways (Atuahene-Gima and Ko, 2001) whilst using CRM strategy further to develop and/or improve co-creation of products over the long term (Li and Calantone, 1998).

High levels of commitment are the features of a long-term relationship with the customers and companies services and product quality and a long-term relationship customers (Grönroos 2000). Since strategic planning, customer-centric orientation, internal marketing, and knowledge management influence on customer commitments, they are more willing to share their knowledge and strong association with customers could further improve the possibility which organization and customers frequently work together in creating a new service and product ideas (Ernst et al., 2011; Jayachandran et al., 2005).

Commitment is defined by Moorman *et al.* (1992) as ‘a long-lasting desire to uphold a valued relationship’ (Moorman *et al.*, 1992, p. 316) and recognised as a critical component

for successful long-term relationships. While the benefits of long-term relationships are straightforward, not all organisations possess the ability to sustain those relationships and commitment may prove to be a great challenge, which is why not all firms have the ability to endure long-term relationships (Morgan and Hunt, 1994). Some organisations face strong pressures to conform to their partners' established expectations and perform certain functions. For example, in order to maintain satisfactory performance, some firms are expected to strictly control their costs, products and markets, so they can maintain a satisfactory performance (Christensen and Bower, 1996; Yu et al., 2014a). Additionally, to uphold relationships and commercial support from their partners, organisations must expect tight regulation and continued control (Guthrie, 2005) to ensure adequate performance (March, 1991). As CRM "is concerned with the relationships between organizations and both potential and current customers" (Udunuwara et al., 2019, p. 445), overcoming such inherent challenges to build long-term relationships requires that CRM strategies must focus on value creation for the involved stakeholders. By identifying their needs, combining resources and abilities that the organisations are acquainted with, CRM enabled relationships can reinforce and refine current products and services. An integrated CRM process ensures that all organisations obtain superior support for technology, information and financing that in turn can be incorporated and utilised within their co-creation (Lu et al., 2010). Hence, despite the inherent risks for firms to collaborate (Miller and Friesen, 1983) in the case that their costs targets are not met (Gedajlovic et al., 2012), if the firms are able to create added value via integrated and synergistic CRM components (strategic planning, customer-centric orientation, internal marketing, and knowledge management) their relationships with stakeholders may

become long-term and rewarding based on the premise of dual creation of value. We thus extended our next hypothesis.

H1b: CRM components (H1b1) strategic planning, (H1b2) customer-centric orientation, (H1b3) internal marketing, and (H1b4) knowledge management are positively associated with commitment to maintaining long-term relationships in high technology ventures.

2.3 CRM and learning behaviour from failure

Customer relationship management has changed from the traditional model which tracks (e.g., customer's age, frequency and financial value), to developing and maintaining commitment and improving customers emotion and satisfaction (Hwang and Choi, 2020). Companies are understanding that the technologies can be influential enablers of CRM to better involve customers. This engagement and interaction create mutual value and learning behaviour (Choudhury and Harrigan, 2014; Garrido-Moreno et al., 2020; Greenberg, 2010; Kunz et al., 2017; Trainor, 2012). The relationship between CRM and learning behaviour from failure is referring to specific processes that incorporate a firm's use of CRM to study failure proactively by both identifying and correcting errors, so that an exploration of the underlying causes can take place (Carmeli, 2007). For example, to identify failures more systematically, a central intelligence and information system could be implemented, so that any contact point with suppliers or customers can be monitored. Any conflicts and tensions can be recorded and the overall information garnered from such a failure detection system would allow for the rapid allocation of resources to support corrections and improve the value-added activities. Such a system would also be helpful in the after-failure context

(Shepherd *et al.*, 2011), as the tracking of any movement can be retrieved and analysed in more detail. Thus, the information acquired via a CRM system becomes a basis for learning behaviour from failure, and with the wide-ranging use of CRM, that knowledge will disperse across the organisation more efficiently (Jantunen, 2005). Integration of learning behaviour from failure as part of such CRM system thus allows firms to be better equipped at identifying and recognising failure more systematically. In the high technology industry, putting more effort in identifying errors enables the managers to respond to these errors rapidly, so that resources to new NPD projects can be allocated and committed accordingly. Learning behaviour from failure suggests that organisations make strategic decisions more efficiently by learning to recognise new business opportunities, identify threats and maintain competitiveness (Yu *et al.*, 2014a). These firms use CRM as a “holistic approach for managing customer relationships to create shareholder value” (Hollebeek *et al.*, 2019, p. 174) and the CRM processes can translate resources acquired into specific benefits (Bierly and Chakrsbarti, 1996), thus boosting their strategic advantage.

According to experiential learning theory, which refers to active learning through experience and reflection (Kolb, 1984), any aspect that creates value and facilitates individuals’ learning may influence the value-added behaviour of the organisation (Burt, 1997; Dubini and Aldrich, 1991). However, an organisation’s learning ability is limited to the resources it owns and controls. Experiential learning theory supports firms’ CRM, as it enables resource (knowledge) management – a central resource and aspect of the ability to learn from failure. Such ability provides indispensable experiential information for organisations’ resource integration (Blyler and Coff, 2003). Thus, when firms implement

CRM and integrate the ability to learn from failure, they become better equipped to constantly scan, search, explore and collect information about markets and technologies both internally and externally to identify and shape opportunities (e.g., NPD) arising from failure (Nelson and Winter, 1982), and ultimately develop their experience through learning. We posit that organisations with better capability to learn from failure possess better optimisation to critical market and technology information, thereby benefiting from a number of areas, such as unique information, supplies, support and technology, further enabling their CRM ability to respond to internal changes proactively. Although the process of developing such abilities may be costly, especially for those lacking resources or established affiliations (Larson, 1991), the knowledge acquired can promote firms' ability to learn from failure systematically and proactively and to identify useful information needed for CRM success. In China's dynamic market economy, the ability to learn from failure would enhance the reallocation of critical resources that support future CRM activities. This led us to our second hypothesis, which concerns China's high technology industry.

H2: CRM components (H1b1) strategic planning, (H1b2) customer-centric orientation, (H1b3) internal marketing, and (H1b4) knowledge management are positively associated with learning behaviour from failure in high technology ventures.

2.4 The mediating effects of learning behaviour from failure

Based on the experiential learning theory, organisational learning theory, and the discussion above, we posit that CRM can influence NPD strategy and commitment to long-term relationships both directly and indirectly via learning behaviour from failure.

Organizational learning theory provides the company “with a sound theoretical lens through which we can examine how existing marketing capabilities may be improved and new marketing capabilities may be created” (Vorhies et al., 2011, p. 736) and increases market knowledge through two basic adaptive processes: exploitation and exploration. Exploitation “refers to the development of new knowledge about the firm’s existing markets, products, and capabilities” whereas “exploration refers to the development of new knowledge that goes beyond what is currently known about markets, products, technologies and capabilities” (Vorhies et al., 2011, p. 737). The current research aims to understand and examine how learning behaviour from failure could be mediating the relationship between CRM components and NPD.

According to Teece et al. (1997), an organisation’s competitive advantages come from their resources, as well as their integration and transformation of those resources through firm-specific abilities, while intangible external resources only count when they are translated into the firm’s internal capital. Shepherd et al. (2011) suggested that learning from failure may serve as an organising principle to learn from mistakes and for coordinating and structuring various resources with functional units, yet it may not affect an organisation’s performance output by itself without sufficient resources. Consequently, learning from failure is of particular importance to firms’ CRM implementation (Bierly and Chakraborti, 1996). CRM, with enhanced strategic planning, customer-centric orientation, internal marketing and knowledge management, provides firms with valuable processes as well as other resources required for innovation and more importantly, the governing mechanisms to encourage firm-specific abilities. Thus, we propose that CRM would affect NPD through the enhancement of

learning behaviour from failure, drawing on a firm's resources and ability to translate knowledge into specific advantages and leading to efficient and proficient NPD (Bierly and Chakrabarti, 1996; Dannels, 2002).

Learning behaviour from failure emphasises a firm's quick commitment of resources to novel NPD activities by proactively responding to errors and mistakes. Several key characteristics describe learning behaviour from failure. Firstly, it broadens firms' visions surrounding internal developments and resources (Cohen and Levinthal, 1990). Secondly, Sanchez (1995) showed that learning from failure increases firms' willingness to sacrifice short-term investment for the sake of future long-term development. Thirdly, it helps organisations improve the breadth of resources, information and knowledge, which are fundamental in identifying mistakes and market opportunities (Gedajlovic *et al.*, 2012). CRM processes with great ability to learn from failure would allow firms to adopt better NPD strategies due to increased absorption and application of new resources both internally and externally, which promote experimentation with different process and product variations (Cohen and Levinthal, 1990) and stimulate capability-building ideas (Worren, Moore, and Cardona, 2002). As a consequence, we believe that firms' learning behaviour from failure, consisting of improved integration of unique information combined with the application of external resources (e.g., financial resources) would increase their chance to discover new market opportunities and to experiment (Coviello, 2006; Yu *et al.*, 2014b). Considering our earlier statements about CRM and learning behaviour from failure, we formed a third hypothesis.

H3a: Learning behaviour from failure mediates the relationship between CRM components and NPD in high technology ventures.

CRM is a “core marketing process that influences firm performance and survival. As a strategic approach, CRM aims to increase shareholder value by creating, developing, and maintaining win-win relationships with valuable customers and key stakeholders, integrating the relationship marketing perspective and information technology in this process” (Foltean et al., 2019, p. 566). An inherent part of a CRM strategy is to build long-term relationships with key stakeholders, we posited that firms with higher capacity to learn from failure have a greater chance to better understand their partners’ relationships, their resources and the way in which they integrate and allocate those resources to foster long-term relationships. Often firms engage in more information search about stakeholders, technologies and markets in order to develop closer relationships, when competition intensifies (Banker et al., 2006). Peng and Luo (2000) suggested that firms may choose to use and integrate internal resources and abilities across the supply chain to develop long-term relationships and alliances with existing stakeholders, in the best way possible. Thus, to reduce the search costs for new resources and improve communication channels, the approach to build long-term relationships may be more relevant and important. By enabling an approach or mind-set that includes learning behaviour from failure, existing relationships are improved by a shared understanding of the emphasis on long-term commitment between the players, creating openness to use resources, information and knowledge conjointly for the purpose of value co-creation and the development of mutual advantages (Shepherd *et al.*, 2011). Organisations are more likely to maximise the full potential of their resources and relationships when they learn from past

failures and mistakes, leading to the creation of value, which is an essential part of any CRM strategy (Barney, 1991). The ability to learn from failure can also help firms employ their acquired resources more efficiently, hence developing better long-term relationships. Firms may attain their long-term performance objectives by reconfiguring existing processes to serve existing customers and promote upgraded products and services, such as cross-sales and cross-development. Based on the experiential learning theory, organisational learning theory, and extensive discussion above, we extend our final hypothesis.

H3b: Learning behaviour from failure mediates the relationship between CRM components and the commitment to maintaining long-term relationships in high technology ventures.

Figure 1 visualises our conceptual model. All operationalised relationships have been discussed above.

3. Methods

3.1 Data collection and study sample

To acquire a comprehensive dataset to test our hypotheses, we select the high technology industry in China as the context of this research. We focus on information and communications technology (ICT) firms that provide IT and telecom hardware, software and services for several reasons. Firstly, because ICT products often have short shelf lives, ICT firms tend to focus more on innovative activities in developing their new products (Balkin and Gomez-Mejia, 1984). Secondly, ICT firms are often eager to commercialise their innovation and build relationships across the supply chain (Brown and Eisenhardt, 1995).

Thirdly, as the Chinese market presents both political and economic challenges as well as less

developed institutional and legal regulations, leading to a highly uncertain and very competitive environment, the allocation of limited resources is of particular importance to ICT firms' innovation strategies. Fourthly, the ICT industry has recently been registered by the government as one of the important industries in China because of its impressive growth as a sector (Bruton and Lau, 2008). Nevertheless, ICT firms often have inadequate financial resources or established managerial routines for effective strategic decision-making (Foltean et al., 2019; Peng and Heath, 1996), reflecting the need for more research attention.

The participating firms were selected based on two criteria. The first one requires the firms to be registered under the ICT sector, meaning that the firms need to be involved in technologies used to 'store, receive, transmit, and algorithmically transform any type of information that can be digitised – numbers, text, video, music, speech, programs, and engineering drawings, to name but a few' (Brynjolfsson and Hitt, 2000, p. 23). The second one selects only those firms with newly enabled CRM systems in order to ensure that we capture both their experiences with CRM and the typical pitfalls that come with CRM. As a result, all firms selected were founded within the last 8 years, following the suggestion of Atuahene-Gima and Li (2004).

Using the above criteria, 1000 CEOs or general managers were randomly selected from thousands of ICT companies in Beijing, Shanghai and Hangzhou. Commonly known as the 'lion's share', these three cities are home to China's ICT industry. Standard region and industry sampling proportions were identified for a random sample of independent private firms (Ucbasaran et al., 2009). We then utilized a stratified random sampling frame of the

1000 independent ICT firms from industry lists across the three cities. Names and addresses of private independent firms were purchased from a managerial consulting company.

To secure access to the participating companies, a trained research assistant was employed to contact the CEOs and managers by sending out email invitations to arrange the survey, which consisted of a hard copy self-administered questionnaire and an accompanying covering letter. To encourage participation, each respondent was also offered a summary of the study's results. Confidentiality was assured to all respondents. We aimed at collecting data from the CEOs as the key informant. Using a combination of onsite visits and email correspondence, we gained access to collect data from the right respondents. Our presence onsite ensured the correct use and understanding of the questionnaire and assisted us in getting higher response rates.

The questionnaire was initially developed in English and then translated into Mandarin Chinese by two management scholars, who are highly competent in both languages and have extensive experience in the field of interest. Back-translation was employed to detect possible misunderstandings (Usunier, 2000), hence eliminating any cultural bias to increase questionnaire content validity. Before conducting the survey, five CEOs were selected for a series of exploratory interviews. Their feedback about the wording and the designing of the questionnaire. In addition, the questionnaire was reviewed by three bilingual academics. Based on their comments, the final version was refined and conducted the survey.

During the data collection period (Jan 2019 to March 2019), a research assistant was employed to obtain the respondents' contact details, answer general inquiries and collect the completed questionnaires. We restricted the recall timeframe to three years to reduce other

possible biases associated with the data collection process (Miller, Cardinal, and Glick, 1997). In total, we received 234 completed and valid questionnaires with a response rate of 23.4% (234/1000). Among the key informants, 55.3% were male, of which 17.1%, 56.4% and 26.5% had completed secondary education, a bachelor's degree and a postgraduate degree (24.4% were Master's and the rest were PhD's), respectively. 26.5% of the participants were under 30 years of age, 53.4% were between 30 and 40 years of age, 17.1% were between 40 and 50 years of age and the rest were over 51 years of age. Table 1 provides a detailed sample profile.

< Insert Table 1 About Here >

3.2 Measures

To operationalise the constructs in the research, we used a seven-point Likert scale to measure all variables (see Appendix B). Building on existing studies, we assessed the components of CRM as four separate constructs (i) strategic planning (Chang et al., 2010; Meadows and Dibb, 2012; Raman et al., 2006), (ii) customer-centric orientation (Rapp et al., 2010; Reinartz et al., 2004; Wu and Wu, 2005), (iii) internal marketing (Avlonitis and Panagopoulos, 2005; Karakostas et al., 2005) and (iv) knowledge management (Jayachandran et al., 2005; Sin et al., 2005). Each construct has five items adapted from previous studies (e.g., Jaber, 2012) that have been empirically validated.

We measured *learning behaviour from failure* using seven items (Carmeli, 2007; Hiraq et al., 2012). To measure *new product development*, we used five items (Atuahene-Gima and Li, 2004; Zhang and Li, 2010). Finally, adapting measurement scales from Ganesan (1994) and Garbarino and Johnson (1999), we measured commitment to maintaining

long-term relationships by asking respondents to rate the extent to which their ventures were successful in relation to their major partners.

4. Analysis and Results

4.1 Reliability and validity

We used a thorough process to purify and validate the measurement scale items following the practice of Gerbing and Anderson (1988) and Hair *et al.* (2010). Our EFA showed an acceptable factor solution for all variables. The EFA results showed that all seven factors had eigenvalues greater than one with no substantial cross-loadings, demonstrating that all items are within the acceptable range (Hair *et al.*, 2010).

Next, we conducted CFA using AMOS 20.0. Following the suggestions by Gerbing and Anderson (1988) and Hu and Bentler (1999), we evaluated the model fits using the DELTA2 index, the goodness of fit index (GFI), the comparative fit index (CFI), the Tucker-Lewis index (TLI) and the root mean square error of approximation index (RMSEA). With these fit indices, the CFA resulted in GFI=0.920, DELTA2=0.989, CFI=0.989, TLI=0.986 and RMSEA=0.040 ($\chi^2=182.201$, d.f.=144, $p=0.001$). Thus, each construct in our model is confirmed, and the measurement structure of seven factors and 37 items indicated excellent fit statistics.

Coefficient alpha reliability and composite reliability indices were calculated to assess the measures' reliability across all dimensions. The results showed that all coefficient alpha reliabilities exceeded the accepted 0.7 threshold (Cronbach, 1951). Fornell and Larcker's (1981) procedures were then employed to calculate composite reliability and the analysis showed favourable results for the seven scales, ranging from 0.879 to 0.960, higher than the

minimum acceptable threshold of 0.7 (Hair et al., 2010). The statistics about reliability and validity are shown in Table 2.

< Insert Table 2 About Here >

Convergent validity was also assessed, using two methods. For the CFA setting, we calculated average variances extracted (AVE) using the Fornell and Larcker (1981) procedures and the results showed that for each of the seven scales, the AVE exceeded the minimum threshold of 0.5. In addition, convergent validity was also evident as suggested by Anderson and Gerbing (1988) because the factor loadings from latent constructs to their corresponding manifest indicators were statistically significant (i.e., $t > 2.0$)

The shared variance between pairs of constructs and verified that they were lower than the AVE value for the individual constructs (Fornell and Larcker, 1981), proving discriminant validity. In every case, the AVE values were higher than the associated shared variance, thus supporting the constructs' discriminant validity. Table 3 presents the means, standard deviations and the variables' bivariate correlations.

< Insert Table 3 About Here >

4.2 Common method variance

To reduce the potential for CMV, we integrated both procedural methods and statistical techniques, following the procedures of Podsakoff and Organ (1986) and Zhang and Li (2010). We reassured the respondents that there were no right or wrong answers and their confidentiality would be kept in mind by the researchers at all time. This helped to reduce the respondents' evaluation apprehension, which may affect their likeliness to edit their responses to be more lenient, socially desirable, acquiescent or consistent with how they

think the researcher wants them to respond (Podsakoff and Organ, 1986). Moreover, we used multiple-item constructs, following Harrison, McLaughlin and Coalter's (1996) suggestion, as common method bias may be more problematic at the item level than at the construct level. In addition, two statistical techniques were followed: First, we used Harman's single-factor test (Podsakoff and Organ, 1986). Results showed that the most variance explained by one factor accounted for only 10.71% and that all of the multiple-item constructs analysed resulted in the expected factor solution (accounted for 77.19%), suggesting that in this study common method bias was not really a concern. Second, we performed the common method factor (CMF) test to find out whether the model was influenced by CMV. This is done by comparing the original CFA results with the result after conducting the CMF, or the common latent factor (CLF), as some researchers refer to it. If the CMV influences the model, the results of both models will be the same, but if the results of the model with CMF or CLF are different from the original model's fit findings, then there is no significant effect of CMV on the hypothesized model. Due to the very poor model fit results when including CMF in the hypothesized model, findings indicate that the influence of common method bias on our results is not problematic.

5. Findings

5.1 Hierarchical linear regression

Next, we tested our research model. To test our study's hypotheses, we used hierarchical linear regression, using the entry approach and centralisation variables to avoid multicollinearity (see Table 4). This approach is considered more appropriate when analysing potentially correlated independent variables. We present the results regarding learning

behaviour from failure in Models 1 and 2; the results on NPD strategy in Models 3, 4 and 5; and the results regarding the commitment to long-term relationships in Models 6, 7 and 8.

< Insert Table 4 About Here >

As shown in Table 4, Models 1 and 2 are tested based on learning behaviour from failure as the dependent variable. In comparison to the base Model 1, the result includes only the four control variables that could affect firms' strategic choice-making (e.g., Child *et al.*, 2003; Yu *et al.*, 2014). These include firm size (number of workers), founding time (up to age six), ownership (different ownership types may differ in the decision-making), and environmental uncertainty. Model 2 explained the effect on learning from failure better when introducing CRM with strategic planning, customer-centric orientation, internal marketing and knowledge management ($\Delta R^2=0.046$, $p<0.01$). Overall, CRM had a direct positive effect on learning from failure, which verifies H2 (strategic planning $\beta=0.283$, $p<0.01$; customer-centric $\beta=0.256$, $p<0.01$; internal marketing $\beta=0.291$, $p<0.01$; knowledge management $\beta=0.288$, $p<0.01$).

Subsequently, we tested the effects on NPD, using Model 3 as the base model, whilst Model 4 tested the main effect of CRM. The addition of the main effect accounted for 8.9% of the variance in NPD over and above Model 3 ($\Delta R^2=0.089$, $p<0.001$). The effect of overall CRM on NPD was significant and positive, specified as strategic planning ($\beta=0.311$, $p<0.001$), customer-centric orientation ($\beta=0.304$, $p<0.001$), internal marketing ($\beta=0.321$, $p<0.001$) and knowledge management ($\beta=0.330$, $p<0.001$). Hence, H1a is supported. The total effects are included in Model 5 – the control variables, independent variable (CRM) and the mediator variable (learning from failure). Adding the mediator (learning from failure) in

Model 5 contributed 13.9% ($\Delta R^2=0.139$, $p<0.001$). These results show the positive effects of CRM (strategic planning $\beta=0.219$, $p<0.001$; customer-centric orientation $\beta=0.223$, $p<0.001$; internal marketing $\beta=0.212$, $p<0.001$; knowledge management $\beta=0.230$, $p<0.001$) and learning from failure ($\beta=0.398$, $p<0.001$) on NPD. In addition, the overall effect of CRM on NPD decreased, when adding learning behaviour from failure (strategic planning β decreased from 0.311 to 0.219; customer-centric β decreased from 0.304 to 0.223; internal marketing β decreased from 0.321 to 0.212; and knowledge management β decreased from 0.330 to 0.230). These results indicate that learning behaviour from failure mediates the association between CRM and NPD.

The same steps were taken to verify the effects on a commitment to long-term relationships. Likewise, adding the CRM dimensions in Model 7 accounted for 15.4% ($\Delta R^2=0.154$, $p<0.001$). The effect of CRM on a commitment to long-term relationships was significant and positive, specified as strategic planning ($\beta=0.406$, $p<0.001$), customer-centric orientation ($\beta=0.395$, $p<0.001$), internal marketing ($\beta=0.384$, $p<0.001$) and knowledge management ($\beta=0.410$, $p<0.001$). Therefore, H1b is supported. Adding learning from failure to Model 8 contributed 4.9% ($\Delta R^2=0.049$, $p<0.001$). These results are evidence of the positive effects of CRM (strategic planning $\beta=0.342$, $p<0.001$; customer-centric $\beta=0.327$, $p<0.001$; internal marketing $\beta=0.319$, $p<0.001$; knowledge management $\beta=0.350$, $p<0.001$) and learning from failure ($\beta=0.220$, $p<0.001$) on commitment to long-term relationships. They also indicate that learning from failure mediates the relationship between CRM and commitment to long-term relationships, as the effect of CRM on a commitment to long-term relationships decreased in Model 8 compared to Model 7 (strategic planning β decreased

from 0.406 to 0.342; customer-centric β decreased from 0.395 to 0.327; internal marketing β decreased from 0.384 to 0.319; and knowledge management β decreased from 0.410 to 0.350).

5.2 Structural equation modelling for further mediation analysis

Based on SEM, we performed a competing model analysis to further validate our mediation analysis, following the approach adopted by Tippins and Sohi (2003). See the SEM mediation analysis in Table 5.

< Insert Table 5 About Here >

The first model (the direct model) examines the direct relationship between CRM and NPD and commitment to long-term relationships. The second model (the mediation model) investigates the same association with learning behaviour from failure as the mediator. Comparing the two models, the results support H3a and H3b in three ways: (1) The mediation model demonstrates more variance of NPD and commitment to long-term relationships, respectively (0.124 vs. 0.196 for NPD, 0.169 vs. 0.242 for commitment to long-term relationships). (2) Although the positive relationship between CRM and NPD/commitment to long-term relationships were significant (*H1a*: strategic planning $\beta=0.290$, $p<0.001$; customer-centric $\beta=0.286$, $p<0.001$; internal marketing $\beta=0.292$, $p<0.001$; knowledge management $\beta=0.296$, $p<0.001$; *H1b*: strategic planning $\beta=0.378$, $p<0.001$; customer-centric $\beta=0.410$, $p<0.001$; internal marketing $\beta=0.340$, $p<0.001$; knowledge management $\beta=0.382$, $p<0.001$), these relationships decrease significantly in the mediation model (effect on *NPD* from strategic planning $\beta=0.210$, $p<0.01$; customer-centric $\beta=0.222$, $p<0.001$; internal marketing $\beta=0.208$, $p<0.001$; knowledge management $\beta=0.216$, $p<0.001$ and effect on

commitment from strategic planning $\beta=0.320$, $p<0.001$; customer-centric $\beta=0.342$, $p<0.001$; internal marketing $\beta=0.300$, $p<0.001$; knowledge management $\beta=0.314$, $p<0.001$). (3) The effect of learning from failure on NPD and commitment to long-term relationships were both significant (NPD $\beta=0.310$, $p<0.001$; commitment $\beta=0.218$, $p<0.001$). As a result, we can further validate the role of learning behaviour from failure as a mediator between CRM and firms' NPD and commitment to long-term relationships.

6. Discussion

This paper theoretically developed and empirically examined a model of CRM, learning behaviour from failure, NPD and commitment to maintaining long-term relationships. The study has provided conceptual and empirical evidence advancing our theoretical understanding of the variables by studying the relationships among them, addressing how to overcome CRM pitfalls, expressed recently by academics as an area of great importance (Boulding et al., 2005).

The findings demonstrate that CRM affects both *internal* value (i.e., NPD) and *external* value (i.e., commitment to long-term relationships). For example, although all four aspects of CRM are important to NPD, knowledge management is of particular importance ($\beta=0.296$, $p<0.001$), as it showed the greatest effect. To achieve commitment to long-term relationships, all aspects of CRM also have positive effects. However, efforts of customer-centric orientation help relationship building the most ($\beta=0.410$, $p<0.001$). This is followed by knowledge management, strategic planning and internal marketing, respectively; each of which demonstrates that CRM must permeate the entire organisation for the most effective

results (Zablah *et al.*, 2004). Such itemisation of CRM to both NPD and commitment to maintaining long-term relationships are new to the literature.

The results also verify and provide new empirical relationships on CRM's interactions with learning behaviour from failure, NPD and commitment to maintaining relationships. Consistent with previous studies, the results indicate that knowledge management has a significantly positive effect on NPD performance (e.g., Marvel and Lumpkin, 2007). We have extended existing literature by showing that the positive effect of strategic planning, customer-centric orientation, internal marketing and knowledge management on NPD performance is mediated by learning behaviour from failure. This supplements the literature on CRM's mechanism and NPD performance. Specifically, we also demonstrate that CRM enhances commitment to maintaining long-term relationships. Although this is sometimes considered inherent in CRM (Boulding *et al.*, 2005), the results provide empirical support, specified across decomposed dimensions of CRM and, more importantly, via the perspective of learning from failure. Learning behaviour from failure is shown to enhance the organisation's ability to identify mistakes and let-downs in the NPD process and commitment to maintain relationships, and to help them make adjustments accordingly. When corrections are in place, the organisations may implement more viable CRM procedures, adopt new technologies or target new markets to achieve their goals of value co-creation and NPD (Aiman-Smith and Green, 2002; Shane and Eckhardt, 2003).

Consistent with previous works, we reveal that knowledge management shapes high technology ventures' NPD performance (Larraneta *et al.*, 2012), demonstrating that knowledge is a vital strategic asset for CRM strategic planning (Jantunen, 2005) and that the

acquisition of customer and market knowledge via CRM's customer-centric orientation enhances the range and depth of firm-specific knowledge. Furthermore, our findings also suggest that the effective application of knowledge transforms it into value-creating assets via CRM's internal marketing. This knowledge management application increases the potential to develop novel products to serve the markets (Yu et al., 2014a), increase market share (Chang et al., 2010) and help firms to develop more long-term relationships (Moorman et al., 1992), contributing to overall favourable performance (Bohling et al., 2006).

To frame our conceptual model, we used experiential learning and organisational learning theory to discuss the relationships across CRM, learning behaviour from failure, NPD performance and commitment to long-term relationships. Previously, experiential learning theory has mostly been used in the psychology, management, education, computer science and medical fields (Kolb et al., 2001). In the fields of information systems and marketing, experiential learning theory remains sparse. Hence, its extension to internal marketing, in particular, is a worthwhile effort, as the findings highlight that internal marketing is critical to enhancing organisational learning behaviour, including those from failure. We posit that the communications line integrated within internal marketing provides a critical feature that assists in the overall learning experience.

6.1 Theoretical contributions

The following section highlights this study's major theoretical contributions. Few previous studies have connected CRM to NPD or commitment to long-term relationships (e.g., Yan et al., 2020). Although it is agreed that technology and marketing management are the key success of new service or products, the previous studies have individually studied

NPD and CRM, and their impact is explored based on different perspectives (Yan et al., 2020; Jin et al., 2019). Also, the previous studies have not assessed the influence of learning behaviour from failure on CRM. Thus, to the best of our knowledge, the study is the first to examine CRM, associate these aspects to learning behaviour from failure, and, subsequently, investigate key outcomes, such as NPD and commitment to long-term relationships. In addition, previous studies have found the different outcome of the impacts of NDP and CRM. Based on our study, technology is essential for the success of NDP and this important study requires further consideration. In addition, our study contributed to the emerging economy by emphasising the impact of CRM on learning behaviour from failure. Companies face many challenges regarding speedy improvement of the technologies environment and learning behaviour from failure requires further attention in strategic and marketing research. In addition, it is vital to consider the influence of NDP related strategic issued on companies in emerging economies.

Furthermore, this study contributes to CRM literature based on our conceptualisation of CRM through four aspects (strategic planning, customer-centric orientation, internal marketing, and knowledge management). The key contribution lies in the developing of the relationship between CRM and strategic planning, customer-centric orientation, knowledge management, internal marketing and learning behaviour from failure as a new group of antecedents for new technology firms' NPD performance. We thus progress the theory on CRM's interactions with learning behaviour from failure, NPD and commitment to maintaining relationships in a single model in the context of China's high technology industry.

As this study empirically examined relationships among CSR components and NDP from the experiential learning and organisational learning theories, thus our study is extending knowledge strategic issues related to the thereby advancing understanding of strategic issues related to NPD in emerging economies. Also, we contribute to CRM research from the knowledge management perspective. Consistent with the knowledge-based view, our findings show that the ultimate source of competitive advantage is knowledge (Araújo et al., 2018; Madhavan and Grover, 1998). We advance previous understanding of knowledge management's effect on NPD performance and commitment to long-term relationships. Finally, we used and extended experiential learning theory to the context of CRM and internal marketing in particular by revealing that CRM is an antecedent of learning behaviour from failure.

6.2 Managerial implications

To manage failure more strategically, organisations must focus on developing novel approaches in the application of CRM and those related to learning related to failure (Payne and Frow, 2005). In addition, in emerging economies, they focus on developing new opportunities for the organisations specific to multinational companies which are looking for expansions and gaining stronger NPD. Though dynamic markets generate severe challenges for the organisations. As there is a lack of study in the field, our research has delivered valuable information to the managers and some recommendations for the policymakers of emerging economies.

Specifically, we note that NPD requires attention and to improve NPD performance, new technology ventures must proactively emphasise the benefits of learning, especially from failure. Since NPD is a process of learning, we propose using failure as a source of unique knowledge that can help make adjustments and transformations. A CRM system should be implemented, with the added feature of making it a failure detection system that monitors and tracks any conflicts and tensions, so that appropriate action can be taken rapidly should they occur.

In addition, the four CRM aspects (i.e., strategic planning, customer-centric orientation, internal marketing and knowledge management) are essential and are related to how customer-relationship resources are employed by the company. In addition, CRM aspects may act as important evaluative criteria in CRM implementation and will facilitate decisions about which CRM aspects are important for achieving the respective outcome (i.e., NPD and/or long-term relationships). In the era of big data, companies have access to the enormous amount of information from customers and to reduce the negative influence of customer information, managers should cautiously consider the operation of the data. This study provides a valuable guideline for policy-makers of emerging economies which are looking to adjust their marketplaces to inspire innovation. As the Chinese government is supportive to the companies for NPD, the results of our study provides a guideline which companies should follow for building technologically innovative knowledge. In addition, the failure detection system should monitor all four aspects of CRM in order to analyse, identify

and correct any failings across the organisation. This highlights the need to ensure that every division in the firm understands a consistent ethos about failure, how to enable learning from failure and how to absorb this unique knowledge for further development.

6.3 Limitations and directions for future research

Although this study makes important theoretical and managerial implications, we acknowledge some limitations. Firstly, as the data were collected from China's technology industry only, it is unclear whether the results are generalisable to other sectors or emerging/developed countries (e.g., Yan et al., 2020). Secondly, the use of a single-method approach may raise concerns about CMV, although several analyses were conducted to confirm the minimal extent of the bias (Alegre et al., 2013). Thirdly, we note that the study did not control for the organisations' prior NPD experience or innovative capability, which could partially influence their failure experiences and subsequent learning from failure.

As a result, future studies are recommended to control for the firm's prior NPD experiences or innovation abilities, in order to better understand whether these factors affect the results. Future studies should also consider the including of new elements, such as knowledge sharing, knowledge flow and knowledge stocks to extend the scope of the research. Other CRM dimensions could be included, for example, Jaber (2012) includes culture and leadership, project management and innovation as additions to CRM adoption. In addition, a longitudinal approach may also be considered to enable the theoretical reflection of the study's results. Finally, the findings should be calibrated to widen the distinctive organisational capabilities and its effect on firms' CRM-NPD performance.

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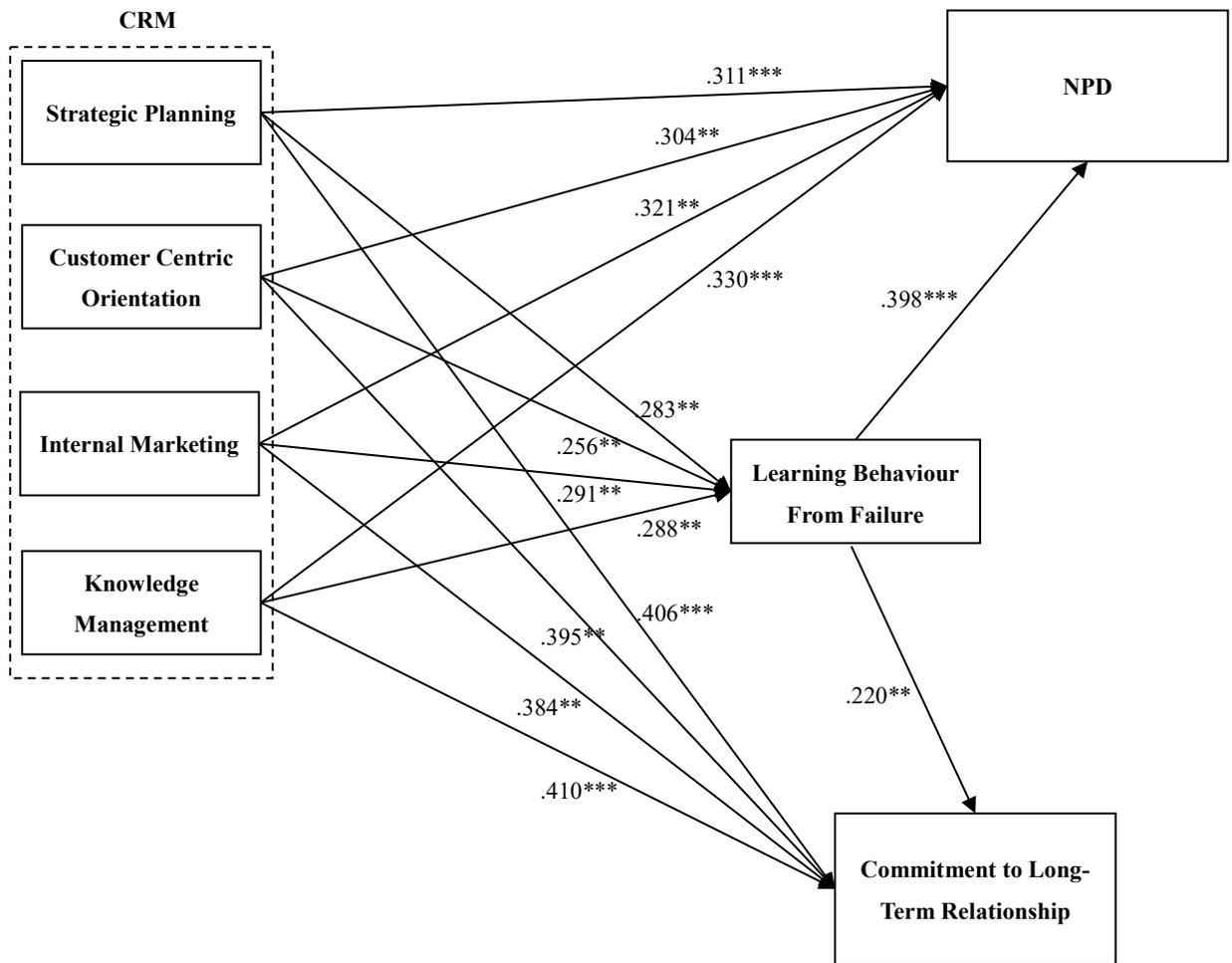


Figure 1. Structural Model Results

*p<.005 **p<.01 ***p<.001

Table 1. Participating Organisations and Respondents' Profiles (N=234)

Sample Characteristics	Frequency	Percentage
Gender		
(1) Male	127	55.3
(2) Female	107	45.7
Age of entrepreneur		
(1) <30	62	26.5
(2) 30-40	125	53.4
(3) 40-50	40	17.1
(4) >50	7	3.0
Education Level		
(1) Secondary education	40	17.1
(2) Bachelor	132	56.4
(3) Master	57	24.4
(4) Doctor	5	2.1
Firm Age		
(1) ≤2 year	32	13.7
(2) 3-4 year	93	39.7
(3) 5-6 year	55	23.5
(4) 7-8 year	54	23.1
Employee No.		
(1) 1-20	62	26.5
(2) 21-50	58	24.8
(3) 51-200	92	39.3
(4) ≥201	22	9.4
City		
Shanghai	89	38.0
Beijing	82	35.0
Hangzhou	63	27.0

Table 2. Factor Analysis

Construct	Items	Loading	t-value	α	CR
CRM strategic planning	SP1	.878	20.281	.962	.936
	SP2	.960	22.070		
	SP3	.832	21.372		
	SP4	.923	20.730		
	SP5	.845	20.533		
CRM customer-centric orientation	CCO1	.962	24.982	.940	.938
	CCO2	.982	38.027		
	CCO3	.926	26.701		
	CCO4	.890	24.229		
	CCO5	.867	22.471		
CRM internal marketing	IM1	.978	19.892	.928	.936
	IM2	.980	20.708		
	IM3	.990	20.665		
	IM4	.982	24.826		
	IM5	.931	21.639		
CRM knowledge management	KM1	.972	16.728	.946	.920
	KM2	.920	20.027		
	KM3	.912	22.282		
	KM4	.967	24.601		
	KM5	.897	20.644		
Learning behavior from failure	LBF1	.910	19.638	.935	.918
	LBF2	.908	22.372		
	LBF3	.918	20.383		
	LBF4	.932	18.370		
	LBF5	.920	20.553		
	LBF6	.922	24.270		
	LBF7	.878	21.981		
New product development	NPD1	.960	20.172	.960	.922
	NPD2	.880	19.881		
	NPD3	.927	20.619		
	NPD4	.930	25.280		
	NPD5	.864	22.538		
Commitment to relationship	COM1	.821	18.373	.906	.910
	COM2	.890	20.232		
	COM3	.924	20.901		
	COM4	.918	24.276		
	COM5	.924	22.648		

Note: α = Cronbach's Alpha; CR = Composite reliability

Table 3. Descriptive Statistics and Correlations Matrix^a

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. New Product Development	5.61	1.271	.836										
2. Commitment to Relationship	5.59	1.285	.212**	.812									
3. Ownership	3.41	.811	.056	.040	.827								
4. Employee Number	74.15	67.352	.082	-.043	-.043	.832							
5. Firm Age	4.31	2.241	.010	-.037	-.026	.031	.871						
6. Environment Uncertainty	4.12	1.8	.103	-.021	-.071	.076	-.049	.822					
7. Strategic Planning	5.347	1.583	.319**	.337**	-.112	.128*	-.028	.121*	.829				
8. Customer-Centric	5.301	1.492	.271*	.246*	-.061	.132	.033	.089	.113	.860			
9. Internal Marketing	5.354	1.537	.301*	.311*	-.034	.082*	-.056	.101	.092	.043	.842		
10. Knowledge Management	5.412	1.297	.277**	.273**	-.029	.098	-.044	.079*	.109	.081	.165*	.819	
11. Learning from Failure	5.328	1.231	.342**	.291**	.131	.072	.026	.054	.056	.037	.132**	.0721	.802

SD, standard deviation. Square root average variance extracted values are shown along the diagonal line in bold.

** Significant at the 0.01 level (1-tailed)

* Significant at the 0.05 level (1-tailed)

Table 4. Results of Hierarchical Regression Analysis^a

Variables	Learning Behaviour From Failure		New Product Development			Commitment to Long-Term Relationships			
	M1	M2	M3	M4	M5	M6	M7	M8	
Controls									
Ownership	.155*	.163**	.096	.108	.061	.041	.065	.041	
Employee Number ^b	.112	.073	.148**	.110†	.083	-.037	-.089	-.104	
Firm Age	.009	.018	-.007	.009	.003	-.034	-.021	-.019†	
Environmental Uncertainty	.038	.021	.090	.073	.061	-.011	-.059	-.063	
Independent Variables									
Strategic Planning		.283**		.311***	.219***		.406***	.342***	
Customer-Centric		.256**		.304**	.223**		.395**	.327**	
Internal Marketing		.291**		.321**	.212**		.384**	.319**	
Knowledge Management		.288**		.330***	.230***		.410***	.350***	
Mediating Variable									
Learning from Failure					.398***			.220**	
R ²	.034	.078	.049	.134	.269	.011	.161	.208	
Adjusted R ²	.018	.056	.030	.116	.248	-.018	.140	.169	
R ² change	.034	.046	.049	.089	.139	.011	.154	.049	
F change	1.623	10.492**	2.198†	20.570***	39.722***	.210	38.020***	10.820**	

^a Reports standardised regression coefficients

^b Natural log value of total employee number

†: p<0.1; *: P<0.05; **: P<0.01; ***: P<0.001

Table 5. SEM Mediation Analysis^a

	Direct effect without learning from failure		Indirect effect with learning from failure	
	NPD	Commitment to Long-Term Relationships	NPD	Commitment to Long-Term Relationships
Independent Variables				
Strategic Planning	.290***	.378***	.210**	.320***
Customer-Centric	.286**	.410***	.222***	.342***
Internal Marketing	.292***	.340**	.208**	.300**
Knowledge Management	.296***	.382**	.216**	.314**
Learning From Failure			.310***	.218***
Control Variables				
Ownership	.053	.060	-.012	.022
Employee Number	.062	-.076	.044	-.082
Firm Age	.030	-.010	.028	-.016
Environmental Uncertainty	.048	-.056	.038	-.064
R ²	.124	.169	.196	.242
Goodness-of-fit statistics				
χ^2	148.038 (p=.001)		280.502 (p=0.000)	
d.f.	110		168	
Goodness of Fit Index [GFI]	.912		.904	
Comparative Fit Index [CFI]	.970		.982	
Tucker-Lewis Index [TLI]	.980		.975	
DELTA2=Incremental Fit Index [IFI]	.970		.982	
Root-Mean-Square Error of Approximation [RMSEA]	.044		.044	

^a Standardised path coefficients

* P<0.05; ** P<0.01; *** P<0.001

Appendix A: The notion of CRM from key recent articles (2019 and 2020)

Reference	Purpose	Definition	Customer relationship management	Strategic Planning	Centric Orientation	Internal Marketing	Knowledge Management	Learning Behaviour From Failure	New product development	Commitment to Long-Term Relationship
Ambroise et al., 2020	... “aims to explore the complex relationships between knowledge strategies (i.e. exploration and exploitation) and the performance of manufacturing SMEs by testing the mediating role of customer relationship management capabilities, which are defined as a firm’s level of interaction orientation in this study” (p. 1)	... “as a process that is concerned with managing customer interactions for the purpose of promoting the establishment and maintenance of long-term, profitable relationships” (p. 2)	×	×	×	□	□	×	×	□
Cao and Tian, 2020	... “aims to draw on the absorptive capacity theory, research on marketing capabilities and marketing analytics to examine the capability-developing mechanisms that enable a firm to use marketing analytics to enhance its CRM and brand management capabilities, thereby improving its marketing performance” (p. 1289)	... “is a firm’s ability to build relationships with potential customers and ability to leverage the established relationship with customers to acquire new customers and retain customers ... thereby maximizing customer lifetime value and profit” (p. 1290)	×	□	□	□	×	□	×	□
Dehghanpouri et al., 2020	... “is to examine the effect of trust, privacy, service quality and customer satisfaction on the success of electronic customer relationship management (E-CRM) systems” (p. 1)	... “The CRM is a composite process of business to eliminate the needs of customers, perform all the elements of the system and manage all the expectations” (p. 1)								

Feng et al., 2020	... “how unprofitable customers should be managed has recently received increasing research attention from the customer and manager angles, but the effects of unprofitable customer management (UCM) strategies on shareholder value is unknown	... “CRM focused on which customers to target with cross-selling, and how to match customers to different channels, and general marketing mix interventions, but these are all after they have become customers and the firm has access to customer behavior and profitability data” (p. 268)	×	×	□	□	×	□	×	□
Foltean et al., 2019	...drawing from institutional theory and capabilities theory, this study identifies the influence of customer coercive pressure and competitor mimetic pressure on SMT use. In addition it investigates the mediator role of CRM capabilities in the relationship between SMT use and firm performance	... “CRM is a core marketing process that influences firm performance and survival. As a strategic approach, CRM aims to increase shareholder value by creating, developing, and maintaining win-win relationships with valuable customers and key stakeholders, integrating the relationship marketing perspective and information technology in this process” (p. 566)	×	□	×	□	□	□	×	□
Hallikainen et al., 2020	... “focuses on the use of big data analytics in managing B2B customer relationships and examines the effects of big data analytics on customer relationship performance and sales growth” (p. 90)	... “an ongoing pro-cess that involves the development and leveraging of market intelligence for the purpose of building and maintaining a profit-maximizing portfolio of customer relationships” (p. 92).	×	□	□	□	□	□	□	□
Hollebeek et al., 2019	...based on the macro-foundational theory of service-dominant, this study develop an integrative, service-dominant logic–informed framework which apply on to customer relationship management.	...can be define “narrowly and tactically’ (e.g., implementing a technology solution) to ‘CRM defined broadly and strategically’ (i.e., CRM as a holistic approach to managing customer relationships to create shareholder value)” (p. 174)	×	×	×	□	×	×	□	□
Kim et al., 2019	...”investigates the role of institutional factors in adopting new technologies to strengthen customer relationship management capabilities and improve company performance has not yet been investigated” (p. 749)	...”often use a hunter–farmer model in which some salespeople are responsible for customer acquisition (hunting) while others are responsible for customer maintenance (farming) to take advantage of the benefits of specialization in skills needed for these two types of activities” (p. 763)	×	×	□	□	□	□	□	□

Kumar and Misra, 2020	... “purpose of this research paper is to evaluate the effects of customer relationship management (CRM) practices on the relationship of organizational learning (OL) with customer satisfaction (CS) essentially dealing with industrial and business organizations. Industrial organizations could benefit from this study’s contributions, where the effectiveness of OL and its antecedents is measured over the level of CS in the presence of CRM practices” (p. 1)	.. “is a term that suggests originating, upholding and managing relations with present and prospective customers” (p. 4).	×	□	×	□	×	×	□	□
Migdadi, 2020	... “introduce a unified framework, which integrates knowledge management (KM) (knowledge acquisition, diffusion and application, knowledge from a customer, knowledge about customers and knowledge for customers), customer relationship management (CRM) success (information sharing, customer involvement, long-term partnership, joint-problem solving and technology-based CRM) and innovation capabilities (ICs) (product innovation, process innovation, marketing innovation, service innovation and administrative innovation). Then empirically test the effect of KM on CRM success, the effect of CRM success on IC and the impact of KM on IC through the mediator” (p. 1).	... “is about managing customer knowledge to better understand and serve them” (p. 1)	×	□	×	□	×	□	×	×
Nelson et al., 2020	... “to identify the impact of analytical customer relationship management (CRM) on salesperson information use behavior” (p. 1)	... “CRM is primarily intended to be a managerial tool designed to produce larger scale replicable business processes throughout the salesforce” (p. 2)	×	□	□	□	□	□	□	□
Nelson et al., 2020	...to identify the impact of analytical customer relationship management (CRM) on salesperson information use behavior	“Analytical CRM refers to the tool used to analyze customer and market information for the purpose of providing intelligence and insights using a CRM system ... which can be effectively used for tactical purposes ... aids in rapid decision making by allowing the salesperson to quickly analyze data from multiple sources”.	×	□	×	□	×	□	□	□

Po-An Hsieh et al., 2011	... based on sensemaking theory, this study develops aims to “understand the antecedents, contingencies, and consequences of customer service employees’ extended use of customer relationship management (CRM) technologies” (p. 2)	... use “to support or enable service work in order to deliver service efficiently and to meet customer needs effectively, thus improving customer satisfaction” (p. 3)	×	□	□	□	×	□	×	□
Udunuwara et al., 2019	... “addresses the question ‘what is the impact of VSB on the relationship between CRM and its outcomes: repeat visitation and positive word of mouth?’” (p. 444)	... “is concerned with the relationships between organizations and both potential and current customers” (p. 445)	×	□	□	□	□	□	×	□
Yan et al., 2020	... “aims to investigate how to improve new product performance in turbulent circumstances of emerging economies” (p. 1)	... “refers to the process by which firms acquire advantageous customer knowledge. It refers to the extent to which a company seeks to develop long-term relationships with its customers” (p. 1)	×	×	□	□	×	□	×	□
Yan et al., 2020	...”aims to investigate how to improve new product performance in turbulent circumstances of emerging economies”.	...refers “to a marketing management concentration for NPD, while “PDM” refers to a technological management concentration ... and improves firms’ ability to respond to external market opportunities and threats”.	×	×	×	□	×	□	□	□
Zhang, 2019	... “proposes a Bayesian spatiotemporal model that simultaneously captures the effects of the interactions between customers and the firm, the static interdependence due to customers’ inherent similarities, and the dynamic interdependence arising from observed interactions among customers” (p. 723)	... refers to “customers’ interactions with the firm and among themselves evolve” (p. 731)	×	□	□	□	□	□	×	□

x = discussed in the paper; □ = not discussed in the paper

Appendix B - Measurement Items and Validity Assessment

Items description summary

CRM – Strategic Planning

1. Our organisation has clear business goals related to customer acquisition, development, retention and reactivation.
2. In our organisation, CRM is an important strategic issue.
3. There is a top-down planning process for linking CRM strategy to business needs.
4. All of our business functions (e.g., marketing/sales, manufacturing, research and development) are integrated into serving the needs of our target markets.
5. Our organisation allocated multi-functional teams that work on plans to achieve CRM objectives.

CRM – Customer-Centric Orientation

6. We continuously track customers' information to assess customers' lifetime value.
7. We use information technology to help us determine which of our current customers are of the highest value.
8. Our organisation systematically attempts to manage the expectations of high value customers.
9. We are structured to optimally respond to groups of customers with different needs.
10. We have technologies that allow for one-to-one communications with potential customers.

CRM – Internal Marketing

11. Our organisation tries to help employees understand what is happening in the organisation.
12. Effective communication channels often support the implementation of CRM.
13. Staff training emphasises internal communication and cooperation across departments to build customer relationships.
14. Our organisation encourages communication between different levels and functional units.
15. Communication in our organisation helps inform employees of the details of the CRM program and the problems that may occur during the execution.

CRM – Knowledge Management

16. Our organisation maintains a comprehensive database of our customers.
 17. Our organisation is able to provide fast customer response because of integrated customer knowledge across several functional areas.
 18. Our organisation can generally predict future customers' expectations.
 19. Information on customers is disseminated throughout the organisation.
 20. In our organisation, customer information is redirected to the right people.
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Learning Behaviour From Failure

1. When a problem for completing a task is raised, our employees provide an immediate solution, but also inform the management and the relevant department of the problem.
2. When an employee makes a mistake, his/her co-workers talk to him/her, not for the purpose of blaming them, but rather for the value of learning.
3. When employees make a mistake, they inform the relevant manager to allow others to learn from it.
4. A question such as, 'Why do we do the things in such a way?' is fully appreciated in our company.
5. Employees in our company are encouraged to ask questions, such as, 'Is there a better way to produce the product or provide the service?'
6. In our company, someone always makes sure that we stop to reflect on the organisation's work process.
7. People in our company often speak up to test assumptions about issues under discussion.

New Product Development

1. Frequently introducing new products.
2. Being first in new product introductions in the market.
3. Quickly launching new products onto the market.
4. Developing new products with superior quality.
5. Using new products to penetrate markets.

Commitment to Maintain Long-Term Relationship

1. We believe that over the long run, our relationship with the customers will be profitable.
 2. Maintaining long-term relationships with the customers is important to us.
 3. We focus on long-term goals in our customer relationships.
 4. We are willing to make sacrifices to help our customers from time to time.
 5. We care about the long-term success of our customer relationships.
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