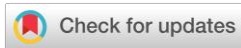


Effect of Digital Transformation on Smart Business Model Adoption in Retail Firms: Evidence from fsQCA

Muhammad Haseeb^{1,*} 

* Correspondence: School of Economics and Management, Wuhan University, China; haseeb.ecb@gmail.com

¹ School of Economics and Management, Wuhan University, China; haseeb.ecb@gmail.com



Citation: Haseeb, M. (2026). Effect of Digital Transformation on Smart Business Model Adoption in Retail Firms: Evidence from fsQCA. *Business Research Review*, 1(2), 116-130. <https://doi.org/10.66348/brr.26.a95>

Received: 2026-07-14

Revised: 2026-09-28

Accepted: 2026-09-29

Published: 2026-09-30

Copyright: © 2026 by the authors.

This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution 4.0 International (CC BY 4.0) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: As smart business model innovation has become a strategic priority for retail companies looking to improve their competitiveness, digital transformation has emerged as a strategic imperative. But the research to date generally only considers the individual impacts of digital transformation capabilities, with linear analytical approaches, offering limited knowledge about the interactions of capabilities in the adoption of smart business models. This study aims to fill this gap by exploring the configurational pathway to the adoption of smart business models within retail companies in China. The study is based on Dynamic Capabilities Theory and the Technology–Organization–Environment (TOE) Framework that considers the roles of digital leadership, digital technology capability, organizational agility, digital skills, and customer digital orientation. A structured questionnaire with five-point Likert-scale measures was used to collect data from 130 managers from Chinese retail companies. The data were analysed using Fuzzy-set Qualitative Comparative Analysis (fsQCA), which was used to draw out the necessary and sufficient conditions and configurations for high smart business model adoption. The findings show that the necessary condition for smart business model adoption is capability with digital technology. In addition, three other types of digital transformation capabilities are found, showing that smart business models can be adopted on multiple strategic paths within retail. The findings also validate the concepts of equifinality and causal asymmetry which means that the configurations that contribute to successful adoption of a business model are different from those that contribute to unsuccessful adoption. It makes a contribution to the literature on digital transformation and business model innovation by using a configurational approach to capability integration and it expands the use of fsQCA in the research on digital transformation. The results also provide valuable recommendations for retail managers and policy makers looking to push digital transformation faster and to create smart and sustainable business models in an ever-competitive digital economy.

Keywords: Digital transformation; Smart business model adoption; Retail firms; Digital leadership; Digital technology capability; Organizational agility; Digital skills

1. Introduction

Digital transformation has fundamentally changed the business landscape all over the world by allowing organisations to leverage cutting-edge digital technologies in their operations, customer interactions, and decision-making processes. The development of artificial intelligence (AI), big data analytics, cloud computing, Internet of Things (IoT) and digital platforms has catapulted organisational innovation and brought about a revolution in traditional business practices across industries. Digital transformation is no longer just a technological upgrade but rather a strategic organisational capability that is helping companies to redesign processes, develop new value propositions, and adapt to the fast-paced market conditions (Agarwal et al., 2024; Asa et al., 2026). Bresciani et al. (2021) claim that the digital transformation is a trigger for product, process, and business model innovation, and Saarikko et al. (2020) state that the digitally aware companies are more likely to build the

organizational capability, which is essential for maintaining long-term competitiveness. As a result, organisations are now seeing digital transformation as a must-have investment, not an optional one.

One of the most radical changes due to digitalisation has been in the retail sector. The value chain and customer experience in retail has been revolutionized with the emergence of omnichannel retailing, AI-powered customer services, digital payment systems, smart logistics, and data-driven marketing. Digital transformation affects all facets of retail, including procurement, inventory management, customer engagement and post-purchase services, as Reinartz et al. (2019) show. Similarly, Malenkov et al. (2021) state that digitalisation has enabled retail stores in retail chains to become more efficient, flexible and competitive. In an earlier study, Cao (2014) found that retailers need to redesign their business models when implementing cross-channel strategies, in parallel with the design of the cross channel. Kurt et al., (2020), for instance, observed that digital transformation transforms the traditional marketing business models by introducing more customer interactions, platforms and personalised service delivery.

In the light of the different results of digital transformation, smart business model adoption is becoming more and more research focus as it is a means for companies to create value out of digital technologies, smart decision making and connected business ecosystems. Smart business models combine the use of digital platforms, artificial intelligence, real-time data analytics, and customer-centric innovation to boost organisational performance and competitiveness. Past research has consistently shown that digital transformation can enable business model innovation, and organisational renewal. For instance, Bresciani et al. (2021) show that digital transformation acts as a catalyst to business model innovation, and Rojers (2018) states that technological innovation increases the efficiency of an organisation through business model transformation. Han et al. (2026) more recently discovered that the adoption of AI has a significant positive effect on the digital business model innovation and retail firm performance. Similarly, Casciani et al. (2022) emphasise that digital transformation can serve as an opportunity for sustainability oriented business model innovation, which is where digital technologies are integrated into supply chains or organisational processes.

Yet, there are significant variations between organisations in their capacity to make digital investments work for business model innovation. Past studies have shown that technology capability alone is not enough to achieve successful digital transformation; the benefits of digitalisation are maximized when complemented with other organizational capabilities such as digital leadership, digital technology capability, organizational agility, digital skills and customer digital orientation (Ali et al., 2023; AlMulhim, 2021; Kumar et al., 2026). But most of the studies have focused on these capabilities using regression-based methods or structural equation modelling that estimate the independent net effects of each of the variables (Bresciani et al., 2021; Reinartz et al., 2019; Malekpour et al., 2025). These methods assume linear and symmetrical relationships and so fail to recognise that different mixes of organisational capabilities can achieve the same successful result. Accordingly, there is a lack of empirical evidence on the combination of configurations of digital transformation capabilities that collectively enable smart business model adoption in retail business, especially in the Chinese retail industry, where digital transformation is a significant contributor to economic development and retail innovation.

The current study aims to overcome those limitations and examines the configurations of digital transformation capabilities that result in the adoption of smart business models in retail companies in China. More specifically, the research takes a look at the following causal conditions that are essential for successful business model transformation: digital leadership, digital technology capability, organizational agility, digital skills, and customer digital orientation. Based on Dynamic Capabilities Theory and the Technology–Organization–Environment (TOE) Framework, the study employs Fuzzy-set Qualitative Comparative Analysis (fsQCA), which has the advantage of uncovering the necessary conditions and multiple sufficient conditions for high smart business model adoption. The study makes three

important contributions to the literature on digital transformation, going beyond the traditional linear analyses. Firstly, it contributes to theoretical understanding, by showing how complementary organisational capabilities interact to enable business model innovation. Second, it presents empirical results from China's fast-changing retail industry where digital technologies play a key role in building organisational competitiveness. Thirdly, managers can get practical insights from the study, as it reveals alternative strategic paths for retail companies to successfully implement smart business models in the ever-growing digital business environment.

2. Literature Review

Digital transformation has turned into a strategic imperative for organisations to stay competitive in significantly more technology-driven markets. Digital transformation is not only about how fast organisations are adopting digital technologies; it's about how organisations are adopting digital technologies to their organisational strategies, processes and value creation activities, fundamentally changing how organisations operate and compete. Recent research has emphasized how advancements in technologies like artificial intelligence (AI), Internet of Things (IoT), cloud computing, big data analytics, and automation have spurred innovation within organisations and improved business competitiveness (Agarwal et al., 2024; Asa et al., 2026; Kumar et al., 2026). Bresciani et al. (2021) posited that the digital transformation provides a catalyst for Productivity, Processivity, and Business Modeling innovation, which helps companies to react properly to the customers' changing demands and market conditions. In the same way, Saarikko et al. (2020) stressed that the organisations with digital consciousness have dynamic capabilities that enable steady adaptation and long-term competitiveness. As a result, digital transformation is no longer just an operational effort, but a strategic organisational capability that can help companies build up sustainable competitive advantages.

In the retail industry, digital transformation has revolutionized the way companies operate and how they interact with customers. The fast-growing e-commerce and omni-channel retailing, AI-driven customer services, and data-driven decision-making have forced retailers to reimagine their value creation mechanisms and organisational processes. Reinartz et al. (2019) revealed the retail value chain from procurement to inventory to customer relationship management (CRM) and after-sales is transformed by digital technologies. Similarly, Malenkov et al. (2021) stated that digitalisation has revolutionised the way retail chains work, making them more efficient, coordinated, and customer-friendly. The author Cao (2014) previously demonstrated the need for retailers moving towards a cross-channel approach to also re-imagine their business models to include both channels. Likewise, Caliskan et al. (2021) determined that digital transformation plays a significant role in changing traditional marketing business models with the support of digital customer interaction, platform integration and personalised service delivery.

There is a growing literature that indicates that in order to take up the adoption of smart business models, digital transformation is a critical factor. Smart business models comprise digital technologies, smart decision making, data analytics and interrelated platforms, enabling innovative value proposition and enhancing organisational performance. Bresciani et al. (2021) stated that digital transformation acts as a springboard for business model innovation, which can help companies reimagine their customer experience, product and process offerings. Likewise, Rojers (2018) highlighted the importance of ongoing business model innovation in order to improve the efficiency of the organisation, and Shomali and Pinkse (2016) showed how smart technologies fundamentally change business models in the energy sector. More recently, Han et al. (2026) have found that the use of AI is a significant driver of digital business model innovation and retail firm performance. Similarly, Casciani et al. (2022) revealed that digital transformation fosters sustainability-oriented business model innovation by introducing digital technologies into business supply chains and operations.

Although the significance of the digital transformation has been acknowledged, in the past, studies have consistently termed that digital investments alone are not enough to bring about successful organisational transformation. Rather, organisational capabilities, including digital leadership, technology capability, organisational agility, digital skill and customer digital orientation, are crucial in the firms' ability to effectively leverage digital technologies. Ali et al. (2023) found that technological capability, organisational readiness and environmental support are the three main factors underpinning IoT adoption in the context of digital transformation. Similarly, AlMulhim (2021) showed that the use of smart digital technology has an important positive impact on the performance of firms because they enhance the capabilities of supply chains. Malekpour et al. (2025) also noted a need for complementary organisational capabilities to be developed for technological innovation and digital transformation. The role of AI capability (Agarwal et al., 2024), digital competencies (Kumar et al., 2026) and digital consumer intelligence (Uddin et al., 2026) in ensuring maximum leverage of digital transformation is also highlighted in recent studies.

While significant strides have been made in the understanding of digital transformation and business model innovation, there are still some key research gaps. The existing literature has mostly focused on net impact of digital transformation on organisational performance, innovation or change in business model through regression-based analysis, conceptual review or structural equation modelling (Bresciani et al., 2021; Reinartz et al., 2019; Asa et al., 2026). The interaction between multiple digital transformation capabilities, leading towards successful adoption of smart business models, has been less studied. Furthermore, studies on the adoption of AI (Han et al., 2026), IoT (Ali et al., 2023), and digital marketing transformation (Caliskan et al., 2021), as well as on digital technology capabilities (Tien Dung et al., 2026), have been conducted, but there is a lack of research that examines the alternative configurations of digital leadership, technological capability, organisational agility, digital skills, and customer digital orientation as factors that enable retail firms to adopt smart business models. This restriction ignores the aspects of causal complexity and equifinality in which different mixes of organisational capabilities can lead to the same result. The current study fills this void by employing Fuzzy-set Qualitative Comparative Analysis (fsQCA) and thus identifies multiple pathways that result in high smart business model adoption in retail firms.

Figure 1 shows the conceptual framework of the work, which depicts the combination of multiple digital transformation capabilities and their contribution to smart business model adoption from a configurational perspective in the context of retail companies. The framework is based on Dynamic Capabilities Theory and the Technology–Organization–Environment (TOE) Framework, and suggests that digital leadership, digital technology capability, organizational agility, digital skills, and customer digital orientation are all critical organisational capabilities for retailers to transform their business model successfully to accommodate the swift pace of change in technology. The framework does not presume that the implementation of each capability allows for the high adoption of smart business models, but instead acknowledges that various combinations of these conditions can result in high adoption of smart business models. Following the principles of causal complexity and equifinality, this view indicates that there are multiple alternative ways to enact digital business model transformation successfully, based on the different organisational resources and strategic capabilities retail companies possess. For that reason, the study utilizes Fuzzy-set Qualitative Comparative Analysis (fsQCA) to determine the necessary conditions and sufficient configurations that enable the adoption of smart business models, thus extending beyond a linear approach and contributing a more holistic perspective on digital transformation.

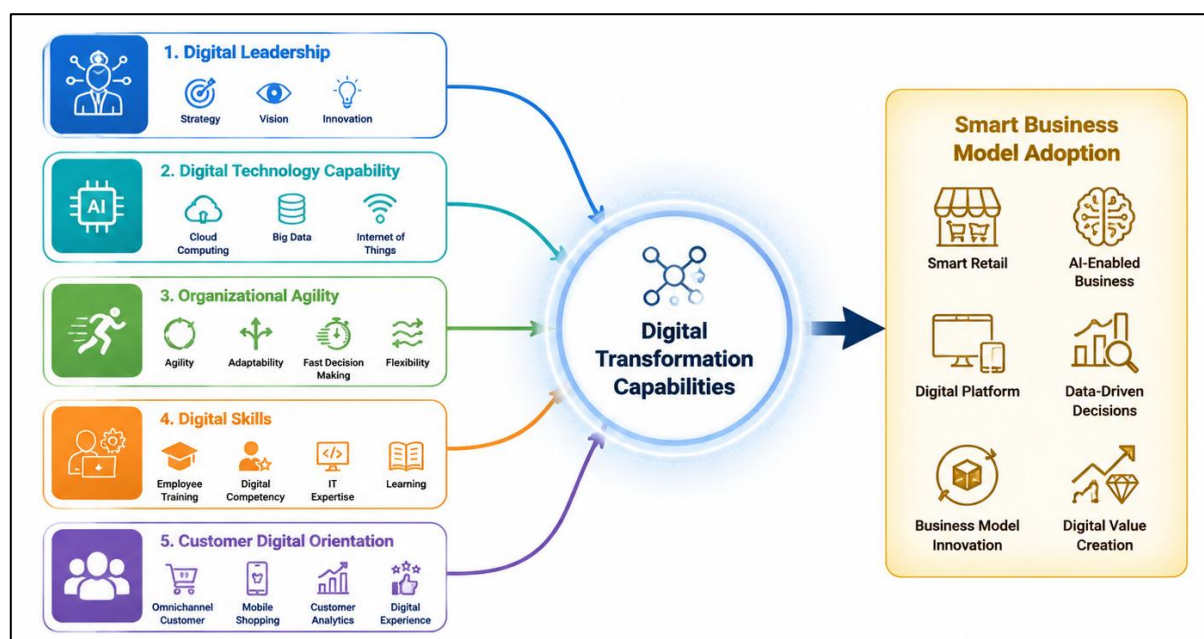


Figure 1. Conceptual model

3. Methodology

3.1 Research Design, Data Collection, and Sample

A quantitative cross-sectional survey design was used in this study to explore the configuration of digital transformation capabilities that helps retail companies to adopt smart business model. The speed of digital commerce, artificial intelligence, big data analysis, and smart retail as well as technologies in China makes it a perfect setting to explore how companies use digital transformation to reimagine their business models. The segment of the population targeted included retail companies with a Digital Transformation initiative in place or under way. The respondents were chosen from senior and middle management professionals such as chief executives, digital transformation managers, information technology managers, operations managers, marketing managers and store managers who have a complete understanding of the organisations' digital strategies and business model development.

Data was gathered from a structured questionnaire through online survey platforms and professional business networks. A purposive sampling technique was used to include those firms that have experience of digital technologies and business model innovation. The questionnaire was face- and content-validated by academic experts and retail practitioners prior to the main survey. Participants were informed that participation was voluntary and all answers anonymous and confidential. A total of 130 completed questionnaires with fewer than 20% missing data were used for analysis. This sample size is adequate for Fuzzy-set Qualitative Comparative Analysis (fsQCA), which configural approaches focus on the identification of causal configurations instead of the estimation of population parameters and can produce solid results in a rather small to medium-sized sample.

3.2 Measurement of Variables

The measurement instrument was designed by adopting existing and proven scales from previous research on digital transformation, digital innovation, and business model transformation. All constructs were measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). There were minor wording changes to make the measurement items more relevant in the context of China's retail industry without altering the conceptual meaning of the original items.

Items adapted from Saarikko et al. (2020), Asa et al. (2026), and Kumar et al. (2026) were used to measure digital leadership, which includes leadership commitment to digital transformation, strategic digital vision, support for innovation, and technology-driven decision-making. Digital technology capability has been measured through items modified from Ali et al. (2023), Agarwal et al. (2024), and AlMulhim (2021), which included firms' ability to adopt and use digital technologies like AI, Cloud Computing, Big Data Analytics, and IoT. Organizational agility was measured through items adapted from Saarikko et al. (2020); Bresciani et al. (2021); and Malekpour et al. (2025) that measured organisational responsiveness, flexibility, adaptability, and quick decision-making in dynamic business environment. Digital skills was assessed through the items adapted from Kumar et al. (2026) and Asa et al. (2026) which measured the digital competencies, technological expertise, digital learning capability, and innovation readiness of the employees. Customer digital orientation was assessed by items adapted from Caliskan et al. (2021), Reinartz et al. (2019), and Uddin et al. (2026) and included items related to firms' customer analytics capabilities, digital platforms, omnichannel services, and personalised digital customer engagement. Finally, smart business model adoption (outcome condition) was measured by items adapted from Bresciani et al. (2021), Han et al. (2026), Tien Dung et al. (2026), and Cao (2014), indicating the level of integration of digital technologies in value creation, business operations, customer interactions, and revenue generation.

3.3 Analytical Approach

Fuzzy-set Qualitative Comparative Analysis (fsQCA 4.1) was used to determine the set of digital transformation capabilities that are linked to high adoption of smart business models for the Chinese retail firms. The fsQCA method differs from the traditional regression analysis because it allows the identification of different sets of interacting conditions that can produce an organisational outcome rather than individual net effects. This is especially relevant to the study of digital transformation, which can involve various mixtures of organisational capabilities resulting in the same successful effect. Furthermore, the principles of equifinality, conjunctural causation, and causal asymmetry are explicitly embraced by fsQCA and are well suited to address complex organisational phenomena.

The analysis was conducted following the normal fsQCA process. Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) were used to examine the reliability and convergent validity of the measurement scales. Then, the original Likert-scale answers were recoded as fuzzy-set membership scores, based on the direct calibration method proposed by Ragin (2008). As is customary, the thresholds for full non-membership, full membership and the crossover point were set at the 5th percentile, 50th percentile and 95th percentile, respectively. A necessity analysis followed the calibration in order to identify conditions that are indispensable for attaining high adoption of smart business models. Then, the truth table was built and frequency and consistency thresholds were used for the analysis, after which the sufficiency analysis was executed to find out alternative causal configurations. Finally, the solutions were analyzed using consistency, raw coverage, unique coverage, and overall solution coverage, and multiple combinations of digital transformation capabilities that will help Chinese retail companies successfully adopt smart business models were revealed.

4. Results and Discussions

4.1 Demographic Profile of the Respondents

The table below (Table 1) shows the demographic characteristics of the 130 respondents that took part in this study. There were 76 males and 54 females in the sample, which is a fairly even division of males and females. Most respondents were in the age group 31-40 years (36.2%) and 41-50 years (29.2%), indicating that the majority were experienced professionals with decision making in the organisation. In terms of education, the respondents were quite well educated with 46.9% holding a bachelor's degree and 30.0% a master's degree. Organisational role-wise, the highest representation was seen among

IT/Digital Managers (23.8%) followed by Store Managers (22.3%) implying the respondents had some relevant knowledge of digital transformation initiatives in their organisations. The majority of firms participating were medium sized enterprises (44.6%) followed by large firms (29.2%) and small firms (26.2%). The respondents come from a variety of industries such as grocery & supermarket, fashion & apparel, electronics, department store and ecommerce, which represents the all-round situation of China's retail industry. The demographic profile overall shows that the sample is suitable for analysing the configurations of digital transformation capabilities related to smart business model adoption.

Table 1. Demographic Profile of the Respondents (n = 130)

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	76	58.5
	Female	54	41.5
Age (Years)	Below 30	28	21.5
	31–40	47	36.2
	41–50	38	29.2
	Above 50	17	13.1
Education	Diploma	21	16.2
	Bachelor's Degree	61	46.9
	Master's Degree	39	30.0
	Doctorate	9	6.9
Position	Store Manager	29	22.3
	Operations Manager	26	20.0
	Marketing Manager	24	18.5
	IT/Digital Manager	31	23.8
	Senior Executive/CEO	20	15.4
Firm Size	Small (<50 Employees)	34	26.2
	Medium (50–249 Employees)	58	44.6
	Large (≥250 Employees)	38	29.2
Retail Segment	Grocery/Supermarket	32	24.6
	Fashion & Apparel	28	21.5
	Electronics	25	19.2
	Department Store	19	14.6
	E-commerce/Omnichannel	26	20.1

4.2 Descriptive Statistics, Reliability, and Convergent Validity Assessment

Descriptive statistics, reliability and convergent validity of the measurement constructs are reported in Table 2. The mean values were between 3.79 and 3.95, which reveal that there was a general perception of favourable responses on digital transformation capabilities and smart business model adoption. The standard deviation ranged from 0.67 to 0.73 indicating acceptable variability of the responses. The result of the reliability test showed that each of the constructs had Cronbach's alpha values that ranged from a minimum of 0.895 to a maximum of 0.918 which had a critical value of 0.70. Similarly, the Composite Reliability (CR) values were in the range of 0.923 to 0.938 demonstrating good construct reliability. In addition, the Average Variance Extracted (AVE) values of the variables varied from 0.707 to 0.741, which is above the minimum standard of 0.50, suggesting that the variables had satisfactory convergent validity. The constructs with the highest reliability was Smart Business Model Adoption with $\alpha = 0.918$; CR = 0.938 and the highest convergent validity was Digital Technology Capability with AVE = 0.741. Together, the results show that the psychometric properties of all the measurement scales are adequate and their use for the subsequent configurational analysis (fsQCA) is appropriate.

Table 2. Descriptive Statistics, Reliability, and Convergent Validity Assessment

Construct	Items	Mean	SD	Cronbach's α	CR	AVE
Digital Leadership (DL)	5	3.86	0.69	0.901	0.927	0.719
Digital Technology Capability (DTC)	5	3.92	0.71	0.912	0.934	0.741
Organizational Agility (OA)	5	3.79	0.73	0.895	0.923	0.707
Digital Skills (DS)	5	3.83	0.67	0.907	0.931	0.731
Customer Digital Orientation (CDO)	5	3.88	0.72	0.899	0.926	0.714
Smart Business Model Adoption (SBMA)	6	3.95	0.68	0.918	0.938	0.717

Note: α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted.

4.3 Correlation Matrix and Discriminant Validity Assessment

As shown in Table 3, the study constructs are correlated and the discriminant validity of the constructs is assessed. Correlations between constructs ranged from 0.486 to 0.704 and were all positive but not substantial enough to suggest that multicollinearity was an issue. The highest correlation was found between Digital Technology Capability and Smart Business Model Adoption ($r = 0.704$) and between Digital Skills and Smart Business Model Adoption ($r = 0.685$), thus emphasizing the link between technological capability and workforce competency with business model adoption. Also, the diagonal elements of the matrix (AVE) exceeded the inter-construct correlations, with each construct's square root of the Average Variance Extracted (AVE) greater than the Average Variance Extracted of the other constructs. That is, the finding meets the Fornell–Larcker criterion for discriminant validity, meaning that each construct measures a different phenomenon. Thus, the measurement model exhibits good discriminant validity which means that the constructs are empirically distinct and suitable for configurational analysis.

Table 3. Correlation Matrix and Discriminant Validity Assessment

Construct	DL	DTC	OA	DS	CDO	SBMA
Digital Leadership (DL)	0.848					
Digital Technology Capability (DTC)	0.564	0.861				
Organizational Agility (OA)	0.498	0.612	0.841			
Digital Skills (DS)	0.547	0.639	0.571	0.855		
Customer Digital Orientation (CDO)	0.486	0.594	0.523	0.558	0.845	
Smart Business Model Adoption (SBMA)	0.643	0.704	0.661	0.685	0.621	0.847

4.4 Calibration of Fuzzy Sets

The fuzzy-set membership scores for the original Likert-scale responses are provided in Table 4. Three qualitative anchors were designated for each construct based on the direct calibration procedure suggested by Ragin (2008): full non-membership (5th percentile), crossover point (50th percentile), and full membership (95th percentile). The values of the crossovers were between 3.70 and 4.00, indicating the maximum possible ambiguity, which is when the cases were neither entirely in nor entirely out of the respective sets. The full membership thresholds ranged from 4.80 to 5.00, meaning that only the respondents with very high scores for their capabilities in digital transformation and very high scores for adoption of a smart business model received strong membership scores. In a similar way, the complete non-membership thresholds varied from 2.10 to 2.40, indicating low levels of the conditions being measured. This calibration process converted the raw survey data into fuzzy-set scores, which maintained the relative degree of membership in each condition, and thus provides a solid foundation for the next step in the analysis: necessity and sufficiency analyses using fsQCA.

Table 4. Calibration Anchors for Fuzzy-Set Membership Scores

Condition	Full Non-Membership (5th Percentile)	Crossover Point (50th Percentile)	Full Membership (95th Percentile)
Digital Leadership (DL)	2.20	3.80	4.80

Digital Technology Capability (DTC)	2.40	3.90	4.90
Organizational Agility (OA)	2.10	3.70	4.80
Digital Skills (DS)	2.30	3.80	4.90
Customer Digital Orientation (CDO)	2.20	3.90	4.90
Smart Business Model Adoption (SBMA)	2.40	4.00	5.00

4.5 Necessity Analysis

Table 5 shows the findings on necessity analysis to achieve high smart business model adoption. In line with well-established fsQCA conventions, a condition is deemed necessary when its consistency value is 0.90 or higher. The results show that only one condition is met, which is Digital Technology Capability (DTC), with a consistency value of 0.912 and a coverage value of 0.826, indicating that having a good technological capability is a must-have for retail businesses looking at implementing smart business models. Digital Leadership, Organizational Agility, Digital Skills and Customer Digital Orientation showed relatively high consistency values but below the recommended level meaning that they are important but not individually necessary conditions. Additionally, when each condition was negated, consistency scores were significantly lower, indicating that none of the negated conditions are necessary for the desired condition. Overall, the results indicate that a range of organisational capabilities are needed to successfully implement smart business models, but only the digital technology capability has proven to be essential.

Table 5. Results of Necessity Analysis for High Smart Business Model Adoption

Condition	Consistency	Coverage	Necessary Condition
Digital Leadership (DL)	0.873	0.764	No
~Digital Leadership (~DL)	0.346	0.291	No
Digital Technology Capability (DTC)	0.912	0.826	Yes
~Digital Technology Capability (~DTC)	0.318	0.276	No
Organizational Agility (OA)	0.884	0.781	No
~Organizational Agility (~OA)	0.372	0.315	No
Digital Skills (DS)	0.895	0.792	No
~Digital Skills (~DS)	0.336	0.289	No
Customer Digital Orientation (CDO)	0.889	0.803	No
~Customer Digital Orientation (~CDO)	0.361	0.304	No

Note: A consistency value ≥ 0.90 indicates a necessary condition (Ragin, 2008).

4.6 Truth Table Construction

Table 6 shows the truth table that was adopted to identify the combinations of digital transformation capabilities that were observed in the literature and in the empirical findings related to smart business model adoption. To ensure that meaningful configurations remain for further analysis, a frequency threshold of three cases, a consistency threshold of 0.80, and a PRI consistency threshold of 0.75 were used following the recommended fsQCA procedures. As seen in the table, there are a number of combinations of the five causal conditions that have consistency ratings above the recommended threshold, which means that they are related to a high smart business model adoption. For instance, the configuration with all of five conditions had the highest consistency value of 0.965, and other configurations with a lack of one condition had high consistency as well. In contrast, those settings that lacked a number of digital transformation capabilities tended to exhibit lower consistency values and were correlated with low digital business model adoption. These results offer preliminary evidence that there are different combinations of organisational capabilities that can yield similar organisational outcomes, and thus support the assumptions of the configurational approach underlying the fsQCA methodology.

Table 6. Truth Table Construction

Configuration	DL	DTC	OA	DS	CDO	Cases	Consistency	Outcome
1	●	●	●	●	●	22	0.965	High SBMA
2	●	●	●	●	○	17	0.944	High SBMA
3	●	●	○	●	●	14	0.931	High SBMA
4	○	●	●	●	●	11	0.918	High SBMA
5	●	●	●	○	●	10	0.906	High SBMA
6	○	○	●	●	●	8	0.811	Low SBMA
7	●	○	○	●	○	7	0.764	Low SBMA
8	○	○	○	○	○	6	0.702	Low SBMA

Notes: ● = Presence of condition, ○ = Absence of condition, Frequency threshold = 3, Consistency threshold = 0.80, PRI consistency = 0.75

4.7 Sufficiency Analysis for High Smart Business Model Adoption

Table 7 presents outcomes of the sufficiency analysis, which includes three alternative configurations which lead to high smart business model adoption. Consistency values were above 0.93 for all three solutions, well above the recommended minimum threshold of 0.80 – this means the solutions each consistently explain the outcome of the phenomenon. The solution with the highest raw coverage (0.481) and consistency (0.952) is solution 1, which is composed of Digital Leadership, Digital Technology Capability, Organizational Agility and Digital Skills, indicating that this combination is the one that explains the higher percentage of successful cases. Solution 2 shows that Digital Leadership, Digital Technology Capability, Digital Skills and Customer Digital Orientation are all equally important while Solution 3 indicates that Digital Technology Capability, Organizational Agility, Digital Skills, and Customer Digital Orientation are also enough to adopt a smart business model. The solution coverage of the overall solution was 0.742, and the solution consistency was 0.938, which means that the proposed configurations can explain about 74.2% of the observed cases with high confidence in the smart business model adoption and at the same time have very high reliability. This clearly illustrates the concept of equifinality: retail companies can transform their business models successfully in different combinations of digital transformation capabilities, and there is no one right way of doing it.

Table 7. Configurations (Sufficiency Analysis) Leading to High Smart Business Model Adoption

Conditions	Solution 1	Solution 2	Solution 3
Digital Leadership (DL)	●	●	
Digital Technology Capability (DTC)	●	●	●
Organizational Agility (OA)	●		●
Digital Skills (DS)	●	●	●
Customer Digital Orientation (CDO)		●	●
Raw Coverage	0.481	0.437	0.396
Unique Coverage	0.108	0.084	0.067
Consistency	0.952	0.941	0.934
Overall Solution	Value		
Solution Coverage	0.742		
Solution Consistency	0.938		

Note: ● = Core condition, Blank = Condition does not contribute to the configuration, Three alternative pathways (equifinality) explain high Smart Business Model Adoption.

4.8 Configurations Leading to the Absence of Smart Business Model Adoption

Table 8 indicates the configurational pathways where smart business model adoption is not present (low level). Three different configurations were found which had

consistency values in the range of 0.891 to 0.918, which means that the explanations were reliable in terms of non-occurrence of the outcome. The first configuration indicates that the combination of Digital Leadership, Digital Technology Capability, Organizational Agility and Customer Digital Orientation is significantly related to low adoption of smart business model. The second configuration indicates that companies that do not have Digital Technology Capability, Digital Skills, and Customer Digital Orientation also have limited chances of successful business model transformation. In the same way, the third configuration emphasizes the fact that another way of not achieving a good business model transformation is the lack of Digital Leadership, Organizational Agility, and Digital Skills. Overall solution obtained had a solution coverage of 0.628 and a solution consistency of 0.907, indicating good explanatory power and reliability. Importantly, these findings support the concept of causal asymmetry, meaning that the conditions that affect the non-adoption of smart business model are not the opposite to those affecting the adoption of smart business model. However, unsuccessful digital transformation manifests itself in various mixes of lacking organisational capabilities, revealing the complexity of digital business model innovation in the retail sector.

Table 8. Configurations Leading to the Absence (Low Level) of Smart Business Model Adoption

Conditions	Configuration 1	Configuration 2	Configuration 3
Digital Leadership	⊗		⊗
Digital Technology Capability	⊗	⊗	
Organizational Agility	⊗		⊗
Digital Skills		⊗	⊗
Customer Digital Orientation	⊗	⊗	
Raw Coverage	0.362	0.317	0.281
Unique Coverage	0.094	0.081	0.062
Consistency	0.918	0.903	0.891
Overall Solution	Value		
Solution Coverage	0.628		
Solution Consistency	0.907		

Notes: ⊗ = Absence (negation) of the condition.

4.9 Discussion

The main goal of this research was to understand the capability configurations that allow for smart business model adoption in retail companies based on a configurational approach. In contrast to previous research that primarily aimed at investigating the effects of digital transformation, this study used Fuzzy-set Qualitative Comparative Analysis (fsQCA) to identify multiple causal pathways to successful smart business model adoption, departing from the symmetric approach that has focused on investigating the independent effects of digital transformation. The results confirm equifinality, causal complexity and causal asymmetry, showing that no one capability in an organisation can explain business model transformation. Rather, the smart business model adoption is a result of varying blendings of digital leadership, digital technology capability, organizational agility, digital skills, and customer digital orientation. These results substantiate the Dynamic Capabilities Theory, which suggests that the firms are gaining competitive advantage by combining and reconfiguring complementary organisational resources, responding to a dynamic technological environment.

The necessity analysis showed that Digital Technology Capability is a necessary condition for a high smart business model adoption. This discovery indicates that technology infrastructure, as well as using digital technologies effectively, are the basic conditions of smart business models at retail firms. This finding aligns with Ali et al. (2023), who found that technological capability is one of the key factors that influences the uptake of IoT in digital transformation. In the same vein, AlMulhim (2021) found that the use of smart digital technologies has a significant positive impact on the performance of organisations

as it increases the operational capabilities and integration of supply chains. Agarwal et al. (2024) have recently provided evidence that artificial intelligence along with other smart technologies have become an irreplaceable force for transforming businesses in the post-pandemic business landscape. Similarly, Han et al. (2026) discovered that the adoption of AI has a direct positive effect on digital business model innovation and on the performance of retail businesses. All these studies and the results of the present study seem to indicate that whatever the organisational characteristics, the enterprise must be equipped with strong digital technology capabilities in order to be able to redesign and implement smart business models.

The sufficiency analysis revealed three different high smart business model adoption configurations, which confirmed that organisations can successfully transform digitally thanks to the combination of various member organisational capabilities. The first configuration, which included Digital Leadership, Digital Technology Capability, Organizational Agility and Digital Skills, accounted for the greatest number of successful cases. This finding indicates that there are complementary roles in visionary leadership, technological infrastructure, organisational adaptability and employee competencies with regard to business model innovation. This is in line with Saarikko et al. (2020), according to which it is necessary for the digitally conscious organisations to have leadership commitment and organisational skills to successfully transform. Likewise, Asa et al. (2026) highlighted the essential role of leadership support, employee digital skills, and strategic adaptation as drivers of digital transformation in SMEs. In addition, Kumar et al. (2026) found that future readiness of businesses is contingent upon the fusion of digital leadership, workforce capabilities, and organizational readiness. All the above indicate that digital transformation is a multi-dimensional organisational process that needs to be worked on with regards to technology, leadership and human capital at the same time.

The second and third configurations show that Customer Digital Orientation and Organizational Agility can serve as substitutes to each other in different combinations of capabilities, so these can serve as additional proof of equifinality. The point is, retail companies can take varying routes with different strategies to get to the same place depending on their strengths and resources. This finding corroborates the idea put forward by Bresciani et al. (2021) that digital transformation acts as a catalyst for business model innovation by combining complementary organisational capabilities and not as an individual technological investment. Similarly, Caliskan et al. (2021) discovered that digital transformation affects the traditional marketing business models and enforces digital interactions with customers and platform-based services. This is also in line with Reinartz et al. (2019) who showed that digital technologies shape the retail value chain in terms of customer engagement, value creation and operational integration. Furthermore, Uddin et al. (2026) emphasized the increasing need for AI-powered customer insights to enhance marketing effectiveness and organizational decision-making. These studies, in their own right, confirm the finding that customer orientation and organisational responsiveness are complementary capabilities that build up the capability of firms for implementing smart business models.

The configurational results also provide empirical support for previous research linking digital transformation with business model innovation. Cao (2014) showed that the retailers that are adopting cross-channel business should rethink their business models to ensure that it will be effective for their business. Likewise, Casciani et al. (2022) pointed out that digital transformation can facilitate business model innovation in a sustainability context by combining digital technologies in supply chains and organisational processes. Rojers (2018) also highlighted that digital transformation is a way to increase the efficiency of organisations in continuous business model innovation, whereas Malenkov et al. (2021) found that retail digitalisation positively affects the operational performance and strategic competitiveness of retail. More recently, Tien Dung et al. (2026) discovered that digital technology capabilities encourage the innovation of digitally enabled eco-business model in retail SMEs. The current study adds to this body of literature by showing that the

adoption of a smart business model is not a question of technological capabilities of individual companies, but rather the result of different mixes of organisational resources and digital transformation capabilities.

Lastly, the analysis of configuration situations that do not result in the adoption of smart business models shows the significance of causal asymmetry. The results show that unsuccessful business model transformation is not just the lack of the successful one, but actually involves varying mixes of missing organisational capabilities. Especially, companies with a low level of digital technology competence in conjunction with a low level of digital leadership, organisational agility, digital skills and customer digital orientation are significantly less likely to use smart business models successfully. This observation confirms the configurational logic of fsQCA and adds to the existing research on digital transformation, which has been based mainly on linear analytical methods. The present study contributes to the literature on digital transformation and business model innovation by showing that retail businesses can reach the same strategic goal by following different paths, and that unsuccessful transformation in retail can be tied to different causal paths. Therefore, managers are advised to not focus on one single digital project but to build up integrated digital capabilities that increase organisational readiness for embracing smart business model adoption.

5. Conclusions

A configurational approach was used to analyze the configurations of digital transformation capabilities that are associated with smart business model adoption in retail companies in China by applying the Fuzzy-set Qualitative Comparative Analysis (fsQCA). The study was based on Dynamic Capabilities Theory and the Technology–Organization–Environment (TOE) Framework, and examines the interaction between digital leadership, digital technology capability, organizational agility, digital skills, and customer digital orientation to collectively contribute to the adoption of smart business models. The results indicate that a high level of smart business model adoption requires digital technology capability as a necessary but insufficient condition, whereas there are several alternative configurations of organisational capabilities that are sufficient to result in high smart business model adoption. These findings show that there is no one single organisational capability that is predictive of digital transformation success; rather, that a diverse array of complementary digital resources and strategic capabilities contribute to digital transformation success in various combinations. Moreover, the analysis shows that equifinality and causal asymmetry are supported, as firms can be successful in the same way via different routes but the routes that take them to unsuccessful business model adoption are quite different.

The study contributes theoretically to the literature of digital transformation and business model innovation in a number of important ways. Firstly, this is an extension of Dynamic Capabilities Theory as it shows that the use of smart business models requires the integration and reconfiguration of several digital capabilities, not only individual organisational resources. Second, the study contributes to the Technology–Organization–Environment (TOE) Framework by offering configurational evidence of the interaction between technological, organisational and customer-oriented capabilities to enable digital business transformation. Third, while most previous studies have estimated net effects using regression-based methods or structural equation modelling, fsQCA is used in this study to incorporate the causal complexity, conjunctural causation, and equifinality. The results therefore provide a more nuanced understanding of digital transformation and its findings are that multiple capability configurations equally effective can result in smart business model adoption. Last but not least, the study offers empirical evidence based on China's retail industry, further extending the geographic range of the study on digital transformation in one of the most advanced digital economies.

The results also have a number of implications for managers and policy makers. This is because digital technologies such as artificial intelligence, cloud computing, big data

analysis, Internet of Things and digital platforms are the base infrastructure of smart business model transformation and should be a top priority for retail companies to invest in. Meanwhile, managers should also be aware technology isn't the only answer. To achieve successful transformation, it is needed to develop digital leadership, organisational agility, digital skills and customer digital orientation simultaneously to build complementary organisational capabilities. Therefore, leadership development programmes, employee digital training, agile organisational structures and customer-centric digital strategies should be part of a company's digital transformation map. Policymakers can also help drive smart retail transformation through the promotion of digital infrastructure, digital capability building, innovation partnerships and incentives for quickened adoption of advanced digital technology, especially for small and medium retail businesses.

The study has some limitations which suggest opportunities for further research. The research design was cross-sectional, which meant that the study could not be used to explore changes over time in digital transformation capabilities. Longitudinal designs could be used in future studies to explore the dynamic development of smart business models. Second, the study was conducted with 130 Chinese retail companies, so the results cannot be generalized to other industrial sectors or other countries. The proposed framework benefits from comparative studies in different national contexts or within different industries for the external validity. Third, the study targeted five major digital transformation capabilities, and future studies could consider including other conditions like organizational culture, innovation capability, cybersecurity readiness, environmental uncertainty, digital ecosystem collaboration, and/or government support to discover more comprehensive configurational pathways. Lastly, future research could combine Necessary Condition Analysis (NCA) or other qualitative methods with fsQCA to gain a more in-depth understanding of the processes that enable digital transformation capabilities to lead to the adoption of smart business models. This type of study would contribute to a better understanding in theory and practice of the digital transformation in the fast-changing retail sector.

Declarations

Ethics and Guidelines: The study was conducted in accordance with the Declaration of Helsinki. The ethical approval specifically covers the research procedures and data collection activities conducted for this study.

Consent to participate: Written informed consent was obtained from all participants prior to data collection. Consent was obtained using a standardized written form, signed by each participant before participation in the survey.

Consent to publish: The authors have provided consent to publish.

Competing interests: The authors declare no competing interests.

Data availability statement: Data will be made available on reasonable request from the corresponding author.

Funding: This research received no external funding.

Clinical Trial Number: Not Applicable.

Declaration of using generative AI: During the preparation of this work the author(s) used ChatGPT in order to correct the grammatical errors. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published article.

Author Contributions: M.H.: Conceptualization, methodology, writing—original draft preparation, writing—review and editing. All authors have read and agreed to the published version of the manuscript.

References

- Agarwal, P., Swami, S., & Malhotra, S. K. (2024). Artificial Intelligence Adoption in the Post COVID-19 New-Normal and Role of Smart Technologies in Transforming Business: A Review. *Journal of Science and Technology Policy Management*, 15(3), 506–529. <https://doi.org/10.1108/JSTPM-08-2021-0122>

- Ali, I., Aboelmaged, M., Govindan, K., & Malik, M. (2023). Understanding the key determinants of IoT adoption for the digital transformation of the food and beverage industry. *Industrial Management & Data Systems*, 123(7), 1887–1910. <https://doi.org/10.1108/IMDS-02-2022-0082>
- AlMulhim, A. F. (2021). Smart supply chain and firm performance: The role of digital technologies. *Business Process Management Journal*, 27(5), 1353–1372. <https://doi.org/10.1108/BPMJ-12-2020-0573>
- Asa, A. R., Nautwima, J. P., & Johannes, H. N. (2026). The transformative impact of digital technology on SME performance: A review and framework for digital transformation. *Cogent Business & Management*, 13(1), 2643949. <https://doi.org/10.1080/23311975.2026.2643949>
- Bresciani, S., Huarng, K.-H., Malhotra, A., & Ferraris, A. (2021). Digital transformation as a springboard for product, process and business model innovation. *Journal of Business Research*, 128, 204–210. <https://doi.org/10.1016/j.jbusres.2021.02.003>
- Caliskan, A., Özkan Özen, Y. D., & Ozturkoglu, Y. (2021). Digital transformation of traditional marketing business model in new industry era. *Journal of Enterprise Information Management*, 34(4), 1252–1273. <https://doi.org/10.1108/JEIM-02-2020-0084>
- Cao, L. (2014). Business Model Transformation in Moving to a Cross-Channel Retail Strategy: A Case Study. *International Journal of Electronic Commerce*, 18(4), 69–96. <https://doi.org/10.2753/JEC1086-4415180403>
- Casciani, D., Chkanikova, O., & Pal, R. (2022). Exploring the nature of digital transformation in the fashion industry: Opportunities for supply chains, business models, and sustainability-oriented innovations. *Sustainability: Science, Practice and Policy*, 18(1), 773–795. <https://doi.org/10.1080/15487733.2022.2125640>
- Han, Z., Waris, I., & Bhutto, M. Y. (2026). AI tool adoption as a driver of digital business model innovation and retail firm performance. *International Journal of Retail & Distribution Management*, 1–17. <https://doi.org/10.1108/IJRDM-05-2025-0381>
- Kumar, J., Rani, V., Rani, M., & Rani, G. (2026). Digital transformation in small and medium-sized enterprises: Key insights for entrepreneurs and policymakers to cultivate a future-ready business. *Digital Transformation and Society*, 5(2), 217–234. <https://doi.org/10.1108/DTS-10-2024-0192>
- Malekpour, M., Sedighi, M., Caboni, F., Basile, V., & Troise, C. (2025). Exploring digital transformation and technological innovation in emerging markets. *International Journal of Emerging Markets*, 20(13), 96–121. <https://doi.org/10.1108/IJOEM-02-2023-0147>
- Malenkov, Y., Kapustina, I., Kudryavtseva, G., Shishkin, V. V., & Shishkin, V. I. (2021). Digitalization and Strategic Transformation of Retail Chain Stores: Trends, Impacts, Prospects. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(2), 108. <https://doi.org/10.3390/joitmc7020108>
- Reinartz, W., Wiegand, N., & Imschloss, M. (2019). The impact of digital transformation on the retailing value chain. *International Journal of Research in Marketing*, 36(3), 350–366. <https://doi.org/10.1016/j.ijresmar.2018.12.002>
- Ragin, C. C. (2008). *Measurement versus calibration: A set-theoretic approach*. OUP.
- Rojers, J. P. (2018). Digital Transformation, Business Model Innovation and Efficiency in Content Industries: A Review. *The International Technology Management Review*, 7(1), 59. <https://doi.org/10.2991/itmtr.7.1.6>
- Saarikko, T., Westergren, U. H., & Blomquist, T. (2020). Digital transformation: Five recommendations for the digitally conscious firm. *Business Horizons*, 63(6), 825–839. <https://doi.org/10.1016/j.bushor.2020.07.005>
- Shomali, A., & Pinkse, J. (2016). The consequences of smart grids for the business model of electricity firms. *Journal of Cleaner Production*, 112, 3830–3841. <https://doi.org/10.1016/j.jclepro.2015.07.078>
- Tien Dung, L., Binh, N. T., & Minh, T. H. (2026). Green Digital Technology Capabilities and Environmental Performance in Retail SMEs: Digitally-Enabled Eco-Business Model Innovation as Mediator and Institutional Safeguard Quality as Moderator. *Sustainable Development*, sd.71072. <https://doi.org/10.1002/sd.71072>
- Uddin, M. M. M., Saha, S. K., & Chowdhury, M. (2026). Decoding the Digital Mind: How AI-Driven Consumer Insights Transform Marketing Effectiveness in India. *Business Research Review*, 1(1), 33–44. <https://doi.org/10.66348/brr.26.v1.n1.a9>

Disclaimer: All statements, viewpoints, and data featured in the publications are exclusively those of the individual author(s) and contributor(s), not of BRR and/or its editor(s). BRR and/or the editor(s) absolve themselves of any liability for harm to individuals or property that might arise from any concepts, methods, instructions, or products mentioned in the content.