Article

Strategic Orientation, Dynamic Capabilities, and Digital Transformation of Commercial Banks: A Fuzzy-Set QCA Approach

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Abstract: Digital transformation is a critical challenge for commercial banks to achieve sustainable competitive advantages in the digital economy. However, conventional research focuses too much on constructing linear models to explain the non-linear relationships between and among the factors relevant to digital transformation. By adopting the configurational framework, we propose that the interactions between strategy and dynamic capabilities determine the paths of how digital transformation may succeed or fail. The fuzzy-set qualitative comparative analysis (fsQCA) of digital transformation practices by Chinese commercial banks shows that: (1) a single condition of strategic orientation or dynamic capabilities does not constitute the necessary condition for high digital transformation, yet market orientation plays a more general role in generating high digital transformation. (2) There are three configurational paths that can contribute to high digital transformation of commercial banks, such as sensing capability-driven paths dominated by strategic orientation, integrating capability-driven paths dominated by strategic orientation, and the market orientation-driven paths dominated by dynamic capabilities. (3) There are two configurational paths that lead to non-high digital transformation, which verifies the existence of the asymmetrical relationship compared to the configurational paths of high digital transformation; (4) In the pathways dominated by strategic orientation, there is a substitutive relationship between sensing capability and integrating capability. The findings make contributions to the literature on digital transformation and provide implications for the digital transformation of commercial banks.

Keywords: strategic orientation; dynamic capabilities; digital transformation; fsQCA

1. Introduction

In the context of a new round of scientific and technological revolution, the development and application of digital technologies such as big data and cloud computing have reconstructed the value creation logic of many industries [1]. The financial industry is no exception. Online and decentralized digital business models, as well as mobile and intelligent digital financial services, have been gradually replacing the traditional business models of commercial banks [2,3]. The sudden COVID-19 pandemic had a huge impact on the offline economy, and it accelerates the process of the transition. Commercial banks can quickly respond to the financial needs of enterprises and society under the epidemic’s control by using non-contact digital financial services [4,5]. In the Fourteenth Five-Year Plan, the Chinese government made an important strategic deployment of “steadily developing financial technology and accelerating the digital transformation of financial institutions”. Furthermore, in 2022, the State Council of China issued “the Fourteenth Five-Year Digital Economy Development Plan”, emphasizing the urgency to further promote the application of big data, artificial intelligence, blockchain, and other digital technologies in the banking industry. In China, the macro-level government, the meso-level industry, and the
micro-level organizations have reached a consensus that digital transformation is the core inevitable strategy for commercial banks to pursue the sustainable competitive advantage in a new digital era.

However, the digital transformation of commercial banks is not easy. Although digital transformation has not changed the nature and inherent logic of finance itself [6], it has broken the traditional financial system to a certain extent. Moreover, digital transformation involves cognitive digitalization, structural digitalization, and product digitalization of commercial banks [7], which involves complex systematic engineering [8]. Statistics show that, in 2020, China’s banking institutions will invest 207.8 billion yuan in information technology, with a year-on-year growth of 20%. However, according to the recent research by Xie and Wang (2022) [9], since 2016, the growth rate of digital transformation of commercial banks has decreased significantly, and the growth rate of digital transformation in 2020 was less than 5%. These statistics and data confirm our view that although commercial banks are actively exploring the successful path of digital transformation, the issue of how to activate and accelerate digital transformation is still an urgent strategic imperative for Chinese commercial banks.

Most scholars follow the PEST analysis framework to explore the impact of government policies, digital economy, social digitalization, and digital technology on the digital transformation of enterprises. Chen et al. (2022) [10] argued that tax policy is one of the important tools to promote the digital transformation of enterprises. The latest research of Bonnet et al. (2021) [11] claimed that digital technology is the key to determine the digital transformation of enterprises. Some other researchers, such as researchers from the micro-level research community, investigated the causes of enterprise digital transformation from the perspective of managers’ characteristics such as digital leadership, managers’ cognition, digital capabilities, and other personal factors [12,13]. While the two research streams have contributed to our understanding of the important roles that the macroenvironment and microagents play in generating the digital transformation of commercial banks, they are still limited in several ways. Furthermore, the existing research either overemphasizes external factors such as the macroenvironment or exaggerates the managers’ personal traits, and neglects the active choice of the internal strategy of the organization and its interactions with its organizational dynamic capabilities. Kane et al. (2015) [14] asserted that the key driving force of digital transformation is strategy, not technology. The strategic orientation towards market-pull and technology-push will inherently promote commercial banks to apply new digital financial technologies and provide digital financial services [15]. Digital transformation is embedded in the market environment, and the digital strategic response of commercial banks triggers the reconstruction of internal and external capabilities. Thus, the topic of dynamic capabilities—such as the sensing, integrating, and transforming of internal and external capabilities to improve the fitness between strategy and environment—becomes salient [16]. Dynamic capabilities provide a capability foundation for commercial banks to integrate digital technology and business processes in the digital economy.

Both strategic orientation and dynamic capabilities are essential for digital transformation [15,17,18], and they allow commercial banks to obtain stronger flexibility and sustainable growth in the digital age. Therefore, commercial banks’ dynamic capabilities should fit the strategic orientation [19]. However, scholars have rarely integrated these factors from a holistic perspective. For example, some studies ignored the linkage between strategies and capabilities and thus cannot figure out the detailed mechanisms of interactions. Others applied regression methods to explore the interaction effect of strategies and capabilities, which has serious methodological and theoretical mismatch problems [20]. Because regression analysis mostly adopts interactive items or other methods to multiply the strategic indicators and capability instruments one by one, these methods cannot analyze the impact of the concurrence of strategic and capability conditions on the digital transformation of commercial banks, nor can it judge the strategic capability structure to achieve high digital transformation [21]. Therefore, the nature of interaction effect in regression analysis is limited to the traditional contingency relationship [22], rather than
the real overall holistic analysis. Fortunately, qualitative comparative analysis (QCA) adopts the configurational perspective, through Boolean algebra and set theory, and we can explore multiple equivalent paths of mutual combination of different conditions, which significantly improves the matching of theories and methods under the integrative analysis [23,24]. QCA and configurational analysis assume that the factors are interdependent rather than independent, which is suitable for explaining complex concurrent causal problems with multiple conditions [25]. As one of the mainstream methods in QCA research, Fuzzy set QCA (fsQCA) has the dual advantages of both qualitative analysis and quantitative analysis [26]. It cannot only identify the necessity of a single condition, but also explore the full interaction between factors [19,27], so as to reveal the complex causal mechanism of strategic orientation and dynamic capabilities on the digital transformation of commercial banks, and present the configurational path to achieve high and non-high digital transformation.

Through our study, we intend to make four key contributions. First, to our knowledge, we are the first to theorize and empirically examine the commercial banks’ digital transformation from a configurational perspective between strategy and capability. By building on configurational theory [27], this study extends the previous literature by discerning the complex concurrent paths of how organizational strategies and capabilities impact digital transformation in Chinese commercial banks [15,28]. Second, we theoretically delineate and empirically validate the interactive mechanism of strategic orientation, dynamic capabilities, and digital transformation. Such findings contribute to the nascent academic literature by enriching the digital connotation of both strategic management theory and dynamic capabilities theory. Third, by introducing fsQCA into commercial banks’ digital transformation, we apply the analysis of necessity (No Y without X) and sufficient (If X, then Y) conditions to examine the links [29,30]. We argue that including the two causal reasonings would adequately tap the relationship between strategic orientation, dynamic capabilities, and digital transformation. Scholars have been debating over different combinatorial ways of achieving digital transformation for some time [31,32], and we extend the conversation by exploring the configurational paths of strategy and capability, which can further foster digital transformation research using the fsQCA approach. Finally, in managerial practice, we address an issue of considerably substantive relevance. Our research and its findings can be used to deepen our understanding of how commercial banks’ strategies and capabilities jointly influence digital transformation practice. For example, our sufficiency analysis shows that the three different configurational paths can be used to help managers achieve high digital transformation.

2. Literature Review

2.1. Digital Transformation of Commercial Banks

With the rapid development of digital technology, the disintermediation, and financial globalization of the financial industry, the place where bank customers make financial transactions is gradually changing from trading floors to online platforms [33]. The most advantageous local customer market may be eroded by foreign financial technology companies. Under the impact of the COVID-19 pandemic, population mobility was restricted, and most banks had to close physical outlets or shorten business hours, resulting in a significant reduction in the business volume of traditional banks. Under the dual pressures from financial technology and epidemic isolation policy, commercial banks are faced with huge digital challenges and need to make all-round digital innovation and reform [5,34]. In recent years, commercial banks are also transforming their organizational structure and product channels with the help of other digital technologies such as big data and artificial intelligence. Digital transformation refers to organizational change that is triggered and shaped by the widespread diffusion of digital technologies [35]. Digital transformation will fully integrate digital technology with the existing business resources and capabilities of commercial banks, thus generating the transformation, upgrading, and sustainable development. The digital transformation of commercial banks involves many aspects of
organizations: cognitive digital transformation, structural digital transformation, and product digital transformation [7]. Cognitive digitalization is the basis for the commercial banks to recognize the digital transformation, which guides the banks to develop in the digital direction; traditional commercial banks are characterized by seniority, departments are independent, processes are lengthy, and decisions are slow, which is significantly inconsistent with the flat organization and fast iterative digital finance. Structural digital transformation is not only the establishment of digital departments, but also the reconstruction of systems, processes, and cultures; product digital transformation refers to the redefinition and discovery of financial product value, the formation of digital financial products for online sales channels with digital technology, and the full completion of product digitalization.

2.2. Strategic Orientation

In the environment of interest rate marketization and rapid development of financial technology, the Chinese commercial banks are facing increasingly fierce market competition, and their intermediary status is seriously challenged. To develop new customers and increase the market share, commercial banks must make fundamental changes. According to the strategic management theory [36], strategic orientation determines the development direction of commercial banks. The differences in the way commercial banks carry out strategic change and reap the benefits of change are also influenced by their choice of strategic orientation. Strategic orientation refers to the strategic direction and operational principles set by commercial banks to continuously achieve excellent performance, which will also determine the resource allocation and strategic actions of commercial banks [37]. The existing research on the strategic orientation of commercial banks involves entrepreneurship orientation, technology orientation, market orientation, and other aspects. In the context of digital technology-enabled financial services, technology and markets are increasingly becoming core elements of the strategic orientation of commercial banks that lead the digital transformation of commercial banks [38,39]. Therefore, we use technology orientation and market orientation as the two important strategic orientations that will lead the digital transformation of commercial banks.

Technology orientation reflects the technology-push logic of commercial banks [40], which is the commitment of commercial banks to transform their business model and to optimize operational efficiency by innovating financial technologies and building new trading platforms. With the rapid development of digital technology, digital financial service is increasingly impacting the operation and profitability of commercial banks [7,41]. In the face of such digital challenges, commercial banks with high technology orientation will gradually increase their digital awareness and put digital technology development and application at the forefront of their development. Further, commercial banks will continue to accumulate the knowledge base of digital technology, and they will actively acquire and apply new digital technologies to push the digital transformation of their current business. Specifically, the digital technology will drive the commercial banks to digitalize their management and products, reshape their value chains and business models, and ultimately lead to a comprehensive digital transformation.

Market orientation refers to the strategic tendency of commercial banks to actively collect and respond to market information to create and improve customer value. The market-pull principle reflects the business philosophy of commercial banks to put customers at the core of operational and strategic decision making. In the era of the digital economy, commercial banks with a high market orientation are more inclined to implement the digital transformation, thus constructing value creation logic centered on customer demand and experience [8]. The reason is that digital transformation helps commercial banks use digital technologies and platform algorithms to quickly store, retrieve, and analyze customer information [42] and communicate with customers faster and more effectively. Thus, they can anticipate and capture customer’s unmet needs [43], address differentiated needs among customers precisely, promote commercial banks to their products and services to online channels, enable customers to transact through online platforms, overcome the
time and location constraints of traditional commercial banking, improve and enhance customer service, and ultimately increase customer satisfaction and loyalty. Therefore, under the market orientation, commercial banks can meet the dynamic needs of customers and create customer value better through digital transformation.

2.3. Dynamic Capabilities

Digital transformation is not innate [8], but is the result of a gradual evolution of commercial banks as a consequence of their organizational capabilities. As the dynamic and complex nature of the environment continues to increase, it becomes steeply more difficult for commercial banks to implement digital transformation. Therefore, organizational capabilities that help banks improvise their resources to match with the changing environment are increasingly important [44]. This paper focuses on dynamic nature of capabilities because digital transformation implies a reconfiguration of the competitive advantage of commercial banks, in which dynamic capabilities may play a crucial role. In other words, the dynamic capabilities theory can provide a solid explanatory basis for commercial banks to respond to market changes through digital transformation [45,46]. Specifically, Teece et al. (1997) [47] proposed that dynamic capabilities are both internal and external to the organization, and new organizational capabilities can be shaped through organic innovation. Therefore, compared with operational capabilities, the improvement of dynamic capabilities will have a positive impact on the operational processes, resource allocation, and management capabilities of commercial banks, thus helping commercial banks to allocate resources and capabilities related to digital transformation in a planned and conscious manner.

Further, the dynamic capabilities are a multi-dimensional aggregative construct that includes three cascading sub-capabilities: sensing capability, integrating capability, and transforming capability [16]. The sensing capability reflects the ability of commercial banks to acquire technical market information and identify new opportunities or threats [48]. In a digital technology environment featuring digitalization and intelligence, such as artificial intelligence and big data, sensing capability helps strengthen commercial banks’ digital transformation perceptions, and the increased awareness will encourage commercial banks to be more proactive in seeking opportunities for digital transformation. Moreover, digital transformation allows commercial banks to use digital infrastructure such as IoT platforms to collect and analyze data in real-time [49]. Therefore, commercial banks with a strong sensing capability may put digital transformation on the agenda to better identify risks in the market environment. The integrating capability helps commercial banks respond to digital change opportunities or eliminate competitive digital threats by effectively coordinating and allocating work tasks and organizational resources across departments [50]. Digital transformation cannot be separated from the support of organizational governance structure. Organizations with higher transforming capabilities can ensure the flexibility of organizational structure [51]. Therefore, commercial banks need to reconfigure transforming capabilities to continuously update and align internal operational processes, as well as innovatively deploy existing resource capabilities to execute digital transformation more effectively. The combined capacity of the sensing capability, integrating capability, and transforming capability help commercial banks better respond to changing customer demands and technology requirements than their competitors. Thus, dynamic capabilities will lay the solid foundation for their ability to capture timely information about digital change, rapidly integrate digital technologies and business processes, and achieve high digital transformation.

2.4. Configurational Framework

In summary, technology orientation, market orientation, sensing capability, integrating capability, and transforming capability are critical factors influencing digital transformation. These elements provide the basis for a systematic exploration of the complex relationship between and among strategic orientation, dynamic capabilities, and the digital transforma-
tion of commercial banks. Although digital transformation is the result of the co-evolution of organizational strategy and capabilities, existing research only focuses on the single effect of strategic orientation and dynamic capabilities on the digital transformation of commercial banks. In the development process of commercial banks, strategic orientation and dynamic capabilities are interdependent, symbiotic, and interactive, but it is difficult to analyze the joint effect between them. Traditional research perspectives and methods are unable to analyze the high digital transformation path of commercial banks. Therefore, it is still an open question to be answered how the strategic orientation and dynamic capabilities of commercial banks are intertwined to further affect digital transformation.

The configurational perspective suggests that outcomes occur due to interactions between these critical elements or factors and that isolated conditions make it difficult to systematically reveal the complex mechanisms of underlying outcome formation. In other words, the configuration perspective focuses on analyzing the synergistic effect and combinational relationship between elements, which is suitable for exploring the nonlinear relationship between causes and effects, and it is helpful for mining multiple equivalent paths to achieve the high digital transformation of commercial banks. Therefore, this paper will adopt a configurational perspective to incorporate technology orientation, market orientation, sensing capability, integrating capability, and transforming capability into one research framework. Within such a comprehensive framework, it will further analyze the complex interactions among the conditions mentioned above, and it is also committed to answering the following questions: first, whether a single element of strategic orientation and dynamic capabilities constitutes a necessary condition for the digital transformation of commercial banks; second, how the strategic orientation and dynamic capabilities conditions of commercial banks are coupled to produce high and non-high digital transformation. Figure 1 presents the research model of this paper.

Figure 1. The configurational framework of the digital transformation of commercial banks.

3. Research Methods

3.1. Sample and Data Collection

Chinese commercial banks have developed an enormous scale and are among the world's leading banks in terms of total assets. Facing the challenges of digital transformation, commercial banks in China have both vigorously expanded online mobile channels and promoted intelligent, experiential, and community-based changes in offline branches. At the same time, they also increase investment in digital financial technology, focus on improving their independent R&D capabilities, and actively apply for fintech-related patents. These actions provide a representative sample for us to study the digital transformation of commercial banks, thus this paper uses Chinese commercial banks as sample cases.

The research data in this paper are derived from two primary sources. First, the data on the digital transformation of commercial banks for the outcome variable is obtained from the Peking University Digital Transformation Index Report for Commercial Banks (2018). The report, released by Peking University's Institute of Digital Finance, covers all large state-owned banks, joint-stock banks, city commercial banks, private banks, leading rural commercial banks, and foreign banks in China. The report team constructed and
calculated the digital transformation index of China’s commercial banks based on the text content of the annual reports and financial data of commercial banks, avoiding the method of subjective evaluation and scoring by experts. The data is reliable and often used in scientific research. Second, data on the antecedent variables (strategic orientation and dynamic capabilities) were obtained from the questionnaire survey. After screening and sorting out the digital transformation data of Chinese commercial banks, we randomly selected 100 out of 167 commercial banks as the research subjects of this paper. Further, this study limited the interviewees to the chairman, general manager, and deputy general manager of the bank because they can evaluate the performance of the bank’s strategic orientation and dynamic capabilities as a whole, and thus could make a correct evaluation of the questionnaire and ensure the quality of the data. In addition, because the respondents were located in different places, it was too difficult to conduct individual research. To ensure that the questionnaires could be distributed and collected centrally, we cooperated with TZ Management Consulting, which was responsible for the distribution and collection of questionnaires, and one of us followed up and supervised the entire process. This survey started in September 2018. TZ distributed questionnaires in 90 commercial banks in the following two months and collected 86 questionnaires. After eliminating invalid questionnaires such as missing critical data and selecting the same rating for all questions, 44 valid questionnaires were obtained, and the final response rate of the questionnaires was 48.89%. Finally, the two sets of data are matched to obtain the complete data of 44 Chinese commercial banks, which are used as the final sample data in this paper. The sample characteristics are presented in Table 1.

Table 1. Sample characteristics.

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of the bank</td>
<td>City commercial bank</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Rural commercial bank</td>
<td>27</td>
</tr>
<tr>
<td>Region</td>
<td>Jiangsu</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Zhejiang</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>10</td>
</tr>
<tr>
<td>Years of establishment</td>
<td>Less than 10 years</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>10–20 years</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>More than 20 years</td>
<td>14</td>
</tr>
<tr>
<td>The number of employees</td>
<td>Less than 1000 employees</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>1000–5000 employees</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>5000–10,000 employees</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>More than 10,000 employees</td>
<td>3</td>
</tr>
<tr>
<td>Operating income (Yearly/RMB)</td>
<td>Less than 1 billion</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>1–3 billion</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>3–6 billion</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>More than 6 billion</td>
<td>12</td>
</tr>
</tbody>
</table>

3.2. The fsQCA Approach

The Qualitative Comparative Analysis (QCA) method was originally developed by Ragin in 1987. The QCA method was mainly applied to sociology, political science, and other disciplines in its early stage and began to be widely applied in the field of organizational management [21]. According to the variable type, QCA is divided into crisp set QCA (csQCA), multi-value QCA (mvQCA), and fuzzy-set QCA (fsQCA). Among them, csQCA can only deal with a binary data type whose antecedent conditions and values
are 0–1. Due to technical limitations, variable information is easily lost, so the scope of its application is narrow. Instead, mvQCA uses multi-valued classifications, allowing condition variables and results to be multivalued with nominal variables, which improves the accuracy of Boolean assignment of interval and ratio variables to a certain extent. However, when dealing with the non-categorical variable type, it will encounter extreme assignment difficulties of variables [22,52]. The fsQCA can resolve all of these problems. It cannot only deal with the category data, but also with the degree variable problem [53]. By using the membership degree assignment method, variables can be more accurately calibrated. Therefore, compared with csQCA and mvQCA, fsQCA has a wider scope of application and higher research quality [8].

Therefore, this paper uses the fsQCA approach to analyze the complex causal mechanisms of strategic orientation and dynamic capabilities in the digital transformation of commercial banks based on a configurational perspective. There are several more specific reasons to choose the fsQCA method. First, strategic orientation and dynamic capabilities drive the digital transformation of commercial banks as a result of the complex and interwoven impact from both of them. Traditional linear regression focuses on analyzing the between-construct relationships characterized by complementary, additive, substitution, or suppression effects. It is challenging to examine the non-linear effects arising from the synergistic effects that are differentiated from traditional bivariate interaction effects [21]. The fsQCA approach can break with the net effect thinking. It starts from a holistic and systemic perspective and focuses on figuring out the complex relationship between causes [8,23,54], thus enabling the exploration of the elemental configurations that cause the digital transformation of commercial banks and the identification of multiple causal paths that influence the digital transformation of banks. Second, the fsQCA method transcends the traditional divisions and boundaries of quantitative and qualitative analysis [26]. The approach can both overcome the challenges of replication in small samples (less than 10 or 15) and remedy the deficiencies of inadequate intrinsic case analysis in large samples (more than 100). In this paper, the research sample is 44 commercial banks, and the sample size is between large and small samples. Because the medium size of the sample fits well with the fsQCA approach, based on the fsQCA approach, this paper can explore the complex causal effects of a bank’s internal strategic orientation and dynamic capabilities and summarize replicable strategies to accelerate the digital transformation of commercial banks.

According to the configuration approach proposed by Fiss (2011), Dai (2022), and Gupta et al. (2020) [23,55,56], the fundamental analysis of fsQCA includes theoretical analysis and refinement of antecedent conditions, data collections, variable recalibration and aggregation membership scores, selection of case frequency and consistency threshold, construction of truth table (identification of configurational conditions of observed cases), and QCA standardization analysis. The fsQCA analysis further simplifies the configuration by generating a simple solution and an intermediate solution (the latter includes the former), distinguishes between core conditions and periphery conditions, and reports the results with QCA symbols. In this study, the antecedent conditions are the five elements of strategic orientation and dynamic capabilities. Samples and data sources report the data collection process; variable calibration, data analysis, results reporting, and other contents will be presented in the subsequent analysis.

3.3. Measurement
3.3.1. Outcome Variables

Digital transformation of commercial banks. This paper uses the Digital Transformation Index for Chinese Commercial Banks constructed by the Institute of Digital Finance of Peking University for measurement. The index consists of three parts: digital cognition, digital organization, and digital products. By extracting and analyzing the text descriptions of banks’ annual reports on digital technology application awareness and thinking (e.g., intelligence, big data, digital, etc.), management digital innovation behaviors (e.g., Internet
finance department, financial technology department, digital finance department, etc.),
and digital finance-related product development behaviors (e.g., mobile banking, WeChat
banking, Internet finance, Internet credit, e-commerce, etc.), we can then judge the degree
of digital transformation of commercial banks.

3.3.2. Antecedent Conditions

Strategic orientation–technology orientation. We adopted four items from Zhou
(2005) [37] to measure technology orientation, such as “We use sophisticated technologies
in our new product development.” The four items were measured on a five-point Likert
scale (1 = strongly disagree, 5 = strongly agree).

Strategic orientation–market orientation. Consistent with prior research [57], market
orientation was measured with twelve items developed by Kohli et al. (1993) [58] and
refined by Homburg and Pflesser (2000) [59], such as “We poll end-users at least once a year
to assess the quality of our products and services.” We anchored all items with a five-point
Likert scale, where 1 = strongly disagree, and 5 = strongly agree.

Dynamic capabilities. Teece et al. (1997) [47] proposed the theory of dynamic capabil-
ities based on resource capability evolution. Twelve items have been rated based on the
instruments developed by Lu et al. (2018) [60] to measure the three dimensions (sensing
capability, integrating capability, and transforming capability) of dynamic capabilities, such
as “Employees are assigned to tasks commensurate with their relevant knowledge and
skill.” All items were rated with a five-point Likert scale from 1 (strongly disagree) to
5 (strongly agree).

3.3.3. Calibration

The use of the fsQCA method requires the calibration of variables into an aggregate
concept, i.e., the calibration aims at transforming regular variables into fuzzy variables
between 0 and 1 [61].

At present, there are four mainstream methods to calibrate variables into sets: First, cal-
ibration is based on case-based descriptive statistics. For example, Chen and Tian (2022) [8]
used the maximum observation value (4.833) as the critical value of complete membership
(1), the mean value (3.64) as the intersection point (0.5), and the minimum value (2.167) as
the critical value of complete non-membership (0) when calibrating and integrating the
previous dependent variable. Second, use the scale of the meter for calibration. In the
measurement of the 5-point Likert scale, the scale itself provides the information of the
 calibration variable; for example, 1 represents “almost inconformity”, 3 represents “basic
conformity”, and 5 represents “complete conformity”. Scholars coded “1” as completely
non-subordinate, “3” as the intersection, and “5” as completely subordinate [23,54]. Third,
calibrate based on the percentile of case data. This calibration method is often used in the
absence of theoretical and knowledge base. That is, when the three anchor points of full
membership, intersection, and non-membership of variables are respectively set as 75%,
50%, and 25% quantiles of sample data, some studies are set as 90%, 50%, and 10% [62,63].
Fourth, set calibration standards according to data characteristics or empirical attributes.
For example, Leppanen et al. (2021) [64] selected Tobin’s Q value 1 as the intersection point.
According to the financial calculation formula, when the perceived value of an enterprise is
the same as its total asset value, Tobin’s Q equals 1 if firms’ valid value is the same as the
value of its total assets.

Since the conditional variables (technology orientation, market orientation, sensing
capability, integrating capability, and transforming capability) obtained data through
questionnaires, there may be social desirability bias, and the outcome variable (digital
transformation of commercial banks) is a newly published measurement that lacks practical
and theoretical support. Therefore, referring to related studies [23], a biased calibration was
used in this paper to set the calibration points for one outcome variable and five conditional
variables “fully in”, “crossover point”, and “fully out” to the upper (75%), median (50%),
and lower (25%) quartiles of the case data, respectively. Calibration anchors and descriptive statistics for each variable are reported in Table 2.

Table 2. Sets, calibration, and descriptive statistics.

<table>
<thead>
<tr>
<th>Fuzzy Set Calibration</th>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set</td>
<td>Fully In</td>
</tr>
<tr>
<td>Technology orientation</td>
<td>4.00</td>
</tr>
<tr>
<td>Market orientation</td>
<td>3.42</td>
</tr>
<tr>
<td>Sensing capability</td>
<td>4.00</td>
</tr>
<tr>
<td>Integrating capacity</td>
<td>3.80</td>
</tr>
<tr>
<td>Transforming capability</td>
<td>4.00</td>
</tr>
</tbody>
</table>

4. Results

The necessity conditions (No Y without X) and sufficient analysis of the configurations (If X, then Y) in this paper are analyzed using fsQCA3.0 software.

4.1. Necessity Conditions Analysis

Necessity conditions analysis is used to test whether any single condition is necessary for commercial banks’ high or non-high digital transformation. Table 3 reports the results of the necessary tests for single conditions. The data show that the consistency coefficient of single conditional variables is below 0.9 in both high and non-high digital transformation groups of commercial banks, indicating that the necessary conditions for generating high and non-high digital transformation of commercial banks do not exist [26].

Table 3. Necessity analysis of single conditions.

<table>
<thead>
<tr>
<th>Conditional Variables</th>
<th>Outcome Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Digital Transformation of Commercial Banks</td>
</tr>
<tr>
<td></td>
<td>Consistency</td>
</tr>
<tr>
<td>Technology orientation</td>
<td>0.486</td>
</tr>
<tr>
<td>~Technology orientation</td>
<td>0.649</td>
</tr>
<tr>
<td>Market orientation</td>
<td>0.628</td>
</tr>
<tr>
<td>~Market orientation</td>
<td>0.429</td>
</tr>
<tr>
<td>Sensing capability</td>
<td>0.564</td>
</tr>
<tr>
<td>~Sensing capability</td>
<td>0.542</td>
</tr>
<tr>
<td>Integrating capacity</td>
<td>0.464</td>
</tr>
<tr>
<td>~Integrating capacity</td>
<td>0.649</td>
</tr>
<tr>
<td>Transforming capability</td>
<td>0.399</td>
</tr>
<tr>
<td>~Transforming capability</td>
<td>0.689</td>
</tr>
</tbody>
</table>

4.2. Sufficiency Analysis of the Configuration

The sufficiency analysis of conditional configurations aims to analyze the configurations of strategic orientation and dynamic capabilities that lead to commercial banks’ high and non-high digital transformation. These different configurations represent different combinations of conditions to achieve the same outcome.
4.2.1. The Configuration That Generates High Digital Transformation of Commercial Banks

According to existing studies [54,63], the case frequency threshold is set as 1, and the consistency threshold is set as 0.8. To reduce potential contradictory configurations, the proportional reduction in inconsistency (PRI) is further used to filter the truth table rows that are linked to the outcome [56]. Based on the analysis of the distribution of case data, the PRI consistency threshold is set to 0.6 in this paper. The results of fsQCA analysis will report three categories of complex, parsimonious, and intermediate solutions. Typically, scholars combine the parsimonious and intermediate solutions to determine each solution’s core and periphery conditions, i.e., conditions that appear in both parsimonious and intermediate solutions are core conditions. Conditions that occur only in the intermediate solutions are periphery conditions [23].

The expression of QCA results has its own symbols. In the table, the size of the circle distinguishes between the core condition and the periphery condition. The symbol ● represents the existence of the core condition, ○ represents the existence of the edge condition, ⊗ represents the lack of the core condition, ⊙ represents the lack of the periphery condition, and blank represents the optional condition. In the expression, * represents and, and ~ represents negation.

Table 4 reports the configuration analysis results that generate the high digital transformation of commercial banks. The results show that three configurations (S1a, S1b, and S2) generate the high digital transformation of commercial banks, where S1a and S1b constitute a second-order equivalent configuration, i.e., their core conditions are the same. The overall solution consistency shows 0.741, and it explains the significance level of the aforementioned configurations as a whole.

Table 4. Configurations that generate the high and non-high digital transformation of commercial banks.

<table>
<thead>
<tr>
<th>Conditional Variables</th>
<th>High Digital Transformation of Commercial Banks</th>
<th>Non-High Digital Transformation of Commercial Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1a</td>
<td>S1b</td>
</tr>
<tr>
<td>Technology orientation</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Market orientation</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Sensing capability</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Integrating capacity</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Transforming capability</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Consistency</td>
<td>0.784</td>
<td>0.702</td>
</tr>
<tr>
<td>Raw coverage</td>
<td>0.226</td>
<td>0.191</td>
</tr>
<tr>
<td>Unique coverage</td>
<td>0.053</td>
<td>0.018</td>
</tr>
<tr>
<td>Solution coverage</td>
<td>0.331</td>
<td></td>
</tr>
<tr>
<td>Solution consistency</td>
<td>0.741</td>
<td></td>
</tr>
</tbody>
</table>

● and ⊗ indicate the existence and absence of core conditions; ● and ⊗ represent the existence and absence of periphery conditions; blank spaces indicate that the condition may be present or absent.

We then adopted Ragin (2008) [26] logic framework to demonstrate the three pathways further, from a theoretical perspective. We propose two conditional paths of high digital transformation that have different core characteristics: one is dominated by strategic orientation, and the other by dynamic capabilities. We will analyze the results of the three configurations in detail below.

Sensing capability-driven path led by strategic orientation (technology orientation * market orientation * sensing capability *—transforming capability). In configuration S1a,
the configuration path of high technology orientation, high market orientation, and non-high transforming capability as core conditions and complementary high sensing capability as a periphery condition can produce the high digital transformation of commercial banks. Regardless of their integrating capabilities, commercial banks can still achieve high digital transformation with poor transforming capabilities so long as they have high technology orientation and market orientation, as well as solid sensing capabilities.

Integrating a capability-driven path led by strategic orientation (technology orientation * market orientation * integrating capability * transforming capability). In configuration S1b, the configuration path of high technology orientation, high market orientation, and non-high transforming capability as core conditions and complementary high integrating capability as periphery conditions can produce the high digital transformation of commercial banks. In other words, regardless of their sensing capabilities, commercial banks can still achieve high digital transformation with poor transforming capabilities so long as they have high technology orientation, market orientation, and strong integrating capabilities.

Configuration analysis can identify the interaction between conditions [23]. By comparing the two configuration groups dominated by strategic orientation (S1a and S1b), it is found that there are mutual substitution effects between sensing capability and integrating capability. For commercial banks with both high technology orientation and high market orientation, focusing on sensing capability or integrating capability can also achieve digital transformation, as shown in Figure 2.

![Figure 2. Substitution effects between sensing capability and integrating capability.](image_url)

The dynamic capabilities-driven path led by strategic orientation (~technology orientation * market orientation * sensing capability * integrating capability * transforming capability). In configuration S2, the configuration path of high sensing capability, high transforming capability, and non-high technology orientation as core conditions and complementary high market orientation and high integrating capability as periphery conditions can produce the high digital transformation of commercial banks. That is, in the absence of technology orientation, commercial banks can also achieve high digital transformation so long as they have strong sensing capability, integrating capability, and transforming capability, while matching high market orientation.

4.2.2. The Configuration That Generates Non-High Digital Transformation of Commercial Banks

This paper also examines the configuration paths that generate non-high digital transformation of commercial banks. Two configurations produce non-high digital transformation. The overall solution consistency is 0.868, with a coverage of 0.361. Configuration NS1 (technology orientation *~market orientation *~integrating capability * transforming capability) shows that regardless of the bank’s sensing capability, high digital transformation is difficult to achieve in commercial banks lacking market orientation and integrating capability, even with technology orientation and transforming capability. Configuration NS2 (technology orientation *~market orientation * sensing capability * integrating capability) shows that even if technology orientation, strong sensing capability, and integrating capability exist, the degree of digital transformation of commercial banks will not be high in an ecology lacking market orientation.
4.2.3. Horizontal Analysis of Antecedent Conditions

We then conducted a horizontal analysis to compare the degree to which antecedent conditions impact digital transformation. As shown in Table 4, all three configuration groups that produce high digital transformation of commercial banks contain high market orientation. All configuration groups that produce non-high digital transformation of commercial banks include non-high market orientation. These results are a good indication that market orientation has a more widespread impact on the digital transformation of commercial banks. There is a strong correlation between market orientation and high digital transformation of commercial banks. However, regardless of the existence of market orientation, commercial banks can achieve high digital transformation. In other words, market orientation must be effectively combined with other conditions to affect digital transformation.

4.3. Robustness Checks

A robustness test is a method to verify the reliability of research results by changing research conditions. To strengthen the accuracy of the findings, this paper conducts a robustness check on the conditional configurations that generate high digital transformation in commercial banks. First, we adjust the consistency threshold from 0.8 to 0.75, resulting in a consistent configuration. Second, considering that there are commercial banks with more than 10,000 employees in the sample, there may be differences between these huge banks and other small and medium banks in terms of conditions and foundations of digital transformation. After deleting three mega commercial banks (Bank of Shanghai, Bank of Jiangsu, and Bank of Ningbo), the configurations obtained from the analysis are the same. The above results indicate the reliability and robustness of the study findings.

5. Discussion

5.1. Research Conclusions

This paper uses an fsQCA approach to explore the configurational effects of strategic orientation (technology orientation, market orientation) and dynamic capabilities (sensing capability, integrating capability, and transforming capability) on the digital transformation of commercial banks. The results of the analyses lead to the following conclusions:

First, neither strategic orientation nor dynamic capabilities offer the necessary conditions for the digital transformation of commercial banks alone, but high market orientation plays a more general role in the digital transformation of commercial banks.

Second, there are three configuration paths for high digital transformation of commercial banks, namely, sensing capability-driven path dominated by strategic orientation, integrating capability-driven path dominated by strategic orientation, and market orientation-driven path dominated by dynamic capabilities, which represent multiple-equifinal paths for achieving high digital transformation among different commercial banks.

Third, there are two configuration paths for non-high digital transformation of commercial banks, which has an asymmetric relationship with the configuration that generates high digital transformation of commercial banks.

Finally, the results show a synergistic relationship in dynamic capabilities conditions. With high technology orientation and high market orientation, commercial banks can equivalently substitute high sensing capability with high integrating capability to drive their high digital transformation.

5.2. Theoretical Contributions

Our findings offer important contributions to several streams of research (Table 5).
Table 5. Contributions of this research.

<table>
<thead>
<tr>
<th>Characteristics of Conventional Regression Methods</th>
<th>Our Findings from a Configurational fsQCA Approach</th>
<th>Theoretical Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational strategy, capability, and digital transformation are significantly correlated</td>
<td>Organizational strategic orientation and dynamic capabilities are not necessary conditions for high digital transformation alone</td>
<td>Analyzing the digital transformation of commercial banks from the configurational perspective of causal complex factors such as organizational strategy and capability is helpful to reconcile the conflicts of inconsistent research results</td>
</tr>
<tr>
<td></td>
<td>Market orientation is an important condition for commercial banks to achieve high digital transformation</td>
<td>Confirming the powerful effect of market orientation on digital transformation of commercial banks</td>
</tr>
<tr>
<td></td>
<td>The configuration model of strategic orientation and dynamic capabilities has been constructed</td>
<td>Providing new ideas for the research on the coupling of organizational elements and digital ecology of commercial banks, and partially responding to the digital transformation framework proposed by Hanelt (2021) [35]</td>
</tr>
<tr>
<td>The relationships between and among the elements of dynamic capabilities are progressive</td>
<td>Sensing capability and integrating capability play a completely substitutive role in promoting the digital transformation of commercial banks</td>
<td>Deepening the symbiotic relationship of organizational capability elements and make up for the deficiency of existing literature on the potential substitutive relationship between and among dynamic capabilities factors</td>
</tr>
<tr>
<td></td>
<td>The driving mechanism of commercial banks’ digital transformation has causal asymmetry: three configuration paths to achieve high digital transformation are not directly opposed to two paths leading to non-high digital transformation</td>
<td>Supporting the initiative of Wilden et al. (2016) [65] and Ma et al. (2022) [66] to systematically study dynamic capabilities using configuration theory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Showing the advantages of QCA in discerning the relationship between various elements within the model and in providing methodological guidance for the follow-up exploration of complex digital transformation phenomenon</td>
</tr>
</tbody>
</table>

Based on the causal necessity analysis, this paper finds that a single condition of strategic orientation or a dynamic capabilities element does not constitute the necessary condition of high digital transformation. Although previous research found that dynamic capabilities or resource arrangement capabilities are significantly related to digital transformation [8,45], digital strategic vision is a necessary and insufficient condition for the development of commercial banks [15]. However, this study claims that these strategic capabilities are not the necessary conditions for high digital transformation. For example, in S1a, in the absence of the transformation capability, high-tech orientation, high market orientation, and high-level sensing capability jointly promote the high digital transformation of commercial banks. This will help to settle the dispute over the inconsistent conclusions of digital transformation due to ignoring the concurrence of organizational factors in previous studies. In addition, the research results show that market orientation is an important...
condition for commercial banks to achieve digital transformation and verify the strong impact of market orientation on commercial banks to accelerate the digital initiatives [67].

By adopting the configuration theory [27], this paper integrates five elements of organizational strategy and capability to investigate the complex causal mechanism of the digital transformation of commercial banks. The previous studies examined the impact of organizational strategy [68] and organizational capability [31], respectively, and addressed the importance of strategy and capability to the digital transformation of commercial banks. However, the internal mechanism of the synergy of strategy and capability affecting the digital transformation of commercial banks is still unclear. The configuration analysis of strategic orientation and dynamic capabilities in this study provides a new idea for research on the coupling of organizational elements and digital ecology of commercial banks, and partially responds to the digital transformation framework proposed by Hanelt (2021) [35]: awareness (market orientation, sensing capability), acceleration (technology orientation, integrating capability), and harmonizing skills (transforming capability).

This study uses fsQCA to observe that sensing capability and integrating capability are substitutive in promoting the digital transformation of commercial banks. Further, it enriches the literature on the symbiotic relationship of organizational capability elements. For high digital transformation, technology orientation and market orientation complement each other. Under this condition, the two elements of dynamic capabilities play a substitute role in explaining the digital transformation—that is, the perception of corresponding capabilities and the integration and utilization capabilities play a completely substitutive role in promoting the digital transformation of commercial banks. The research results make up for the deficiency of existing research on the potential substitution relationship between dynamic capabilities elements [16], and support the advocacy of Wilden et al. (2016) [65] and Ma Hongjia et al. (2022) [66]. Of course, this also fully reflects the advantages of fsQCA in exploring the relationships between various elements within the model [69] and provides methodological guidance for demonstrating the complex digital transformation phenomena in the future.

Finally, this study certifies that the inherent mechanism of the digital transformation of commercial banks has causal asymmetry. The configurational path leading to high digital transformation is not directly opposite to those leading to non-high digital transformation. In other words, the reasons for non-high digital transformation cannot be directly deduced according to the factors and conditions leading to high digital transformation. As a result, the QCA method breaks through the unified symmetry assumption of causality effect in linear regression [63,70]. Thus, the approach can more subtly explore the reasons for the results [25] and further clarify the complex causes in more detail.

5.3. Practical Implications

Our findings imply that commercial banks develop a customer-centric value creation logic and, strategically, strengthen the market orientation in the digital transformation. The results of analysis show that customer-centric market orientation plays a more pervasive role in driving digital transformation. When implementing digital transformation, commercial banks need to consider customer demands. Based on providing the best customer experience that is supported by digital technology [71], commercial banks strive to construct the bridge between themselves and the customer. The high digital transformation can optimize financial technology and services promptly according to customer information data [72] so as to aggregate and create a continuous stream of digital value.

Second, managers of commercial banks should understand the relationship between organizational strategy and capability from the holistic perspective and correctly comprehend the complex causal interactions of strategic orientation and dynamic capabilities. Digital transformation of commercial banks is the result of the interaction of various elements of organizational strategic orientation and dynamic capabilities, and a single element is not a prerequisite for high digital transformation. This suggests that commercial banks cannot be limited to optimizing individual strategic orientation or dynamic capabilities
elements, and more attention must be paid to the complex webs of causal mechanisms between organizational strategies and capabilities to create the combination that can help commercial banks achieve high digital transformation.

Third, commercial banks should choose the appropriate digital transformation path based on their own strategic direction and capability base. For commercial banks with a clear strategic orientation, focusing on enhancing sensing capability (see S1a) or integrating capability (see S1b) is the “recipe” for achieving digital transformation; if commercial banks have strong dynamic capabilities, building a customer-centric market orientation is an important configuration for achieving high-level digital transformation (see S2).

5.4. Limitations and Future Research

This study is not excepted from limitations. First, we analyze digital transformation of commercial banks from a static perspective. Du et al. (2021) [73] proposed that the temporal dimension should be incorporated into the QCA approach to develop dynamic configuration theory. In the future, data could be collected period by period to construct a panel model to study the impact of the evolutionary trajectory of strategic orientation and dynamic capabilities on the digital transformation of commercial banks based on time-series QCA. Second, we only explored the effect of strategic orientation and dynamic capabilities. Exploring more organizational elements from multi-levels and multi-dimensional perspectives in the QCA research model can further enrich the literature. Third, this paper simply analyzes the managerial support path of the digital transformation at the organizational level. In the future, the technical practice path of transformation can be designed based on network or digital ecosystem with emerging technologies such as blockchain [74], cloud computing [75], and other technologies.

6. Conclusions

The fuzzy-set qualitative comparative analysis (fsQCA) of digital transformation practices by Chinese commercial banks shows that a single condition of strategic orientation or dynamic capabilities does not constitute the necessary condition for high digital transformation, yet market orientation plays a more general role in generating high digital transformation. The results suggest that successful digital transformation does not depend on a single condition, but on complex synergistic interactions between strategic orientation and dynamic capabilities. One key recommendation for managerial practice is that, in the digital economy, stronger market orientation leads to higher digital transformation. This is a first step for Chinese commercial banks to achieve sustained competitive advantage through digital transformation. In addition, and as a second step, in the volatility, uncertainty, complexity, and ambiguity environment, it appears that commercial banks need more consistent strategic orientation and stronger dynamic capabilities to achieve a higher digital transformation.

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