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The Role of Dynamic Capabilities and Strategic Orientation for Digital Transformation: A Configurational Approach

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Anna Kwiotkowska[1]

Abstract:

Purpose: *Today, digital transformation is becoming a critical challenge for achieving sustainable competitive advantage in the digital economy. However, most of the research conducted so far has focused on linear models to explain the essentially non-linear relationships between the leading factors important for digital transformation. Therefore, based on the configurational approach, the aim of this paper is to find paths for the success or failure of digital transformation based on the interaction between dynamic capabilities and strategic orientation.*

Design/Methodology/Approach: *In this study, focusing on discovering and understanding the causal mechanisms of digital transformation, a configurational set-theoretic analysis was performed using fuzzy set qualitative comparative analysis (fs/QCA). Polish SMEs were selected and used fs/QCA to explore how companies can engage strategy and dynamic capabilities to achieve digital transformation.*

Findings: *The research shows: (1) a single condition of dynamic capabilities or strategic orientation is not a necessary condition for high digital transformation, (2) two configuration paths can contribute to high digital transformation of companies, (3) there are two configuration paths leading to low digital transformation, which makes it possible to verify the asymmetric relationship by comparing the configuration paths of high and low digital transformation.*

Practical Implications: *For managers of SMEs, a holistic understanding of the relationship between organizational strategy and dynamic capabilities together with the complex causal interactions occurring between these dimensions is necessary. The digital transformation of SMEs is not the result of a single condition but rather the interaction of different elements of strategic orientation and dynamic capabilities. This conclusion suggests that companies cannot limit themselves to optimizing single elements of strategic orientation or dynamic capabilities. Importantly, more attention needs to be paid to the complex web of causal mechanisms between the analyzed conditions in order to create a combination that leads to high digital transformation. SMEs should choose the right digital transformation path built on their chosen strategic direction and their capability base. According to the research, for SMEs with a clear strategic orientation, a focus on enhancing sensing capability is a recipe for achieving digital transformation; if SMEs have strong dynamic capabilities, building a technological orientation is an important configuration for achieving high-level digital transformation.*

[1]*DSc Ph.D. Eng., Associate Prof., Department of Organization and Management, Silesian University of Technology, Poland; akwiotkowska@polsl.pl;*

Originality/Value: *The findings provide a contribution to the literature on digital transformation. The introduction of a configuration perspective focusing on the analysis of the synergistic effect and combination relationship between elements allowed for the discovery of many equifinal paths to achieve high digital transformation.*

Keywords: *Digital transformation, dynamic capabilities, strategic orientation, fuzzy set qualitative comparative analysis (fs/QCA).*

JEL codes: *L20, O33, C89.*

Paper type: *Research article.*

1. Introduction

More and more SMEs are trying to achieve sustainable competitive advantage by using the latest digital technologies to innovate their business models (Spieth *et al.*, 2019; Ciampi, 2021). Specialized knowledge and technologies are dominant and safe sources of competitive advantage. In recent research, Bonnet and Westerman (2021) concluded that digital technology is the key to defining the digital transformation of enterprises.

In the literature, researchers analyze the causes of digital transformation of enterprises from a micro perspective with an emphasis on managerial characteristics such as digital leadership, manager cognition, digital capabilities and other personal factors (McCarthy *et al.*, 2021; Tyagi *et al.*, 2023; Grima *et al.*, 2023; 2020), or from a macro perspective. In this trend, a significant number of scientists study the impact of government policy, digital economy, social digitization and digital technology on the digital transformation of enterprises.

Although both of these approaches bring us closer to understanding the role that the micro and macro environment plays in generating the digital transformation of enterprises, research is still limited. Moreover, existing research quite significantly neglects the active selection of an organization's internal strategy and its interactions with dynamic organizational capabilities.

Meanwhile, digital transformation is embedded in the market environment, and enterprises' digital strategic response rebuilds internal and external capabilities. Hence, issues related to sensing, integrating, and transforming internal and external capabilities to improve the fit of the strategy to the environment are becoming more important. Dynamic capabilities underpin the opportunities for enterprises to integrate digital technology and business processes in the digital economy.

As numerous studies indicate (Ghosh *et al.*, 2022; Yu and Moon, 2021), both strategic orientation and dynamic capabilities are essential for digital transformation because they allow for greater flexibility and sustainable growth.

However, scientists have rarely integrated these factors and considered them from a holistic perspective. Moreover, much of the research conducted to date largely uses regression methods to analyze the interaction effect of strategy and capability.

However, these methods are not able to analyze the impact of the co-occurrence of strategic and capability conditions on digital transformation, nor can they assess the structure of strategic capabilities to achieve a high level of digital transformation (Fiss, 2007). The answer to such limitations may be the use of a configuration approach and fs/QCA (fuzzy set qualitative comparative analysis), which allows for examining many equivalent paths of interconnection of the analyzed variables (Fiss, 2011; Ragin 2014).

Fs/QCA and configurational analysis assume that factors are interdependent rather than independent, which in turn is well suited to explaining complex cause-and-effect problems with multiple conditions (Douglas *et al.*, 2020). Fs/QCA not only enables the identification of the necessity of a single condition but also allows for the explanation and analysis of the full interaction between factors (Furnari *et al.*, 2021), to reveal the complex cause-and-effect mechanisms of strategic orientation and dynamic capabilities in the field of digital transformation. Moreover, it is also possible to identify configuration paths leading to high and low digital transformation.

This study offers several contributions to the literature. First, it proposes a framework for analyzing enterprise digital transformation from a configurational perspective between strategy and capabilities.

Drawing on configuration theory (Furnari *et al.*, 2021), this study extends prior literature by discerning and identifying the complex, concurrent paths through which organizational strategy and capabilities influence digital transformation (Niemand *et al.*, 2021; Naimi-Sadigh *et al.*, 2022).

Second, the study reveals multiple equal paths to high and low digital transformation, rather than a single best solution offered by most studies in the literature to date. The study provides a better understanding of the interplay of causal conditions in established relationships with the outcome under investigation.

Such findings contribute to the emerging literature by enriching the digital connotation of both strategic management and dynamic capabilities theories. Third, introducing fs/QCA into the digital transformation of enterprises enables the analysis of necessary and sufficient conditions to explore the connections (Parmigiani *et al.*, 2022).

Finally, an issue of substantive importance may be research findings that can deepen understanding of how enterprise strategies and capabilities collectively impact digital transformation practice. As indicated by the sufficiency analysis,

there are three different configuration paths that can be used to help managers achieve a high digital transformation.

This article is structured as follows. Section 2, Literature Review, presents and discusses the conceptual background of digital transformation, strategic orientation, dynamic capabilities, and the interactions of these concepts. Section 3, Methodology, describes the research design, data and method.

The main empirical results are presented in Section 4, Research Results. Section 5, Discussion and Conclusions, discusses the study results, their theoretical and practical implications, and conclusions, limitations, and tracing future research paths.

2. Literature Review

The literature emphasizes that digital transformation changes the company's business model, among others: by changing value creation processes, organizational tasks and the way of doing business. Moreover, digital transformation is facilitated by digital technologies and carried out to achieve competitive advantage. As indicated by Verhoef *et al.* (2021, p. 889), digital transformation is "changing the way a company uses digital technologies to develop a new digital business model that helps create and leverage greater value for the company."

However, many companies have significant difficulties in adapting and making appropriate organizational changes to ways of working to fully exploit the potential of their digital efforts (Parviainen *et al.*, 2017). There are many reasons why digital transformation efforts fail, including inadequate leadership (Fitzgerald *et al.*, 2014), data security issues, lack of interoperability with existing systems, and lack of control (Schwertner, 2017).

When these threats can be eliminated and digital technology is implemented in a way that supports a company's overall strategic and operational goals, then digital transformation can have a significant and positive impact on company performance (McLaughlin, 2017). Therefore, the appropriate formulation and implementation of a digital transformation strategy becomes important (e.g. Warner and Wäger, 2019). Better aligning digital technology with your overall strategy requires a thoughtful way of implementing technology.

Integrating digital technology into internal processes and customer offers should be a way to improve the business model and create better customer experiences (McLaughlin, 2017). Digital technologies therefore have an impact on the strategic development of companies, and the need for digital transformation of companies in order to create a competitive advantage requires well-thought-out strategic processes (Aspara *et al.*, 2013).

In order to create an organization that can manage digital transformation, developing dynamic capabilities is becoming increasingly important. At a time of ever-increasing digital disruption, a company's current skills and resources may become insufficient and will require a greater focus on change capability. In other words, a sound basis for explaining how firms will be able to respond to market changes through digital transformation will be the theory of dynamic capabilities (Warner and Wäger, 2019).

Dynamic capabilities focus on the actions taken by companies to change their resources, better adapt them and build competitive advantage in a changing environment (Teece *et al.,* 1997). Due to the fact that digital transformation causes a number of changes, including those related to the processes of creating value and achieving competitive advantage, it can be concluded that dynamic capabilities are necessary to effectively implement these changes.

In particular, dynamic capabilities may be preferred when environmental changes threaten a firm's ability to compete in the marketplace (Winter, 2003). Thus, dynamic capabilities provide a coherent approach to examining digital transformation, especially given the significant impact that digital technologies continue to have and will continue to have on business outcomes (Warner and Wäger, 2019).

To successfully achieve digital transformation, companies need a set of capabilities that facilitate changes in their business models. Teece (2007) suggests that the joint sensing opportunities and threats, seizing these opportunities, and the ability to maintain competitiveness through reconfiguration create dynamic capabilities. This classification of dynamic capabilities is widely used in the literature (Warner and Wäger, 2019; Yeow *et al.,* 2018) and will form the basis in this paper for examining the capabilities necessary for digital transformation.

Sensing as well as shaping new possibilities involves activities related to scanning, creating, learning and interpreting (Teece, 2007) and, as Teece (2014) points out, entails ". . . identification, development and assessment of technological possibilities in relation to customer needs" (p. 332). To perform sensing and shaping, embedded organizational routines linked to specific core activities are needed (Teece, 2007). Companies must be aware of their entire ecosystem, not only in terms of their immediate environment but also regarding potential threats from new entrants and other competitive activities (Teece, 2007).

Companies need to build digital sensing capabilities to better understand unforeseen changes in the environment and take actions to manage the changes (Jacobi and Brenner, 2018). Seizing capabilities refers to the ability to sense opportunities thereby creating for example new products, processes, services, or combinations of these alternatives (Teece, 2007). This capability allows companies to capture the value of potential business opportunities and make specific changes

to fully exploit them (Yeow *et al.,* 2018). The introduction of new technologies into companies is often associated with the possibility of creating a gap in existing capabilities (Karimi and Walter, 2015), hence the seizing capability is important to be able to capture value from new opportunities.

Reconfiguring refers to the continuous renewal and transformation of organizational routines (Yeow *et al.,* 2018). Reconfiguring capabilities becomes central to achieving sustainable growth due to the constant transformation of organizational structures and assets as the company grows and the environment changes (Teece, 2007). Reconfiguration capabilities are extremely important when it comes to transforming existing resources to adapt them to new strategies, or building completely new resources and filling gaps in the company's resource base (Yeow *et al.,* 2018).

This capability especially becomes important when market conditions change rapidly (Helfat *et al.,* 2007). Due to the significant challenges of digital transformation, many companies may have deficits in existing internal resources, such as digital knowledge, to succeed (Yeow *et al.,* 2018).

Therefore, the development of reconfiguring capabilities is necessary for these companies to access new resources and build them appropriately (Yeow *et al.,* 2018). The combined sensing, seizing and reconfiguring capabilities help companies respond to changing market demands faster than their competitors. Therefore, dynamic capabilities constitute a foundation for the ability to capture up-to-date information on digital changes, quickly integrate digital technologies and business processes, and achieve a high level of digital transformation.

The theory of strategic orientations is a theoretical framework aimed at categorizing different types of strategies at the level of business and organizational culture. According to Narver and Slater (1990, p. 20), a company's strategic orientation "reflects the strategic directions implemented by the company to create appropriate behaviors that ensure continuous, excellent corporate performance." Strategic orientation is defined as “the principles that guide and influence an organization's activities” (Hakala, 2011, p. 210).

Moreover, strategic orientation serves as a guide for organizational practices and decisions related to the allocation of resources and the exploitation of opportunities, and it reflects the culture of the company (Deshpandé *et al.,* 1993).

The choice of strategic orientation, in turn, is often based on the tangible and intangible resources that the company has (Narver and Slater, 1990). Organizations therefore vary in the degree to which they have different orientations.

On this basis, the three strategic orientations most frequently included in research on SMEs in the context of digital transformation were considered for further

analysis: entrepreneurial orientation, market orientation and technological orientation.

Entrepreneurial orientation is one of the most actively explored areas of strategic management (Balaji and Roy, 2017; Rauch *et al.*, 2009). Entrepreneurial orientation can be defined as "the set of processes, practices, and decision-making styles associated with entering new or established markets with new or existing products and services" (Lumpkin *et al.*, 1997). Companies with a high entrepreneurial orientation gain a competitive advantage on the market over companies with a more conservative approach to management (Arshad *et al.*, 2014).

Entrepreneurial orientation reflects the managerial ability to take proactive and aggressive initiatives to resist competitive forces and gain market advantage (Alegre and Chiva, 2013). An entrepreneurially oriented company can be defined as one that undertakes risky activities, engages in innovation in the product market, and pioneers proactive innovations, overcoming competition (Wiklund *et al.*, 2005).

The definition of entrepreneurial orientation in the literature most often includes three leading dimensions, i.e., innovation, proactivity and risk-taking (Gupta and Wales, 2017). Innovation is a predisposition to creative involvement and experimentation by introducing new products or services, as well as technological leadership through research and development activities in new processes (Rauch *et al.*, 2009).

Proactivity is a long-term perspective related to the search for opportunities, which assumes the introduction of new products and services before the competition and the ability to anticipate future needs (Rauch *et al.*, 2009; Amin, 2015). Risk-taking means the company's readiness to take bold actions in terms of committing resources to specific organizational initiatives with unknown consequences (Wiklund and Shepherd, 2005; Amin, 2015).

Market orientation is based on the assumption that companies gain and maintain their competitive advantage by effectively serving stakeholders and continuously meeting changing market needs (Narver and Slater, 1990). It can be defined as a set of cross-functional processes and activities aimed at customer satisfaction through continuous needs assessment (Deshpandé and Farley, 1998). Narver and Slater (1990) suggest and describe three behavioral components of market orientation: customer orientation, competitive orientation and interfunctional coordination.

Customer orientation refers to gathering relevant information from the market in order to understand the customer's needs and profile and thus continuously offer them increased value.

Competitive orientation is the ability and willingness to identify, analyze, and respond to competitors' activities and customer needs (Gatignon and Xuereb, 1997).

Both customer and competitive orientation encompass all activities related to collecting customer and competitive information and communicating this information throughout the organization.

The third component, interfunctional coordination, is based on how well information and the combination of the previous two components are distributed and shared within the company.

Many scholars have examined the impact of market orientation on various measures of company performance, for example, according to Narver and Slater (1990), market orientation is an important determinant of profitability. Moreover, Gatignon and Xuereb (1997) found that the competitor orientation component is important for firms that want to develop innovations in high-growth markets.

The concept of technological orientation can be defined as "the ability and willingness to acquire significant technological background and use it in the development of a new product" (Gatignon and Xuereb, 1997). Similarly, Zhou *et al.* (2005) considered involvement in research and development, acquisition of new technologies and application of the latest technologies as the basic feature of technological orientation.

Moreover, technology orientation is increasingly linked to companies' ability to understand, acquire and assimilate internal and external knowledge about new technological developments. In other words, technological orientation refers to a company's openness to new ideas and tendency to adapt new technologies during product development (Hurley and Hult, 1998). Technology orientation is naturally a key characteristic of technology companies, but it can also emerge in any industry as long as the company places a strong emphasis on IT and technology management (Workman, 1993).

To adapt to disruptive changes imposed by markets and technologies, companies are expected to develop digital strategies and achieve digital transformation (Kane *et al.,* 2021). This means implementing systemic changes in the way companies organize their workforce and develop digitally oriented cultures, broadening the horizons of strategic planning, and implementing digital experiments that consequently encompass the entire enterprise.

These activities have a direct impact on the business, attracting talent and visionary leaders committed to a digitally oriented vision (Kane *et al.,* 2017). These principles do not seem to apply when organizations demonstrate low levels of the strategic orientations mentioned above.

In summary, entrepreneurial orientation, market orientation, technological orientation, sensing capability, seizing capability and reconfiguring capability are some of the fundamental and critical factors influencing digital transformation.

These elements provide the basis for a systematic examination of the complex relationships between strategic orientation, dynamic capabilities and the digital transformation of enterprises. It should be noted that although the digital transformation is the result of the joint evolution of organizational strategies and capabilities, existing research to date basically focuses only on the single impact of strategic orientation and dynamic capabilities on the digital transformation of enterprises.

While strategic orientation and dynamic capabilities are interdependent and interactive in the process of enterprise development, the joint effect between them has been analyzed to a very limited extent so far. Therefore, the question remains how strategic orientation and dynamic capabilities are interconnected to further influence digital transformation.

To address these challenges, this paper adopts a configurational perspective, which suggests that outcomes emerge from interactions between critical conditions/variables (Du and Jia, 2017, Kwiotkowska *et al.,* 2022) and focuses on the analysis of the synergistic effect and combination relationship between variables. This approach is therefore suitable for examining the non-linear relationship between causes and effects and helps discover multiple equivalent paths to achieve high digital transformation of enterprises.

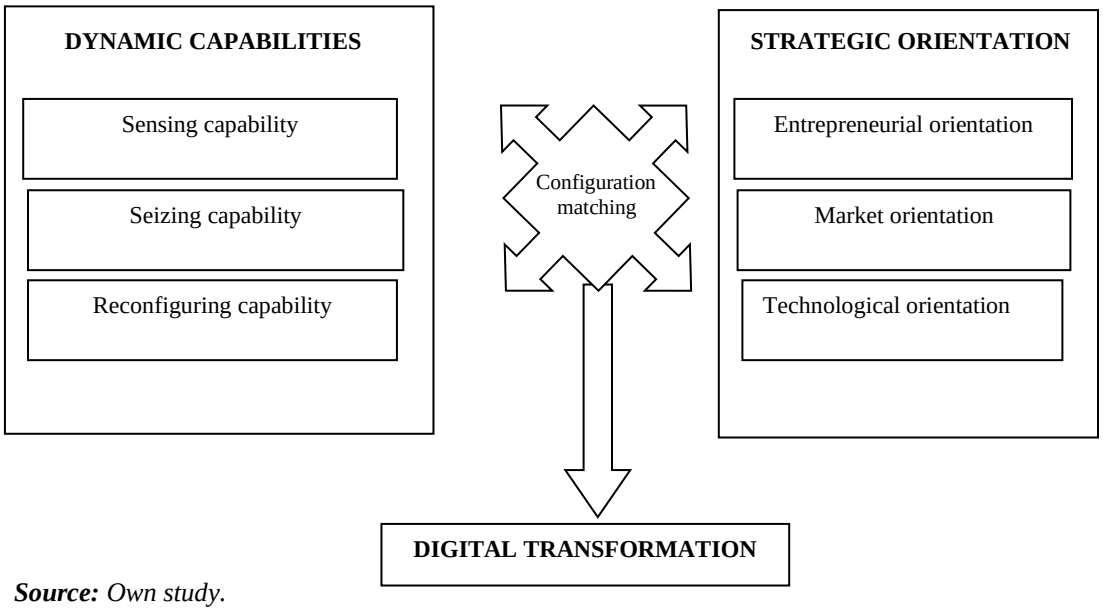
The paper, adopting a configurational perspective, takes into account entrepreneurial orientation, market orientation, technological orientation, sensing capability, seizing capability and reconfiguring capability in one research structure to analyze the complex interactions between the mentioned conditions.

Moreover, the article sought answers to the following research questions: first, whether a single element of strategic orientation and dynamic capabilities are a necessary condition for the digital transformation of enterprises, secondly, how strategic orientation and conditions regarding dynamic capabilities are related to ensure high and low digital transformation. Figure 1 shows the research model.

3. Research Methodology

The present study used the fuzzy-set Qualitative Comparative Analysis (fs/QCA) method, which is suitable for examining the combined effects of multiple antecedent conditions to obtain the same result (Rihoux, Ragin, 2008). The fs/QCA method was originally developed by Ragin in 1987. The fs/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 (Fiss, 2007).

Figure 1. *Research configuration model with variables*



Source: *Own study.*

The fs/QCA can identify both necessary and sufficient conditional relationships; therefore, the fs/QCA method was used to study the complex causal mechanisms between entrepreneurial orientation, market orientation, technological orientation, sensing capability, seizing capability, reconfiguring capability and digital transformation. The fs/QCA approach examines how the interaction between conditions/elements affects the whole from a configuration perspective rather than analyzing conditions in isolation.

In fs/QCA, configuration theory is used to conduct a cross-case comparative analysis, and the method ensures the exploration of which conditional elements of the configuration cause the expected results. Given that the fs/QCA can well reflect the degree and level of membership of the set, it has the advantages of both qualitative and quantitative analyses (Charles, 2008).

The fs/QCA method not only solves the generalization problem inherent in a qualitative analysis of a few cases but also compensates to some extent for the lack of qualitative change and analysis of phenomena inherent in a purely quantitative analysis with a large sample size.

The research was conducted using a survey questionnaire developed based on previous studies with high validity. Initially, the instrument's reliability was checked on a sample of 39 respondents from ten SMEs. The survey questionnaire was in electronic form. The entire data collection period was the last quarter of 2023 and the first quarter of 2024. To explore digital transformation at the

organizational level, this study collected data from Polish SMEs undergoing digital transformation with some achievements under their belt.

For this reason, the automotive industry was chosen, which - as the analyzed literature shows - leads to the knowledge and application of concepts and technologies related to digital transformation. This is confirmed, among others, by research conducted by Schuh et al. (2017), who showed that the automotive industry is the first to implement digital technologies, having more favorable hardware and software conditions compared to other industries.

Data was collected from 96 small and medium-sized enterprises in Poland, focusing on middle and senior managers. A total of 156 valid questionnaires were obtained for this study. A summary of the main characteristics of the sample is presented in Table 1.

Table 1. *Characteristics of the research sample*

Category (N=156)		**Statistic**
Respondent level	Position	Manager: 29.3%
		Senior Manager: 43.7%
		Executive (CEO, CMO, CFO, CIO): 27%
	Established	Within 5 years: 8.2%
		Within 5–10 years: 18.9%
		Within 10–15 years: 46.8%
		More than 15 years: 26.1%
	Age	Mean: 49.1 years
	Gender	Female: 14.3%
		Male: 85.7%
Firm level	Employees	<10: 17.3%
		<50: 39.7%
		<250: 43%
	Firm age	≤5: 8.7%
		6-14: 42.2%
		≥15: 49.1%

Source: *Own study.*

All measurement items used in this study were adopted from established scales. The survey items of all variables in the questionnaire are measured by Likert's 5-level indicator (1= strongly disagree, 5 = strongly agree). Following a literature review on dynamic capabilities, the focus for measurement was on three capabilities proposed by Teece (2007): sensing, seizing, and reconfiguring (defined earlier).

Due to the theoretical nature of Teece's work, the scales proposed by Pavlou and El Sawy (2011) were used for measurement, including three items for sensing capability, four items for seizing, and five items for reconfiguring. Cronbach's alpha coefficients for sensing, seizing, and reconfiguring capabilities were 0.87,

0.77, and 0.84, respectively. An established measure of entrepreneurial orientation was also used. This scale is based on Miller's (1983) conceptualization, developed by Covin and Slevin (1989) and refined by Naman and Slevin (1993). It uses eight measures to assess key dimensions of entrepreneurial orientation (Cronbach's alpha = 0.83): innovation, proactivity and risk-taking.

To measure market orientation (Cronbach's alpha = 0.87), the MORTN scale was used (Deshpande and Farley 1998), which uses the most effective measures of the three scales established in the literature on market orientation, the Kohli, Jaworski and Kumar (1993), the Narver and Slater (1990) scale, and the Deshpande, Farley, and Webster (1993) scale. The previous two scales are the two most commonly used scales in the literature.

Measures on this 10-point scale focus on companies' commitment to customer satisfaction. To measure technological orientation (Cronbach's alpha = 0.78), a four-item scale developed by Gatignon and Xuereb (1997) was used, which has later been applied in other studies (Talke *et al.*, 2011; Chen *et al.*, 2014).

This construct examines whether the company uses advanced technologies in product development, whether the products incorporate the latest technology, whether the company actively develops new, technologically advanced products, and whether research-based technological innovations are readily accepted. To measure the construct of digital transformation, a five-item scale with dimensions proposed by Nwankpy and Roumani (2016) and Chu, Chi and Wang (2019) was used. The measurement items for the used constructs are presented in Table 2.

Table 2. *Measurement items for the used constructs*

Constructs	**Items**
Sensing capability *Pavlou, El Sawy (2011)*	1. We often review our product development efforts to ensure they are in line with what the customers want. 2. We devote a lot of time implementing ideas for new products and improving our existing products. 3. We frequently scan the environment to identify new business opportunities.
Seizing capability *Pavlou, El Sawy (2011)*	1. We are effective in transforming existing information into new knowledge. 2. We are effective in using knowledge into new products. 3. We carefully interrelate our actions to each other to meet changing conditions. 4. We are effective in developing new knowledge that has the potential to influence product development.
Reconfiguring capability *Pavlou, El Sawy (2011)*	1. We have effective routines to identify, value, and import new information and knowledge. 2. We can successfully reconfigure our resources to come up with new productive assets. 3. We often engage in resource recombination to better match our

	product-market areas and our assets. 4. We ensure that the output of our work is synchronized with the work of others. 5. We ensure and appropriate allocation of resources within our group.
Entrepreneurial orientation *Naman, Slevin (1993)*	1. We place great emphasis on R&D, technological leadership and innovation. 2. We have a strong tendency towards high-risk projects (with the chance of very high returns). 3. We believe in bold, broad-based action. 4. When faced with decision-making processes fraught with uncertainty, my company typically takes a bold, aggressive stance to maximize its potential to exploit potential opportunities. 5. The changes in your products or services over the last five years have been dramatic. 6. When dealing with competitors, my company usually initiates actions to which competitors then respond. 7. When dealing with competitors, my company is the first to introduce new products, services, administrative techniques, operational technologies, etc. 8. When dealing with competitors, my company typically adopts a very competitive "take your competitors back" attitude.
Market orientation *Deshpande, Farley (1998)*	1. We continually monitor customers and competitors to find new ways to improve customer satisfaction. 2. We freely communicate information about our successful and unsuccessful customer experiences across all business functions. 3. Our strategy for competitive advantage is based on our understanding of customers' needs. 4. We are more customer focused than our competitors. 5. We poll end users at least once per year to assess the quality of our products and services. 6. Our business objectives are driven primarily by customer satisfaction. 7. We measure customer satisfaction systematically and frequently. 8. We have routine or regular measures of customer service. 9. I believe this business exists primarily to serve customers. 10. Data on customer satisfaction are disseminated at all levels in this business on a regular basis
Technological orientation *Gatignon, Xuereb (1997)*	1. We use advanced technologies in our product development. 2. Our products always contain the latest technology. 3. We are actively developing new technologically advanced products. 4. Technological innovation based on research is accepted without further ado in our company.
Digital transformation *Nwankpy, Roumani (2016); Chu, Chi, Wang (2019)*	1. Our company is driving new business processes built on technologies such as big data, analytics, cloud, mobile and social media platform. 2. Our company is integrating digital technologies such as social media, big data, analytics, cloud and mobile technologies to drive

	change. 3. Our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile and social media platform. 4. Our company is developing digital products and services. 5. Our company is willing to vigorously promote and publicize digital skills and management knowledge".

Source: *Own study.*

The most important issue when using fs/QCA is to calibrate the measured constructs to translate them into sets appropriately. Due to the lack of reference to external standards in this study, to avoid errors due to lack of theoretical and practical experience, the lower quartile (25%), the median (50%) and the upper quartile (75%) were used to calibrate the outcome variable (digital transformation) and the six conditional variables (sensing capability, seizing capability, reconfiguring capability, entrepreneurial orientation, market orientation, technological orientation) and to represent anchor points falling fully within the threshold, crossover points, and full out anchor points falling fully outside the threshold. The calibration anchors and descriptive statistics for each variable are presented in Table 3.

Table 3. *Sets, calibration, and descriptive statistics*

Fuzzy Set Calibration				**Descriptive Statistics**			
Set	**Fully in**	**Crossover point**	**Fully out**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Digital transformation	4.6	4.1	3.9	4.1	1.2	1.6	5
Sensing capability	4.5	4.2	4.0	3.9	1.0	1.2	5
Seizing capability	4.7	4.1	3.3	3.8	0.9	1.4	4.9
Reconfiguring capability	4.6	4.3	3.7	3.9	0.9	1.3	5
Entrepreneurial orientation	4.7	4.1	4.0	4.1	1.0	1.4	5
Market orientation	4.4	3.9	3.4	3.9	1.1	1.2	4.8
Technological orientation	4.1	3.8	3.5	3.8	1.0	1.0	5

Source: *Own study.*

4. Research Results

The analysis of necessary and sufficient conditions for configurations in this paper have been analyzed using the fs/QCA 3.0 software. First, a necessity condition analysis was performed to check whether any single condition is necessary to achieve high or low digital transformation. In a necessity analysis, a causal condition is considered necessary for the outcome if the consistency score exceeds 0.90.

The analysis of antecedents for achieving high and low digital transformation is

presented in Table 4. From Table 4, it can be concluded that in the high and low digital transformation analysis, there was no consistency antecedent condition exceeding 0.9. The results therefore indicate that none of the six antecedent conditions (sensing capability, seizing capability, reconfiguring capability, entrepreneurial orientation, market orientation, technological orientation) was a necessary condition to obtain the examined result (digital transformation).

Table 4. *Necessity analysis of single conditions*

Condition	**High Digital Transformation**		**Low Digital Transformation**	
	Consistency	**Coverage**	**Consistency**	**Coverage**
Sensing capability	0.688	0.583	0.615	0.708
~Sensing capability	0.698	0.588	0.603	0.689
Seizing capability	0.656	0.565	0.664	0.693
~Seizing capability	0.608	0.599	0.558	0.651
Reconfiguring capability	0.621	0.583	0.671	0.671
~Reconfiguring capability	0.603	0.569	0.606	0.686
Entrepreneurial orientation	0.675	0.623	0.664	0.693
~Entrepreneurial orientation	0.664	0.585	0.663	0.667
Market orientation	0.632	0.607	0.652	0.683
~Market orientation	0.621	0.608	0.667	0.662
Technological orientation	0.670	0.537	0.613	0.658
~Technological orientation	0.662	0.652	0.601	0.637
Note: *the symbol ~ denotes logical negation - the absence of conditions.*				

Source: *Own study.*

In the next step, a sufficiency analysis was performed, whereby recommendations of previous studies, the threshold of consistency was set at 0.8 and the frequency number was set at 2. Additionally, based on the results obtained, conditions that appeared both in the intermediate solution and in the parsimonious solution were identified as core conditions, while conditions that occurred only in the intermediate solution were identified as peripheral conditions. Taking this into account, the results of the fs/QCA analysis in this study are presented in Table 5.

When presenting the fs/QCA results, symbols traditionally used in the literature for this method were used. Therefore, in Table 5, the size of the circle distinguishes between the core condition and the periphery condition. The large full circle symbol represents the existence of the core causal conditions, the small full circle symbol represents the existence of the peripheral casual condition, the symbol of a large crossed out circle represents the lack of the core casual condition and blank

spaces indicate "do not care", therefore a condition that is irrelevant to achieving the analyzed outcome.

In this study, two configuration paths achieved high digital transformation. The overall consistency is 0.841, moreover, the consistency of each configuration is greater than 0.8, which indicates that the consistency level is qualified (e.g. Schneider and Wagemann, 2012). The total coverage of the solution is 0.885, which indicates that configurations explain most of the outcome.

Table 5. *Configuration of high digital transformation*

Condition	**High Digital Transformation**	
	HDT1	**HDT2**
Sensing capability	●	⬤
Seizing capability		●
Reconfiguring capability	⊖	⬤
Entrepreneurial orientation	⬤	⊖
Market orientation	⬤	⊖
Technological orientation	⬤	●
Raw coverage	0.632	0.604
Unique coverage	0.252	0.081
Consistency	0.841	0.862
Overall solution coverage	0.885	
Overall solution consistency	0.841	
Note. ⬤ – core causal conditions (present); ● - peripheral casual condition (present); ⊖ - core casual condition (absent); blank spaces indicate "do not care".		

Source: *Own study.*

As the results of the analyses indicate, there are two configuration paths of high digital transformation that have different basic features - one is dominated by strategic orientation, the other by dynamic capabilities. The results of both configurations are analyzed in detail below.

In configuration HDT1 (sensing capability*~reconfiguring capability*entrepreneurial orientation*market orientation*technological orientation) the combination path of high entrepreneurial orientation, high market orientation, high technological orientation and low reconfiguring capability as core conditions and complementary high sensing capability as a periphery condition can produce a high digital transformation.

Regardless of their seizing capability, SMEs can still achieve a high level of digital transformation with weak reconfiguring capability as long as they have a high entrepreneurial, technological and market orientation, as well as solid sensing capability.

In configuration HDT2 (sensing capability*seizing capability*reconfiguring

capability*~entrepreneurial orientation*~market orientation*technological orientation), the configuration path of high sensing capability, high reconfiguring capability, low entrepreneurial orientation, and low market orientation as core conditions and complementary high technological orientation and high seizing capability as periphery conditions can produce the high digital transformation of SMEs.

That is, in the absence of entrepreneurial and market orientations, SMEs can also achieve high digital transformation so long as they have strong sensing capability, seizing capability, and reconfiguring capability, while maintaining high technological orientation.

This study also examined configurations that generate low digital transformation. These configurations are shown in Table 6. Two configurations provide low digital transformation. The overall solution consistency is 0.812, with a coverage of 0.706.

Table 6. *Configuration of low digital transformation*

Condition	**Low Digital Transformation**	
	LDT1	**LDT2**
Sensing capability		
Seizing capability	⊖	
Reconfiguring capability	⊖	
Entrepreneurial orientation		⊖
Market orientation		⊖
Technological orientation	●	●
Raw coverage	0.414	0.568
Unique coverage	0.092	0.116
Consistency	0.822	0.841
Overall solution coverage	0.706	
Overall solution consistency	0.812	
Note: ● *– core causal conditions (present);* ● *- peripheral casual condition (present);* ⊖ *- core casual condition (absent); blank spaces indicate "do not care".*		

Source: *Own study.*

The configuration LDT1 (~seizing capability* ~reconfiguring capability*technology orientation) shows that regardless of sensing capability, entrepreneurial and market orientation, a high level of digital transformation is difficult to achieve in enterprises that lack seizing capability and reconfiguring capability, even with a technology orientation.

The configuration LDT2 (~entrepreneurial orientation*~market orientation*technological orientation) shows that even if there is a technological orientation, the degree of digital transformation of SMEs will not be high in a situation without entrepreneurial orientation and market orientation.

In addition, a robustness test was also performed to check the reliability of the research results by changing the research conditions. To ensure the robustness of the findings, the case frequency thresholds were adjusted from two to three, adjusted the consistency threshold from 0.8 to 0.75 and the grouping of dynamic capabilities and strategic orientation in connection with high digital transformation was re-examined.

The results showed no significant changes. Therefore, according to the research of Greckhamer et al. (2018) that if adjusting the parameters did not result in significant changes in the number, composition, consistency and coverage of the configurations, the results could be considered robust.

5. Discussion and Conclusions

This study uses the fuzzy set qualitative comparative analysis (fs/QCA) method based on configuration theory to verify the relationship between dynamic capabilities (sensing capability, seizing capability, reconfiguring capability) and strategic orientation (entrepreneurial orientation, market orientation, technological orientation) and the digital transformation of SMEs.

The results indicate that all the analyzed conditions relating to strategic orientation but also dynamic capabilities cannot constitute necessary conditions for achieving digital transformation. Although previous research has shown that dynamic capabilities are significantly linked to digital transformation a digital strategic vision is a necessary and not sufficient condition for SME development (Chen and Tian, 2022). This study finds that these strategic capabilities are not necessary for achieving high digital transformation.

For example, in the case of HDT1, in the absence of reconfiguring capability, high entrepreneurial orientation, high market orientation, high technological orientation and high-level sensing capability jointly promote the high digital transformation of SMEs. This will help resolve the dispute over inconsistent conclusions of digital transformation resulting from ignoring the mutual simultaneous impact of different organizational factors in previous studies.

The results show that high digital transformation can be achieved through two paths. The first path indicates that high digital transformation can be achieved based on a high entrepreneurial, technological and market orientation, as well as a solid sensing capability.

The second path, in turn, is based on strong sensing capabilities, seizing capability, and reconfiguring capability, while maintaining high technological orientation. It should be emphasized that these paths represent equifinal paths for achieving high digital transformation among different SMEs. Based on configurational theory, this paper integrates six elements relating to strategic orientation and dynamic

capabilities, creating a complex causal mechanism for examining the digital transformation of SMEs.

Therefore, going beyond the limitations of research conducted so far in the literature, a new idea for research on the coupling of organizational elements and the behavior of SMEs in the era of digital transformation was provided.

Furthermore, the paper carried out a configuration analysis with reference to achieving high digital transformation and also low digital transformation, which makes it possible to conclude that configurations that achieve high and low digital transformation are not symmetrical. Based on the research conducted, it can be concluded that causal asymmetry is an inextricable mechanism of the digital transformation of SMEs.

Configuration paths leading to high digital transformation are not opposed to paths leading to low digital transformation. In other words, the causes of low digital transformation cannot be directly explained by the conditions leading to high digital transformation. Therefore, by using fs/QCA it was possible to overcome a certain uniformity that constitutes the leading assumption of the symmetry of the causal effect in linear regression (Rihoux and Ragin, 2008). With this approach, the causes of results can be more accurately explored and complex causes can be better explained.

This study used fs/QCA to observe that dynamic capability and strategic orientation are somewhat substitutable in promoting the digital transformation of SMEs. In the case of high digital transformation, the analyzed strategic orientations are complemented only by a high sensing capability, or in the second final path, dynamic capabilities are supplemented only by a high technological orientation.

The results fully reflect the advantages of fs/QCA in examining the relationships between various elements within the adopted model and provide methodological guidance for demonstrating complex digital transformation phenomena in the future.

Considering the practical implications of this research, attention should be paid to SME managers' understanding of the relationship between organizational strategy and dynamic capabilities from a holistic perspective in order to correctly recognize and interpret the complex causal interactions occurring between these elements.

The digital transformation of SMEs is the result of the interaction of both strategic orientation and dynamic capabilities, and a single element is not a sufficient condition for high digital transformation. This suggests that SMEs cannot limit themselves to optimization based only on a selected strategic orientation or dynamic capability. Rather, greater attention needs to be paid to the complex webs of causal mechanisms between organizational strategies and capabilities to create a

combination that can help companies achieve high levels of digital transformation. In addition, SMEs should choose the appropriate digital transformation path based on their own capability base and strategic direction. For SMEs with a clear strategic orientation, focusing on strengthening sensing capability (see HDT1) or if the SMEs have a high dynamic capability, building a high technology orientation is an important configuration to achieve high-level digital transformation (see HDT2).

Like other studies, this also has several limitations. First, the source of data in this study was Polish SMEs in the automotive industry. Therefore, the study cannot fully represent all SMEs and future research should be conducted on a broader research sample. Second, only the impact of strategic orientation and dynamic capabilities was examined.

Therefore, expanding the research to include other organizational elements may further enrich the literature. Third, mainly secondary data were used to support the conclusions of this study. Future research may investigate the influence of primary data on the analyzed results.

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