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Impact of AI capability, digital strategy, and digital maturity on organisational performance

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ABSTRACT
In the face of the inevitable digitalisation of enterprises, limited research has investigated the impact of digital strategy, digital maturity, and AI capability on organisational performance. Drawing on the resource-based theory and recent work on AI in the organisational context, this research aims to uncover the configurations under which a firm's digital strategy, digital maturity, and AI capability would jointly lead to higher performance. This study uses a unique fuzzy-set qualitative comparative analysis methodology to analyse data collected from 56 SMEs to investigate three domains of AI capability, along with digital strategy and digital maturity. The results suggest that high organisational performance does not depend on a single condition but rather on complex synergistic interactions among the studied conditions. The results indicate that three equifinal configurations lead to high performance of SMEs. The study suggests that AI technical resources are mandatory for any viable solution. This study provides pioneering insights into the empirical contributions of AI capability, digital strategy and digital maturity and their relationships to organisational performance in SMEs, by using a configurational approach. The adopted theoretical perspective addresses the need for a holistic approach to uncover the mechanisms underlying digital strategy and digital maturity in relation to AI capabilities in SMEs, and their mutual impact on organisational performance. These results have practical implications for decision-makers and owners of SMEs, providing new insights into the combination of factors that drive high performance.

KEY WORDS
artificial intelligence capability, digital transformation, firm performance, fsQCA

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Introduction

The current surge of interest in artificial intelligence (AI) tools and applications in the business world is becoming a top technological priority. On the other hand, it entails major investments and challenges. Integrating AI tools into existing business models requires achieving a convergence of a set of resources to create the right capabilities (Drydakis, 2022; Wamba-Taguimdje et al., 2020). Understanding what resources need to be developed and deployed is essential for achieving performance gains through AI. In the literature, the AI capability construct, based

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on the resource-based theory (RBT) of the firm, is considered a higher-order construct conditioned by three types of resources, generally tangible, intangible, and human (Mikalef & Gupta, 2021; Akter et al., 2021). The literature on AI capabilities, although constantly evolving, remains rather scattered and requires further in-depth research, especially regarding the impact of AI capabilities on company performance. Nevertheless, it is worth noting the work of Abou-Foul et al. (2023), who developed a model supported by dynamic capabilities to assess the impact of AI capabilities on servitisation. In turn, in the work of Belhadi et al. (2021), organisational information processing theory was used to assess the impact of AI capabilities on supply chain performance in the context of resilience.

Previous literature reviews (e.g., Leidner & Preston, 2011; Parida et al., 2015) clearly indicated that developing innovative digital strategies through special digitalisation capabilities and experimenting with different technologies is an integral part of higher organisational performance. Companies that have a clearly defined digitalisation strategy, referring to making investment and personnel decisions to achieve technical progress and redesigning business processes to develop internal digitalisation capabilities, tend to achieve a competitive advantage (Matarazzo et al., 2021). In this context, as empirical studies indicate, the degree of digital maturity is important. In organisations with a high level of digital maturity, where business models are highly digitalised, companies have a clear and coherent digital strategy and often use digital technologies to achieve strategic goals and high performance (Kane et al., 2015). It has been proven that achieving a high level of digital maturity is a significant competence that allows organisations to respond quickly to opportunities and threats in the environment (Calli & Calli, 2021).

Following this trend, there is a lack of research focused on understanding the individual and combined factors related to the development of AI capabilities, digital maturity, and appropriate digital strategies that lead to improved firm performance (Fosso Wamba & Queiroz, 2023; Matarazzo et al., 2021). The following research gaps are often cited as important: the need for new empirical findings testing the theoretical approach to the perception of AI capabilities in relation to defining an adequate digital strategy and building digital maturity in a dynamic way, and examining the impact of dynamic shaping of these capabilities on firm performance (Steininger et al., 2022; Wilden et al., 2013). Furthermore, limited conceptual and empirical studies focus on the development of AI capabilities during digital transformation and on how organisational resources can be used more effectively and efficiently in these processes. To fill this important gap, this study explores possible explanations for important research questions:

RQ 1: What combinations of AI capabilities, digital strategy, and digital maturity could affect the firm's performance positively?

RQ 2: What are the core AI capabilities (technical, human, and infrastructure) for firm performance?

For this purpose, a configurational approach is used, which is better suited for analysing complex relationships, in particular fuzzy-set qualitative comparative analysis (fsQCA). This approach allows for gaining deeper insights into the dataset and the studied phenomena by discovering equifinal configurations (combinations of AI capabilities, digital strategy, and digital maturity) for high performance.

In terms of the contribution of this paper, first, it enhances understanding and knowledge by providing a model of the impact of AI capabilities, together with digital strategy and digital maturity, on company performance. Second, using fsQCA indicates different resource configurations and the existence of core and peripheral conditions in the discovered configurations. Furthermore, the study aims to promote activities regarding the contribution of technological innovations towards sustainable development. This research can support and provide some insights for the Sustainable Development Goals.

This paper is organised as follows. The next section reviews the literature on AI capability, digital strategy, and digital maturity as leading factors of digital transformation and their role in organisational performance. Then, the research methodology used to answer the research questions is described. The results of the analyses are presented in turn and discussed in relation to the findings of previous studies. The paper concludes with theoretical and practical implications and directions for future research.

1. Literature review

Adopting a resource-based theoretical perspective facilitates understanding how IT investments generate value and enable performance gains (Wade & Hulland, 2004). Knowing what AI resources firms need to develop is essential to achieving return on investment. Previous literature based on resource-based theory suggests that, in addition to the technol-

ogy itself, other human and complementary organisational resources are required to leverage the investment (Gupta & George, 2016; Mikalef et al., 2018). Empirical evidence from previous studies consistently demonstrates the power of RBT in explaining the relationship between organisational resources and firm performance. Moreover, this theoretical approach is particularly appropriate in turbulent and rapidly changing business environments because resource complementarity and the development of hard-to-imitate capabilities have long been associated with competitive success (Dutta et al., 2005). A fundamental premise of research conducted in the spirit of the resource-based approach, which also underpins this research, is the possibility of combining resources, which, in turn, facilitates the development of organisational capabilities that drive performance growth (Sirmon et al., 2011).

AI capability is defined as a firm's ability to select, organise, and utilise AI-specific resources (Mikalef & Gupta, 2021). Taking the resource-based view into account, organisations should deploy resources to build a set of AI capabilities, which in turn can help firms improve their performance. As indicated in the literature, AI capabilities include tangible resources (data, technology, investments, and time), intangible resources (coordination efficiency, firm capability, risk orientation, etc.), and human resources (employee business and technical skills). Previous studies have emphasised the importance of AI capabilities for creating firm performance (Wamba-Taguimdje et al., 2020; Mikalef & Gupta, 2021). Moreover, AI capabilities contribute to improving both business model innovation and firms' value proposition (Sjödin et al., 2021; Enholm et al., 2022). In this study, based on the insights of Wamba-Taguimdje et al. (2020), AI capability is presented as a high-order construct consisting of AI technical resources, AI human resources, and AI infrastructure. AI technical resources were assumed to include "AI-based algorithms that use various techniques such as machine learning, deep learning, and bots to support business operations" (Fosso Wamba et al., 2024). AI human resources, in turn, refer to the knowledge and ability of personnel to design and manage AI tools and applications. In contrast, AI infrastructure would refer to "connecting companies' technological resources (e.g., hardware, software, data centres, and databases) with their network resources (e.g., cloud solutions and data storage) to support AI tools and applications" (Fosso Wamba et al., 2024). As argued by Fosso Wamba et al. (2024), technical, human, and infrastructure resources can support the performance of firms in terms of AI capabilities. Moreover, recent reports on AI capabilities indicate that AI applications benefit stakeholders (Mikalef et al., 2022) and also significantly impact the performance of firms in supply chains (Belhadi et al., 2021).

Previous studies in the framework of observed digital transformation drew attention to the importance of information technology capabilities and resources, employee skills and abilities, and the presence of digital strategy (Eller et al., 2020). In the current business environment, integrating digital technologies and various IT systems with business strategies is an important element for achieving competitive advantage (Matalamäki & Joensuu-Salo, 2022). For this reason, it seems crucial to properly establish a strategic vision for the business and develop adequate processes for making strategic decisions and implementing them (Goodwin & Wright, 2001). Previous literature reviews emphasise that formulating innovative digital strategies through the development of special digital capabilities, as well as experimenting with various technologies, including AI, is an integral part of higher organisational performance (Leidner et al., 2011; Parida et al., 2015). As indicated by Montealegre (2002, p. 514), defining the right digital strategy is "a gradual process that is cumulative, extensive and highly dependent on the way in which difficult-to-imitate resources and activities are combined". Developing the right digital strategy requires a results-oriented business mindset that enables transforming existing business models and internal processes through advanced digital technologies. In turn, companies with a clear digital strategy for accelerating and developing digital capabilities stand out from their competitors (Matarazzo et al., 2021).

Moreover, empirical studies have shown that organisations with a clear and coherent digital strategy often use digital technologies to achieve strategic goals and are characterised by a high level of digital maturity and highly digitalised business models (Kane et al., 2015). Digital maturity, especially in relation to SMEs, includes such aspects as customer experience, operational processes and business models (Calli & Calli, 2021). Research from the perspective of SMEs indicates that digital maturity enables effective use of digital technologies to transform existing operations (Omrani et al., 2022). Digitally mature companies invest significantly more resources into developing staff skills to implement their strategies. In turn, achieving a high level of digital maturity

will be an important competence to respond quickly to environmental changes. However, it should be noted that most companies, especially SMEs, are just starting or are in the early stages of digital transformation and, therefore, have a low to medium level of digital maturity (Berghaus & Back, 2016).

In summary, although there is an increasing number of studies in the literature using the resource-based approach in IT and AI-related areas, the number of empirical studies examining the direct impact of AI capabilities in relation to digital maturity and digital strategy implementation on firm performance, especially in the context of SMEs, remains significantly low. It is also worth mentioning the recent study conducted on 209 digital manufacturing firms, which highlighted the positive association of dynamic digital capabilities with the financial and non-financial performance of firms (Wang et al., 2022). Moreover, with regard to digitalisation, previous studies have shown that having digital capabilities enables companies to achieve a wider range of strategic goals and build unique business models (Street et al., 2017). In turn, the dynamic relationship between digital capabilities and performance is strongly dependent on a firm's technological capabilities (Heredia et al., 2022).

Despite these recent reports, research conducted within the framework of digital capabilities, digital maturity or AI capabilities ignores the possibility of coexistence and interdependence between these factors. Recent empirical studies conducted on the interactions and construction of digital capability configurations in organisational contexts suggest such an existence. In this vein, Chu et al.'s (2019) pioneering study explores the relationship between IT capabilities, digital transformation, and innovation performance through configurational analysis, using data from 138 Chinese manufacturing enterprises.

To fill the existing research gap and provide new insights into AI capabilities, this research assumes that different configurations of AI capabilities, digital strategy, and digital maturity can be considered to explain high firm performance. According to the available literature, there is no such research addressing the configurational approach to the relationship between these factors and organisational performance, especially in the context of SMEs. As shown in Fig. 1, the research framework proposes that different configurations of AI capabilities, treated as a high-order construct, digital strategy and digital maturity, have a positive impact on organisational performance.

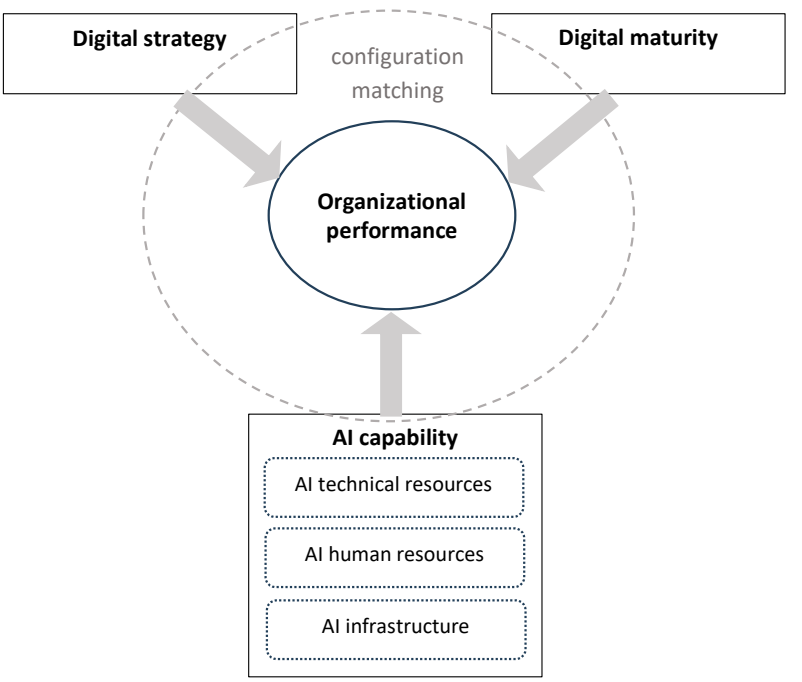

Fig. 1. Research framework of configurations producing organisational performance

2. Research methods

This study used the configurational approach to apply the fsQCA method based on set theory and fuzzy algebra, treating cases as sets of features expressed by their membership in the set (Ragin, 2000; Woodside, 2013). FsQCA enables insight into the different ways to combine features to create configurations associated with the analysed result. Importantly, this method, as indicated by the increasing number of examples of its application (Kumar et al. 2022; Kraus et al., 2018), has additional advantages over traditional methods. This means that it examines the relations between configurations of different causal conditions and the result. Moreover, it emphasises the equifinality of solutions, i.e., several paths (configurations) lead to the same result. FsQCA includes causal asymmetry, which indicates that configurations associated with the presence of the result are different from those associated with its absence (Ragin, 2008; Schneider & Wagemann, 2012). This study used version 3.0 of fsQCA for Windows (Ragin & Davey, 2016).

The research used a survey questionnaire, developed based on previous studies, characterised by high validity. In the first stage, the reliability of the research tool was checked on a sample of 39 respondents from ten SMEs. To examine AI capabilities, digital strategy, and digital maturity at the organisational level, this study collected data from Polish SMEs undergoing digital transformation and already having some achievements in this field. For this reason, the automotive industry was selected as one of the first to implement digital technologies and having more favourable hardware and software conditions than other industries (Schuh et al., 2017). The data collection process lasted three months at the beginning of 2024. Data were collected from 56 small and medium-sized enterprises in Poland, focusing on middle and senior management. A total of 113 questionnaires were initially collected. However, to ensure high quality and validity, invalid questionnaires (i.e., those that were empty and incompletely filled) were removed. Ultimately, 73 high-quality questionnaires were obtained. Descriptive statistics of the sample are presented in Table 1.

All measurement items used in this study were adopted from established scales. In this study, a seven-point Likert scale from "strongly disagree" (1) to "strongly agree" (7) was used to measure all constructs. AI capability, a high-order construct, is formed by AI technical resources, AI human resources, and AI infrastructure adapted from Mikalef and Gupta (2021) and Fosso Wamba et al. (2023). Digital strategy was measured with four items adapted from Eller et al. (2020) and Kane et al. (2015), while digital maturity was measured with four items adapted from Eller et al. (2020) and Li et al. (2022). In turn, organisational performance was operationalised based on the items proposed by Lee and Choi (2003). Table 2 presents all items included in the measures used in the study.

Subsequently, the fsQCA approach, integrating fuzzy sets and logical rules with Qualitative Comparative Analysis (QCA), was applied in the studies (Pappas et al., 2020; Ragin, 2000). Importantly, fsQCA allows for capturing conditions that are (1)

Tab. 1. Results of descriptive statistics of the sample

Content	Category	Proportion (%)
Gender	Male	85.7
	Female	14.3
Position in the company	Manager	29.3
	Senior Manager	43.7
	Executive (CEO, CMO, CFO, CIO)	27
Employed in the company	5 years	8.2
	6-10 years	18.9
	11-15 years	46.8
	More than 15 years	26.1
Company age	≤5	9.6
	6-14	38.4
	≥15	49.4
Number of employees in the company	<10	17.3
	<50	38.8
	<250	43.9

Tab. 2. Measurement items

Constructs	Items	Source
AI Capability	AI technical resources • In our organisation, we use machine learning platforms (providing algorithms, APIs, toolkits for building and training, data, and computing power to design, train and deploy models to applications, processes and other machines) to support business operations. • In our organisation, we use AI-optimised hardware (i.e., graphics processing units (GPUs) and devices specifically designed and engineered to efficiently perform AI-centric computing tasks) to support business operations. • In our organisation, we use deep learning platforms to support business operations. • In our organisation, we use robotic process automation to support business operations. • We integrate data from multiple internal sources into a data warehouse or storage to provide easy access. • We can efficiently prepare and cleanse AI data and evaluate data for errors.	Mikalef & Gupta, 2021; Fosso Wamba et al., 2023
	AI human resources • Our managers are able to understand business problems and direct AI initiatives to solve them. • Our managers are able to work with data scientists, other employees and customers to determine opportunities that AI might bring to our organisation. • Our managers are able to anticipate future business needs of functional managers, suppliers and customers and proactively design AI solutions to support these needs. • Our managers are capable of coordinating AI-related activities in ways that support the organisation, suppliers and customers. • We have strong leadership to support AI initiatives, and managers demonstrate ownership of and commitment to AI projects. • In our organisation, we take bold and wide-ranging actions to achieve the firm's objectives. • We typically adopt a bold, aggressive posture in order to maximise the probability of exploiting potential opportunities.	
	AI infrastructure • We have explored or adopted cloud-based services for processing data and performing AI and machine learning. • We have the necessary processing power to support AI applications (e.g., CPUs, GPUs). • We have invested in networking infrastructure (e.g., enterprise networks) that supports efficiency and scale of applications (scalability, high bandwidth, and low latency). • We have explored or adopted parallel computing approaches for AI data processing. • We have invested in advanced cloud services. • We have invested in scalable data storage infrastructures. • We have explored AI infrastructure to ensure that data is secured end-to-end with state-of-the-art technology.	
Digital strategy	Our company has a clearly defined digital strategy. • Our managers possess the awareness and skills necessary to implement our company's digital strategies. • We actively monitor digital trends that impact our industry. • We comprehend the potential effects of digital trends on our business model and strategies, and we take appropriate actions.	Eller et al., 2020; Kane et al., 2015
Digital maturity	• We have streamlined and digitised key business processes to enhance our profitability and competitiveness. • We organise our business processes and system infrastructure digitally to facilitate decision-making and value creation from data. • Our system infrastructure enables us to swiftly integrate new digital information technology solutions and services. • We encourage diversity of thought, knowledge sharing, and collaboration across all departments and teams, emphasising the adoption of new digital applications.	Eller et al., 2020; Li et al., 2022
Organisational performance	• Compared to our key competitors, our organisation is more successful. • Compared to our key competitors, our organisation has a greater market share. • Compared to our key competitors, our organisation is growing faster. • Compared to our key competitors, our organisation is more profitable. • Compared to our key competitors, our organisation is more innovative.	Lee &Choi, 2003

Tab. 3. Descriptive statistics and calibration values

Conditions/ Outcome	Descriptive statistics				Calibration criteria		
	Mean	Std. Dev.	Min	Max	Full in	Cross-over point	Full out
AI technical resources	3.8	1.0	1.0	5	6.80	5.33	2.78
AI human resources	3.9	1.1	1.2	4.8	6.41	5.25	2.34
AI infrastructure	4.1	1.0	1.4	5	6.60	5.50	2.50
Digital strategy	3.9	0.9	1.3	5	7.00	5.40	3.07
Digital maturity	3.8	0.9	1.4	4.9	6.80	5.50	2.47
Organisational performance	3.9	1.0	1.2	7	6.93	5.20	2.94

Tab. 4. Reliability test results

Conditions/Outcome	Items	Cronbach α
AI technical resources	6	0.976
AI human resources	7	0.876
AI infrastructure	7	0.952
Digital strategy	4	0.880
Digital maturity	4	0.90
Organisational performance	5	0.885

sufficient or necessary to explain the outcome and (2) insufficient in themselves, although they are necessary parts of the solutions that can explain the outcome (Pappas & Woodside, 2021; Ragin, 2008). The first step in the application of fsQCA is the calibration of the data on outcomes and conditions. The calibration process involves converting the raw data (measured at the ordinal, interval, or ratio level) into set membership scores, which are based on qualitative anchors (Kraus et al., 2018). Variables are converted into set memberships ranging from full non-membership (0) to full membership (1). The cross-over point (0.5) denotes the maximum ambiguity. To select the three thresholds and define the conditions (i.e., AI technical resources, AI human resources, AI infrastructure, digital strategy, and digital maturity) and the outcome (organisational performance), recommendations consistent with the work of Pappas, Woodside (2021) and Ragin (2008) were adopted and defined as follows: 0.95 (full membership), 0.5 (cross-over point), and 0.05 (full non-membership). The selected thresholds enable the examination of conditions that can explain very high organisational performance (i.e., 7 or 6 on the Likert scale). Most organisations in the sample have some experience with AI applications. The aim is to explain how companies that have already adopted or invested in AI and are performing at a satisfactory level (i.e., 4 or 5 on the Likert scale) can achieve very high performance by learning from those that have already reported such results. Table 3 presents descriptive statistics and calibration values for variables developed from the raw data obtained before calibration. It should be emphasised that the traditional linear approach was not used to analyse the associations between conditions and outcome. The findings presented next show how the configurational approach can reveal nonlinear, multiplicative, synergistic, and equifinal effects compared to the traditional linear approach (Fiss, 2007).

As shown in Table 4, Cronbach's α of the four conditions and outcome is greater than 0.8, indicating that the questionnaire of this study has considerable reliability.

3. Research results

Five conditions were considered in this study. Three AI capabilities (AI technical resources, AI human resources, and AI infrastructure), digital strategy, and digital maturity were antecedent conditions and organisational performance was used as the outcome (Table 5).

Before starting the actual configuration analysis, the "necessity" of each condition that impacts organi-

Tab. 5. Definitions of conditions and outcomes

Condition/Outcome		Code
Outcome	Organisational performance	OP
Antecedent condition	AI technical resources	AITR
Antecedent condition	AI human resources	AIHR
Antecedent condition	AI infrastructure	AIINF
Antecedent condition	Digital strategy	DS
Antecedent condition	Digital maturity	DM

Tab. 6. Analysis of the necessary conditions

Conditions	High organisational performance	
	Consistency	Coverage
AI technical resources (AITR)	0.624	0.591
~AI technical resources (~AITR)	0.463	0.501
AI human resources (AIHR)	0.665	0.628
~AI human resources (~AIHR)	0.469	0.473
AI infrastructure (AIINF)	0.509	0.510
~AI infrastructure (~AIINF)	0.603	0.475
Digital strategy (DS)	0.479	0.611
~Digital strategy (~DS)	0.452	0.443
Digital maturity (DM)	0.614	0.621
~Digital maturity (~DM)	0.636	0.548

Tab. 7. Configurations related to high organisational performance

Conditions	High organisational performance		
	C1	C2A	C2B
AI technical resources (AITR)	●	●	●
AI human resources (AIHR)	•		
AI infrastructure (AIINF)		●	●
Digital strategy (DS)	●	•	
Digital maturity (DM)	●		•
Raw coverage	0.488	0.398	0.347
Unique coverage	0.034	0.008	0.005
Consistency	0.935	0.951	0.966
Overall solution coverage			0.565
Overall solution consistency			0.918

Note. ● - core causal conditions (present); • - peripheral causal conditions (present); blank spaces indicate “do not care”.

sational performance should be tested. The test results are presented in Table 6. The consistency level is used to determine whether a condition is necessary. Following Ragin (2008), a condition can be considered necessary if its consistency exceeds 0.9. In this study, the consistency level for all conditions falls below 0.9, indicating that none of them can be considered necessary. In other words, the organisational performance of SMEs should consider the simultaneous and coordinated effects of AI capabilities, digital strategy, and digital maturity.

In the next step, a fuzzy set analysis was conducted to identify sufficient condition combinations that explain the high level of organisational performance. The first step is to create a truth table containing condition combinations that have strong membership in the outcome. Second, the truth table should be reduced to reasonable configurations by developing a rule. In this study, the truth table was further modified by setting the criteria of frequency N=2 and the lowest consistency score at 0.9 to avoid less reasonable combinations, as suggested by previous studies (Greckhamer et al., 2018; Kwiotkowska, 2024). Finally, the Quine-McCluskey algorithm, which is based on Boolean algebra, is used to logically simplify the truth table. Based on the obtained results, the conditions that appeared in both the intermediate solution and the parsimonious solution were identified as core conditions, while the conditions that appeared only in the intermediate solution were identified as peripheral conditions. The results of the fsQCA analysis in this study are presented in Table 7. When presenting the fsQCA results, the symbols traditionally used in the literature for this method were used. Therefore, in Table 6, the size of the circle distinguishes between the core condition and the peripheral condition. The large circle symbol represents the existence of the core causal conditions, the small circle symbol represents the existence of the peripheral causal conditions, and blank spaces indicate "do not care"; therefore, a condition that is irrelevant to achieving the analysed outcome.

Three configurations that can lead to high levels of performance have been identified: C1, C2a, and C2b, where C2a and C2b are equivalent second-order configurations, i.e., they share the same core conditions. The overall solution consistency is 0.918, which explains the significance level of the combined consistency of the causal recipes. This indicates that 92% of the cases that follow these three configurations exhibit high levels of organisational performance. Furthermore, the overall solution coverage is found to be 0.565, which means that the three configurations obtained in the study have a solid overall explanatory power that accounts for 57% of the observed high organisational performance in the cases included in the study.

The final solution regarding high organisational performance can be written in the following formula:

$$\text{AITR*AIHR*DS*DM + AITR*AIINF*DS + + AITR*AIINF*DM} \quad (1)$$

were:
the "*" sign represents the logical AND and "+" logical OR.

To ensure the reliability of the configuration analysis, a robustness test was conducted by changing the test conditions. For this purpose, the case frequency thresholds were adjusted from two to three, and the consistency threshold was changed from 0.9 to 0.8. The grouping of AI capabilities, digital strategy, and digital maturity in relation to high organisational performance was re-examined. The results showed no significant changes. Therefore, in line with the work of Greckhamer et al. (2018), Du Yunzhou et al. (2021) or Judge et al. (2020), it was found that if the parameter change does not cause significant changes in the number, composition, consistency, and coverage of the configurations, the results could be considered robust.

4. Discussion of the results

The results of this study contribute to the debate on the importance of AI capability for organisational performance. This research uses a configurational approach based on fsQCA, which provides in-depth insight into the set of conditions that facilitate company performance. The conclusions drawn from this study are that neither AI capability nor digital strategy nor digital maturity alone provides the necessary conditions for achieving high organisational performance. The results of this study show that with different combinations of antecedents, high levels of organisational performance can be achieved.

Based on the logical framework proposed by Ragin (2008), presenting the results of this research, it can be stated that three configurations leading to high organisational performance have been identified. Configuration C1 is AITR*AIHR*DS*DM. The configuration combines the presence of AI technical resources with the presence of digital strategy and digital maturity as core conditions and the presence of AI human resources as a peripheral condition. This

configuration accounts for 48.8% of the membership in the outcome and has a high level of consistency (0.935). This configuration suggests that all conditions except AI infrastructure play a role in determining high levels of organisational performance.

The next two configurations C2a: AITR*AIINF*DS and C2b: AITR*AIINF*DM are driven by two core conditions, i.e., AI technical resources and AI infrastructure. In configuration C2a, high organisational performance is additionally achieved thanks to the presence of digital strategy as a peripheral condition, and in the case of configuration C2b, the peripheral condition is digital maturity. In other words, regardless of AI human resources, SMEs can still achieve high organisational performance with highly developed AI technical resources and AI infrastructure as long as they have a highly developed either digital strategy or digital maturity. As shown by the conducted configuration analysis, it is possible to identify the interaction between the conditions (Fiss, 2011). By comparing the two configurations, C2a and C2b, having the same core conditions, it can be concluded that mutual substitution effects exist between digital strategy and digital maturity. In the case of SMEs with high AI technical and AI infrastructure, focusing on building the right digital strategy or achieving high digital maturity can lead to high organisational performance, as shown in Fig. 2.

The findings of this study offer important contributions to several streams of research (Table 8).

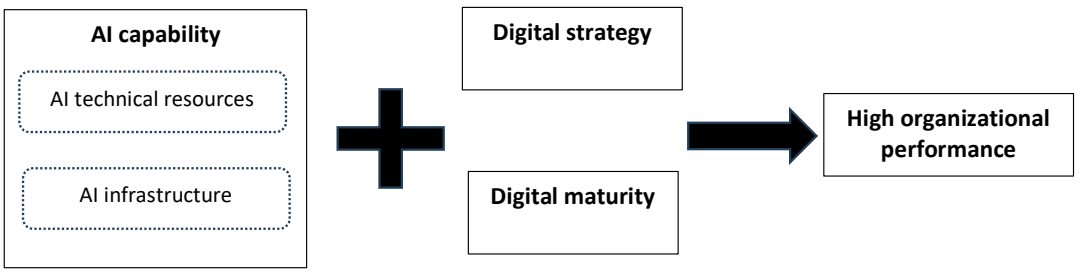

Fig. 2. Substitution between digital strategy and digital maturity

Tab. 8. Contributions of this research

Findings based on the fsQCA configuration approach	Theoretical contributions
The configuration model of AI capabilities, digital strategy, and digital maturity has been constructed.	Conducting new ideas for the research on AI capabilities in connection with digital strategy and digital maturity, constituting a certain continuation and extension of the research conducted in the literature, among others by Fosso Wamba et al. (2024), Mikalef and Gupta (2021).
AI capability, digital strategy, and digital maturity are not necessary conditions for high organisational performance alone.	Analysing the organisational performance from the configurational perspective of causal complex conditions, such as AI capability, digital strategy, and digital maturity, is helpful to deepen existing research and bring new insights into the relationships between these antecedent conditions.
AI technical resources are an important condition for SMEs to achieve high levels of organisational performance.	Confirming the strong impact of AI technical resources related to AI-based algorithms using, among others, machine learning on creating firm results and their organisational performance (Fosso Wamba et al., 2024).
Digital strategy and digital maturity with high AI capability can play a substitutive role in achieving high organisational performance.	Deepening insight into the substitutive role of the relationship between digital strategy and digital maturity and making up for the deficiency in this regard in the literature.
	Continuation of research suggested in the literature by, among others, Kane et al. (2015) on in-depth research of digital maturity and digital strategy, also from a configurational perspective.
	Showing the possibilities of using fsQCA to distinguish the relationship between various elements of the research model and to provide methodological guidance for further exploration of achieving high organisational performance in the era of digital transformation.

The conducted research demonstrates that AI capability, digital strategy, and digital maturity are not individually necessary conditions for achieving high organisational performance; however, their various configurations play a crucial role. In particular, the study emphasises the importance of AI-related technical resources in SMEs, which - through machine learning algorithms - can significantly enhance organisational effectiveness (Fosso Wamba et al., 2024). The findings also highlight the substitutive role of digital maturity and digital strategy when combined with high AI capabilities. The theoretical contribution lies in deepening the configurational perspective in digital transformation research and showcasing the potential of fsQCA methods to analyse complex relationships between digital resources and organisational performance (Mikalef & Gupta, 2021).

These results contribute to the broader scholarly debate on the strategic importance of digital resources and dynamic organisational capabilities (Bharadwaj et al., 2013; Teece, 2018). They underscore that digital transformation requires the integration of technology, strategy, and organisational competencies, rather than merely the implementation of isolated technological solutions (Vial, 2019; Yoo et al., 2010). In line with previous findings, an effective digital strategy should be grounded in a coherent business model that enables firms to respond flexibly to environmental changes and leverage the potential of digital innovation (Westerman et al., 2014).

Building on configuration theory (Furnari et al., 2021), this paper integrates five conditions - including AI capabilities, digital strategy, and digital maturity - to explore the complex causal mechanisms that ultimately affect the achievement of high organisational performance. The configuration analysis provided new insights into the identified combinations of variables, also suggesting directions for future research on the coupling of AI capabilities and antecedents of dynamic digital capabilities, particularly those related to digital strategy and digital maturity. Using fsQCA, it was observed that digital strategy and digital maturity can act as substitutes in configurations that lead to high organisational performance. This finding extends current knowledge of the relationship between these elements, particularly in the case of firms building strong AI capabilities.

With respect to high organisational performance, AI technical resources were found to be combined either with AI infrastructure or with AI human resources. Thus, the results suggest that AI technical resources are essential for building AI capabilities that support firm performance. Moreover, fsQCA revealed different configurations among high-performing companies. Interestingly, in none of the identified configurations did the AI capability construct encompass all three resources simultaneously. This indicates a further element of substitution, as AI technical resources - present in all three configurations - were combined either with AI human resources (Configuration C1) or with AI infrastructure (Configurations C2a and C2b). These findings address gaps in the existing literature and align with the results of Queiroz et al. (2023), who emphasised the importance of identifying key resource combinations under conditions of scarcity. This reflects the reality that not all resources contributing to AI capability are necessarily acquired at the same time. Resource-based theory further reinforces the importance of managing resource configurations as a source of developing key capabilities. Finally, the study contributes to advancing the multidimensional AI capability scale (Abou-Foul et al., 2023; Belhadi et al., 2021).

From a practical perspective, the results of this study provide directions for managers and practitioners. Practitioners should recognise that developing AI capabilities requires investing in key AI resources, i.e. technical, human, and infrastructure. Managers should also pay attention to building a digital strategy and achieving digital maturity, which, however, requires building high AI capabilities to achieve high performance. The results also reveal some implications and tips for decision makers, clearly indicating the importance of AI capabilities and their relationship with company performance in powering key elements of sustainable development. Decision-makers should pay attention to the importance of investment in AI technical and infrastructure resources, which in turn play a significant role in supporting the performance of the organisation. Secondly, as the results indicate, decision makers should consider the importance of supporting sustainable development using different configurations, which is especially important in relation to turbulence and changes in the environment.

This study has some limitations that may constitute a basis for future research. First, the data used in this study come from Polish SMEs from the automotive industry. Therefore, the research can not only be extended to other industries but also to other entities or regions. Next, in the collected data set, SME performance was subjectively measured based on the responses of senior managers. Such collected data,

although quite commonly used, may not fully reflect the actual results. In future studies, the use of objective performance measures may yield more accurate results. Moreover, the research was conducted in a specific time period, which does not allow for a precise examination of the dynamics of the analysed variables, e.g., AI capabilities. In the future, longitudinal studies may be considered.

Conclusions

A qualitative comparative analysis (fsQCA) of the configuration of AI capabilities, digital strategy, and digital maturity affecting organisational performance shows that no single condition is necessary for high performance. The results suggest that high organisational performance does not depend on a single condition but on the complex synergistic interactions between the conditions studied. The AI capability resources (AI infrastructure, AI human resources, and AI technical resources), placed within the research framework designed in this paper, can enable the discovery of different configurations leading to high organisational performance. Furthermore, the study suggests that AI technical resources are mandatory for any viable solution. The paper contributes to the RBV theory by suggesting that the configuration of AI capability, digital strategy and digital maturity are essential components contributing to a more sustainable society by improving enterprise performance based on the acquisition, use and management of the right resources.

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