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DYNAMIC MANAGERIAL CAPABILITIES' IMPACT ON INTERNATIONAL OVERALL PERFORMANCE

O Impacto das capacidades dinâmicas dos gestores na performance internacional

Impacto de las capacidades dinámicas de los gestores en el desempeño internacional

Joana Marçal Gomes[*1] | joana.gomes@student.uc.pt | ORCID: 0009-0006-3342-4370
Fernando Carvalho[1] | fc@fe.uc.pt | ORCID: 0000-0002-8527-3790
André Alves[1] | monteiroalves@uc.pt| ORCID: 0000-0002-0631-1454
Ângelo Cabral[1] | anca@student.fe.uc.pt | ORCID: 0000-0001-7525-9146

[*]Corresponding author
[1]Universidade de Coimbra, Faculdade de Economia, Coimbra, Portugal

ABSTRACT

This article investigates the relationship between top managers' dynamic managerial capabilities and the international overall performance of small and medium enterprises (SMEs). It addresses the limited understanding of the mediating effects of digital maturity and the moderating effect of market turbulence on international overall performance. Data was collected using a questionnaire survey applied to international Portuguese SMEs. The responses were analyzed using covariance-based structural equation modeling and path analysis using IBM® SPSS® Amos™. The main results show evidence of a positive impact of dynamic managerial capabilities on international overall performance and digital maturity. Additionally, we found a mediating effect of digital maturity between dynamic managerial capabilities and international overall performance, and a negative moderation of market turbulence between digital maturity and such performance, contributing to the enlightenment of top managers' dynamic managerial capabilities as an antecedent of international overall performance, international overall performance, and digital maturity as a mediator on this relationship.

Keywords: dynamic managerial capabilities, international overall performance, digital maturity, market turbulence, SMEs.

RESUMO

Este artigo investiga a relação entre as capacidades gerenciais dinâmicasde gestores de alto escalão e o desempenho global internacional de pequenas e médias empresas (PME). A pesquisa contribui para a compreensão dos efeitos mediadores da maturidade digital e moderadores da turbulência do mercado no desempenho global internacional, cujo conhecimento é ainda limitado. Os dados foram recolhidos por meio de questionários entregue a PMEs. As respostas foram analisadas pelo método de modelação de equações estruturais e análise de caminho usando IBM® SPSS® Amos™. Os nossos resultados observam o impacto positivo das capacidades gerenciais dinâmicas no desempenho global internacional e na maturidade digital. Corroboramos o efeito mediador da maturidade digital entre as capacidades dinâmicas gerenciais e desempenho global internacional, contribuindo para a investigação das capacidades gerenciais de gestores de alto escalão como antecedente do desepenho internacional e para a maturidade digital como mediador nessa relação.

Palavras-chave: *capacidades gerenciais dinâmicas, desempenho global internacional, maturidade digital, turbulência do mercado, PMEs.*

RESUMEN

Este artículo investiga la relación entre las capacidades directivas dinámicas de los altos directivos y el desempeño general internacional de las pymes. Se aborda la limitada comprensión sobre los efectos mediadores de la madurez digital y el efecto moderador de la turbulencia del mercado en el desempeño general internacional. Se recopilaron datos mediante una encuesta por cuestionario dirigida a pymes internacionales. Las respuestas se analizaron mediante modelado de ecuaciones estructurales basado en covarianza y análisis de senderos utilizando IBM® SPSS® Amos™. Se encontró evidencia de un impacto positivo de las capacidades directivas dinámicas en el desempeño general internacional y en la madurez digital. Además, se identificó un efecto mediador de la madurez digital entre las capacidades directivas dinámicas y el desempeño general internacional, así como un efecto moderador negativo de la turbulencia del mercado entre la madurez digital y dicho desempeño, lo que contribuye a la comprensión de las capacidades directivas dinámicas de los altos directivos como antecedentes del desempeño general internacional y a la madurez digital como mediadora en esta relación.

Palabras clave: *capacidades directivas dinámicas, desempeño general internacional, madurez digital, turbulencia del mercado, pymes.*

INTRODUCTION

The global economy is continuously changing, and markets quickly adjust to shifts in demand, technology, and services (Ciampi et al., 2022). Additionally, differences between the economic and digital worlds in a digitalized economy pressure managers to pursue strategic change (Heubeck & Meckl, 2022). They are led to develop companies not only to survive, but also to attain competitive advantage and superior performance (Troise et al., 2022). In this context, managers must pay attention to digital technologies, digital transformation, and their implications for management, strategy, governance, employees, leadership, and society (Schneider & Kokshagina, 2021). Firms' long-term success highly depends on managers' capacity to align business strategy with a continuously changing environment (Heubeck & Meckl, 2022). Top managers are key resources in strategic decision making and firm outcomes (White & Borgholthaus, 2022).

This research is grounded in the fields of strategic management, international business, dynamic managerial capabilities (DMCs), and digital transformation. According to the upper echelons theory, the firm outcomes are based on top managers' characteristics. Many studies have shown that their "background, past experiences, personality, and values can influence strategic decision making and therefore organizational outcomes" (Singh et al., 2023, p. 2). This study follows the DMCs perspective, focusing on managers' characteristics and how they affect firm resources, leading to higher organizational performance (Adner et al., 2003; Helfat & Martin, 2015; Huynh et al., 2022). DMCs promote innovation in digital firms (Heubeck & Meckl, 2022), strategic change (Haapanen et al., 2020), and are an antecedent of digital business model transformation (Heubeck, 2023). Digital transformation brings the possibility to optimize processes, access more information about market changes, and allow managers to make better decisions that drive superior performance (Li, 2022). Digital maturity allows us to better understand the current stage of organizations regarding digital transformation and how it is impacting the companies' performance and competitiveness (Haryanti et al., 2023). Top managers have an impact on digital innovation through their digital knowledge (Firk et al., 2022) and on digital transformation (Sciuk & Hess, 2022) through their culture and openness to facilitate strategic renewal (Schildt et al., 2023). Firms with improved DMCs can implement digital transformation more effectively, and it is in the best interest of managers to promote it within the company, especially in SMEs with reduced resources (Civelek et al., 2023). Digital maturity is the measure of digital transformation within firms (Çallı & Çallı, 2021) and evaluates how digital the company is (He et al., 2022).

According to the European Commission's 2022 SME country fact sheet, Portuguese SMEs accounted for 99.9% of the firms in the country and contributed 67.7% of the value added to the economy in 2021. Considering the size of Portugal, firms feel pressure to expand internationally (Nielsen, 2010b), and an internationalization strategy is an opportunity for SMEs to develop and grow (Cabral et al., 2020a). For Lockett and Thompson (2001), such a strategy envisions firms' efficiency and is related to their assets and attributes. International performance, as a measure of the success of internationalization, is related to the extent to which a firm is satisfied and its financial and strategic goals are achieved in foreign markets following a specific plan.

Managers' characteristics are one of the main vectors for international performance (Cabral et al., 2020a). Additionally, it is noteworthy that international activity brings some risks, like uncertainties regarding the environment and changes in customers' behaviors and demands (Cabral et al., 2020a). In this sense, the notion of market turbulence, characterized by frequent and unpredictable changes in product preferences and customer needs (Jaworski & Kohli, 1993), plays a role in internationalization processes.

In this context, there is a lack of empirical investigation of managers' DMCs at the individual level (Ambrosini & Altintas, 2019; Heubeck & Meckl, 2022) and how they can impact digitalization (Wrede et al., 2020) as an antecedent on firm performance (Heubeck, 2023; Lestari et al., 2021). There is also a lack of studies investigating whether DMCs directly increase firm performance or if they act through other variables that mediate that impact (Helfat & Martin, 2015). It is well established that digital transformation can positively impact firms (Li, 2022; Schneider & Kokshagina, 2021; Tratkowska, 2020). However, there are still gaps concerning the level of digital maturity achieved by organizations (Haryanti et al., 2023), as well as how the backgrounds of top managers influence both processes (Cuypers et al., 2022; Dixit et al., 2021; Schildt et al., 2023). The study of top managers' role in strategic decision making and awareness regarding digital transformation is still scarce (Fletcher & Griffiths, 2020), as research on the link between digital maturity and performance (Çallı & Çallı, 2021), the skills required to develop digital transformation (Schneider & Kokshagina, 2021), and the mediating role of such transformation (Nasiri et al., 2022) is also scarce.

To try to fill these gaps, our research addresses top managers' DMCs within SMEs, to understand their direct and indirect effect on international overall performance (IOP) in changing environments, through digital transformation (Mehta & Ali, 2020) as a mediator (Troise et al., 2022). We applied a questionnaire survey to Portuguese internationalized SMEs, gathering data that was treated and analyzed with covariance-based structural equation modeling (CB-SEM) and path analysis, due to the necessity of incorporating interaction effects.

The findings reveal that strong DMCs increase IOP. Furthermore, digital maturity partially and positively mediates this relationship. However, we found evidence of a negative moderation of market turbulence on the digital maturity/performance relationship, contrary to what was expected. Thus, this study contributes to strategic management literature by showing a new perspective of managers' importance and impact on firms' digital maturity and ultimately performance. It also highlights DMCs' role in companies, such as how turbulence might affect the level of companies' digital maturity. Additionally, it practically helps companies by showing some of the important lines of investment, such as on managers' capabilities and on digital transformation.

This article is structured in seven sections, including this introduction. The next section covers the theoretical background, followed by a section outlining the hypotheses and research model. The fourth section presents the methodology, and the fifth and sixth sections bring the results and discussion. The seventh and last section includes the conclusion, study limitations, and suggestions for future research.

THEORETICAL BACKGROUND

This article is grounded in the upper echelons theory developed by Hambrick and Mason in 1984, which posits that managers' characteristics and background have an impact on firms' results (Hambrick & Mason, 1984). Some companies seem to have firm-specific capabilities in developing new processes and/or products that drive innovation and performance (Lockett & Thompson, 2001). These unique resources and capabilities are essential for the firm to be one step ahead of the competition, feeling the market insights, and capable of avoiding the ambiguity and risk caused by market turbulence, "[…] a key environmental condition that moderates the effects of dynamic capabilities" (Wang et al., 2015, p. 1828). The management team is a specific resource with the ability to maintain activities under review using dynamic capabilities as a tool to update and improve sources of competitive advantage (Lockett & Thompson, 2001).

Dynamic managerial capabilities

One of the main challenges for firms is to achieve and sustain competitive advantage (Teece et al., 1997). Dynamic capabilities, as a firm resource, refer to specific characteristics, routines, and culture that help firms to rapidly deal with change (Teece, 2018). These capabilities are organizational and strategic routines by which managers combine their skills and functional and personal backgrounds to generate new value-creating strategies (Eisenhardt & Martin, 2000). Dynamic capabilities reside in part with individual managers and the top management team (Teece, 2016), which led to the concept of dynamic managerial capabilities (DMCs) introduced by Adner et al. (2003).

Managers' choices are not always rational. They are influenced by the individuals' goals and aspirations, which impact firm performance (Nielsen, 2010a). DMCs are the capabilities that managers have that might influence the organization's performance from a dynamic capability perspective (Adner et al., 2003; Helfat & Martin, 2015). They are "the capabilities with which managers build, integrate, and reconfigure organizational resources and competences" (Adner et al., 2003, p. 3). Later, the concept is extended to the external environment "[…] dynamic managerial capabilities may affect not only the internal attributes of an organization but also its external environment […]" (Helfat & Martin, 2015, p. 1284).

DMCs combine three factors from managerial resources that influence the strategic and operational decisions of managers: managerial cognition, managerial social capital, and managerial human capital (Adner et al., 2003; Corrêa et al., 2019; Helfat & Martin, 2015). Managerial cognition consists of managers' knowledge, mental models, beliefs, emotions, and mental processes (Helfat & Martin, 2015). It involves the human mental activities in acquiring and processing information, as well as human beliefs and knowledge (Corrêa et al., 2019).

Managerial human capital refers to human characteristics, skills, and knowledge that individuals develop through their experience, training, and education (Felício et al., 2014; Helfat & Martin, 2015). Diversity and complementarity in human capital have a positive impact on

a company's performance and directly influence management decisions (Corrêa et al., 2019). Managerial social capital is related to the value of social connections. It includes both formal and informal relations, such that managers can use it to access resources and information (Corrêa et al., 2019; Helfat & Martin, 2015). This factor does not regard individuals themselves, but their relationships and the resources they can access through these relationships, which emerge from collective development (Corrêa et al., 2019).

Digital maturity

Digital maturity measures the level of digital transformation in firms (Çallı & Çallı, 2021; Haryanti et al, 2023), evaluating how digitalized the company is (He et al., 2022). Digital transformation is a continuous and dynamic process that needs adjustments. It encompasses transformations in technologies, business models, culture, and the workforce, and digital maturity measures the firm's performance and the status of the transformation (He et al., 2022). Recent studies propose the concept of digital maturity as "a capacity to respond to change in an appropriate manner" (Vial, 2019, p. 133). He et al. (2022) add that it describes "what a company has already achieved in terms of performing transformation efforts" (p. 7), providing management with a benchmark for their status and performance on the continuous process of digital transformation. Thus, digital maturity is essential in digital transformation strategies because it gives firms knowledge and acts as an antecedent of the transformation process (Nasiri et al., 2022).

Digital maturity combines two dimensions. Digital intensity is "investment in technology-enabled initiatives to change how the company operates its customer engagements, internal operations, and even business models" (Westerman & McAfee, 2012, p. 2). Transformation management intensity is the "leadership capabilities necessary to drive digital transformation in the organization" (Westerman & McAfee, 2012, p. 2). However, digital maturity is attained through a process of adaptation and transformation of the digital landscape, and it focuses on an interactive approach and continuous progress (Nasiri et al., 2022).

HYPOTHESES AND RESEARCH MODEL

Dynamic managerial capabilities and international overall performance

Upper echelons' characteristics reflect the situation of the firm and are determinant for strategic choices and organizational performance (Huynh et al., 2022). From the upper echelons' perspective, their characteristics reflect the actual situation of the firm and are determinant for strategic choices and through them organizational performance (Hambrick & Mason, 1984). Performance is one of the ultimate outcomes of top managers, but it also impacts internationalization (Nielsen, 2010a). Managers' characteristics are essential to the internationalization process and firms' international

performance (Cabral et al., 2020a). Other research suggests an approach to find a direct impact on performance driven by DMCs (Lestari et al., 2021; Widianto et al., 2021). Some research indicates that DMCs' relation with performance should be viewed as a two-step process, first looking for intermediate outcomes, in the form of strategic change, and then analyzing firm performance (Huynh et al., 2022). Other research suggests an approach looking for a direct impact on performance driven by DMCs (Lestari et al., 2021; Widianto et al., 2021). In this study, we pursue both views to better understand if managers' unique capabilities can directly and indirectly impact the performance of Portuguese SMEs. Thus, we propose hypothesis one.

H1: Dynamic managerial capabilities positively impact international overall performance.

Dynamic managerial capabilities and digital maturity

Regardless of size or sector, digital transformation is an unavoidable reality for any company. It prompts organizations to open boundaries, connect with other industries, stakeholders, and customers (Cortellazzo et al., 2019). Matarazzo et al. (2021) highlight the importance for SMEs' survival in perceiving digital technologies, such as customer interactions, co-creation of value, changing routines, reconfiguring resources, and building new capabilities. Digitalization pressures managers to digitally transform business models through competition, making this an important subject for managers' attention (Heubeck, 2023). Nevertheless, this is not a straightforward process, and involves not only processes but also human resources, an easy adaptive culture, and managers' involvement (He et al., 2022; Nasiri et al., 2022), showing the necessity to understand the role of top managers in digital transformation through digital maturity (Wrede et al., 2020).

Previous studies emphasize the importance of managers in digital transformation, as they drive the company's strategy and shape the organizational context and resources to achieve it (Cortellazzo et al., 2019; Wrede et al., 2020). Managers play a crucial role in implementing digital culture and are key to shaping the digital transformation process (Cortellazzo et al., 2019). Their profiles are linked to new digital processes and increased competitiveness (Kraus et al., 2022). Higher DMCs increase digital business model transformation, reinforcing their role (Heubeck, 2023). Digital maturity reflects the managerial interpretation of what the firm achieved regarding Digital transformation (Teichert, 2019).

Nevertheless, there is still a lack of understanding about whether and how top managers and their DMCs affect strategic change (Helfat & Martin, 2015; Heubeck, 2023), and how they can impact digitalization (Wrede et al., 2020). It is not fully understood how the backgrounds of top managers impact digital innovation (Firk et al., 2022), digitalization, and digital transformation (Cuypers et al., 2022; Dixit et al., 2021; Schildt et al., 2023). Therefore, hypothesis two is:

H2: Dynamic managerial capabilities positively impact digital maturity.

Digital maturity and international overall performance

Digital maturity gives the firm the needed information about digital transformation, a process that is vital to define strategy (He et al., 2022) and deal with turbulent environments (Fletcher & Griffiths, 2020). Therefore, it is important to understand the link between digital maturity and performance, since it gives firms the needed information about the digital transformation process, which is vital to define strategy and goals accordingly (Çallı & Çallı, 2021). Previous research has already shown that artificial intelligence positively influences international performance (Denicolai et al., 2021) and that firms can incur better performance through digital transformation (Li, 2022). Concerning digital maturity, mature firms showed increased profitability (Westerman & McAfee, 2012), making this a possible mediator for financial performance (Nasiri et al., 2022).

However, further studies are needed to deepen our understanding of the digitalization phenomenon and its impact on businesses (Reis et al., 2020). SMEs have difficulties implementing digital technologies, so it is important to comprehend how digitalization unfolds and influences performance (Eller et al., 2020). Therefore, a gap exists concerning which digital technologies firms use, their impact on digital transformation – such as the initiatives they need to develop, the skills required, evaluation issues – and how digital technologies influence firms' performance (Schneider & Kokshagina, 2021). Hence, we hypothesize that:

H3: Digital maturity positively affects International overall performance.

H3a: Digital maturity mediates the positive effect of dynamic managerial capabilities on international overall performance.

Market turbulence moderation

Market turbulence is characterized by frequent and unpredictable changes in product preferences and customer needs, making it challenging for companies to understand in which direction to define their strategy (Elazhary et al., 2022; Jaworski & Kohli, 1993; Wang et al., 2015). Top managers play a critical role in strategy and dealing with the external environment. They are responsible for explaining the importance of customer needs to drive market orientation (Jaworski & Kohli, 1993). Top managers use DMCs to sense the market and business environment as it changes (Huynh et al., 2022), so they can adjust resources, capabilities, and strategies to maintain competitiveness (Haapanen et al., 2020). DMCs are a key driver for managers in shaping their strategy (Helfat & Martin, 2015). Although some research exists on how market turbulence affects overall performance (Mangus et al., 2020), there are still issues to be addressed regarding its impact in changing environments (Helfat & Martin, 2015). Therefore, it is hypothesized that:

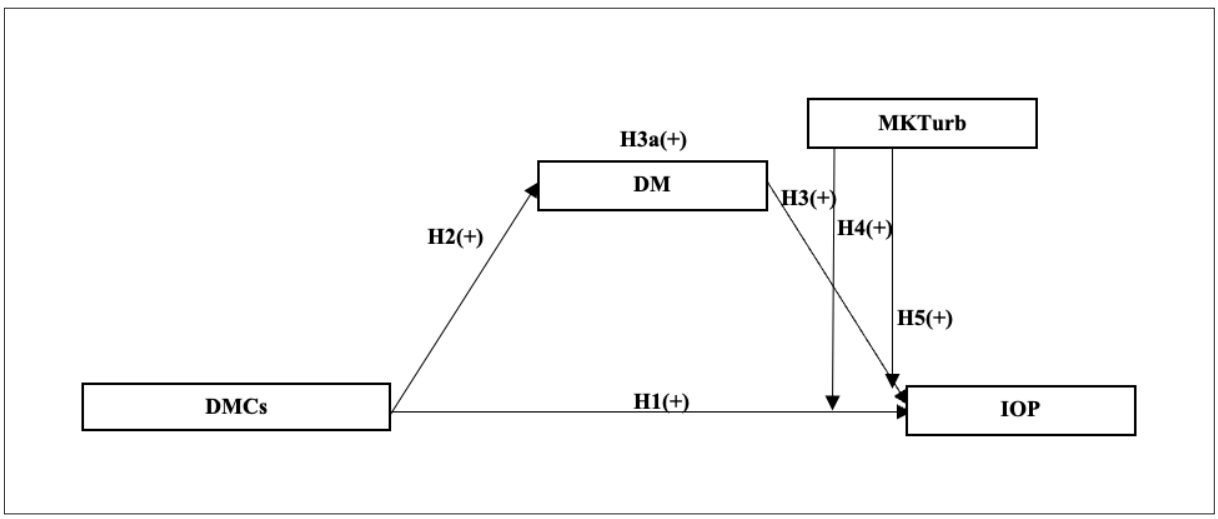
H4: Market turbulence positively moderates the effects of dynamic managerial capabilities on international overall performance

Digital technologies are considered crucial tools for firms to deal with volatile, uncertain, complex, and ambiguous environments (Eller et al., 2020). Digital transformation enables firms to access differentiated information using digital channels and track customer needs, innovating ahead of competitors (Li, 2022). Digital technologies can help firms rapidly adapt to environmental changes and maximize their chances of survival (Vial, 2019). Consequently, we developed the last hypothesis:

H5: Market turbulence positively moderates the effects of digital maturity on international overall performance.

Research Model

Figure 1. Research Model



Note: DM = Digital maturity; DMCs = Dynamic managerial capabilities; IOP = International overall performance; MKTurb = Market Turbulence. H3a = DMCs → DM → IOP.

RESEARCH METHODOLOGY

Data collection process

To test the model, data were collected through a questionnaire answered on a Likert scale and applied to a wide array of Portuguese SMEs engaged in international operations. The definition of SMEs adopted was based on the criteria of the European Union. A total of 592 responses were obtained. The respondents were top managers, specifically CEOs, board members, and managers.

Table 1. SMEs' Thresholds

Company Category	Staff headcount	Turnover	OR	Balance Sheet total
Medium-sized	< 250	≤ EUR 50 m		≤ EUR 43 m
Small	< 50	≤ EUR 10 m		≤ EUR 10 m
Micro	< 10	≤ EUR 2 m		≤ EUR 2 m

Note: Adjusted from https://single-market-economy.ec.europa.eu/smes/sme-definition_en

The responses were treated by covariance-based structural equation modeling (CB-SEM) and path analysis using IBM® SPSS® Amos™ version 28.0, as interaction effects needed to be incorporated.

The questionnaire was translated and back-translated into Portuguese to maintain theoretical consistency and ensure correct understanding (Behling & Law, 2000; Cabral et al., 2020a). After that, it was pretested with a group of 10 managers to verify the meaning, instructions, format, and response time. Minor adjustments were made to improve the questions and fix spelling errors. The questionnaires were sent by email using Lime Survey, version 5.0, with forced answers except for the biographical questions (gender, educational background, and year of birth).

Sample

Out of the 592 responses obtained, 209 were excluded because they were incomplete or did not meet the research criteria (respondents had to be managers, and the firms had to be SMEs operating internationally). The remaining 383 responses were screened for unengaged respondents by calculating the standard deviation of each respondent's answers across key survey items; responses with excessively low variance were flagged as potentially unengaged and excluded (Cabral et al., 2020b; Hair et al., 2019), reducing the sample to 356 responses. Finally, an outlier analysis identified only one moderate outlier (Hair et al., 2019), which was removed. Consequently, the final sample comprised 355 valid questionnaires. The respondents' profiles are shown in Table 2.

Table 2. Sample Profile

Sector		
I	17	5%
II	131	37%
III	207	58%
Size		
Micro	5	1%
Small	8	2%
Medium	342	96%

Continue

Table 2. Sample Profile

Concludes

Position		
Accountant	8	2%
Board of Directors	39	11%
CEO	180	51%
Manager	128	36%
Gender		
Feminine	127	36%
Masculine	209	59%
N/A	19	5%
Education		
Graduate degree (PhD)	3	1%
Basic school (grades 5-9)	7	2%
Primary school (grades 1-4)	2	1%
High school (grades 10 -12)	81	23%
Undergraduate degree	261	74%
N/A	1	0.3%

Measurement

Existing scales were used to measure the constructs in this model through 5-point Likert scales. For DMCs' human capital (5 items – HUM) and social capital (4 items – SOC) dimensions, we used the scales from Bendig et al. (2018) and Pastoriza and Ariño (2013), respectively. For managerial cognition (5 items – SENS), we used Adna and Sukoco's (2020) approach to evaluate cognition. However, we only used the sensing part of the scale, based on a previous study in which the difference in cognition was linked to sensing capabilities (Harvey, 2022).

Digital maturity enables organizations to assess the extent of digital transformation already undertaken, allowing them to develop strategies for its further development and leverage (Haryanti et al., 2023). It is composed of digital intensity(DIN) and transformation management intensity (TMI) with 10 questions each (He et al., 2022). DMCs and digital maturity were modelled as second-order factors.

We measured IOP in the last year, previous three years, and in relation to competitors in the last year considering the answering date and using a scale from Cabral et al. (2020b) adapted from Jaworski and Kohli (1993). This performance measurement adopts a multidimensional perspective, placing the firm's objectives,such as managerial satisfaction with performance across

various dimensions,at the center (Cabral et al.,2020b). Furthermore, it facilitates the evaluation of both the firm's overall performance and its comparative performance relative to competitors (Cabral et al.,2020b).

As a moderator, we used market turbulence (5 items) as measured by Matanda and Freeman (2009). This measure assesses how preferences and customer demands tend to change over time (Jaworski & Kohli, 1993). Assessing environmental changes, the use of subjective measures allows a better view of how managers react to them (Matanda & Freeman, 2009).

Regarding the controls, we used firm age and Sector I (raw materials extraction) and Sector II (manufacturing) as binary variables (0 for other sectors, 1 for materials extraction and manufacturing). These variables represented industries 1 and 2, respectively.

Distribution and multicollinearity

We evaluated our sample for homoscedasticity and multicollinearity (Hair et al., 2019) as seen in Tables 3, 4, and 5 and in Figure 2. Skewness and kurtosis were within the thresholds proposed by Hair et al. (2019), (at .01 significance level), and (at .01 significance level), respectively.

Table 3. Skewness and Kurtosis

	DM	IOP	DMCs
N	355	355	355
Skewness	-.084	-.449	-1.049
Standard Error of Skewness	.129	.129	.129
Kurtosis	-.757	-.553	1.423
Standard Error of Kurtosis	.258	.258	.258

Note: DM = Digital maturity; DMCs = Dynamic managerial capabilities; IOP = International overall performance.

The variance inflation factors (VIF) were calculated for digital maturity and DMCs, as seen in Table 4. Considering that none of the VIFs are above 5, there is no evidence of multicollinearity (O'Brien, 2007).

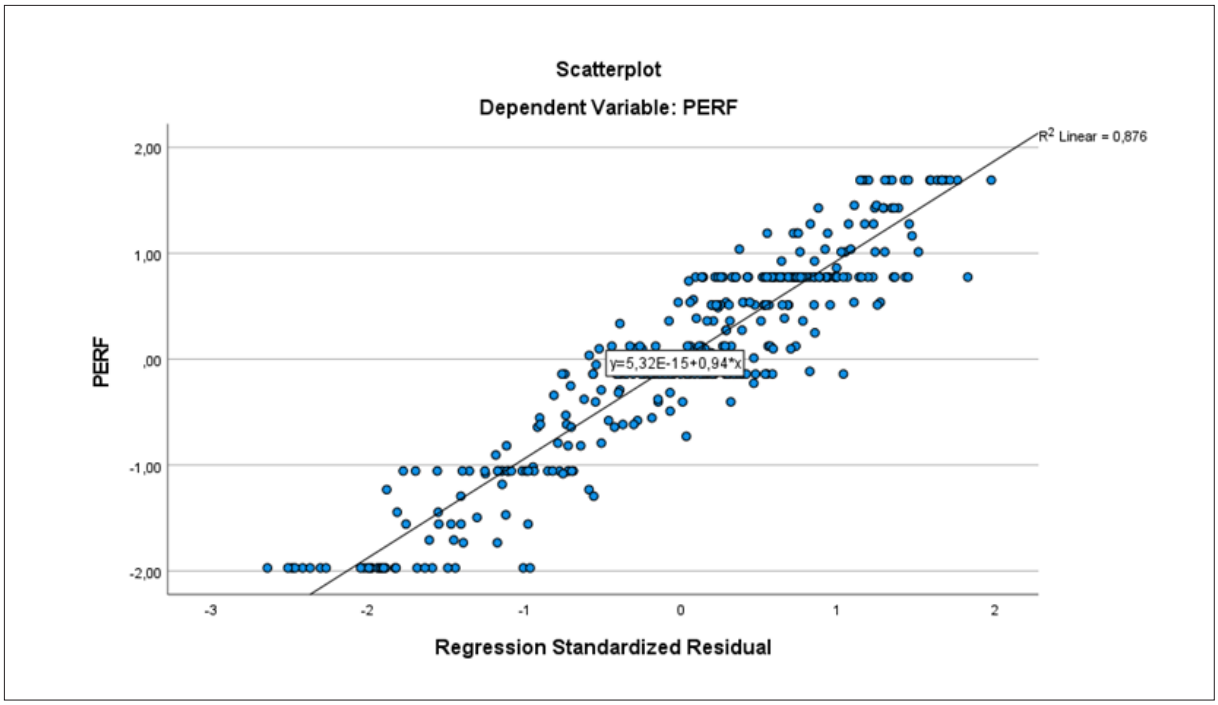
Table 4. Multicollinearity

Variable	VIF
DM	1.571
DMCs	1.672

Note: DM = Digital maturity; DMCs = Dynamic managerial capabilities. Dependent variable: IOP = International overall performance.

To explore potential dependency relationships between variables and assess homoscedasticity, a plot was generated (Figure 2), showing no evidence of heteroscedasticity (Hair et al., 2019).

Figure 2. Homoscedasticity



Note: PERF= International overall performance (dependent variable).

Common method bias

Procedural remedies were used to control common method variance. The study was anonymous, and it was clear that there were no right or wrong answers to decrease social desirability (Podsakoff et al., 2003). The questionnaire was partially randomized to decrease proximity effects (Podsakoff et al., 2003), structured in small sections, and the questions' wording was changed to reduce fatigue, induce context, mood, and consistency motif (Podsakoff et al., 2003). The study followed standard procedures for questionnaire building (Podsakoff et al., 2003). Harman's single factor test (Table 5) indicated that no single factor explained more than 50% of the variance, suggesting that there is no common method bias (Alves & Carvalho, 2023; Podsakoff et al., 2003).

Table 5. Harman's Single Factor Test

Extraction Sums of Squared Loadings		
Total	% of Variance	Cumulative %
20,310	36.927	36.927

RESULTS

Data analysis

To determine the reliability and validity of the study, values for composite reliability (CR), average variance extracted (AVE), and maximum H reliability – MAXR(H) – were examined (Hair et al., 2019) (Table 6). To establish convergent validity, standardized loading estimates should be 0.5 or higher (Hair et al., 2019). AVE values should be 0.5 or higher to attest that adequate levels of variance were explicated by variables related to factors (Hair et al., 2019). CR should be above 0.7 to meet the Fornell and Larcker criterion and indicate adequate convergence or internal consistency (Alves & Carvalho, 2023; Cabral et al., 2020a; Hair et al., 2019). MAXR(H) is another indicator of discriminant validity, which must be higher than CR, and the square root of AVE must be higher than the correlation values of that variable with other variables (Fornell & Larcker, 1981).

Looking at standardized loading factors, one item from Cognition (SENS1) had a standardized loading below 0.5 (Table 6). In line with the guidelines by Hair et al. (2019), the item was deleted.

Table 6. Standardized Loadings

Latent Variable	Standardized Loadings
COG	
SENS1	0.421
SENS2	0.500
SENS3	0.765
SENS4	0.863
SENS5	0.840
SOC	
SOC1	0.891
SOC2	0.854
SOC3	0.924
SOC4	0.932
HUM	
HUM1	0.677
HUM2	0.718
HUM3	0.863
HUM4	0.804
HUM5	0.900

Continue

Table 6. Standardized Loadings

Concludes

Latent Variable	Standardized Loadings
DIN	
DIN1	0.762
DIN2	0.730
DIN3	0.676
DIN4	0.796
DIN5	0.845
DIN6	0.676
DIN7	0.695
DIN8	0.704
DIN9	0.859
DIN10	0.797
TMI	
TMI1	0.852
TMI2	0.868
TMI3	0.736
TMI4	0.858
TMI5	0.892
TMI6	0.791
TMI7	0.866
TMI8	0.800
TMI9	0.807
TMI10	0.825
IOP	
IOP1	0.858
IOP2	0.868
IOP3	0.909

Discriminant and convergent validity were assessed; all CR values exceeded 0.7, following Fornell & Larcker's criterion for discriminant validity. The MAXR(H) value is higher than the CR value for each latent variable integrated in the model, and AVE's values are higher than 0.5. Additionally, the square roots of AVEs are higher than correlation values between each variable and other variables, ensuring discriminant validity for all latent variables (Fornell & Larcker, 1981; Hair et al., 2019).

Table 7. Discriminant and Convergent Validity

	IOP	DMCs	DM	CR	AVE	MAXR(H)
IOP	**0.879**			0.910	0.772	0.914
DMCs	0.329***	**0.814**		0.853	0.674	0.926
DM	0.217***	0.317***	**0.982**	0.980	0.995	1.792

Note: IOP = International overall performance; DMCs = Dynamic managerial capabilities; DM = Digital maturity; CR= Composite Reliability; AVE = Average Variance Extracted; MAXR(H) = Maximum H Reliability. Diagonal values are the squared roots of AVE per construct; off-diagonal values are the correlations of the variables.

Measurement model validity

Standardized residuals between 2.5 and 4 deserved attention and led to the removal of items from cognition (SENS 2) (Hair et al., 2019). For samples superior to 250 answers and with over 30 observed variables, the comparative fit index (CFI) should be above 0.92, /df below 5; root mean square error of approximation (RMSEA) should be below 0.07 and Tucker–Lewis index (TLI) above 0.91 (Hair et al., 2019; Hu & Bentler, 1999; Xia & Yang, 2019), and PClose (closeness of fit) above 0.05 (Browne & Cudeck, 1992). With a CFI of 0.959, a χ^2/df of 1,830, an RMSEA of 0.048, and a TLI of 0.955, the model fit tests show adequate results (Hair et al., 2019; Hu & Bentler, 1999), and PClose of 0.702 (Browne & Cudeck, 1992; Cabral et al., 2020a).

Table 8. CFA Goodness-of-fit Statistics

Indicator	Threshold	Model
χ^2		990.071
df		541
χ^2/df	‹5	1.830
RMSEA	‹ 0.07	0.048
CFI	› 0.95	0.959
TLI	› 0.91	0.955
PClose	› 0.05	0.702

Note: ^{2} = Chi-square; dF = Degrees of freedom; /df = Chi-squared divided by degrees of freedom; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker–Lewis' index; PClose = closeness of fit. Thresholds from /df, RMSEA, CFI, and TLI (Hair et al., 2019; Hu & Bentler, 1999; Xia & Yang, 2019) and PClose from (Browne & Cudeck, 1992).

Hypothesis analysis

Path analysis

Within the scope of path analysis (Table 9), the direct effects of DMCs on digital maturity were statistically significant at both the 99% and 95% confidence levels in relation to IOP. Digital maturity also showed a significant positive impact on IOP. As indicated by the values in Table 9, all values exceeded the critical threshold of 1.96, corresponding to confidence levels of 99% ($\rho < 0.0001$) and 95% ($\rho < 0.05$). Firm age showed no statistically significant effect.

Table 9. Path Analysis

Hypotheses	Path Analysis			SRW	value	ρ	Results
H1	DMCs	→	IOP	0.194	2.448	0.014	Supported
H2	DMCs	→	DM	0.658	10.566	***	Supported
H3	DM	→	IOP	0.257	3.472	***	Supported
	Sector I	→	IOP	0.036	0.695	0.487	
	Sector II	→	IOP	0.255	4.710	***	
	Firm Age	→	IOP	-0.091	-1.740	0.082	

Note: DM = Digital maturity; DMCs = Dynamic managerial capabilities; IOP = International overall performance; SRW = Standardized Regression Weights. ***β< 0.001.

The most accurate and recommended method for indirect effects assessment is bootstrapping (Hair et al., 2019). Therefore, the estimates were bootstrapped with 2000 samples at a 0.95 confidence level. The mediation effect of digital maturity from DMCs to IOP was evaluated (Table 10), and there is a significant mediation effect of digital maturity from DMCs on IOP at 99%.

Table 10. Digital Maturity Mediating Effects

Hypothesis	Indirect Path[a]	Lower	Upper	ρ	β	Result
H3a	DMCs→DM→IOP	0.200	0.451	0.001	0.174***	0.200

Note: DM = Digital maturity; DMCs = Dynamic managerial capabilities; IOP = International overall performance ***β< 0.001. [a] Bootstrapped estimates with 2000 samples at a confidence level of 0.95.

Moderation analysis

To assess the moderating effect of market turbulence on the relationship between DMCs and digital maturity on the IOP, path analysis was conducted using the maximum likelihood method, in two steps. The results are presented in Tables 11 and 12. The values for estimation and moderator were standardized beforehand and centralized to minimize multicollinearity. There was no evidence of the moderation effect on DMCs' relation with IOP.

Table 11. Path Analysis Results Showing the Moderating Effect of Market Turbulence

Hypothesis	Relationship	*β*	*t* value	*ρ*	Result
	MKTurb →IOP	-0.143	0.768	0.443	
	DMCs→ IOP	0.042	0.242	0.809	
H4	MKTurb *DMCs→IOP	0.179	0.672	0.502	Not supported

Note: MKTurb = Market turbulence; DMCs = Dynamic managerial capabilities; IOP= International overall performance ***β< 0.001.

There was a significant moderation at the 95% confidence level (Table 12) on the relationship between digital maturity and IOP (H5). However, this relationship was negative (β=-0.336), contrary to what was expected.

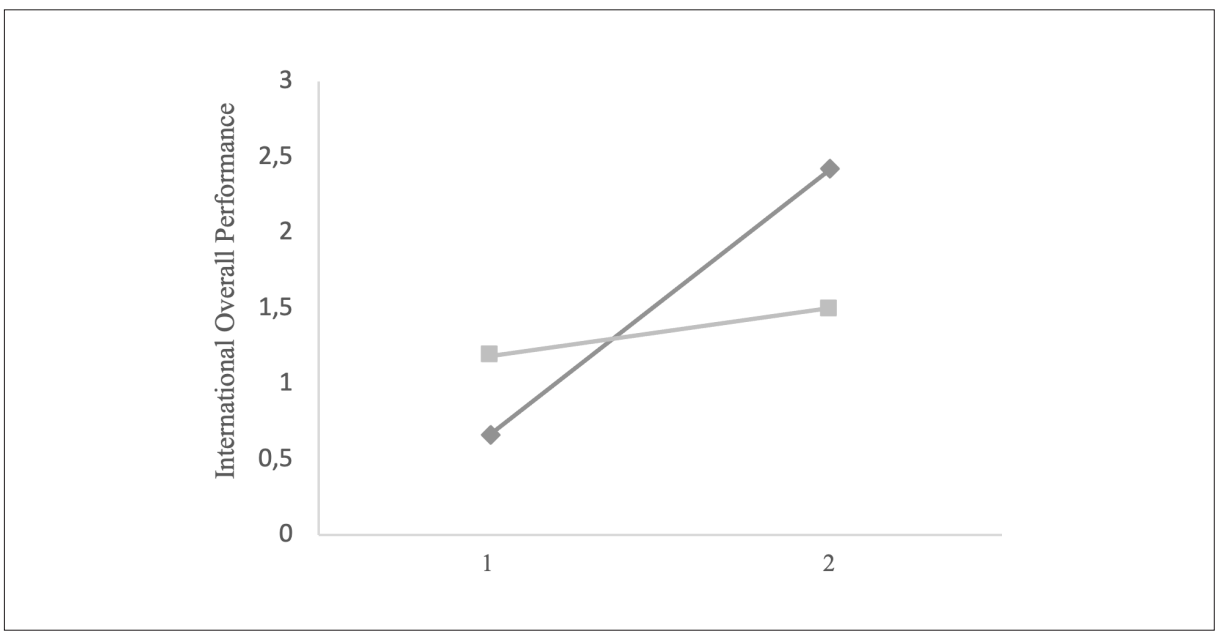
Table 12. Path Analysis Results Showing the Moderating Effect of Market Turbulence

Hypothesis	Relationship	*β*	value	*ρ*	Result
	MKTurb →IOP	0.144	2.368	0.018	
	DM→IOP	0.512	9.659	***	
H5	MKTurb *DM→IOP	-0.336	-4.587	***	Not supported (the reverse is supported)

Note: MKTurb = Market turbulence; DM = Digital maturity; IOP= International overall performance ***β< 0.001.

Digital maturity leads to an increase in performance and presents benefits in either low or high market turbulence, as we can see in Figure 3.

Figure 3. Graphic Representation of the Moderation Effects of Market Turbulence on Digital Maturity with a 95% Confidence Interval (Light – Low Value of Market Turbulence, Dark – High Value of Market Turbulence)



DISCUSSION

DMCs are a combination of managers' knowledge and background (cognition), human characteristics, skills, experience (human capital), and social connections (social capital) (Helfat & Martin, 2015). Coming from the upper echelons' theory, the backgrounds and characteristics of top managers assume a preponderant role in a firm's outcomes at the strategic and performance level (Hambrick & Mason, 1984; White & Borgholthaus, 2022). Previous studies have shown the impact of top managers on strategic change (Bachrach et al., 2022; Singh et al., 2023), such as on international performance (Nielsen, 2010b). The direct effect of DMCs on IOP is consistent with previous research and theory indicating that top managers' characteristics serve as antecedents to a firm's internationalization outcomes (Nielsen, 2010b), resource allocation, and reconfiguring (Teece, 2016), ultimately influencing firm achievements (Adner et al., 2003; Helfat & Martin, 2015).

Digital maturity enables managers to assess the extent of digital transformation within firms (Çallı & Çallı, 2021). Digital transformation brings unique opportunities to the firm (Schneider & Kokshagina, 2021) to maintain a competitive advantage (Annarelli et al., 2021). Top managers are the first responders in changing the environment of firms and driving strategic change to digitally transformed firms (Fletcher & Griffiths, 2020). Increased DMCs give these managers more tools to deal with digital transformation and drive firms to digital maturity (Heubeck, 2023), as corroborated by the significant positive impacts DMCs show on digital maturity (H2).

Focusing on digital maturity and its relationship with IOP (H3), it is important to highlight that, although digital technologies are critical for firms' survival (Vial, 2019) and performance (Westerman & McAfee, 2012), they remain a challenge for many SMEs due to their typically limited resources (Eller et al., 2020). Nevertheless, digital transformation represents a key strategy for smaller firms aiming to compete in international markets and improve their international performance (Denicolai et al., 2021). In this regard, SMEs must pursue higher levels of digital transformation in order to scale internationally. Based on a sample of internationalized Portuguese SMEs, the findings of this study support this perspective, as digital maturity was found to have a significant and positive effect on IOP.

When exploring the indirect effect of DMCs on IOP (Huynh et al., 2022), this study shows that top managers' DMCs are antecedents of changing the business to achieve digital maturity (Teichert, 2019) for better IOP, supporting H3a. The results indicate that top managers with well-developed DMCs foster an increase in digital transformation within firms.

This study builds on the premise that digital maturity provides firms with a competitive advantage in environments characterized by high market turbulence, primarily through enhanced information acquisition and greater adaptability (Li, 2022). However, the findings reveal that the positive impact of digital maturity on IOP is weaker among firms operating in highly turbulent markets compared to those in more stable environments. These results suggest that market turbulence moderates the relationship between digital maturity and IOP, attenuating the effect of this maturity as evidenced by a reduced slope in the interaction

analysis. This result seems to confirm the results of Li (2022), which show that under high market turbulence, the positive effect of digital transformation on performance is closer to linear. This may be due to the fact that turbulent markets are characterized by frequent and unpredictable changes not only in product preferences and customer needs (Jaworski & Kohli, 1993), but also in the competitive landscape and technological advancements (Wang et al., 2015). Such volatility may account for the observed results. Overall, the findings suggest that the moderating role of market turbulence in the relationship between digital maturity and IOP is more complex than initially anticipated.

CONCLUSION

This study contributes to the literature on DMCs (Adner et al., 2003) by offering additional insights into their underlying mechanisms and how these capabilities influence firm-level outcomes and organizational processes (Huynh et al., 2022). Previous research has highlighted the challenges in fully understanding how top manager impact firm performance (Heubeck, 2023; Widianto et al., 2021), likely due to the multifaceted and often indirect nature of their influence. The findings support this notion, revealing that the top managers' DMCs exert a direct effect on firm performance through the development of digital transformation.

Digital transformation is increasingly seen as a necessity rather than a mere differentiator (Kraus et al., 2022). However, SMEs often face structural limitations and resource constraints, making it difficult for digital maturity to be prioritized (Eller et al., 2020). Despite these challenges, digital transformation can serve as a unique resource for firms, providing a competitive advantage and enhancing performance, as demonstrated in this study, enhancing the importance of higher digital maturity levels. Whether through acquiring more information from clients, improving specific processes, or driving strategic changes, digital maturity offers numerous pathways for organizational advancement (Zhai et al., 2022).

One of the unexpected findings of this study was the role of market turbulence as a moderator. This study was grounded in the premise that, due to enhanced information acquisition, SMEs would adapt more quickly, and that digital maturity would enable firms to perform better in turbulent market environments (Li, 2022). Companies with lower levels of digital maturity are more vulnerable and exposed to environmental changes, while those with higher maturity are more flexible and capable of adapting and responding to such changes (Fletcher & Griffiths, 2020). However, digital transformation is not an easy process for top managers and firm implementation (Zhai et al., 2022). Digital transformation affects firms in multiple ways, including organizational structure, value creation, business models, and the disruption of the status quo (Tratkowska, 2020). In markets where customer preferences and needs are in constant change (market turbulence) (Jaworski & Kohli, 1993), smaller firms often struggle with the digital transformation process, a challenge further exacerbated by limited resources.

Theoretical contribution

This study was based mainly on upper echelon dynamic capabilities, joining the importance of top managers' characteristics with the concept of capabilities that managers have as a resource for firms. Economic theory offers limited insights into the role of managers as decision-makers, particularly regarding the challenges they face in dynamic and uncertain environments (White & Borgholthaus, 2022). This study aimed to address this gap through an empirical investigation of managers' DMCs at the individual level and their relationship with firm performance (Heubeck, 2023). The findings contribute to a deeper understanding of the mechanisms through which top managers influence strategic decision-making and foster awareness of digital transformation (Fletcher & Griffiths, 2020) as well as IOP. Furthermore, this study provides additional insights into how internationalized SMEs respond to turbulent market conditions—an area that warrants further investigation.

Practical contributions

These findings suggest that managers should be encouraged to expand their knowledge structures and mental models in order to better anticipate market changes and respond effectively, thereby enhancing their managerial cognition (Helfat & Martin, 2015). It is equally important for managers to invest in their own development—through skills acquisition, training, and education—to strengthen their human capital (Felício et al., 2014; Helfat & Martin, 2015). Additionally, building and maintaining strong social networks is essential for increasing social capital, providing access to valuable resources and information that can contribute to improved firm performance (Helfat & Martin, 2015; Corrêa et al., 2019). As key decision-makers, top managers should actively address digital transformation and foster digital maturity within their firms.

When effectively leveraged, information combined with the right capabilities can become a source of sustained competitive advantage (Fletcher & Griffiths, 2020). Given the specific challenges that SMEs face in foreign markets—particularly those related to size and resource constraints—digital transformation may serve as a driving force, offering low-cost opportunities that redefine competition and collaboration while requiring adaptation from firms and their stakeholders (Schneider & Kokshagina, 2021).

Limitations and future research

Although this study offers several important contributions to the management literature—particularly by highlighting the role of DMCs in enhancing firms' IOP—it is not without limitations. The research was conducted at a single point in time, focusing exclusively on Portuguese SMEs and specifically on top managers. Future studies should consider longitudinal designs, cross-country comparisons, and broader samples that include firms of different sizes and sectors.

Further research could also examine top managers not only as individuals but as members of top management teams, with a focus on collective DMCs (Huynh et al., 2022). Another direction could involve the study of middle managers, who are closer to operational processes and may play a distinct role in the implementation of digital strategies. Additionally, exploring whether similar patterns emerge in larger organizations, in different organizational contexts, or in specific industries—such as the technology sector—would offer valuable insights.

Regarding the mediation effects observed, this study found evidence of partial mediation, suggesting that other variables may mediate the relationship between DMCs and IOP, or link digital transformation more directly to digital maturity. As for moderation effects, future research could explore alternative moderators such as competitive intensity, technological turbulence, or broader environmental conditions.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

AUTHORS' CONTRIBUTION

Joana Gomes: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Resources; Software; Validation; Visualization; Writing – original draft; Writing – proofreading, and editing.

Fernando Carvalho: Conceptualization; Formal analysis; funding acquisition; Methodology; Project administration; Resources; Software; Supervision; Software; Validation; Visualization; ; Writing –proofreading, and editing.

André Alves: Data curation; Formal analysis; Methodology; Software; Validation; Visualization; Writing– proofreading, and editing.

Ângelo Cabral: Data curation; Formal analysis; Methodology; Software; Supervision; Validation; Visualization.