



“Navigating through the digital swamp”: assessing SME propensity for online marketplaces

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Abstract

Digital technology has produced deep changes in the business world. However, companies have a hard time understanding consumers' changing needs and new consumption patterns, especially small and medium-sized enterprises that currently face growing challenges in an era characterized by a lack of time and information overload. New mechanisms must be found that not only can keep businesses competitive in digital environments but can do so in innovative and sustainable ways. This study sought to address this issue by adopting a process-oriented approach and developing a decision-support tool for SMEs that are considering joining online marketplaces. The proposed analysis model helps these companies decide whether they are ready to take advantage of these digital platforms or whether they have to take action to improve in specific areas of their business operations. The model-building process relied on a combination of cognitive mapping and the best–worst method. An expert panel was recruited to identify the most relevant factors determining SME readiness to join online marketplaces. The model was applied to a set of real companies to assess their propensity for online marketplaces. The practical applicability of this decision-support system was then discussed in a consolidation session with a member of Portugal's *Agência Nacional de Inovação* (National Innovation Agency), who acknowledged the strong potential of the proposed model.

Keywords Best–worst method (BWM) · Cognitive mapping · Digital transformation · Firm performance · Online marketplace · Small and medium-sized enterprise (SME)

JEL classifications L26 · L25 · O33

1 Introduction

The current Age of Digital Transformation is not just about new technology but also shifting mindsets, lifestyles, consumer behaviors, and business models (Nurhidayati and Ratnasari 2020; Troise et al. 2022). Consumers have changed and continue to change every day. The business world—especially small and medium-sized enterprises (SMEs) (*i.e.*, businesses that typically employ fewer than 250 people and have either an annual turnover of up to €50 million or an annual balance sheet total of up to €43 million (*cf.* European Commission 2020))—needs to adapt to this new reality. According to Troise et al. (2022, p. 1), markets are currently characterized by “*unprecedented levels of volatility, uncertainty, complexity, and ambiguity (VUCA)*[(Warren and Burt 1985), so...] *organizational agility, arguably, is the key strategy to counter the challenge of VUCA for both large companies and SMEs*”. Many organizations have thus been forced to look for ways to reinvent their businesses and become more competitive.

The continued success of online platforms and growing electronic-commerce (hereafter, e-commerce) fever have made joining online marketplaces vital for brands seeking to strengthen their competitiveness, attract new customers, and increase their revenues (Yenipazarli 2021). However, mere interest is not enough because, if companies do not have the necessary capabilities and/or adopt the most appropriate strategies, achieving and maintaining high levels of performance becomes difficult. Our study is therefore motivated by the recent findings of Fernandes et al. (2022) and Ballerini et al. (2023), which highlight the importance of conducting an in-depth analysis of digital skills to adequately prepare companies for the challenges presented by diverse digital marketplaces. Indeed, smaller firms, such as SMEs, end up feeling an even greater pressure to join online marketplaces as these organizations most need to gain confidence and recognition in e-commerce. However, they have fewer resources and technology at their disposal to do this sustainably (Nurhidayati and Ratnasari 2020; Fernandez-Vidal et al. 2022).

Similar to physical marketplaces, online marketplaces have a panoply of many brands competing with each other in the same space, with the small difference that purchases in this case are just a click away. The disadvantages are that no salesperson is there to talk about how good products are, and that customers cannot smell or touch products before deciding to buy them. New ways are needed to make customer experiences as enriching and satisfying as possible so that the results are positive.

In addition, many companies do not have the necessary assets to enter online marketplaces. Before opting to join these marketplaces, SMEs must analyze their organizational reality and the resources they have at their disposal. Then, they can adopt the strategies and mechanisms that, given their internal characteristics, best facilitate their integration and increase their business performance. However, it is worth noting that previous studies (*e.g.*, Barroso et al. 2019; Tolstoy et al. 2022) suggest that, first, the criteria used to assess SME propensity to do well in online marketplaces are usually identified in a poorly structured way. Second, few analyses have concentrated on the cause-and-effect relationships between the evaluation criteria applied,

and, last, the trade-offs between these criteria are frequently calculated in nontransparent ways. To fill these gaps, three main questions require answers:

- How can SME propensity for online marketplaces be assessed?
- What qualitative and quantitative metrics can be used to do this?
- How can these metrics be integrated into an overall assessment system?

The present study therefore sought to create a decision-support tool that would facilitate evaluations of these companies’ actual proclivity to join online marketplaces, as well as adding to the existing knowledge about—and benefits offered by—this business strategy. To this end, two methodologies were combined and applied in three phases: (1) structuring; (2) evaluation; and (3) recommendations.

The structuring phase made use of cognitive mapping techniques applied with the assistance of a panel of experts on the topic under study in order to structure the decision problem, break down the component ideas, and generate relevant insights. The cognitive mapping procedures were based on the value-focused thinking (VFT) approach (Keeney 1996), which concentrated on finding solutions in response to a trigger question. In the evaluation phase, multiple-criteria decision analysis (MCDA) was conducted via the best–worst method (BWM) (Rezaei 2015a). This approach helped the panel compare the criteria generated in the structuring phase, and assign weights to them so that an analysis model could be created to evaluate SME propensity to join a marketplace. We have found no prior documented evidence reporting the combined use of these methods to evaluate SME propensity for online marketplaces, allowing our study to add to the extant literature. Finally, the model was applied to a set of real SMEs to generate a ranking of the firms, which was discussed in the recommendations phase.

The remainder of this paper is organized as follows. Section two presents the literature review and this study’s fundamental concepts, as well as identifying previous research related to the main topic and limitations of prior studies. Section three provides the background of the methodologies used (*i.e.*, VFT and the BWM), highlighting their advantages and potential contributions to the resolution of the decision problem. Section four describes the components of the empirical research. Finally, section five concludes the study, including suggesting lines to be followed in future research.

2 Literature review and research gaps

Technologies and trends have gradually emerged in response to the emerging needs of society at large and of companies, which collectively have marked industries across history and given rise to the current all-pervasive digital transformation. The literature on this topic advocates various perspectives that complement each other but provide no universal approach. Nurhidayati and Ratnasari (2020) argue that digital transformation comprises a radical, comprehensive change that significantly improves companies’ performance through advanced technology. McKinsey (*in* Ulas 2019) highlights the ability of digital transformation to create value for customers

and employees by reordering technologies, business models, and processes inherent to the Age of Digital Economy.

The consequences of digital transformation in terms of consumer behavior and market competitiveness are discussed by multiple authors including Verhoef et al. (2021, p. 889), who state that “*digital transformation and [the] resultant business model innovation have fundamentally altered consumers’ expectations and behaviors, putting immense pressure on traditional firms, and disrupting numerous markets*”. SMEs can deal with these demands by implementing well-designed strategies and business plans, but changes in these companies’ value proposition may be needed to leverage their digital transformation and create value for their customers (Fernandez-Vidal et al. 2022). Digital transformation also has disadvantages, such as the information overload characteristic of Industry 4.0 (Sima et al. 2020).

Recent transformations have been further accelerated by the coronavirus disease-19 (COVID-19) pandemic (Clauss et al. 2022). Concurrently, the emergence of innovative business models and consumer pressures due to high expectations have generated uneasiness in many markets (Lemon and Verhoef 2016; Santoro et al. 2018; Bertello et al. 2022). Companies have thus been forced to contemplate changes to adapt to the new digital age, especially SMEs because they have had to adopt strategies to leverage their competitiveness in the relevant markets. According to Hånell et al. (2019) and Tolstoy et al. (2022), SME presence in the digital market can be a strong driver of these firms’ own international growth. Nowadays, companies essentially cannot survive without an online presence given an increasingly digitalized, well-informed world that stimulates consumers to search for information in the most diverse digital media.

SMEs represent 99% of businesses in the European Union (*cf.* European Commission 2020), and they play a leading role in economic growth and job creation worldwide (Soni et al. 2022). Among the main characteristics of SMEs are: (1) personalized management with little decentralization of authority; (2) limited resources for managing labor, finance, and marketing; and (3) dependence on a small number of customers and activities in limited markets. Other common features are flat, flexible structures, high innovation potential, reactive mindsets, informal and dynamic strategies, tacit knowledge, little attention paid to formalizing processes, and weak performance measurement procedures (Taticchi et al. 2008).

Some characteristics are also limitations, and a considerable portion of SMEs fail in the first 3–5 years mainly due to poor financial control and a lack of management experience and planning (*cf.* Baard and Watts 2001). In addition, these firms have been taken by surprise by advances in technology. For the most part, adopting these innovations entails financial costs that are often excessively high for SMEs. High levels of know-how are also required from employees, and extremely important cultural and organizational issues in digital transformations are often ignored. SMEs are thus forced to change not only traditional processes but also their culture and the way they manage people—*i.e.*, key resources that actively contribute to companies’ digitization. SMEs have to compete on a global scale with larger firms that are preparing for the digital age at high speed (Stich et al. 2020), so they must take a holistic view of internal digital transformation, including implementing measures that go far beyond technical aspects.

Besides defining SMEs’ main characteristics and challenges, a clearer understanding of the present study’s key concept is needed—*i.e.*, online marketplaces based on the concept of e-commerce. E-commerce channels can be defined as “*the trading of goods or services over computer networks such as the Internet*” (Hånell et al. 2019, p. 516). Online marketplaces, in contrast, are multi-player e-commerce channels that, according to Bakos (1998), rely on three main functions: (1) creating a match between buyers and sellers; (2) facilitating transactions; and (3) providing institutional infrastructure. Zhang and Ma (2022) assert that online marketplaces are digital platforms through which suppliers contact final customers directly to sell products and services. To be in these digital spaces, sellers have to pay a fee to the relevant e-commerce entity.

As the Internet has evolved, e-commerce has grown, offering great advantages to SMEs, especially to those with limited resources (*e.g.*, opportunities to do business internationally). Zaied (2012) notes that these companies’ adoption of e-commerce can even significantly increase their competitive advantages and improve their market performance. Bakos (1998) and Barroso et al. (2019) stress the importance of online and/or physical marketplaces as creators of value for economies and for all those involved in commercial processes, such as buyers, sellers, and society in general. Over time, online marketplaces have revolutionized the way products are bought and sold, and thus have had an extremely strong impact in recent years.

Yenipazarli (2021) observes that online marketplaces are dramatically changing e-commerce, noting that, in 2018, customers spent 1.66 trillion United States dollars in the top 100 online marketplaces, generating 50% of global market sales in the same year. By 2020, sales from e-commerce vendors accounted for 54% of Amazon’s total third-quarter revenue (Wei and Dong 2022). Companies that already have e-commerce platforms use online marketplaces to complement their existing product lines with a much wider offering and to reduce operational costs, broaden their value proposition, and increase operational efficiency (Yan et al. 2020).

Online marketplaces are thus an excellent way for SMEs to sell their products and services, increase their visibility, and effectively reach customers from any region worldwide who are interested in these firms’ products and/or services regardless of geographic location. For SMEs to flourish in these environments, they must develop specific digital competencies (Tolstoy et al. 2021 and 2022). However, the managers involved need to understand first what their employees’ true competencies are and where they should improve in order to increase their company’s probability of success.

The resource-based view is based on the basic principle that firms’ competitive advantage and performance are closely linked to their resources and the ability to use them wisely (Barney 1991; Murcia et al. 2022). A fundamental part of building this capability is to examine their organizational characteristics before entering into any transformation process—whether it is digital or not. In the context of SMEs and online marketplaces, several key resources and capabilities can be identified, and the resource-based view sheds light on how these determinants, such as technological resources, human resources, financial resources, networks and partnerships, and regulatory environments, can interact to facilitate or restrict SME propensity to

join online marketplaces. Understanding these factors can help policymakers, industry stakeholders, and SMEs themselves in developing strategies and initiatives to facilitate SMEs' successful integration into digital marketplace ecosystems. In addition, companies must be able to measure their performance. Assessing SME propensity for online marketplaces is also extremely important as these firms can then measure their performance in relevant areas and identify those in which they need to improve. Some previous studies have focused on business performance and digital transformation. Table 1 presents a selection of this research, including contributions and limitations.

Table 1 confirms that various prior studies have focused on evaluating SME performance in digital transformations, but the existing research has significant limitations. The articles analyzed have only considered internal SME factors, and the samples have been too small to allow for general conclusions. Employees and other stakeholders have also not been included in the participants. These and other gaps suggest that, first, the criteria used to assess SME propensity to do well in online marketplaces were identified in an unclear or poorly structured way. Second, few analyses have concentrated on the causal relationships between the evaluation criteria applied, and, last, the trade-offs between these criteria were calculated in non-transparent ways.

To fill the gaps in the literature, the present study created a model for evaluating SMEs that intend to extend their activities to online marketplaces, which currently have great growth potential and which can bring added value. The proposed methodology combined VFT and cognitive mapping to overcome the first two general limitations identified above. The BWM then addressed the third limitation. The conceptual framework of these methodologies is discussed in the next section.

3 Methodology

Assessing SME propensity for online marketplaces is an understudied topic that has yet to address the unresolved issues identified in the previous section (*cf.* Yenipazarli 2021). VFT, cognitive mapping, and the BWM offer viable solutions to these problems in this research context.

3.1 VFT and cognitive mapping

The VFT approach was developed originally by Keeney and McDaniels (1992). This approach seeks to support decision makers, in particular identifying and structuring complex decision problems (Françoze and Belderrain 2022). VFT distinguishes between the key values driving the strategic objective of a given assumption in a proactive, creative way. As a rule, managers who have to make decisions tend to rely on alternative-focused thinking, concentrating on choosing the best solution from a set of several options. VFT, in contrast, focuses on values, so less time and effort are required to make decisions as the alternatives

Table 1 Contributions of and Limitations in Research on Digital Transformation and Business Performance in Small and Medium-Sized Enterprises

Authors	Methods	Contributions	Limitations
Xia and Zhang (2010)	Compustat database of more than 100 publicly traded companies	Present new evidence of the relative advantages of digital companies' retailers versus more traditional companies Explore the benefits of using the Internet and clarifying the returns from e-commerce in general and online channels in particular Can serve as a reference point for companies preparing to use online channels	Due to the aggregated data sample, the authors were unable to obtain sufficient detail about the firms' operational capabilities
Anggadwita and Mustafid (2014)	Quantitative statistical analysis of questionnaire data	Propose a conceptual model of performance measurement for SMEs, suggesting four factors be measured: (1) entrepreneurship; (2) human resource competence; (3) innovation; and (4) sustainability	This study only covered SMEs' internal factors
Pratono and Mahmood (2015)	Structural equation model with SME data (<i>i.e.</i> , quantitative method of cross-sectional design)	Offer insights into the role of external environment turbulence in the relationship between SMEs' entrepreneurial orientation (EO) and performance based on a combination of resource-based view and contingency theories Provide a decision-making framework Suggest that EO contributes to firms' success, and that marketing capabilities help manage environmental turbulence	The empirical research is based only on the responses of company owners and/or managers without paying attention to employees or other stakeholders' perspective The authors emphasize the valuable insights that stakeholder interviews could have provided

Table 1 (continued)

Authors	Methods	Contributions	Limitations
Hånell et al. (2019)	Qualitative method and interviews	Explore how market factors shape online retailers' internationalization strategies Improve understanding of how e-commerce affects SME internationalization Offer new insights into SME managers' possible adaptation of international expansion strategies in retail	The small sample size is a problem as only a single country case study was conducted, which does not allow for generalization of the results More research is needed on international marketing regarding how learning about digital tools and exploring marketing analytics can shape the internationalization process
Barroso et al. (2019)	Fuzzy cognitive mapping	Provide a methodological framework that promotes a better understanding of the determinants of e-commerce for SMEs Seek to improve these firms' business performance Offer new insights into this topic and more knowledge about e-commerce practices in SMEs	The model developed is idiosyncratic, which means that any changes in the group session participants or mechanics could give rise to different results
Tolstoy et al. (2022)	Linear regression and mediation analysis	Analyze the effect of online marketing capabilities (OMCs) on the performance of SMEs involved in international e-commerce Investigate using a capabilities perspective to explain international performance among SMEs involved in e-commerce Place capabilities in a broader strategy context by creating a model for suggesting market orientations and measuring the impact of OMCs on international performance	A relatively small sample was used although it was representative of the country studied (<i>i.e.</i>, Sweden) because this is a small country The measurement scales used are subjective as they depend on chief executive officers and senior managers' perceptions, so the participants may have under- or overestimated their own company's performance compared to that of other firms

generated are aligned with the decision makers’ values and are likely to be more viable and sustainable (Manninen and Huiskonen 2019). According to Keeney (1996, p. 1), “*values are fundamental to all that we do; and thus, values should be the driving force for our decision making. They should be the basis for the time and effort we spend thinking about decisions*”. Thinking about values is, nonetheless, not enough because they need to be structured in a logical, organized way. Keeney (1996) suggests that objectives should be the first thing to think about and list when making decisions. The standard steps for correctly apply VFT are: (1) identify objectives; (2) structure objectives; (3) create alternatives; and (4) analyze decision opportunities.

The present study used cognitive mapping to harness the benefits of VFT. Tolman (1948) developed cognitive mapping in order to understand specific individuals’ mental representations at particular moments during decision making by displaying their ideas visually. Eden (2004, p. 673) states that cognitive mapping is “*the representation of thinking about a problem that follows from the process of mapping*”. It is a well-established method of structuring and organizing complex decision problems that visualizes thinking by constructing a cognitive map, and facilitates the management of cause-and-effect relationships between variables in complex, uncertain environments (Rosário et al. 2021). These maps comprise a “*network of nodes and arrows as links [...] where the direction of the arrow implies believed causality*” (Eden 2004, p. 673), which is why these representations are also known as causal maps (Mackenzie et al. 2006). Their contents can be graphical or informative (e.g., diagrams, metaphor maps, or sketches) (Rosário et al. 2021; Rocha et al. 2022), and individual or group maps. For groups of decision makers, these maps ultimately leverage all the decision-maker panel members’ interests, and usually represent an aggregation of the maps made by each group member (Eden 1988 and 2004).

To ensure more reliable results, the participants should consist of “*a decision-making group of 5–7 experts and other key-players*” (Bana e Costa et al. 2002, p. 227). Simões et al. (2020), in turn, suggest that the panel should consist of 6–10 decision makers. The experts need to be from different business areas to add diversity and richness to the panel’s vision. The goal is to make the most of the experts’ knowledge and expertise by ensuring the session is participatory and collecting all valuable insights, which will provide the best possible structuring of the decision problem (Silva et al. 2019; Andrade et al. 2022; Soares et al. 2022).

3.2 Best–worst method

The BWM is a multicriteria methodology that is based on assessing the performance of different alternatives using evaluation criteria previously identified by a group of decision makers (Rezaei et al. 2018). The BWM was developed by Rezaei (2015a) to resolve multicriteria decision-making problems utilizing pairwise comparison to determine the weight of criteria previously selected by

an expert or a group of specialists in areas related to the decision problem. This method derives the weights in a different way compared to the existing MCDA methods. Specifically, it uses less comparison data because it only compares each criterion to the best (most important, most desirable) and the worst (least important, least desirable) criteria, respectively (Rezaei 2015a; Mendes et al. 2022). The BWM is structured into five steps (*cf.* Rezaei 2015a; Patel and Patel 2020) that, when correctly followed, define the weight of each criterion.

3.2.1 Step one

The first step is to determine a set of decision criteria. The decision makers consider η criteria to select the set $\{c_1, c_2, c_3, \dots, c_\eta\}$ to be applied based on each expert's choice (see Fig. 1).

3.2.2 Step two

The second step is to identify the best (*i.e.*, the most desirable) and the worst (*i.e.*, the least desirable) criteria (see Fig. 2).

3.2.3 Step three

The third step is to determine the degree to which the best criterion is preferred over each of the remaining criteria on a scale from 1 to 9. The value “1” means that both criteria have the same importance, and a “9” shows that the best criterion is extremely important compared to the other criteria. The best-to-others vector, which determines the best criterion over all others, is represented by Eq. (1):

$$A_B = (a_{B1}, a_{B2}, a_{B3}, \dots, a_{B\eta}) \quad (1)$$



Fig. 1 Determination of Criteria Sets. (Source: Rezaei (2015b))



Fig. 2 Identification of Best and Worst Criteria. (Source: Rezaei (2015b))

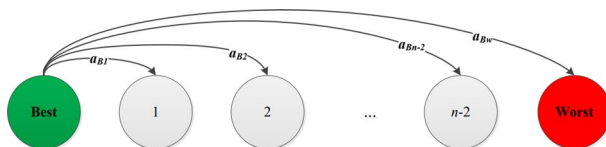


Fig. 3 Determination of Best-to-Others Vector. (Source: Rezaei (2015b))

in which a_{jw} is the degree of preference for the best criterion B over the criterion j and $a_{BB} = 1$ (see Fig. 3).

3.2.4 Step four

The fourth step is to define the degree to which each of the other criteria is preferred over the worst criterion on a scale from 1 to 9. The others-to-worst vector, which determines the worst criterion compared to all others, is written as Eq. (2):

$$A_W = (a_{1w}, a_{2w}, a_{3w}, \dots, a_{nw})^T \quad (2)$$

in which a_{jw} represents the preference for criterion j over criterion W (see Fig. 4).

3.2.5 Step five

The last step is to determine the optimal weights for the criteria ($w_1^*, w_2^*, w_3^*, \dots, w_n^*$) such that, for each pair of $\frac{w_B}{w_j}$ and $\frac{w_j}{w_W}$, $\frac{w_B}{w_j} = a_{Bj}$ and $\frac{w_j}{w_W} = a_{jW}$. To satisfy this condition for all criteria j , a solution must be found in which the maximum absolute difference $\left| \frac{w_B}{w_j} - a_{Bj} \right|$ and $\left| \frac{w_j}{w_W} - a_{jW} \right|$ for all criteria j is minimized, according to the model defined by Eq. (3):

$$\begin{aligned} \min \max_j & \left\{ \left| \frac{w_B}{w_j} - a_{Bj} \right|, \left| \frac{w_j}{w_W} - a_{jW} \right| \right\} \\ \text{s.t.} & \\ & \sum_j w_j = 1 \\ & w_j \geq 0, \text{ for all } j. \end{aligned} \quad (3)$$

This model can be reformulated in accordance with the linear model defined by Eq. (4):

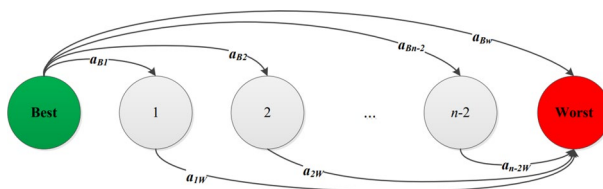


Fig. 4 Definition of Preference for Other Criteria over Worst Criterion (Source: Rezaei (2015b)).

$\min \xi^L, \text{ s.t.}$

$$\begin{aligned} \left| \frac{w_B}{w_j} - a_{Bj} \right| &\leq \xi^L, \text{ for all } j \\ \left| \frac{w_j}{w_W} - a_{jW} \right| &\leq \xi^L, \text{ for all } j \\ \sum_j w_j &= 1 \\ w_j &\geq 0, \text{ for all } j \end{aligned} \quad (4)$$

By solving Eq. (4), optimal weights $(w_1^*, w_2^*, w_3^*, \dots, w_n^*)$ are defined. Finally, the decision makers need to calculate the consistency index of comparison in order to confirm the reliability of the values obtained with the pairwise comparisons. A comparison is fully consistent when $a_{Bj} \times a_{jW} = a_{BW}$ for all j , in which a_{Bj} , a_{jW} , and a_{BW} are, respectively, the preference for the best criterion over criterion j , preference for criterion j over the worst criterion, and preference for the best criterion over the worst criterion. This procedure is depicted in Fig. 5.

The consistency ratio is estimated based on the consistency index, such that ξ^* represents a consistency indicator, as represented by Eq. (5):

$$\text{Consistency ratio} = \frac{\xi^*}{\text{Consistency index}} \quad (5)$$

The closer the consistency ratio is to zero, the higher the reliability level of the analysis will be, and the more reliable will be the comparisons between the criteria. The next section demonstrates to what extent the BWM combined with cognitive mapping can contribute to evaluations of SME propensity for online marketplaces.

4 Empirical research and results

The application of the methodologies took place in three phases. The first comprised cognitive mapping, which facilitated the initial structuring of the decision problem and the creation of a group cognitive map. The second phase focused on the BWM, which took the cognitive map and built it into an evaluation model to support decision making for real SMEs. The last phase included the subsequent discussion, validation, and recommendations with regard to the model and results.

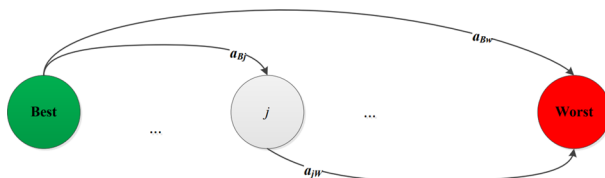


Fig. 5 Calculation of Consistency Index (Source: Rezaei (2015b))

4.1 Development of group cognitive map

Before the first phase started, a search was initiated for available professionals qualified to deal with the topic under study (*i.e.*, decision makers). The criteria for choosing the experts were experience and know-how in SMEs, marketplaces, digital marketing, and e-commerce. In addition, the goal was to find participants from different business sectors and with different levels of experience to ensure the panel would be deeply knowledgeable about digital platforms and SMEs and diverse in terms of gender, age, seniority, and professional background.

An intensive search was conducted using the social network LinkedIn (see <https://www.linkedin.com/>) and recommendations from various people. The panel was completed only after a lengthy process of not only choosing and filtering the candidates using to the aforementioned criteria but also finding people available for long group work sessions (*i.e.*, a total of about seven and a half hours for both sessions). After the panel members were confirmed, the process of scheduling the first session was equally challenging due to the difficulty in finding a convenient date for all concerned. The panel ended up being composed of eight decision makers, which follows the guidelines in the literature (*cf.* Silva et al. 2019; Simões et al. 2020; Vieira et al. 2022).

The sessions were conducted online using the Zoom platform (<https://zoom.us/>). Although the growing popularity of online meetings has raised barriers to clear communication for many, in this case, this factor made the group work process faster and more agile than if it had been done in person. The digital tools used for the online session were provided by Miro (<https://miro.com/>), which is a collaborative group dynamics and brainstorming platform. The “post-its technique” was used in this structuring session to construct the group cognitive map (Eden and Ackermann 2001).

The first session lasted approximately four and a half hours and began with a brief explanation of cognitive mapping and its importance function in the present study. The work was completed in three steps: (1) determining the evaluation criteria; (2) allocating the criteria to clusters; and (3) hierarchizing the criteria within each cluster. To start the process, a trigger question was posed by the facilitator: “*Based on your values and professional experience, what factors facilitate or constrain SMEs’ propensity for joining online marketplaces?*”.

The decision makers were asked to use post-it notes to answer the question so that each note contained only one concept, one expression, or one phrase, and no criteria were repeated. In addition, each factor had a positive (+) or negative (−) sign associated with it to show whether that its impact would enhance or hinder SMEs’ use of online marketplaces. The panel members were encouraged to discuss the topic as a group not only to avoid repeating ideas or similar criteria but also to generate a richer discussion of the topic and break it down as much as possible to identify the most realistic criteria possible.

By the end of this step, 192 evaluation criteria had been isolated (*i.e.*, factors that facilitate or restrict SME propensity to join online marketplaces). Next, the experts were asked to group the criteria into clusters (*i.e.*, areas of interest or performance). To start this process, a cluster labelled “Logistics” was suggested, and the experts

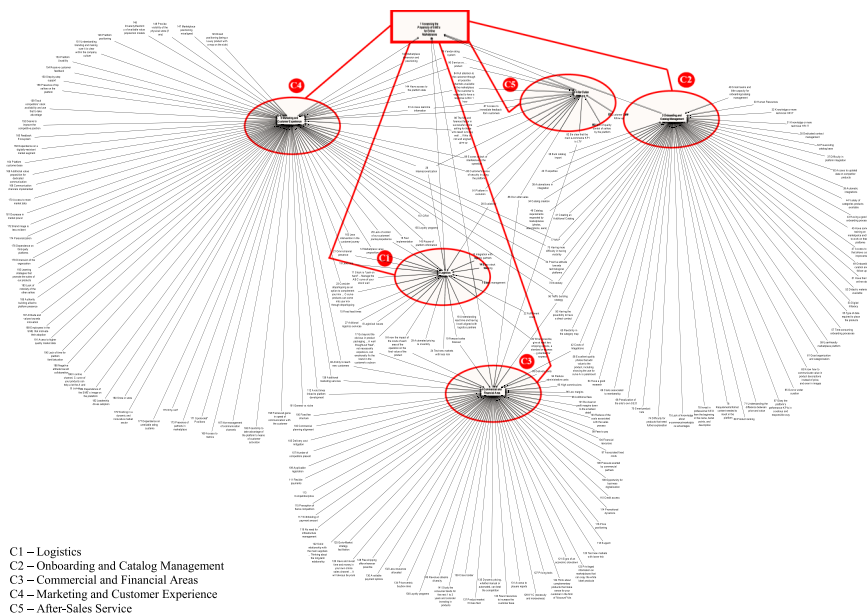


Fig. 6 Group cognitive map

focused on it while reading the criteria one by one to identify those that belonged to that first cluster. The next cluster was suggested by the decision makers, and the same exercise was performed until the key areas of the decision problem were identified. The clusters were labeled: *Logistics* (C1); *Onboarding and Catalog Management* (C2); *Commercial and Financial Areas* (C3); *Marketing and Customer Experience* (C4); and *After-Sales Service* (C5).

Once the main clusters were defined, the last step was to hierarchize the criteria within the clusters into three levels of importance: (1) high; (2) intermediate; and (3) low. The first session ended after this task was completed. The results were used to develop a cognitive map (see Fig. 6) of the clusters and criteria that, according to the decision-maker panel, contribute to—or condition—SME ability to join online marketplaces (size restrictions prevent a better visualization, but an editable version of the entire group cognitive map can be obtained from the corresponding author upon request). As can be seen from Fig. 6, three of the five clusters have the largest number of criteria—C4, C3, and C2—and the remaining two are smaller—C1 and C5. This map shows the cause-and-effect relationships between the concepts identified, with the arrows pointing to the areas in which, according to the experts, actions should be taken (Silva et al. 2019). It is worth noting that all the decision criteria, associated cause-and-effect relationships and respective interpretations were directly provided and approved by the panel members according to the Strategic Options Development and Analysis (SODA) guidelines for cognitive mapping (*cf.* Eden and Ackermann 2001), and after intense collective discussion and negotiation. Specifically,

the decision-maker panel reached a consensus on the type of relationship(s) they deemed to exist between each pair of decision criteria. In this regard, we highlight the importance of group dynamics, since this allows individuals to confront different opinions and to reach more consensual solutions. The evaluation phase is described in the next subsection (*i.e.*, the BWM application).

4.2 BWM application

Once the structuring phase was completed, the decision problem was assessed using the BWM. Eden (2004) and Ferreira et al. (2015) assert that cognitive maps are a useful tool with which to structure complex decision problems, but these maps should not be the final output of the decision-making process. A second group session was thus conducted with the five members of the initial panel available at that time.

The meeting lasted three hours, and it was once again held remotely on the Zoom platform with Excel tools. The session began with a brief explanation of how the BWM and its conceptual framework fit in with the study’s objectives. The cognitive map (see Fig. 6) was then presented to the experts, who were given an opportunity to express their opinions about its format and contents. After the cognitive map had been validated, the most important criteria within each cluster were identified using nominal group technique and multi-voting, which reduced the number of criteria to be assessed down to 30 out of the 192 factors initially defined. The results are shown in Table 2.

After the most important criteria were identified, the next steps were to determine the weights of the five clusters and of their criteria, as well as estimating their consistency index (see *subSect.* 3.2.5). This index is better the closer it is to zero. The panel proceeded to carry out pairwise comparisons of the clusters, first determining which cluster was the best or most desirable and which was the worst or least desirable. The experts then compared the best cluster to the others (*i.e.*, best-to-others) and the other clusters to the worst cluster (*i.e.*, others-to-worst), using the scale presented in Table 3.

This first comparison of the clusters produced Fig. 7, which shows that C3 has the greatest weight of all, followed by C1 and C5 with equal weights, and then C2. Finally, C4 was identified as the cluster that least influences SME propensity to join online marketplaces. With the exception of C4’s extremely low weight, the other clusters have quite similar weights.

The same procedure was followed for each cluster to compare their most significant criteria internally (see Table 4). This phase of assigning weights to the clusters and their criteria using the BWM was extremely important for the next step. After the evaluation model was created, the decision makers used it to rank the propensity to join online marketplaces of 18 specific SMEs (*i.e.*, termed “Alphas” hereafter to maintain confidentiality). Although these 18 SMEs cannot be considered a “sample” in the traditional/statistical sense of the term, they were located in different Portuguese regions, were all known by the members of the decision panel, and represent

Table 2 Criteria Selected for Best–Worst Method Evaluation

Cluster 1: Logistics	Cluster 2: Onboarding and Catalog Management	Cluster 3: Commercial and Financial Areas	Cluster 4: Marketing and Customer Experience	Cluster 5: After-Sales Services
Stock management	Pre-existing catalog database	Ability to reach new customers	Fast implementation	Seller rating system
Integration with logistics partners	Good onboarding process in place	Delivery costs (–)	Additional marketing services	Platforms' lack of seller quality control (–)
Good understanding of lead time and suitable alignment with logistics partners	Marketplaces' catalog requirements (<i>i.e.</i> , photos, descriptions, and European article numbers) (–)	Knowledge of the impact of each operational area's costs on products' final value	Platform usability	Customer service follow-up
Sales forecast	Lack of knowledge about e-commerce and/or marketplaces' advantages (–)	Fees (–)	Realtime access to information	Customers' feeling of security while using platforms
Scalability	Serious, responsible use of platforms' key performance indicators (KPIs)	Competition and/or prices (–)	No management of communication channels (–)	Own after-sales services (–)
	Product rankings	Payment of withholding tax (–)	Access to the best quality market data	
	Investment in professional search engine optimization from the very beginning in terms of names, bullet points, and descriptions	Clear understanding that lifetime value is the main e-commerce KPI	Strategies to increase traffic	

(–) = negative influence on SME propensity for online marketplaces

Table 3 Best–Worst Method Comparison Scale

1	Equal importance
2	Between equal and moderate importance
3	Moderately more important
4	Between moderate and strong importance
5	Noticeably more important
6	Between strong and very strong importance
7	Much more important
8	Between very strong and absolute importance
9	Absolutely more important

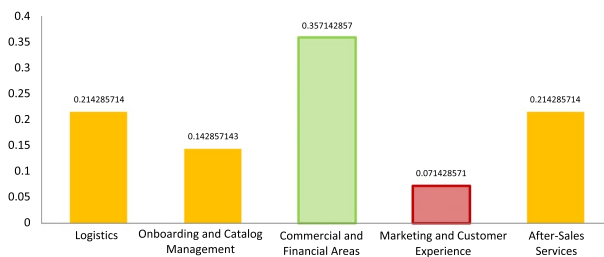


Fig. 7 Cluster Weights

the diversity of businesses operating in the country, encompassing a wide range of sectors and industries, including manufacturing, technology, retail, and services.

The decision makers were asked to identify real SMEs familiar to them, and rate them on a scale of 1 to 9 on which “1” means the criteria do not apply at all to the company and “9” indicates the criteria apply perfectly to that firm. The assessment of these real SMEs with the direct assistance of the panel members served the purpose of testing the framework’s functionality, usability, and applicability. This interactive approach allowed for an immediate exploration of the inputs to the model, enabling further discussion, which aligns with the constructivist nature of the study. It is important to note that, as a process-oriented study, our focus was not solely on the specific outcomes of these assessments but rather on the overall methodology and its potential to accommodate new information and adapt to different contexts based on the decision-makers’ collective perceptions.

The evaluation resulted in a ranking of 18 SMEs, which is presented in Fig. 8. Alpha 4 comes first with a score of 6.58, so this company has the most characteristics that favor joining online marketplace. In contrast, Alpha 12 has the lowest score (*i.e.*, 3.52). Based on the criteria chosen by the specialists, this SME has the lowest propensity for online marketplaces. Alpha 12 may thus need to review its organizational strategy and work on the clusters identified as its greatest challenge to make the process of joining these marketplaces more successful.

Alpha 11 comes in second with 6.44 points not far behind the top SME, followed by Alpha 7 with 6.37. The second and third worst places are almost at the same

Table 4 Real Small and Medium-Sized Enterprises’ Propensity for Online Marketplaces

		SME Propensity for Online Marketplaces																	
		Alphas																	
Clusters	Criteria	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0.214285714	Logistics																		
	Stock management	9	9	9	9	9	9	7	9	8	3	8	1	3	3	9	1	1	8
	Integration with logistics partners	7	5	6	9	7	7	6	9	9	7	8	1	1	2	8	6	7	8
	Good understanding of lead time and suitable alignment with logistics partners	7	6	6	9	8	8	8	9	7	5	7	1	1	2	8	4	8	6
	Sales forecast	6	5	8	9	6	6	6	7	7	4	7	1	1	1	7	6	7	6
0.142857143	Scalability	5	4	5	8	9	9	9	9	8	7	8	1	1	1	2	7	8	2
	Total weight of cluster	7.52	6.82	7.50	8.94	8.01	8.01	7.10	8.65	7.67	4.34	7.57	1.00	1.81	2.17	7.88	3.51	4.89	6.79
	Pre-existing catalog database	7	3	1	1	4	7	4	9	8	7	8	7	7	1	6	6	2	7
	Good onboarding process in place	9	9	8	9	6	6	6	8	7	7	8	5	5	5	8	9	9	7
	Marketplaces' catalog requirements (i.e., photos, descriptions, and European article numbers) (–)	4	4	2	1	2	1	4	1	7	7	2	3	3	9	3	4	7	3
	Lack of knowledge about e-commerce and/or marketplace's advantages (–)	7	2	8	9	9	9	9	9	4	9	7	5	5	5	2	1	3	2

Table 4 (continued)

SME Propensity for Online Marketspaces																			
Clusters	Criteria	Alphas																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0.357142857 Commercial and Financial Areas	Serious, responsible use of platforms' key performance indicators (KPIs)	7	5	6	7	5	5	5	5	4	8	6	5	5	1	7	9	8	8
	Product rankings	4	5	4	5	6	6	6	7	7	8	6	5	5	5	6	7	4	6
	Investment in professional search engine optimization from the very beginning in terms of names, bullet points, and descriptions	4	3	7	9	6	4	3	4	7	8	4	1	6	1	4	7	9	6
	Total weight of cluster	6.75	5.21	5.79	6.55	5.45	5.45	5.33	6.33	6.21	7.58	6.23	4.52	5.12	3.79	5.68	6.74	6.81	5.93
	Ability to reach new clients	7	8	9	9	9	9	9	9	3	8	6	9	9	9	9	8	9	5
	Delivery costs (–)	1	4	4	5	1	1	6	1	4	4	8	3	3	3	3	4	8	4
	Knowledge of the impact of each operational area's costs on products' final value	9	7	7	7	9	9	7	9	4	8	6	5	5	5	9	8	8	8
	Fees (–)	5	7	5	5	2	2	2	2	7	7	7	1	1	1	2	1	3	1
	Competition and/or prices (–)	5	7	6	5	7	7	7	7	4	6	5	8	8	8	1	4	7	2
	Payment of withholding tax (–)	6	7	6	5	7	7	7	7	7	4	8	5	5	5	3	9	9	6

Table 4 (continued)

SME Propensity for Online Marketspaces																				
Clusters	Criteria	Alphas																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
0.071428571	Clear understanding that lifetime value is the main e-commerce KPI	4	3	7	9	5	5	5	5	1	4	6	1	1	1	4	6	9	6	
	Total weight of cluster	5.64	6.12	6.38	6.64	5.85	5.85	6.12	5.85	4.29	6.03	6.70	4.22	4.22	4.22	5.21	6.10	7.67	5.16	
	Strategies to increase traffic	7	8	9	9	6	5	3	8	3	7	4	5	6	1	2	7	9	7	
	Fast implementation	9	6	6	5	6	7	6	8	3	7	5	1	1	1	3	8	6	8	
	Additional marketing services	9	7	7	7	2	2	5	5	3	7	6	6	6	1	2	3	5	5	
	Platform usability	5	3	5	5	3	3	3	6	8	8	7	1	4	1	2	6	6	7	
	Real-time access to information	5	3	4	5	3	3	3	3	2	4	6	1	1	1	6	8	9	3	
	No management of communication channels (–)	6	7	6	5	7	7	7	7	8	6	6	5	4	9	9	6	2	5	
	Access to the best quality market data	4	3	7	9	3	3	3	3	3	2	4	3	4	2	1	6	6	9	4
	Total weight of cluster	7.05	5.44	6.21	5.95	4.68	4.91	4.68	6.56	4.52	6.77	5.44	2.64	3.15	1.87	3.56	6.55	6.12	6.52	

Table 4 (continued)

SME Propensity for Online Marketspaces																			
Clusters	Criteria	Alphas																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0.214285714	After-Sales Services	7	5	6	6	5	5	5	5	8	9	3	6	8	1	6	8	6	8
	Seller rating system	6	5	5	7	6	6	6	6	5	3	8	4	2	9	7	5	6	5
	Platforms' lack of seller quality control (-)	7	6	8	7	6	6	6	6	8	7	5	6	8	1	6	8	8	7
	Customer service follow-up	7	7	8	7	8	8	8	8	8	8	8	7	8	1	3	6	8	3
	Customers' feeling of security while using platforms	1	3	1	1	1	1	9	1	4	7	5	3	2	9	8	7	2	4
Own after-sales services (-)		4.31	4.54	4.40	4.34	3.89	3.89	7.29	3.89	5.89	6.74	5.38	4.52	4.64	5.48	6.80	7.05	4.96	5.31
Total weight of cluster																			

Note. (-) = negative influence on SME propensity for online marketplaces

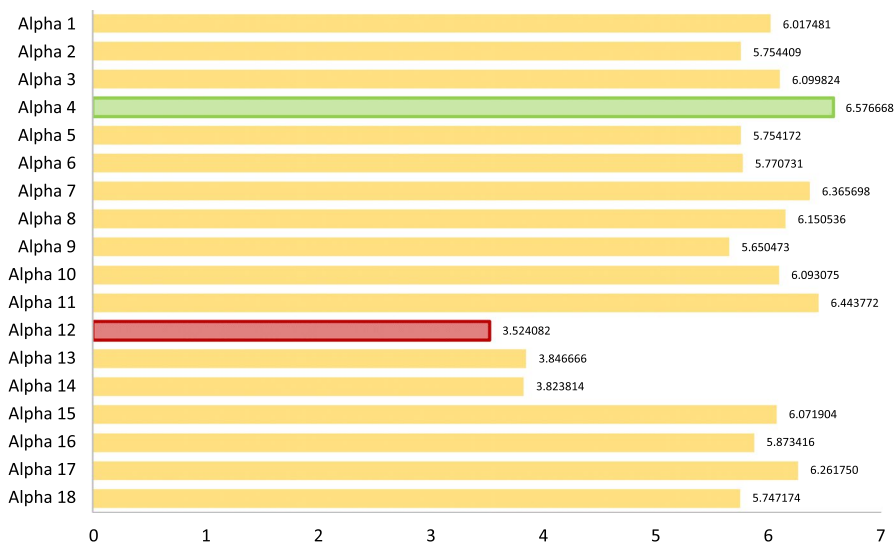


Fig. 8 Small and Medium-Sized Enterprise Ranking: Overall Scores

level, with Alpha 14 receiving a score of 3.82 points and Alpha 13 a score of 3.85. None of the evaluated SMEs exceeded the weight of 7 points, which suggests that they all lack characteristics needed to make them completely compatible with online marketplaces and that these companies may face challenges as they enter these platforms—even the highest ranked SME.

By analyzing in detail each Alpha using the five clusters, more concrete conclusions can be drawn from the firms' performance for specific clusters. The results provide a better idea of the most important areas needing work before these companies can join an online marketplace. Figure 9 presents the partial performance of the three worst and three best SMEs (*i.e.*, Alphas 4, 7, 11, 12, 13, and 14).

The first three SMEs (*i.e.*, Alphas 4, 11, and 7) do not present a great difference in their values in the overall ranking, yet the weights assigned for each cluster reveal these firms have distinct features. The three worst SMEs (*i.e.*, Alphas 14, 12, and 13), in contrast, are more aligned in each cluster, which explains their similar values in the overall ranking. Figure 9 further shows that Alpha 12, despite being ranked the worst SME, has its best ranking in C2 and C5, with an average of 4.52. This result is curious since C5 was identified as the second most important cluster in the analysis model. However, Alpha 12's worst partial performance is in C1. Thus, if this SME wants to join an online marketplace, this firm will have to improve its performance in all areas but especially in logistics. The same can be said of Alphas 13 and 14, although Alpha 14's position in C5 stands out, with 5.48 points—an even higher value than that of Alpha 4.

The best SMEs need to work specifically on some areas that lower their final ranking. All three (*i.e.*, Alphas 4, 11, and 7) received extremely good partial scores for C1. Alpha 4, for example, has a quite low weight for C5—lower than even the three worst companies—but this SME compensates for this weak area with its

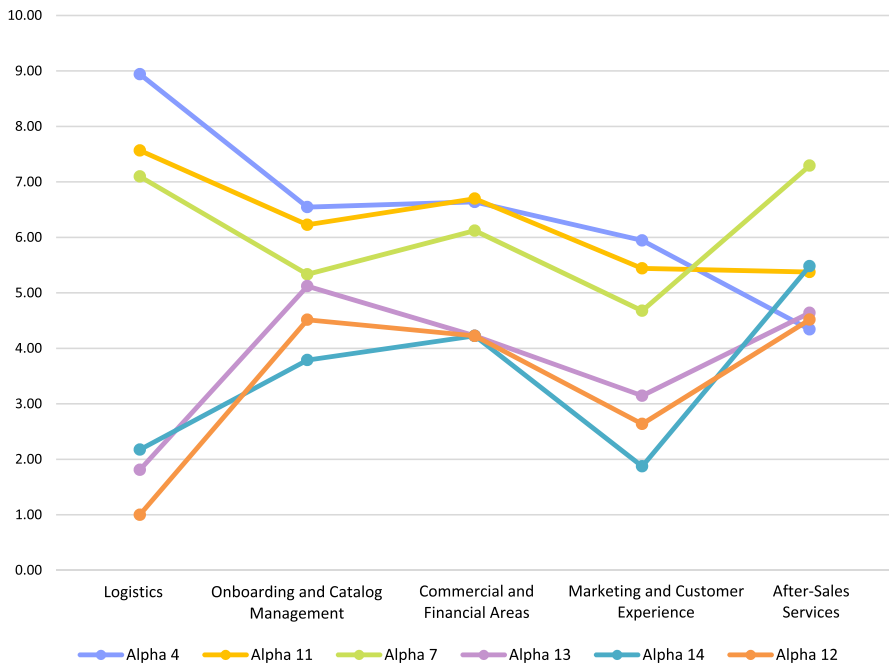


Fig. 9 Small and Medium-Sized Enterprise Ranking: Partial Performance of Alphas 4, 7, 11, 12, 13, and 14

excellent performance in C1 (*i.e.*, 8.94). After the empirical research and evaluation phase was completed, the only task that remained was to validate the proposed model and gather recommendations regarding its practical application. To this end, a consolidation session was held with an independent, neutral expert who had not participated in the previous sessions.

4.3 Discussion, validation, and recommendations

The structuring and evaluation phases were followed by the recommendations phase. An external specialist—the Head of the Monitoring Unit of Portugal’s *Agência Nacional de Inovação* (ANI) (National Innovation Agency)—was invited to assess the study findings. ANI is a governmental institution whose mission is to “*catalyze and enhance innovation in Portugal*” and to promote the “*connection between science and the economy*”. This organization thus coordinates “*collaborative partnerships*”, remains in constant contact with the National Innovation System, and is at the forefront of business innovation (ANI 2022). It is worth noting that this single-expert procedure is a common practice in MCDA studies and aligns with the recommendations of Bana e Costa et al. (2002), Ferreira et al. (2022), and Murcia et al. (2022), who advocate for the involvement of a neutral expert capable of providing an impartial assessment of the results.

The last session took place remotely in the Zoom platform and lasted about 1 h and 20 min. The meeting was structured into five parts. The first was a presentation of the main research objectives and background concepts (*i.e.*, digital transformation, SMEs, and online marketplace). The second part was dedicated to the conceptual framework of the applied methodologies (*i.e.*, cognitive mapping and the BWM), while the third and fourth were presentations of the empirical research component and a discussion of the results. The final part focused on the independent expert's comments and recommendations regarding the applicability of the proposed analysis model in real-life contexts.

Regarding cognitive mapping, the ANI representative agreed it is “*an interesting methodology*” (in his words), but admitted feeling neutral about its use. He stated that the application of this method should be a personal choice of the decision makers and that its usefulness depends on the participant “*ensuring that s/he has complied with what has been defined and studied in the literature on that methodology*” (also in his words). This specialist also questioned the criteria applied when choosing the expert panel, emphasizing the importance of the candidates' area of expertise being closely linked to the topic under study.

The interviewee had a positive opinion of the clusters and criteria in the cognitive map, and saw them as valuable, asserting that he fully believed that, if the participants have experience and knowledge about the decision problem, the map will contain good information. He said, “*in terms of clusters, they do reveal areas that, it seems to me, make sense and are relevant*” (his words). The ANI expert understood perfectly the purpose and value of the model, stating that this system is for “*companies to assess their performance and then analyze whether they are in good shape or not or where they need to improve if they want to join a marketplace*” (also in his words).

After examining the SME ranking, the expert suggested the analysis of the results could be improved by “*maybe defining a threshold*” that could show what level the company is at based on its results. To illustrate, the specialist gave an example of a company that, after obtaining scores that are above x , would know that it was well prepared but that, above y , it would be very well prepared, and so on. The ANI representative also stressed the importance of firms comparing their self-analysis with other SMEs to understand where they stand since “*only when you have a benchmark can you make the picture complete*” (in the interviewee's words).

After this statement, he suggested that an online questionnaire should be created to make this tool available to SMEs. Companies could fill in their self-diagnosis results, and data analysis similar to the one conducted in this study could be carried out, possibly with segmentation by region or sector of activity. The interviewee praised the analysis that the ranking facilitates, which he considered important to firms' decision-making process. In this expert's opinion, the model “*has the potential to be implemented. It is always important to have self-diagnostic tools that help companies, especially SMEs*” (again in his words). The neutral specialist suggested the analysis system could be applied in an entity like the *Instituto de Apoio às Pequenas e Médias Empresas e à Inovação* (IAPMEI) (Institute for the Support of SMEs) or by another business association. Still, he felt room can always be found

for improvement and possible adjustments, and noted that this tool is set up so it can evolve.

Overall, it is worth recalling that this study aims to provide a methodological framework, where its application may result in different findings when applied in different contexts. Due to the process-oriented nature of the methodology, results generally are not applicable from one context to another and, in some respects, the actual results may not be as critical as the process. As Bell and Morse (2013, p. 962) explain, *“there is less emphasis on outputs per se and more focus on process”*. Although methodological, we note that our study is realistic, namely if we consider that each context has specific characteristics, which will require different solutions to address propensity for online marketplaces in different SMEs.

5 Conclusion

According to Kotler et al. (2017), with consumers becoming increasingly mobile and connected, time is life’s scarcest resource. Technological and digital evolution have produced new habits and needs that have caused changes in consumer shopping experiences. This change has forced and will continue to force many organizations to adapt by creating new business models. With the growth of e-commerce, companies have gradually moved from offline to online marketplaces, and firms now want to have their product portfolio available at the click of a mouse—either through their own e-commerce platform or other marketplaces. However, smaller companies, such as SMEs, have fewer resources to make these changes and to adapt to these new business models successfully. Resource-based view theory (Barney 1991) asserts that companies must be able to analyze their organization internally, namely looking first at the resources they have and what they can do with them, and to use mechanisms to evaluate their performance. In this way, they can participate in the relevant markets with greater confidence and in harmony with their strategic objectives.

The European Commission (2020, p. 3) reports that *“nine out of ten companies are SMEs and SMEs generate two out of three jobs”*. These companies, therefore, appear to be indispensable for economic growth and innovation to take place. Compared to multinational firms, most SMEs have limited resources and certain characteristics that prevent them from moving fluidly in their markets. In addition, the COVID-19 pandemic has accelerated the current digital transformation and caused market disruption, contributing to the failure of many SMEs. To bridge the resource gaps affecting the most vulnerable companies and encourage the current technological acceleration, the present study sought to build an assessment tool for firms that are deciding whether to enter e-commerce platforms or, specifically, online marketplaces. A combination of cognitive mapping and the BWM was applied to construct a model for evaluating SME performance in this context. The results answer the three research questions previously defined (*i.e.*, How can SME propensity for online marketplaces be assessed? What qualitative and quantitative metrics can be used to do this? How can these metrics be integrated into an overall assessment system?).

The main theoretical and practical contributions of this study to the field of management research and to the business world are as follows. Theoretically, the results add to the existing knowledge about a still underdeveloped topic and offer valuable insights into an expanding area of business provided by a panel of experts with valuable know-how in this subject and who focused on finding solutions to the decision problem through VFT. Specifically, by examining determining factors in online marketplaces and introducing a novel evaluation mechanism designed to assist SMEs in identifying factors that may be intensified or influenced by the dynamic nature of online marketplaces, our study directly responds to calls made in previous literature for an in-depth analysis of digital skills in preparing SMEs for the diverse landscape of digital markets (*cf.* Fernandes et al. 2022; Ballerini et al. 2023). Moreover, by employing VFT/MCDA techniques, our study also aligns with Fernandes et al.'s (2022) specific call for interdisciplinary insights, thereby enriching our understanding of online marketplaces as a multidisciplinary phenomenon within the realm of digital entrepreneurship. The results can further be used as a springboard for additional studies, complementing previous contributions in the field. From a methodological point of view, our contribution is two-fold: one coming from the combination of the methods used, which we believe to be novel in the study context; and, second, from the description of the process followed, which allows for replications in other contexts. While we acknowledge the methodology itself may not be entirely novel, the specific context of our study presents unique challenges and considerations that require a tailored approach. Thus, the methods' application and adaptation to this study context are original and provide valuable insights and guidance for decision-makers. Furthermore, the selected methodology helped the panel create a group cognitive map with 192 criteria facilitating or constraining the problem under study. The findings ultimately contribute to mitigating real problems through an intuitive decision-support tool that can be used by any SME manager who wants to enter the world of e-commerce. The proposed analysis model was able to rank the propensity to join marketplaces of real SMEs, and this evaluation system can be adapted further to facilitate comparisons between SMEs. This tool is also capable of facilitating and guiding these companies' strategic planning within online marketplaces and improving their performance before, while, and after joining marketplaces. Finally, the findings should promote additional discussion on this topic and highlight the potential of online marketplaces.

Although the present results are encouraging, some limitations of this research need to be highlighted. The study first experienced difficulties in scheduling the work group sessions. Second, a large number of criteria were repeated in the discussions of the first session, which contributed to the procedure lasting longer. Third, technical problems occurred throughout the online sessions. Fourth, the idiosyncratic structure of the methodologies meant that, if the participants had been different, the procedures would have produced a dissimilar final product. Fifth, two clusters were given equal weight regarding their order of importance, so managers could have difficulty prioritizing the relevant tasks during the implementation phase of their action plan. Last, because many criteria were identified (*i.e.*, 192), the best

solution might have been to divide them into more clusters to ensure greater segmentation into areas of interest.

The methodologies chosen and applied in this research generated concrete results, which indicates that the chosen combination in association with a panel of highly qualified and carefully selected experts is a valid way to solve the decision problem addressed in this study. However, the proposed model can always improve, evolve, or change (*i.e.*, from a constructivist perspective). The following lines of future research are thus suggested. First, the study can be replicated with different decision makers to check if the criteria and clusters identified are the same. If new areas of interest and/or criteria are defined, this added material could strengthen the model and make it more specific. Second, as suggested by the ANI expert, the proposed tool can be used by a government organization such as IAPMEI or in a business incubator by providing a questionnaire for SMEs to assess the various clusters and criteria. The questionnaire data should then be used to generate a ranking of firms with comparisons between companies (*i.e.*, similar to what was done in the present study) possibly by region, sector, or size. Third, researchers could try using other techniques to support decision making in this area, which would provide other results to integrate with those obtained in the current investigation. Last, this study needs to be conducted in other geographical settings to find out if the results are influenced by cultural issues.

Overall, the model created proved to be a practical tool that is easy to use and apply in real contexts by any SME that wants to join an online marketplace but does not know which is the best approach and/or whether its workforce has all the necessary skills to make this process successful.

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