

Disentangling the relationship between business model, absorptive capacity, differentiation strategy and performance. Evidence from a transition economy

Business
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Abstract

Purpose – This paper explores the relationships between firm absorptive capacity, novel business model design (NBMD), product differentiation strategy and performance in a transition economy.

Design/methodology/approach – The study uses structural equation modeling (SEM) to analyze firm-level data from a unique sample of Albanian manufacturing and service firms.

Findings – The study shows that absorptive capacity enables and shapes the NBMD that, in turn, leads to performance gains. The authors also find that the NBMD capacity mediates the impact of realized absorptive capacity on performance, whereas product differentiation strategy moderates the relationship between new business model and performance.

Research limitations/implications – All variables were measured based on a self-assessed scale leading to potential method bias. Also, based on relevant literature, the study focuses on only one type of business model (BM) design.

Practical implications – Since dynamic capabilities are the foundation of NBMD, firms should invest carefully in developing such capabilities. Thus, the study results provide an integrative framework for understanding the role of absorptive capacity in NBMD adoption and for explaining the relationship between NBMD adoption and performance, an aspect that helps organizations in a dynamic environment.

Originality/value – This study strives to investigate the relationships between absorptive capacity, business model design, product strategies and performance by answering the call of Teece (2018) to “flesh out the details” of such relationships.

Keywords Absorptive capacity, Novel business model design, Firm performance

Paper type Research paper

1. Introduction

Understanding how companies design their business models has attracted the attention of several scholars (McDonald and Eisenhardt, 2020; Wang *et al.*, 2020) and sparked broad interest in strategic management research (Chen *et al.*, 2022). By providing innovative solutions for products or services or improving transaction speed and reducing transaction



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costs, well-designed business models create value for customers and increase business efficiency. They also enable companies to differentiate themselves from their competitors, successfully navigate turbulent and competitive markets and gain competitive advantage (Yuan *et al.*, 2021; Frankenberger and Sauer, 2019; Snihur and Zott, 2020; Guo *et al.*, 2020).

First proposed by Amit and Zott (2001), the concept of business models design (BMD) refers to the design of an activity system for an organization's boundary-spanning transitions. It shapes the business profile of the organization to face the dynamic and fast-moving environment in which companies operate (D'Souza *et al.*, 2015). Although it is a very complex task, BMD is necessary for companies to improve their competitiveness to create and deliver value (Pang *et al.*, 2022). Accordingly, developing a business model (BM) requires special attention from top management because it plays a fundamental role in the long-term survival of an organization (Yuan *et al.*, 2021). Following the milestone contribution by Amit and Zott (2001), an extensive academic literature has explored the Novelty Business Model Design (NBMD) framework as a powerful approach for sustaining business competitiveness over time (Pati *et al.*, 2018; Balboni *et al.*, 2019; Bocken and Snihur, 2020; Wang *et al.*, 2020; Karmeni *et al.*, 2021; Yuan *et al.*, 2021; Chen *et al.*, 2022; Pang *et al.*, 2022). This framework has attracted much interest in business and management research because of its role as a booster of firm performance (Chen *et al.*, 2022). As a result, many scholars have called for further research to identify potential antecedents for NBM design capabilities of companies (Amit and Zott, 2015; Guo *et al.*, 2016; Foss and Saebi, 2017; Pati *et al.*, 2018, 2021; Snihur and Zott, 2020).

Among the various approaches aimed at identifying the antecedents of NBMD, the concept of absorptive capacity (AC) is one of the most promising (Zhang *et al.*, 2019; Jiménez-Barrionuevo *et al.*, 2019; Müller *et al.*, 2021; Pang *et al.*, 2022). Current literature reports that high levels of absorptive capacity can help organizations identify new opportunities, drive innovation and create value by using knowledge-based assets more efficiently, sensing technological change and working to reconfigure functional capabilities (Abou-Foul *et al.*, 2023). However, although some research acknowledges the critical role of AC in driving model change (Miroshnychenko *et al.*, 2021), the link between AC and NBMD is still underexplored. The present work aims to fill this gap by investigating whether and to what extent absorptive capacity affects NBMD.

As described in the current literature, absorptive capacity can be divided into two different dimensions: potential absorptive capacity (PAC) and realized absorptive capacity (RAC), the former denoting the ability to acquire and assimilate, and the latter denoting the ability to transform and utilize (Ho and Amin, 2022). Following Godkin (2010), Zhang *et al.* (2019) and Jiménez-Barrionuevo *et al.* (2019), we rely on the RAC dimension of AC as a supporter of organizational change (Godkin, 2010; Zhang *et al.*, 2019) and positively associated with new venture creation (Jiménez-Barrionuevo *et al.*, 2019). Therefore, before testing the hypothesis regarding the influence of AC on NBMD, we first examine whether there is a relationship between the two dimensions of AC, i.e. PAC and RAC, and whether these two components show a positive correlation.

By adopting new activities or new ways of linking and managing activities, NBMD produces unprecedented value propositions, original mechanisms for value creation and new systems for value capture (Foss and Saebi, 2018; Guo *et al.*, 2017; Pati *et al.*, 2018). Empirical research has examined how NBMD generates and captures value and how this relates to firm performance in dynamic markets. Despite the large number of studies, the study of whether and how NBMD affects performance deserves further attention as it can help scholars gain a more nuanced understanding of NBMD's contribution to performance. Thus, the [second hypothesis](#) tested in this paper is whether the introduction of NBMD directly affects performance.

To provide an integrative framework of the relationships between absorptive capacity, business model design and performance, the paper takes a further step on understanding

the performance-generating mechanism in more details, i.e. the Teece's call to "flesh out the details" of the relationships. Therefore, we explore the mediating role of NBMD in the relationship between RAC and performance and then we delve into the moderating role of product differentiation strategy (PDS) in the relationship between NBMD and performance. As for the former, although the question of mediation between RAC and performance has been discussed by several scholars (Wang *et al.*, 2015; Ringov, 2017; Kale *et al.*, 2019), it is still an open issue as NBMD could play a crucial role as a mediator by capturing the value created by absorptive capacity and converting it into performance gains (Amit and Zott, 2016; Teece, 2018). Regarding the latter, i.e. the PDS, several scholars are still questioning the role of this strategy (Zott and Amit, 2008; Amar, 2015; Teece, 2018) [1], thus making the analysis of its role in the relationship between performance and NBMD a timely and relevant issue to explore (Zott and Amit, 2008).

We test our conceptual framework with survey data from companies operating in Albania, a transition economy in Europe. Based on the Albanian context, this study contributes to the existing literature on firms operating in transition environments (Zhang *et al.*, 2019; Pang *et al.*, 2022). Albania belongs to the group of "efficiency-driven economies" and ranks 81st in competitiveness, 82nd in ease of doing business and 110th in innovation capacity. It is also ranked 75th in ICT adoption, 76th in institutions, 104th in corruption and 128th in the efficiency of the legal framework (World Economic Forum, 2019). The country invests 0.15% of GDP in research and development, compared to the average of 0.91% of the 96 countries listed on the website TheGlobalEconomy.com [2]. All these indicators are a good proxy for a country's absorptive capacity (Narula, 2004, 2014), which tends to increase rapidly in countries like Albania that are catching up with the rest of the world [3]. Thus, the country is perfectly suited to assess the impact of country-level absorptive capacity on NBMD and performance. In addition, although the level of absorptive capacity in the country is low on average compared to developed countries, some companies have accumulated a significant stock of absorptive capacity, making the variance in the distribution of absorptive capacity an informative and powerful tool for determining its impact on performance.

To preview our results, we find that RAC, as a dynamic capability, drives NBMD innovation and adoption which, in turn, drives performance. In this framework, new business model design theme emerges as a crucial antecedent of high performance in adopting organizations. On the performance-generating mechanism, then, we show that NBM mediates the relationship between RAC and performance and that PDS reinforces the positive effect of NBM on performance.

The remainder of the paper is organized as follows. Section 2 reviews the literature on business models, design themes, absorptive capacity and firm performance and presents the hypotheses. Section 3 provides detailed methodological explanations for the ML-SEM approach. Section 4 reports on model fit, measurement model testing and results from ML-SEM. The paper concludes with a discussion of the main results, theoretical and practical implications, limitations, and suggestions for future research.

2. Theoretical background and hypotheses development

2.1 Absorptive capacity: potential and realized

The concept of Absorptive Capacity (AC), introduced by Cohen and Levinthal (1989, 1990) in the late 1980s to understand and explain a firm's innovation behavior, defines the ability to successfully absorb external knowledge, i.e. to recognize, assimilate and apply it (Cohen and Levinthal, 1990). Despite theoretical debates (Senivongse *et al.*, 2019), AC is widely accepted as a dynamic capability [4] (Lane *et al.*, 2006; Apriliyanti and Alon, 2017; Zhang *et al.*, 2019; Abou-Foul *et al.*, 2023), as it allows organizations to enhance their abilities to learn, transfer and use external knowledge (Vargas and Muratalla, 2017). This contributes to the

reconfiguration of the ordinary capabilities they possess (Roberts *et al.*, 2012; Zapata and Mirabal, 2018; Zapata Rotundo and Hernández Arias, 2018).

Zahra and George (2002) pioneered the dynamic capability-based formulation of AC. By providing a comprehensive explanation of how absorptive capacity works, they responded to the call to open the “black box” of AC. According to the authors, AC is a dynamic capability embedded in corporate routines and processes that enables analysis of the stocks and flows of a company’s knowledge [5]. Their proposed framework, based on four organizational capabilities that build on the dynamic side of AC, has been used, tested and improved in empirical research exploring the antecedents and outcomes of such capabilities (e.g. Jansen *et al.*, 2005; Lane *et al.*, 2006; Lichtenthaler, 2009; Limaj and Bernroider, 2019; Ho and Amin, 2022).

In addition, the dynamic capability perspective of AC points to two distinct but interactive capabilities: PAC, conceptualized as acquisition and assimilation capability, and RAC, defined as transformation and exploitation capability (Zahra and George, 2002) [6]. PAC refers to the knowledge-seeking capabilities developed by a firm (Crescenzi and Gagliardi, 2018; Schweisfurth and Raasch, 2018), which may or may not be used to create innovation and organizational change (Gong *et al.*, 2013; Wiedner *et al.*, 2017). In contrast, RAC represents the ability to develop products and services based on this body of knowledge (Miroshnychenko *et al.*, 2021). The two concepts of potential and realized AC should not be considered separately, but complementarily, as their impact is not isolated (Leal-Rodríguez *et al.*, 2014). On the one hand, a company may recognize the value and acquisition of external knowledge, but this does not guarantee that it will use this knowledge (Albort-Morant *et al.*, 2018). On the other hand, a company will not be able to use knowledge if it cannot first recognize the benefits and acquire that knowledge (Jiménez-Barrionuevo *et al.*, 2019). In addition, the potential dimension of absorptive capacity ensures the novelty and diversity of the required knowledge, while the RAC dimension indicates the operationality of the new knowledge (Zhang *et al.*, 2019). Companies need to invest and develop the potential and RAC appropriately to avoid focusing on one dimension and neglecting the other (Kale *et al.*, 2019).

The relationship between these two dimensions of absorptive capacity has been empirically demonstrated in other studies (e.g. Zahra and George, 2002; Volberda *et al.*, 2010; Albort-Morant *et al.*, 2018; Limaj and Bernroider, 2019). In our study, we re-test this hypothesis to confirm the previously assessed correlations and to prove them in our sample to check consistency. Therefore, based on the previous empirical studies, we test the following hypothesis:

H1. The PAC positively affects the firm’s RAC

In our study, we will focus on RAC because it enables the organization to leverage and effectively use knowledge and resources to achieve process and product innovation (Chang *et al.*, 2013; Ben-Oz and Greve, 2015). Compared to PAC, RAC is a more direct enabler for encouraging and managing innovation (Patel *et al.*, 2015), organizational change (Zhang *et al.*, 2019), business model innovation (Miroshnychenko *et al.*, 2021), new venture creation and enterprise self-renewal (Jiménez-Barrionuevo *et al.*, 2019).

2.2 Realized absorptive capacity and novel business models

Progress has been made in developing a convergent definition of the business model (BM) [7]. The definition most commonly used by many scholars refers to Teece’s (2010) notion: the “design or architecture of the value creation, delivery, and capture mechanisms” [8]. By introducing business model themes that drive value creation, Amit and Zott (2001), Zott and Amit (2010) emphasize the rational design process undertaken by managers in designing

BM (Martins *et al.*, 2015). This process requires the design of an activity system for an organization's boundary-spanning transitions (Zott and Amit (2007) that leads to superior value creation.

NBMD is widely accepted as one of the most powerful design themes for a firm's boundary-spanning transitions (Bocken and Snihur, 2020) [9]. Creating new and innovative products, services or experiences (Zott and Amit, 2007) is intended to add value to customers by solving problems in new and unique ways and offering products or services that are significantly different from those currently available in the market, thereby improving performance.

To date, the study of the antecedents and influencing factors of NBMD has accelerated and developed mainly from two perspectives (Feng *et al.*, 2022). The first relates to environmental constraints such as legality, society, politics, culture (Amit and Zott, 2015) and supply chain integration (Feng *et al.*, 2022), while the second deals with internal resources such as production flexibility (Wei *et al.*, 2017), distribution of top management teams' attention (Frankenberger and Sauer, 2019), dynamic capabilities (Müller *et al.*, 2021; Pang *et al.*, 2022), entrepreneurial behavior and experience (Pati *et al.*, 2018; Wang *et al.*, 2020), and exploration and exploitation activities (Karmeni *et al.*, 2021). In terms of internal resources, which are further influenced by the increasing complexity of the business model, many scholars have paid special attention to the more dynamic, flexible and adaptive capabilities compared to the other antecedents (Pang *et al.*, 2022).

Following Teece *et al.* (2016), the basic intuition of our approach is that the stronger the company AC, the greater the opportunity for managers to adopt a novel BM that is responsive to the opportunities and/or challenges of the business environment [10]. As RAC is the dimension of AC that better fits the concept of dynamic capabilities (Zhang *et al.*, 2019; Lane *et al.*, 2006), we hypothesize that a large RAC helps organizations in developing "specialized and standardized routines" with "fewer errors", leading to effective organizational change (Zhang *et al.*, 2019) and new business model design (Jiménez-Barrionuevo *et al.*, 2019).

Several studies have examined the innovation outcomes of the RAC dimension of AC, especially for an organization operating in a dynamic environment. Alborn-Morant *et al.* (2018) and Müller *et al.*, 2021 suggest that RAC is an antecedent of exploitative and exploratory innovation, green products and process innovation; Sun and Anderson (2012) argue that these capabilities are a source of new venture creation and self-renewal. Similarly, Jiménez-Barrionuevo *et al.* (2019) confirm that RAC is positively associated with new venture creation and self-renewal, whereas Zhang *et al.* (2019) examined the role of RAC in transformational and realization capabilities and confirmed its positive effect on organizational change. Finally, Miroshnychenko *et al.* (2021) investigated the role of RAC in triggering BM innovation (BMI). However, to our knowledge, no empirical study has examined the role of RAC in the design and adoption of NBM. Following Amit and Zott (2016), we argue that sensing and seizing capabilities are likely to promote NBMD and that a firm's ability to adopt an NBM design depend on how well it can combine existing knowledge with new knowledge and apply it to change existing competencies or create new ones. Therefore, we hypothesize that RAC will have a positive impact on NBM design. Formally specified:

H2. RAC positively affects the Novel Business Model Design theme (NBMD).

2.3 Novel business models and firm performance

Several scholars have highlighted the impact of BMs on performance (e.g. Amit and Zott, 2001; Chesbrough, 2010; Teece, 2010). Firms develop NBMs that may be difficult to imitate to achieve superior performance (Hamel and Prahalad, 2000) and competitive advantage (Teece, 2010), attract new customers and enhance their reputation in the marketplace (Amit and Zott, 2001). NBMD creates value by developing a novel pattern, fostering innovation in the transaction

structure and providing significant first-mover advantages to the focal firm (Wei *et al.*, 2017). NBMD also promotes organizational success as it makes the company a market driver (Kumar *et al.*, 2000) that provides opportunities for disrupting current industries or creating new markets (Markides, 2013). As a market driver, the company brings brand awareness and market reputation (Wei *et al.*, 2017), leads to competitive advantage (Teece, 2010) and ultimately to superior performance (Hamel and Prahalad, 2000; Pati *et al.*, 2021). A specific example of a company's success under NBMD is Tesla: Pang *et al.* (2022) attribute Tesla's rapid growth to the good design of NBM, specifically, to the idea of combining sports cars with new energy technology. In 2021, Tesla's market value has exceeded \$560 billion, and the company is listed among the six largest companies in the United States (Pang *et al.*, 2022). Thus, NBMD acts as a catalyst for speed improvement.

Empirical research has confirmed the positive effects of NBMD on performance in a variety of contexts: emerging markets (e.g. Gerdoçi *et al.*, 2018), emerging economies (e.g. Wei *et al.*, 2017), developed countries (Pucci *et al.*, 2017), among entrepreneurial firms (Zott and Amit, 2007), small- and medium-sized enterprises (Cucculelli *et al.*, 2014) and even in the pension industry (Hartmann *et al.*, 2013). However, there is no direct test of the impact of NBMD on performance in a country with a low level of absorptive capacity. Therefore, we hypothesize the following:

H3. The Novel Business Model Design theme (NBMD) positively affects the firm's performance (PERF).

In addition, several research papers argue that the relationship between NBM design and firm performance could be further enhanced if studied together with firm strategy (Zott and Amit, 2008; Amar, 2015; Teece, 2018). However, a direct test is still missing. Therefore, to improve the explanatory power of our model, we investigate whether PDS acts as a moderator between NBMD and firm performance [11]. Theoretically, a PDS is believed to improve a firm's competitiveness by allowing firms to compete in the marketplace on more than just price (Amar, 2015). Zott and Amit (2008) assume that linking an NBMD with a product market strategy of differentiation is a good fit and could improve firm performance. Following the reasoning of Teece (2018) and the empirical work of Zott and Amit (2008), we posit that:

H4. PDS strengthens the positive effect of Novel Business Model Design theme (NBMD) on firm's performance.

2.4 The mediating role of NBMD on performance

The interdependencies between DC and BM (Teece, 2018) have important implications for understanding and modelling organizational performance. The arguments of Teece *et al.* (2016) and Teece (2018) suggest that a firm's dynamic capabilities determine the business model a firm chooses and vice versa, suggesting a concurrent effect. Moreover, the four-stage comprehensive approach outlined by Teece *et al.* (2020) links BM change, dynamic capabilities and value creation by developing a roadmap for firms to maintain competitiveness over time [12]. Within this framework, the business model is supposed to change in order to capture the value created by dynamic capabilities and transform it into a competitive advantage. As a result, an alignment process of BM and dynamic capabilities is hypothesized, but concerns remain about the ability of BM to capture the value created by dynamic capabilities (Zott and Amit, 2010; Teece *et al.*, 2016, 2020; Teece, 2018; Helfat and Raubitschek, 2018).

Absorptive capacity has already been recognized as a key determinant of firm performance (Kostopoulos *et al.*, 2011; Huang *et al.*, 2015; Choi and Park, 2017), and the mechanism by which it improves performance has been studied mainly through mediating

variables: R&D (Tseng *et al.*, 2011), strategic alliances (Flatten *et al.*, 2011a, b), entrepreneurial orientation (Wales *et al.*, 2013), strategic agility (Kale *et al.*, 2019) and labor productivity (Liu *et al.*, 2020). However, despite this established empirical evidence (Zott, 2003; Wang *et al.*, 2015; Ringov, 2017; Kale *et al.*, 2019), the question of the mechanism by which absorptive capacities ultimately affect performance is still open (Ali *et al.* (2016), Helfat *et al.*, 2007; Zott, 2003; Di Stefano *et al.*, 2014; Ali *et al.* (2016), Ringov, 2017; Kale *et al.*, 2019). We argue that an NBMD is well suited to convert the value created by absorptive capacity into performance gains. This argument is supported by Amit and Zott's (2016) reference to the compatibility of NBMD with sensing and seizing capabilities: as for these capabilities, NBMD may mediate the relationship between RAC and firm performance and positively impact on it. Since NBM design tends to capture the value created by AC, it could be another missing link between absorptive capacity and performance. Therefore, we hypothesize the following:

H5. The adoption of the Novel Business Model Design theme (NBMD) mediates the positive effects of RAC on firm's performance (PERF).

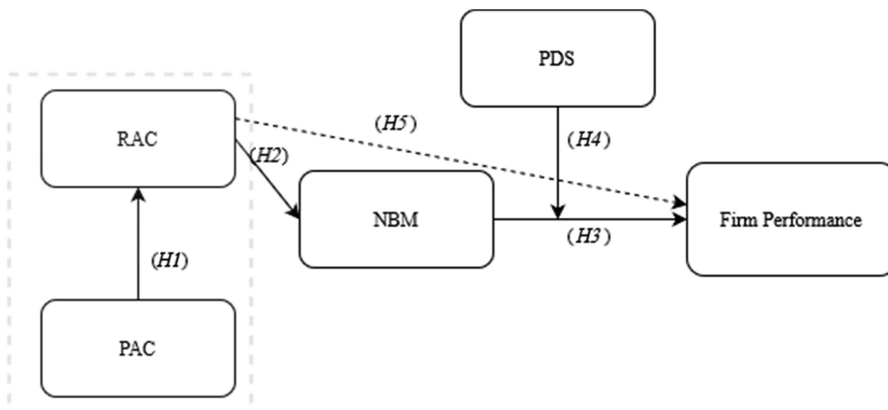
Figure 1 summarizes the hypotheses and describes the resulting structure of the conceptual model showing the relationships between PAC, RAC, NBMD and business performance.

3. Data and methods

3.1 Sampling

To test these hypotheses, data were collected from companies in the second half of 2019. The sample was drawn from a database of all limited liability companies operating in the two main regions of Albania in terms of economic activity (INSTAT, 2019): the capital Tirana and the main port, Durres. The decision to use this sample was motivated by two factors. First, this is the only large and updated sampling frame available in Albania. Second, limited liability companies are the only firms that present reliable data on sales, profits, and other financial indicators, which helps to ensure descriptive validity (Tashakkori and Teddlie, 2002). Most of the information can be obtained from tax offices and other government agencies, while this is not the case for other types of businesses.

Model and hypothesis



Note(s): Dotted line (H5) represents hypothesis for mediation

Source(s): Figure by authors

Figure 1. Model and hypothesis

Using the Statistical Classification of Economic Activities (NACE) (European Commission, 2008), the sample frame was limited to companies operating in nine specific sectors with medium to high knowledge intensity (Table 1). This selection was motivated by our research topic. We chose medium to high knowledge intensity sectors to better capture the phenomena under study, primarily the novelty of business models. The literature provides some reasons for this choice. First, knowledge-intensive firms can solve complex problems in creative and innovative ways (Von Nordenflycht, 2010). Second, unlike traditional industrial firms, knowledge-intensive firms can create and capture value in unique ways (Sheehan and Stabell, 2007). Nevertheless, by selecting sectors with different technology intensity, we ensured sufficient variability in our sampling frame to avoid possible industry-specific biases in adopting a particular BM. For this selection, we used the OECD taxonomy of economic activities (OECD, Organisation for Economic Co-operation and Development, Development Centre, and Society for International Development, 2005). Despite its limitations regarding the use of R&D and its application in the services sector, this taxonomy is often used to classify sectors based on technology intensity (e.g. Kirner *et al.*, 2009). Table 2 shows the percentage of firms in our sample based on technology intensity.

A closer examination of the database of companies operating in the nine sectors revealed that some companies had multiple business lines, and in a few cases the description of the activity did not match the classification. Since the stratification could be based on unreliable data, we therefore used simple random sampling as the sampling method. The final sample consists of 201 randomly selected companies.

3.2 Instrument and data collection

The questionnaire protocol served as the primary means of data collection. The majority of questionnaires (62%) were face-to-face interviews, while we used email survey protocols for

Table 1.
Sampled firms: by
sector

Sector	%
Manufacturing	28.4
Professional and technical services	26.4
Real estate	2.0
Education and scientific research	4.0
Mining	2.0
Information and communication	13.4
Warehousing, transport and logistics	12.9
Financial and insurance activities	8.5
Health	2.5
Total	100.0

Source(s): Table by authors

Table 2.
Sampled firms divided
by technology
intensity level

Level of technology intensity	%
Not classified	3.5
1 High R&D	4.5
2 Medium-High R&D	13.4
3 Medium R&D	9.5
4 Medium Low R&D	43.8
5 Low R&D	25.4
Total	100.0

Source(s): Table by authors

the remainder. Face-to-face interviews were preferred over other methods because they are best for building trust with respondents, increasing response rates, and obtaining reliable and valid information. All respondents were informed that survey data would be kept confidential and used for academic purposes only. Four trained researchers conducted the survey. Researchers were also provided with a written guide on how to properly conduct the interview and answer the survey questions.

3.3 Missing data and outliers

We examined the dataset for (1) missing data, (2) suspicious response patterns and (3) outliers (Hair, 2010). First, the number of missing data per construct did not exceed 1%. We performed Little's MCAR (missing completely at random) test. The significance is much higher than 0.05, so our data are missing completely at random. For the latent factors, we looked at the surrounding values and used the mode value for that respondent to replace missing values. The remaining missing values in the columns were replaced using the Expectation-Maximization technique (see Hair, 2010; Kline, 2011). Second, there are no unengaged responses because the standard deviations of all latent factors are greater than 1. Third, following the suggestion of Kline (2011), we looked for univariate and multivariate outliers. Using the modified Z-score method (Iglewicz and Hoaglin, 1993), 13 univariate outliers were identified and removed from the data set. The analysis shows some expected cases of outliers on two variables: firm age and firm size. Specifically, there are three companies that started their operations during the communist era (one is 59 years old, the other two are 49 years old). There are also five cases of companies with more than 400 employees and five with less than three employees. We applied a log transformation to account for outliers. This transformation also reduces the error variance and skewness (see Kline, 2011). Multivariate outlier analysis was performed during data screening and before the structural model results were reported. We used Mahalanobis distance to identify multivariate outliers. Following Kline (2011), we took a conservative approach by eliminating 19 (nineteen) cases with a p -value less than 0.001. Thus, the final sample for this study consists of 169 cases.

3.4 Univariate normality

We observed normal distributions for our latent factors. Skewness levels range from very mild to -1.334 , the most extreme value. These values are within the range between -2 and $+2$ suggested by Kline (2011). Similarly, kurtosis levels are also mild, with the highest level being 1.504 and the lowest -0.952 (ibid). As expected, skewness and kurtosis for two controls in our analysis required action: the number of employees and the firm's age is above the suggested threshold. As mentioned above, to remedy the problem of non-normality and outliers, we used the log-transformation of these variables.

3.5 Common method variance

Data were collected from one informant per company, usually the owner or top managers of the company, using a self-reported questionnaire. General method bias (CMB) control techniques were used (Podsakoff *et al.*, 2003). First, the questionnaire was pre-tested with experts and managers to avoid misleading and ambiguous questions. Second, respondents were informed in a cover letter that their responses would remain anonymous and would be used for research purposes only. Third, Harman's single-factor technique was used to control for common method variance. This analysis showed that the one factor extracted accounts for 18.49% of the variance, well below the 50% threshold. Finally, common latent factor (CLF) analysis was used to test all observed variables in our model for common method bias (CMB).

We compared the standardized regression weights of the unconstrained model with those of the constrained model. All differences are less than 0.19 (see [Table A2](#) in [Appendix 2](#)), which corresponds to a small effect size that is below the threshold of 0.2 ([Cohen, 1988](#)). Thus, CMB is not a problem in our study.

3.6 Non-response bias

Despite the relatively good response rate, we performed an analysis of response bias. The sample includes 201 cases (out of 505 active companies), representing a response rate of 39.8%. Despite repeated attempts to contact the companies, the number of unreachable companies remained significant (52 cases). The active response rate of 44.37% was reasonable. We looked for potential variations within the existing data set ([Groves, 2006](#)). We compared early with late responders, assuming that late responders were likely to be similar to non-responders (see [Miller and Smith, 1983](#)). No differences were found between groups in organizational characteristics, such as number of employees (χ^2 -test, $p = 0.471$) and age (χ^2 -test, $p = 0.117$), or in respondent characteristics, such as number of years of experience in a leadership position (χ^2 -test, $p = 0.319$).

3.7 Structural equation modeling (SEM) approach

We estimated our model using Maximum Likelihood (ML). ML covariance-based SEM requires normally distributed data ([Kline, 2011](#)). As mentioned above, we examined skewness and kurtosis to determine the data distributions before selecting the estimation procedure. We normalized the data that violated this assumption. Therefore, the use of a covariance-based procedure was deemed appropriate. However, the assumption of multivariate kurtosis was not met in full in the later stages of the analysis. We used bootstrapping techniques to confirm the accuracy of the model and the significance of the estimates. The software used is IBM AMOS 22.

3.8 Operationalization of constructs

Variables were operationalized using multi-item self-assessed indicators on a seven-point Likert-type scale. [Table A1](#) (see [Appendix 1](#)) presents all items adapted from the literature. The dependent variable of company performance (PERF) was measured using six items: Market Share, Sales, Profit, Cash Flow, Return on Investment and Marketing. Respondents were asked to rate their company performance relative to their most direct competitor over the past three years. The metric represents a combination of different metrics ([Auh and Merlo, 2012](#); [Slater and Olson, 2000](#); [Delaney and Huselid, 1996](#)). The NBM design theme was measured using [Zott and Amit's \(2007, 2008\)](#) original scale. Following [Limaj and Bernroider \(2019\)](#), who build on the work of [Camisón and Forés \(2010\)](#) and [Flatten et al. \(2011a, b\)](#), PAC and RAC were measured using seven and six scale points, respectively. Finally, PDS was measured using the four-item scale of [Zott and Amit \(2008\)](#).

Several controls were introduced in the model to account for potentially confounding variables. We first controlled for the effects of the institutional environment on firm performance and the business model chosen by the firm by introducing three controls-regulatory, normative, and cognitive social systems (see [Scott, 1995](#)). For operationalizing these constructs, we used the scales of [Manolova et al. \(2008\)](#). The Cronbach's alphas for these constructs are excellent, respectively, at 0.967, 0.869 and 0.878. Second, because many researchers recognize the impact of a dynamic and competitive environment characterized by changes in technologies, product demand and customer preferences on innovation and firm performance (e.g. [Jansen et al., 2006](#)), we introduced three industry-level controls-technological turbulence, dynamism and heterogeneity. Following [Slater and Narver \(1994\)](#), we used a four-item scale for technological turbulence. This measure yielded a good

Cronbach's alpha of 0.863. Following Miller (1987), we used industry dynamics and heterogeneity to measure environmental dynamics. These two constructs were measured with a four-item scale and a one-item scale, respectively. The industry dynamics measure yielded a low but still acceptable Cronbach's alpha of 0.590. Third, we controlled for the effects of managers' political ties on firm performance. We used a four-point scale to measure this (Sheng *et al.*, 2011). The Cronbach's alpha for this construct is excellent at 0.898. Following previous research on the role of firm size and age on BM design and performance (e.g. Zott and Amit, 2008; Brettel *et al.*, 2012; Pucci *et al.*, 2017), we introduced log-transformed size and age as firm-level control variables.

3.9 Scale refinement – exploratory factor analysis (EFA)

Conservatively, in our study, we used the original scale of Zott and Amit (2007, 2008), while recent empirical research tends to use scales with a lower number of items (e.g. 6 or 7 instead of the original 10). To confirm our scale, we conducted reliability analyses and tested the validity of the factor structure using EFA – a less restrictive procedure than confirmatory factor analysis (CFA) (Kline, 2016). Despite minor differences in factor loading, both procedures yielded similar results and factor structures. We performed EFA with promax rotation to test the validity of our self-assessed, multi-item variables (see Table A3 in Appendix 2). The factor extraction method used is the maximum likelihood method because it is best suited for normally distributed data (Fabrigar *et al.*, 1999) and is compatible with CFA (Kline, 2016). The PDS items loaded reasonably high, while four items for NBMD, one item for PERF, one for PAC and one for RAC were removed due to reliability analysis and because of low loading (Fabrigar *et al.*, 1999).

4. Analysis and results

4.1 Survey sample properties

The final sample consisted of 62.7% micro and small enterprises and 37.3% medium and large enterprises (see Table 3). About 44% of the sampled companies are less than ten years old,

	Valid % Full sample, including outliers ($N = 201$)	Valid % Sample without outliers ($N = 169$)
<i>Sector</i>		
Manufacturing	29.4%	28%
Services	70.6%	72%
<i>Size of firm</i>		
Micro/Small	62.1%	62.7%
Medium/Large	37.9%	37.3%
<i>Number of employees</i>		
1–9 employees	25.9%	26.6%
10–49 employees	36.2%	36.1%
50–249 employees	29.4%	29.6%
More than 250 employees	8.50%	7.7%
<i>Age of firm</i>		
Ten, or less than ten years old	45.8%	43.8%
11–20 years	34.8%	36.7%
Over 20 years	19.4%	19.5%

Note(s): The classification is based on European Commission guidelines (European Commission, 2008)

Source(s): Table by authors

Table 3.
Sample descriptive

about 37% are between 11 and 20 years old, while the rest are older than 20 years. Twenty-eight percent are manufacturing firms, while the vast majority is in different service sectors. As shown in [Table 3](#), there are no significant differences between the two samples, i.e. the one containing both univariate and multivariate outliers and the one without such outliers.

4.2 Assessment of the measurement model

We started our model assessment by conducting a confirmatory factor analysis (CFA). Also, our constructs were tested for internal consistency reliability, convergent and discriminant validity (see [Kline, 2011](#)).

The CFA model fit statistics were satisfactory: chi-square divided by the degrees of freedom (χ^2/df) = 1.409, comparative fit index (CFI) = 0.957, root mean squared error of approximation (RMSEA) = 0.049, Pclose = 0.528, Tucker Lewis index (TLI) = 0.950 and root mean square residual index (SRMR) = 0.0663. CFA results indicate a violation of the multivariate kurtosis (see [Byrne, 2010](#)). Thus, we used the Bollen-Stine bootstrapping procedure to assess model fit ([Bollen and Stine, 1992](#)). The p -value is above 0.05 ($p = 0.154$) suggesting that our model is correct.

Discriminant validity was tested using the EFA analysis results and the criteria suggested by [Hu and Bentler \(1999\)](#). First, the EFA results show no cross-loading (see [Table A3](#) in [Appendix 2](#)). Second, the correlations of factors are relatively small (smaller than 0.5) (see [Table A4](#) in [Appendix 2](#)), suggesting that the measures are not related (see [Fabrigar et al., 1999](#)). Third, the Maximum shared variance (MSV) values are smaller than the values of AVE (see [Table A5](#) in [Appendix 2](#)). Forth, the Maximum reliability (MaxR (H)) values are greater than CR. Finally, the AVE and the square root of AVE are greater than inter-construct correlations supporting the construct's discriminant validity (see [Hu and Bentler, 1999](#)). Internal consistency reliability was tested using Cronbach's alpha and composite reliability. All constructs have a Cronbach's alpha above 0.7, meeting the recommended criteria of [Nunnally \(1978\)](#) (see [Table A5](#) in [Appendix 2](#)). The different outer loadings show good composite reliability values above 0.806. Convergent validity was tested using the average variance extracted (AVE). The obtained AVE values for all constructs are higher than 0.5, except for NBM showing a lower value, at 0.448 below the threshold suggested by [Hu and Bentler \(1999\)](#). However, according to [Fornell and Larcker \(1981\)](#), even if AVE is less than 0.5 but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate.

4.3 Structural model

Before discussing the Structural Equation Model (SEM) results, we tested for influential multivariate outliers, model fit and multicollinearity. In addition to the Mahalanobis distance statistics mentioned above, we performed a cook's distance analysis to identify global prediction outliers. There is no case with a cook's distance greater than one (see [Pek and MacCallum, 2011](#)). Therefore, there are no more outliers in our dataset. Variance inflation factors (VIF) values are less than three for all predictors, far less than the threshold of 10 ([Kline, 2011](#)). Thus, multicollinearity is not a problem in our study. The hypothesized structural model achieved a good fit ($\chi^2/df = 1.422$; CFI = 0.932; RMSEA = 0.050, Pclose = 0.485; TLI = 0.914; SRMR = 0.070; GFI = 0.855) (see [Hu and Bentler, 1999](#)). Bollen-Stine bootstrapping procedure results suggest the model is correct ($p = 0.134$) despite the critical ratio of multivariate kurtosis above the threshold of 5 ([Byrne, 2010](#)).

4.4 ML-SEM direct and moderating effects

[Table 4](#) shows the hypothesized relationships' results, unstandardized coefficients, their respective standard errors, standardized coefficients and the critical ratio.

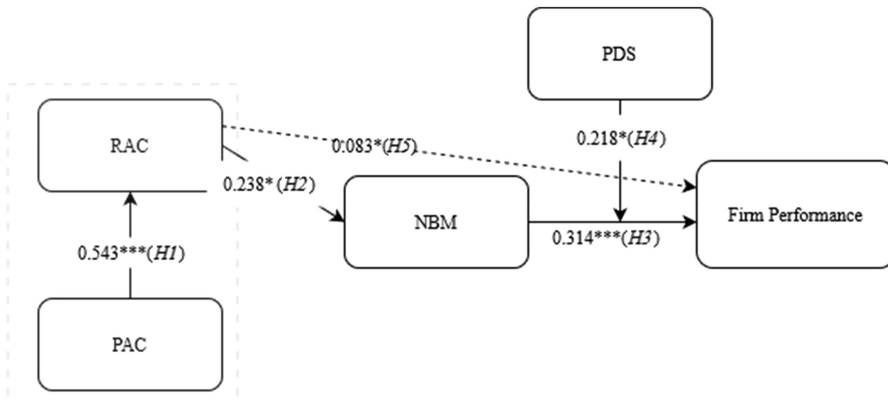
The ML-SEM results, presented in [Figure 2](#), show that PAC has a large positive effect ($\beta = 0.543, p < 0.001$) on RAC, supporting hypothesis [H1](#). Further, RAC has a medium positive

Hypothesis	Path	Est	SE	St.est	CR	P
Direct effects						
H1	PAC → RAC	0.819	0.138	0.543	5.924	***
H2	RAC → NBM	0.157	0.064	0.238	2.452	0.014
H3	NBM → PERF	0.566	0.171	0.314	3.312	***
Moderating effects using path analysis						
	PDS → PERF	0.054	0.140	0.032	0.385	0.700
H4	Interaction term (NBM and PDS) → PERF	0.235	0.088	0.179	2.684	0.007
Moderating effect using Lin et al. (2010) approach						
	NBM → PERF	0.870	0.241	0.449	3.612	***
	PDS → PERF	0.188	0.160	0.109	1.176	0.239
H4	Latent variable interaction (NBM and PDS) → PERF	0.747	0.307	0.218	2.433	0.015

Note(s): PAC (Potential Absorptive Capacity), RAC (Realized Absorptive Capacity), PERF (Firm's Performance), PDS (Product Differentiation Strategy), NBMD (Novel Business Model design theme); "****" $p < 0.001$; estimates (Est.); standardized estimates (St.est.); standard errors (SE); critical ratio (CR); p -value (P)
Source(s): Table by authors

Table 4. Structural model results for direct and moderating effects

ML SEM results



Note(s): ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$. Standardized estimated of the model

Source(s): Figure by authors

Figure 2. ML SEM results

effect ($\beta = 0.238, p < 0.05$) on NBM, supporting hypothesis H2. Also, NBMD has a medium positive effect on PERF ($\beta = 0.314, p < 0.001$), supporting hypothesis H3. Finally, we used path analysis and the approach of Lin et al. (2010) to test for moderation. Following Aiken et al. (1991) and Lin et al. (2010), before producing the interaction term in both approaches, we mean-centered the predictor and the moderator to reduce potential, nonessential collinearity. The results of the path analysis show that there is no significant direct relationship between NBMD and PERF, while the effect of the interaction term is significant ($\beta = 0.179, p < 0.01$), supporting hypothesis H4 (see Table A6 in Appendix 3). The more sophisticated, double-mean-centering approach of Lin et al. (2010) that allows to model a latent variable interaction shows similar results. The effect of PDS as a moderator on firm's performance is not significant, while the effect of the predictor on the outcome is significant ($\beta = 0.449, p < 0.001$). Finally, the effect of the interaction between the predictor and the moderator (using all 24 "pairs" when forming product indicators) is significant ($\beta = 0.218, p < 0.05$) and even stronger than the effect indicated

by the path analysis. Therefore, it can be argued that PDS is a pure moderator in the relationship between NBMD and firm's performance.

4.5 ML-SEM mediating effects

We tested for the mediating role of NBMD in the relationship between RAC and firm's performance, following the approach outlined by Zhao *et al.* (2010). These authors suggest that to demonstrate mediation, there is a need to use bootstrapping and test the significance of the indirect effect while examining the direct effect. The bootstrapping analysis shows no significant direct effect of RAC on PERF, while the indirect effect is significant (see Table 5). We can conclude that NBMD fully mediates the relationship between RAC and PERF as hypothesized in H5.

The ML-SEM results for the control variables, presented in Table A7 of Appendix 4, indicate that size, normative environment, and political ties positively affects firm's performance (respectively $\beta = 0.224, p < 0.001$; $\beta = 0.182, p < 0.05$; $\beta = 0.130, p < 0.1$), although the results for political ties are not robust. Further, the technological turbulence and dynamism positively affect the adoption of NBM (respectively, $\beta = 0.228, p < 0.05$; $\beta = 0.222, p < 0.05$). Finally, size has a considerable negative effect on RAC ($\beta = -0.153, p < 0.05$), while the regulatory environment has a sizable positive effect ($\beta = 0.283, p < 0.001$). The rest of the relationships between controls and our endogenous variables are not significant.

5. Discussion and conclusions

5.1 Discussion of results

Our results on the AC-NBMD link provide evidence for Teece's (2018) argument that dynamic capabilities drive innovation and design choices in BM and are consistent with few empirical studies on this topic (e.g. Achtenhagen *et al.*, 2013; Müller *et al.*, 2021; Pang *et al.*, 2022). In particular, our study suggests that absorptive capacity has a significant impact on NBMD, confirming the hypothesis of Amit and Zott (2016), who point to a high compatibility between dynamic capabilities and NBMD adoption. Moreover, the results of our mediation analysis suggest that NBMD is well suited to capture the value created by absorptive capacities that leads to improved performance, providing further evidence for the indirect effect of dynamic capabilities on performance hypothesized by Zott (2003) and Teece *et al.* (2020). Absorptive capacities should therefore be considered as a catalyst for performance improvements. However, it is the BM that transforms the knowledge acquired, assimilated and exploited into tangible performance outcomes.

The results of the moderation analysis provide further evidence of the fit between differentiation strategy and NBMD, which is consistent with the findings of Zott and Amit (2008) while supporting the conclusion of much of the literature that identifies NBMD as a source of value creation and a value driver of firm performance (e.g. Kumar *et al.*, 2000; Zott and Amit, 2007, 2008; Markides, 2013; Wei *et al.*, 2017). Although our research design does not allow us to test the feasibility of different strategies, as suggested by Teece (2018), we showed that the two are intertwined, as the differentiation strategy acts as a moderator, i.e. reinforces the relationship between NBMD and performance. Moreover, contrary to the findings of some

Hypothesis	Path	Indirect effect	p-value	Type of mediation
H5	RAC → NBM → PERF	0.083	0.025	Indirect-only mediation

Table 5. Results of the mediation analysis through bootstrapping

Note(s): RAC (Realized Absorptive Capacity), PERF (Firm's Performance), NBMD (Novel Business Model design theme)
Source(s): Table by authors

researchers (e.g. [Ju et al., 2017](#); [Gorondutse and Hilman, 2018](#)), we found no association between differentiation strategy and performance. These results suggest that when the effect of BM on performance is considered, strategy complements the effect of BM. Such a result confirms [Casadesus-Masanell and Ricart's \(2011, p. 100\)](#) assertion that "... in the future, the quest for sustainable advantage may well begin with the business model."

The results of the study confirm [Zahra and George's \(2002\)](#) arguments about the complementarity of PAC, i.e. knowledge-seeking capacities, and RAC, i.e. the capacity to develop products and services based on this body of (e.g. [Limaj and Bernroider, 2019](#)). We found a strong relationship between the two. As [Teece \(2018\)](#) notes, dynamic capabilities are strong when all facets, i.e. recognizing, grasping and transforming, are strong. Moreover, without the ability to recognize opportunities or, in terms of PAC, acquire, assimilate and create knowledge, it is impossible to seize opportunities and overcome challenges in the business environment.

5.2 Theoretical and practical implications

This study has theoretical and practical implications for both researchers and practitioners. From the perspective of theoretical implications, this research is a pioneering study that contributes to the current absorptive capacity theory and business model literature by incorporating RAC, NBMD, PDS and firm performance into a single research model. Through our framework, we demonstrate how RAC can promote NBMD and how it contributes to achieving superior performance. We extend the research that calls for further investigation to identify and quantify the direct and indirect effects of AC on competitive advantage and performance (see [Liu et al., 2020](#)). Our results show that RAC has an indirect effect on performance enabled by NBMD capacity.

On the other hand, from the perspective of the practical implications of this study, there are important suggestions for practitioners. First, managers who design and adopt NBMD must cultivate dynamic organizational capabilities that help their organizations identify risks and opportunities and adapt to the ever-changing business environment. This means they must strive to create an entrepreneurial and learning culture that enables employees and other stakeholders, including suppliers, to learn, change and adapt. In practice, companies need to build information and exchange mechanisms with the entire value network to improve knowledge acquisition. Moreover, such collaboration should extend to the use of acquired knowledge (e.g. joint product development, ICT solutions and other industry-specific innovations). Second, given the strength of the relationship between RAC and NBMD, and considering one of the dimensions of NBMD – specifically, the adoption of new methods to manage transactions ([Zott and Amit, 2008, 2010](#)) – the results of our study suggest that managers should establish partnerships and relationships aimed at joint problem solving and joint coordination of activities. Third, in adopting NBMD, firms can develop product differentiation strategies that increase their chances of high performance. We suggest that firms, especially SMEs (the majority of firms in our sample), should look for complementarities between the novel business model elements and the PDS, as this could increase customers' willingness to pay by offering unique products in new ways. Overall, our study suggests that the path to success for companies operating in sectors with moderate to high knowledge intensity lies in business model innovation. The success of such efforts requires the use of strategy-oriented and BM-oriented tools in the design of BMs, their alignment with product strategy, and the development of organizational resources and capabilities (see [Bouwman et al., 2020](#)).

5.3 Research limitations and developments

We note some limitations in our study. However, we believe that some of them provide valuable starting points for future research. First, our study does not consider other design themes, such

as efficiency-centered, lock-in or complementary-centered design (see [Amit and Zott, 2001](#), [Zott and Amit, 2010](#)) or multiple business model designs (see [Benson-Rea et al., 2013](#)). Future research could test the different BM design and strategy combinations, including their effects on performance, as suggested by [Zott and Amit \(2008\)](#). In addition, the relationship between dynamic capabilities and these designs should be further investigated. Second, our study did not examine the effect of absorptive capacity as a dynamic capability on the control, development and aggregation of other lower-order capabilities, as suggested by [Teece et al. \(2020\)](#) and [Teece \(2018\)](#). Some research has confirmed the effect of absorptive capacities on exploratory and exploitative innovations (e.g. [Limaj and Bernroider, 2019](#)), providing empirical evidence for the role of higher-order dynamic capabilities on lower-order capabilities. Future studies can shed light on the sequential relationship between higher- and lower-order capabilities and business models. Third, our study takes a static approach, which limits our ability to capture changes in absorptive capabilities and their impact on other operational capabilities ([Teece, 2018](#)). In addition, we focused on NBMD, a design that shares some similarities with BMI, although it also has some ambiguities, as noted by [Foss and Saebi \(2018\)](#), and we did not measure BMI. Future longitudinal studies are needed to test these complex relationships.

Some other limitations must be considered when interpreting the results. Our study context may limit the generalization of our results to developed countries. It can be argued that the development stage of Albania could lead to a high level of absorptive capacity of the studied firms (see [Narula, 2004](#)). Another limitation has to do with the heterogeneity of our sample. While it has reduced potential industry-specific biases in adopting a particular BM, it is somewhat biased toward certain categories. In addition, the within-industry absorptive capacities have a higher standard deviation than the across-industry ones, suggesting higher variability of the construct within a given industry. Future, industry-specific studies may provide more nuanced insights. With the exception of company size and age, all measures were based on subjective self-assessments. Future studies should collect objective measures to eliminate common method bias. Finally, from a methodological perspective, the use of SEM requires larger samples. Although we have taken all necessary steps to validate the fit and correctness of our model, the sample should generally be larger than 200 cases (see [Kline, 2011](#)).

5.4 Conclusions

The purpose of this study was to investigate the role of AC as an antecedent of NBMD, to explore the interplay between this specific design theme and differentiation strategy, and to identify how such relationships may be responsible for the emergence of different firm performance. This approach aimed at responding to [Teece's \(2018: 40\)](#) call to provide empirical evidence and “flesh out the details of such relationships”. This study presents the causal chain mechanism linking absorptive capacity, NBMD and performance, with differentiation strategy as a moderator that amplifies the effect of the NBMD-performance link.

Based on recent literature, a conceptual framework was developed and applied to a unique dataset of 169 cases of Albanian companies. The results of our study are of theoretical and practical value. We found that absorptive capacity as a dynamic capability has a positive impact on NBMD due to the role of value creation through knowledge acquisition, assimilation, transformation and utilization. These results confirm the suggestion of [Amit and Zott \(2016\)](#) regarding the compatibility between this design theme and dynamic capabilities. In addition, our results on the mediation effect provide further empirical evidence for theoretical arguments and previous empirical findings on the indirect effect of dynamic capabilities on performance. Our results contribute to the existing literature by empirically confirming the effects of NBMD on performance and its complementarity with a differentiation strategy. Finally, our study provides further evidence of the close link between knowledge acquisition and assimilation (i.e. PAC) and knowledge transformation

and utilization (i.e. RAC), as extensively demonstrated in previous research. We believe that these results are noteworthy for both scholars and practitioners. In a competitive business world, even in an efficiency-driven economy, companies that apply NBMD can succeed. Moreover, when deciding to adopt such a design, top managers must be aware of the importance of knowledge acquisition and learning, its concrete uses (e.g. resource allocation, technology and product innovation), and the adoption of appropriate business strategies to properly exploit the potential of this BM design.

Notes

1. The business model design is intertwined with the firm's strategy: sometimes the BM design adopted by a firm determines the feasibility of a particular strategy, and sometimes it is the corporate strategy that dictates the BM design choice (Teece, 2018).
2. Despite the growth and transformation after the fall of communism in the early '90s, Albania still struggles with inefficient contract enforcement, weak institutions, low judicial independence, poor intellectual property protection, low investment in research and development (R&D), and low Foreign Direct Investments (FDI) (TheGlobalEconomy.com).
3. The capabilities of a country and its firms to absorb external knowledge depend on institutions, government policies, and the economic and innovative ecosystem that includes institutes, research centers, universities and organizations for the protection of intellectual property, the level of FDI for spillover effects and other factors (Narula, 2004).
4. The concept of dynamic capabilities, introduced by Teece *et al.* (1997), refers to a framework that analyses the sources and methods of wealth creation and capture by organizations operating in environments of rapid technological change. While the term capabilities highlight the critical role of management in adapting, integrating and reconfiguring internal and external organizational skills, resources and functional competencies to match the necessities of a changing environment, the term dynamic refers to the capacity to renew competencies to achieve congruence with the changing business environment.
5. Different researchers have highlighted that knowledge is the main determinant of the decisions made by the organization and consists of one of the most important components of the firm's survival (Zahra and George, 2002; Lee *et al.*, 2010; Martín-de Castro, 2015; McDonald and Eisenhardt, 2020; Senivongse *et al.*, 2019).
6. So, PAC refers to the capability of firms to acquire and assimilate external knowledge or to create knowledge, whereas RAC refers to the capability to transform, exploit and utilize knowledge (Lane *et al.*, 2006).
7. According to Teece (2010), the purpose of a business model is to define how the enterprise delivers value to customers, entices customers to pay for value and converts those payments to profit.
8. Similar to the view of Teece (2010), Amit and Zott (2001) define BM as "the design of transaction content, structure, and governance to create value through the exploitation of business opportunities" with content and structure representing details of the BM architecture. The firm's activity system that transcends the focal firm boundaries enables it to create an appropriate value (Zott and Amit, 2010).
9. Amit and Zott (2001), Zott and Amit (2010) propose four design themes: novelty-centered, efficiency-centered, complementarity and lock-in. The first two opposing themes have attracted the attention of numerous researchers (Zott and Amit, 2007, 2008; Müller *et al.*, 2021; Gerdoçi *et al.*, 2018). The efficiency-centered BM design focuses on generating efficiency by reconstructing the business model elements, such as increasing transaction speed or reducing transaction costs (Zott and Amit, 2008, 2010). The novelty-centered often adopts novel activities by bringing new parties into the system (content), reorganizing transaction participants and activities (structure), or adopting new ways to govern transactions (governance) (Zott and Amit, 2008, 2010). The configurational approach of design themes, i.e. viewing BM as a bundle of building blocks has important implications for a firm's capacity to reconfigure BMs.

10. The ability to design and choose a business model depends on the strength of higher-order capabilities (Teece, 2018), i.e. sensing, seizing and transforming competencies that aggregate and direct the various ordinary capabilities (Teece *et al.*, 2016; Teece, 2018; Khodaei and Ortt, 2019; Bocken and Geradts, 2020).
11. Product differentiation strategy, one of Porter's key business strategies, refers to the ability of a firm to develop a unique product or service (Porter, 1996).
12. The four steps framework proposed includes: i) sensing opportunities and threats that might affect the organization, ii) reallocating resources, improvement of processes and alignment of governance, creating new capabilities when gaps are identified, iii) introducing BM changes that can capture the value created and finally, iv) renewal of existing capabilities.

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(The Appendix follows overleaf)

<i>Novel Business model design theme (NBMD)</i>	<i>Zott and Amit (2007, 2008)</i>
Our business model offers new combinations of products, services and information (NBM1)	
The business model brings together new participants (NBM2)	
Incentives offered to participants in transactions are novel (NBM3)	
Our business model gives access to a wide variety and number of participants and/or goods/services (NBM4)	
The richness (i.e. quality and depth) of some of the enabled links between participants is novel (NBM5)	
In our industry, we are a pioneer in exploiting our business (NBM6)	
We have continuously introduced innovations to make our business more effective (NBM7)	
There are no competing businesses in our industry that are threatening to ours (NBM8)	
There are other important aspects of the business model that make it novel (NBM9)	
Our business model, overall, is novel (NBM10)	
<i>Potential Absorptive Capacity (PAC)</i>	<i>Limaj and Bernroider (2019)</i>
Searching for relevant external information is everyday business in our organization (PAC1)	
Our employees are encouraged to identify and consider external information sources (PAC2)	
We expect our employees to acquire relevant external information (PAC3)	
Ideas and concepts obtained from external sources are quickly analyzed and shared (PAC4)	
We work together across the organization to interpret and understand external information (PAC5)	
In our organization, external information is quickly exchanged between business units (PAC6)	
We regularly organize and conduct meetings to discuss new insights (PAC7)	
<i>Realized Absorptive Capacity (RAC)</i>	<i>Limaj and Bernroider (2019)</i>
Our employees have the ability to structure and use newly collected information (RAC1)	
Our employees are used to preparing newly collected information for further purposes and making it available (RAC2)	
Our employees are able to integrate new information into their work (RAC3)	
Our employees have immediate access to stored information, e.g. about new or changed guidelines or instructions (RAC4)	
Our employees regularly engage in the development of prototypes or new concepts (RAC5)	
Our employees apply new knowledge in the workplace to respond quickly to environment changes (RAC6)	
<i>Product Differentiation Strategy (PDS)</i>	<i>Zott and Amit (2008)</i>
Assess the level of importance for your firm of new product development, innovation and R&D activity (PDS1)	
Assess the level of importance for your firm of emphasis on growth by acquiring, or merging with R&D/technology intensive firms (PDS2)	
Assess the level of importance for your firm of branding and advertising as part of firm's marketing strategy/approach (PDS3)	
Assess the level of importance for your firm of differentiation strategy (PDS4)	
<i>Performance (PERF)</i>	Adapted from <i>Auh and Merlo (2012), Delaney and Huselid (1996)</i>
Performance compared to the direct competitor concerning market share (PERF1)	
Performance compared to the direct competitor concerning revenues (PERF2)	
Performance compared to the direct competitor concerning profit (PERF3)	
Performance compared to the direct competitor concerning cash flow (PERF4)	
Performance compared the direct competitor concerning return on investment (PERF5)	
Performance compared the direct competitor concerning marketing (PERF6)	

Table A1.
Measurement items

Source(s): Table by authors

Path	With CLF	Standardized regression weights Without CLF	Difference
PERF → PERF1	0.733	0.775	0.042
PERF → PERF2	0.915	0.949	0.034
PERF → PERF3	0.918	0.950	0.032
PERF → PERF4	0.840	0.870	0.030
PERF → PERF5	0.833	0.863	0.030
PAC → PAC1	0.532	0.668	0.136
PAC → PAC2	0.609	0.712	0.103
PAC → PAC4	0.742	0.818	0.076
PAC → PAC5	0.816	0.905	0.089
PAC → PAC6	0.744	0.831	0.087
PAC → PAC7	0.578	0.706	0.128
RAC → RAC1	0.811	0.874	0.063
RAC → RAC2	0.727	0.789	0.062
RAC → RAC3	0.805	0.861	0.056
RAC → RAC4	0.416	0.512	0.096
RAC → RAC6	0.628	0.729	0.101
NBM → NBM1	0.393	0.530	0.137
NBM → NBM2	0.633	0.698	0.065
NBM → NBM3	0.759	0.788	0.029
NBM → NBM4	0.606	0.689	0.083
NBM → NBM5	0.630	0.708	0.078
NBM → NBM7	0.380	0.570	0.190
PDS → PDS1	0.576	0.723	0.147
PDS → PDS2	0.360	0.480	0.120
PDS → PDS3	0.622	0.735	0.113
PDS → PDS4	0.771	0.887	0.116

Note(s): The table shows the difference of standardized regression weights of the unconstrained model with the constrained one

Source(s): Table by authors

Table A2.
Common latent factor:
the difference of
standardized
regression weights of
the unconstrained
model with the
constrained one

Items	F1	F2	Factors F3	F4	F5
BMN1				0.376	
BMN2				0.712	
BMN3				0.693	
BMN4				0.781	
BMN5				0.836	
BMN7				0.445	
PDS1					0.667
PDS2					0.521
PDS3					0.656
PDS4					0.946
PAC1		0.718			
PAC2		0.644			
PAC4		0.761			
PAC5		0.913			
PAC6		0.873			
PAC7		0.706			
RAC1			0.866		
RAC2			0.772		
RAC3			0.917		
RAC4			0.489		
RAC6			0.574		
PERF1	0.764				
PERF2	0.961				
PERF3	0.989				
PERF4	0.855				
PERF5	0.828				

Note(s): Underlying dimensions in five factors: F1 = business performance, F2 = potential absorptive capacity, F3 = realized absorptive capacities, F4 = novelty-centered business model design, F5 = Product differentiation strategy; Extraction method: maximum likelihood; rotation method: promax with Kaiser normalization

Table A3.
Exploratory factor analysis

Source(s): Table by authors

Factor	PERF	PAC	RAC	NBM	PDS
PERF	1.000	-0.050	0.151	0.384	0.276
PAC	-0.050	1.000	0.508	0.294	0.181
RAC	0.151	0.508	1.000	0.184	0.067
NBM	0.384	0.294	0.184	1.000	0.430
PDS	0.276	0.181	0.067	0.430	1.000

Table A4.
Factor correlation matrix

Note(s): Extraction method: maximum likelihood; rotation method: promax with Kaiser normalization
Source(s): Table by authors

	Cronbach's alfa	CR	AVE	MSV	MaxR(H)	PERF	PAC	RAC	NBM	PDS
PERF	0.934	0.947	0.781	0.152	0.963	<i>0.884</i>				
PAC	0.886	0.901	0.605	0.291	0.92	-0.065	<i>0.778</i>			
RAC	0.884	0.872	0.584	0.291	0.902	0.150†	0.540***	<i>0.764</i>		
NBM	0.856	0.827	0.448	0.228	0.843	0.390***	0.314**	0.214*	<i>0.67</i>	
PDS	0.799	0.806	0.52	0.228	0.862	0.271**	0.154†	0.084	0.477***	<i>0.721</i>

Note(s): Composite reliability (CR); average variance extracted (AVE); maximum shared variance (MSV); maximum reliability (MaxR (H)); on the diagonal are the square roots of AVE in bold font; Significance codes: “†” $p < 0.100$, “*” $p < 0.050$, “**” $p < 0.010$, “***” $p < 0.001$

Source(s): Table by authors

Table A5. Internal consistency, convergent validity, and discriminant validity

Appendix 3

Hypothesis	Verdict
<i>Direct effects</i>	
Hypothesis 1. The potential absorptive capacity (PAC) positively affects a firms realized absorptive capacity (RAC)	Supported
Hypothesis 2. Realized absorptive capacity (RAC) positively affects the adoption of Novel Business Model Design theme (NBM) by firms	Supported
Hypothesis 3. The adoption of Novel Business Model Design theme (NBM) positively affects firm’s performance (PERF)	Supported
<i>Moderating effect</i>	
Hypothesis H4. Product differentiation strategy (PDS) strengthens the positive effect of Novel Business Model Design theme (NBM) on firm’s performance	Supported
<i>Mediation effect</i>	
Hypotheses H5. The adoption of Novel Business Model Design theme (NBM) mediates the positive effects of realized absorptive capacity (RAC) on firm’s performance (PERF)	Supported

Source(s): Table by authors

Table A6. Summary of hypotheses and findings

Path	Est	SE.	St.Est	CR.	<i>P</i>
REG → RAC	0.156	0.047	0.283	3.297	***
NOR → RAC	0.017	0.048	0.029	0.354	0.723
COG → RAC	-0.061	0.057	-0.098	-1.065	0.287
DYN → RAC	0.032	0.079	0.033	0.409	0.682
HET → RAC	0.024	0.045	0.039	0.529	0.597
TT → RAC	-0.005	0.061	-0.007	-0.088	0.930
PT → RAC	0.006	0.046	0.010	0.130	0.897
AGE (log) → RAC	0.089	0.258	0.025	0.344	0.731
SIZE (log) → RAC	-0.246	0.119	-0.153	-2.063	0.039
REG → NBM	0.016	0.036	0.043	0.429	0.668
NOR → NBM	-0.035	0.037	-0.090	-0.954	0.340
COG → NBM	0.015	0.043	0.037	0.355	0.723
DYN → NBM	0.145	0.063	0.222	2.316	0.021
HET → NBM	0.007	0.034	0.017	0.206	0.837
TT → NBM	0.113	0.048	0.228	2.342	0.019
PT → NBM	-0.009	0.034	-0.024	-0.276	0.783
AGE (log) → NBM	-0.023	0.193	-0.010	-0.116	0.907
SIZE (log) → NBM	0.117	0.092	0.110	1.272	0.203
REG → PERF	0.036	0.054	0.055	0.667	0.504
NOR → PERF	0.128	0.056	0.182	2.291	0.022
COG → PERF	0.010	0.065	0.013	0.148	0.882
DYN → PERF	0.063	0.095	0.054	0.660	0.509
HET → PERF	0.040	0.055	0.055	0.773	0.440
PT → PERF	0.092	0.052	0.130	1.768	0.077
AGE (log) → PERF	-0.463	0.296	-0.109	-1.565	0.118
SIZE (log) → PERF	0.467	0.136	0.244	3.424	***
TT → PERF	0.046	0.071	0.052	0.646	0.518

Note(s): RAC (Realized Absorptive Capacity), PERF (Firm's Performance), NBM (Novel Business Model design theme), REG (Regulatory), NOR (Normative), COG (Cognitive), DYN (Dynamism), HET (Heterogeneity), TT (Technological Turbulence), PT (Political Ties), AGE (log) (logarithm of age), SIZE (log) (logarithm of Size); "***" $p < 0.001$; estimates (Est.); standardized estimates (St.est.); standard errors (S.E.); critical ratio (C.R.); p -value (*P*)

Source(s): Table by authors

Table A7.
Structural model
results for control
variables

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