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Business model innovation in SMEs: the role of boundaries in the digital era

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Abstract

The digital era is radically changing our societies and how firms do business. Innovating the business model has become a fundamental capability to survive competition, particularly for small and medium-sized enterprises (SMEs). This study investigates the digital-era role of boundary management capabilities in the processes of Business Model Innovation (BMI) in SMEs. Structural Equation Modeling is adopted to analyze data from a survey of 250 Italian experts who possess direct research and consulting experience with SMEs. Our findings reveal that digitalization and firms' boundaries affect BMI in SMEs. Moreover, our results demonstrate how boundary management, specifically its technological and relational aspects, directly impacts BMI and mediates the relationship between boundary size and BMI. The study also offers important theoretical and practical insights, calling on scholars and managers to give more attention to the boundary management of SMEs in order to support BMI.

Keywords: digitalization, SME, Business model, boundary capabilities

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1. Introduction

Digital technologies are powerful forces pushing firms toward new business models (Cohen & Kietzmann, 2014; Fjeldstad & Snow, 2018), making the capability to innovate increasingly relevant (Chesbrough, 2010; Foss & Saebi, 2018; Zott & Amit, 2007) and emphasizing the shift from the boundaries of management to the management of boundaries (Caputo, Fiorentino, & Garzella, 2018). Studies from economic, management and organizational behavior perspectives have referred to the boundary concept to analyze resources, activities and processes that can be jointly controlled and influenced by many organizations (Yang, Lin & Lin, 2010). As such, boundaries are defined as transitional areas between the inside and the outside of an organization, circumscribing resources and capabilities over which governance and control are extended (Fiorentino, 2016). Boundaries should be viewed as a continuum; an area in which it is difficult to distinguish the firm from its external environment (Normann & Ramírez, 1993). Therefore, it is increasingly necessary to consider the autonomy of the concept of boundaries as having intrinsic characteristics, such as the size of these boundaries, namely how much the continuum area is extended, the resources that are positioned in the boundaries, and their management (Caputo, Fiorentino, et al., 2018).

Existing research has predominantly focused on large firms, with limited studies exploring how inherent characteristics, an organizational-wide approach to collaborative innovation (Fjeldstad & Snow, 2018) and unique contexts prevalent within SMEs can affect business model innovation (Anwar, 2018; Child et al., 2017). Some authors highlight the fact that large firms are more active than SMEs in leveraging external resources for innovation (Dooley, Kenny, & Cronin,

2016). At the same time, digitalization represent an opportunity for SMEs, where a less structured organization can faster develop the capability to proactively lead Business Model Innovation (BMI) (Lindgren & Abdullah, 2013). Digital technologies can increase levels of production efficiency to reduce production costs while optimizing immobilized capital, by minimizing inventories and streamlining information flows. Indeed, firms can limit risks by sharing processes and activities to reduce the risks of flow interruptions along the supply chain, minimizing operational risks contingent on operating costs (Fiorentino, 2016). The relevance of network models and of the development of a digital society exert pressures on the management of the business processes concerning firms boundaries (Caputo, Fiorentino, et al., 2018; Schotter, Mudambi, Doz, & Gaur, 2017).

Our research responds to the need of studying the BMI construct within the SMEs context, prevailing in many countries such as Italy, and aims to delineate a line of actions and solutions on how SMEs can develop innovative business models and foster boundaries capabilities management in the new digital landscape. Our aim is to analyze how SMEs should successfully implement more innovative and co-creational business models. Specifically, we formulate the following research question: how do firms boundaries affect business model innovation of SMEs in the digital era? Boundary management is a concept advanced in previous research (Caputo, Fiorentino, et al., 2018; Garzella, 2000) and is considered a set of capabilities developed by managers and organizations in order to manage the web of resources and relationships in the boundary areas of a given firm. Boundary management capabilities are conceptualized into three categories: technological, relational and cultural capabilities (Caputo, Fiorentino, et al., 2018). We advance this theoretical model analyzing the boundary management capabilities in contexts of rapid technological change, where the need for continuous BMI through cooperation, competition

and a search for new markets is pivotal. Our model highlights how the size of boundaries and a firm's capabilities to manage them can be relevant to the elaboration and implementation of innovative business models in SMEs. We tested our hypotheses through a Structural Equation Model that analyzes data collected by a survey submitted to professionals (e.g. CEOs, advisors and consultants) in Italian SMEs.

2. Theoretical background

Business model literature has successfully developed frameworks and practices to capture the complex interrelationship between the creation and appropriation of value and to understand the logic of an organization for value creation (Massa, Tucci, & Afuah, 2017; Zott, Amit, & Massa, 2011). Stemming from prior accounts of business models, we use a comprehensive definition which sees business models as a modelling and representation tool. It allows businesses to mediate technological and other resources in several ways: controlling, communicating and innovating; classifying, disclosing, focusing managerial attention, helping idea exploration, and supporting and coordinating the knowledge flow (Zott et al., 2011). A business model can be made of an internal value chain: product and services, activities, resources; and of an external value chain: customers, partners, competitors. Business models help innovation since they turn market opportunities into profits, delivering the value of a service or product through commercialization (Zott & Amit, 2012). Companies commercialize new ideas and technologies through their business models; but while companies have extensive investments and processes for exploring new ideas and technologies, they often have little ability to innovate their business models (Chesbrough, 2010; Spieth, Schneckenberg, & Matzler, 2016).

In line with these assumptions, more companies now are turning toward BMI as an alternative or complement to product or process innovation and because it can translate to a sustainable advantage (Brehmer, Podoynitsyna, & Langerak, 2018). The digital era and the Industry 4.0 paradigm, combining different technologies, open unforeseen possibilities and offer the potential not only to create radically new products and services and to share knowledge between different actors of the technology ecosystem (Lombardi, 2019) but also to generate innovative business models (Caputo, Marzi, & Pellegrini, 2016; Spieth et al., 2016). BMI refers to a new activity system of a firm (Foss & Saebi, 2016) and innovative structures for value creation and value capture (Chesbrough, 2010) involving a single firm and its alliance partners and customers (Bouncken & Fredrich, 2016). Recent developments emphasize a need for a more dynamic perspective that addresses BMI itself so that any fundamental change in the relationship between the model elements can be understood as BMI (Foss & Saebi, 2016).

Firms often experience conditions of resource scarcity, especially SMEs, and they need to focus on BMI as source of future value (Amit & Zott, 2012). Competitors might find it more challenging to imitate or replicate an entire novel activity system than a single new product or process (Casadesus-Masanell & Zhu, 2013). Managers must be aware of the possibility of competitors' efforts in this area because BMI can be a powerful competitive tool. Competitive pressures have pushed BMI much higher than expected on firms' priority lists. Even under conditions of resource scarcity, organizations do not need to renounce innovation as a way of enhancing their performance (Zott & Amit, 2008). Instead, managers should consider the opportunity offered by BMI to complement innovation in processes and products. BMI can allow managers to resolve the apparent trade-off between innovation costs and benefits by addressing how they do business and by involving partners in new value-creating activity systems.

Prior studies have shown BMI as a core driver for a firm's survival and superior performance, especially in growing industries. However, the role of BMI has been discussed theoretically, while empirical studies still lack reference to SMEs (Child et al., 2017). Moreover, traditional definitions of business models considering internal or external value chains (Zott & Amit, 2012) demonstrate that the literature focuses mostly on internal or external elements, giving less importance to the connecting elements: boundaries and how boundary management can be significant for the elaboration and implementation of a business model (Caputo, Fiorentino, et al., 2018).

Accordingly, we wish to shed light on the influence of digital technologies on firms' boundaries and, consequently, on BMI. Indeed, boundary management requires firms to develop the capability to manage resources that are neither internal nor external, with the need to balance new technological tools (e.g. cloud technologies, sensors, big data, 3D printing) and new inter-organizational relationships (e.g. cooperation, collaboration and communication between the firms' networks) together with the cultural evolution due to the integration of new ways of creating a sense of belonging as well as with new leadership styles (Caputo, Fiorentino, et al., 2018).

3. Hypotheses development

Digital technologies have radically changed the nature and structure of new products and services, shaped novel value creation and value appropriation pathways, enabled innovation collectives that involve dynamic sets of actors with diverse goals and capabilities and produced a new breed of innovation processes (Porter & Heppelmann, 2015). Digitalization creates (and consequently changes) market offerings, business processes and models that result from the use of new technology (Caputo, Fiorentino, et al., 2018; Caputo et al., 2016). Digital innovation

management refers to the practices, processes, and principles that underlie the effective orchestration of digital innovation (Nambisan, Lyytinen, Majchrzak, & Song, 2017).

Digital technologies have changed the way of doing business, and the first reaction of scholars and operators has been that of linking new forms of strategic development to the concept of boundaries (Brouthers & Hennart, 2007; Fiorentino, 2016; Nambisan et al., 2017; Schotter et al., 2017). In fact, some authors argue that digital technologies dissolve firms' boundaries (Lindgren & Abdullah, 2013) and shift agency of traditional entrepreneurship and innovation processes and outcomes (Nambisan et al., 2017). However, other scholars suggest that the new competitive context and digital convergence are able to develop intra and inter-organizational boundaries (Schotter et al., 2017; Yang et al., 2010). Phelps (2007) modeled the effects of the increasing utilization of information technology on organizational boundaries resulting in a more heterogeneous network of boundaries. Furthermore, Caputo and colleagues (2018) theorized that the digital transformations of our time are creating new competitive contexts, and such contexts are having a major impact on firms and business processes, making the boundaries of the firms fluid, dynamically expanding and more blurred than in the past.

Thus, we expect that digital technologies impact firms' boundary sizes in a way that enlarges the dimensions and the relevance of the continuum area of the business' borders in which it is not easy to distinguish internal or external environments of firms. Accordingly, we formulate the following hypothesis:

Hypothesis 1: Digital technologies positively affect SMEs' boundary size.

Understanding new value creation and value appropriation pathways which enable innovation collectives to involve a dynamic set of actors with diverse goals and capabilities should force businesses to pay attention to their *boundary size*. In any case, this means shifting attention of firm leaders in the business process periphery. The management of boundaries is designed to create value by focusing on business processes and activities that occur at a firm's boundaries (Fiorentino, 2016). In a context in which new communication tools and new ways of governing relationships are established, bringing boundaries to the center of the strategy promotes the bearing or linking of strategies and can in turn promote creativity and innovation (Foss & Saebi, 2018; Phelps, 2007).

Managing boundaries involves a set of capabilities that guarantees balance and harmony between various elements and activities combined with internal and external forces (Parmigiani & Mitchell, 2009). To manage effectively, it is necessary to invest in management personnel attitudes, a fact that highlights the importance of governing relational, organizational and technological factors (Caputo, Fiorentino, et al., 2018).

In line with the enlargement of boundary size, boundary management teams must express the increasingly urgent need to organize innovative relational systems (Conway, 1997). According to Yan *et al.* (2019), top management behavior has a significant impact on BMI. This organizational effort must extend beyond classical business boundaries and interpret new ways of managing processes that move resources from within to boundary areas (e.g. issues related to the development of telework or the “internet of things”) as well as processes that approach resources from the outside (e.g., the creation of inter-company networks or “big data analytics”). The boundary manager emerges as a new figure in the business landscape, one who has to govern the flow of information and corporate communications both internally and externally. Moreover, he

or she must commercially and operationally support the company's mission and represent its values and culture while maintaining relationships with partners. To render the information system and the circulation of information effective, the boundary manager must organize the flow of information itself in a bidirectional manner to identify weak signals received from inside and outside (Phelps, 2007). The need to deliver creativity and flexibility to the corporate system while maintaining stability implies the need to redefine interpersonal relationships, the role system, leadership style and control methods (Kickul & Gundry, 2001).

Typical management and organizational issues relating to the enlargement of boundary size are all represented by the difficulty of controlling organizations and individuals gravitating to the boundary area over time and representing the strategically relevant resources (Berglund & Sandström, 2013). Barner-Rasmussen and colleagues (2014) argue that while boundary enlargement involves linking external and internal groups, it is more profoundly about intervening in the process in such a way to mediate conflict, build competence and negotiate meaning across boundaries. By engaging in the process of boundary enlargement, selective managers produce new kinds of practices that serve to link individuals across boundaries (Birkinshaw et al., 2017; Levina & Vaast, 2017).

The change of firms' boundary size due to digitalization allows the reduction of physical, temporal, relational and even cultural barriers (Garzella, 2000). As conceptualized by Caputo and colleagues (2018), there are three relevant factors for the management of boundaries: technological, cultural and relational capabilities. Consequently, we formulate the following related hypothesis:

Hypothesis 2a: Boundary size positively affects SMEs technological boundary management capability.

Hypothesis 2b: Boundary size positively affects SMEs cultural boundary management capability.

Hypothesis 2c: Boundary size positively affects SMEs relational boundary management capability.

Considering the relations between boundaries and BMI, Bouncken and Fredrich (2016) analyze how firms' sizes, alliance experiences and the alliance durations influence value capture from BMI. What they demonstrate highlights the role of openness and the role of users in influencing the development of technologies and business model choice (Baden-fuller & Hae, 2013; Foss & Saebi, 2018).

Openness refers to the permeability of a company's boundaries. This drives firms towards the use of new "sharing economy" business models (Cohen & Kietzmann, 2014). In a global environment where the digital revolution has substantially enhanced the rate of competition, cooperation strategies applied within company departments and between companies can often have a number of benefits, including improved levels of communication, stronger relationships between suppliers and customers and process sharing (e.g. co-design and co-production) enlarging firms' boundaries size. Moreover, other authors (Dooley et al., 2016) highlight that large-scale firms are more active than SMEs in leveraging external resources for innovation and that small-sized firms are least active in this practice.

This scenario is significant when, due to a lack of knowhow or funds, businesses can hardly self-generate the innovation needed to effectively respond to market needs. SMEs face many more fundamental and basic challenges on their digital transformation path due to a scarcity of funds. Therefore, only through expanding the boundary size and collaborating with suppliers and customers can they achieve BMI. Our third hypothesis is shaped by the above considerations:

Hypothesis 3: Boundary size positively affects SMEs business model innovation.

Teece (2018) argues that business models are more context-dependent than technology, depending on resources and capabilities that are available within the respective company. Therefore, the role of management and managers emerges as a relevant factor in BMI and boundary management. Boundary managers should develop a great capability to manage boundary resources and the relationship between the firm and the environment, using all relational, communicational, technological and technical attitudes (Kickul & Gundry, 2001; Takeishi, 2001). Accordingly, we formulate the following hypothesis:

Hypothesis 4a: Technological boundary management capability positively affects SMEs business model innovation.

Hypothesis 4b: Cultural boundary management capability positively affects SMEs business model innovation.

Hypothesis 4c: Relational boundary management capability positively affects SMEs business model innovation.

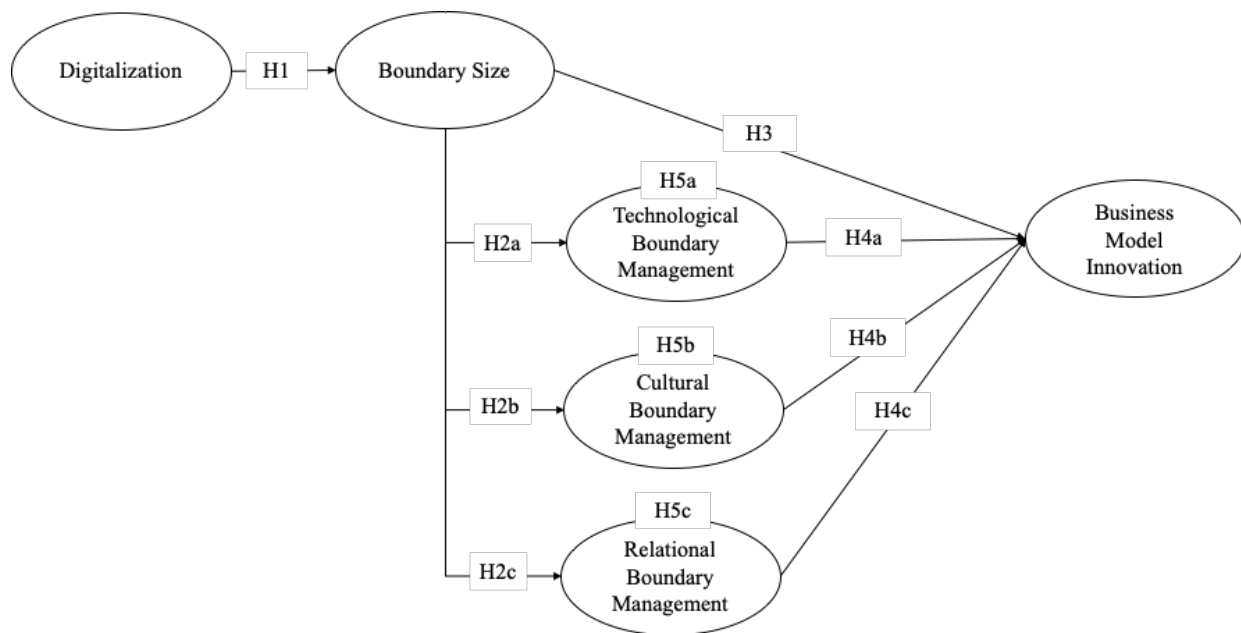
Having established that boundary size is connected to boundary management capability and, in view of the positive influence of the boundary management capability on BMI, we also hypothesize that:

Hypothesis 5a. Technological boundary management capability mediates the positive relationship between boundary size and business model innovation.

Hypothesis 5b. Cultural boundary management capability mediates the positive relationship between boundary size and business model innovation.

Hypothesis 5c. Relational boundary management capability mediates the positive relationship between boundary size and business model innovation.

Figure 1 - Theoretical model.



4. Methods

Procedure and sample

We administered an online questionnaire to a sample set of Italian professionals who possess direct expertise in managing and/or consulting with SMEs about strategic decisions. The questionnaire was back-translated, tested by a panel of experts and piloted with 20 other experts to ensure appropriateness within the Italian context. Survey administration took place in late 2018

through the members list of the Italian Association of Business Administration and Management (*AIDEA – Accademia Italiana di Economia Aziendale*), which comprises 2,287 academics in business administration, accounting, management, marketing and organization in Italy. Most of the AIDEA members are administrators, CEOs, advisors or consultants in both Italian and foreign companies. Only those with an active managerial or consulting role in one or more SME were included in the sample. Thus, our survey targeted experts with both business and academic experience who have a holistic view of the changes and challenges facing SMEs.

A total of 439 questionnaires were filled, however, 189 of these were incomplete. Therefore, we used 250 completed questionnaires in our data analysis (this represents an 11% response rate). To limit the possible bias in self-administered surveys due to directional responses, we performed a series of robustness checks to assure that bias did not jeopardize the validity of our data (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In particular, we conducted a *t*-test comparing different categories of respondents, and we checked for common method variance using the Harman one-factor method (Caputo, Ayoko, & Amoo, 2018; Podsakoff et al., 2003). All tests delivered satisfactory results.

Measures

All scales used in the questionnaire were derived from existing literature, adopting 5-point Likert scales ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). We measured *digitalization*, i.e. the relevance of digital technologies for SMEs, through a 4-item scale adapted from previous studies (Caputo, Fiorentino, et al., 2018; Kuester, Konya-Baumbach, & Schuhmacher, 2018; Tarutė & Gatautis, 2014). Respondents were asked to indicate the extent to which they agreed with different statements concerning the impact of digital technologies (e.g., IoT, AI, Big Data, Social Media). *Boundary size* was measured with a scale adapted from Garzella

(Garzella, 2000) and Galeotti and Garzella (2013). Respondents were asked to indicate the extent to which the boundary area of SMEs had increased in size. The construct of *boundary management capability* was operationalized through three first-order constructs. To measure *relational boundary management* (RBM), *cultural boundary management* (CBM) and *technological boundary management* (TBM), we used a scale adapted from Caputo, Fiorentino and Garzella (2018). To measure *BMI*, we used a scale adapted from previous studies (Snihur & Wiklund, 2018; Zott & Amit, 2007).

Reliability and validity

To determine the reliability (i.e. internal consistency) and validity of measurements, we adopted the AMOS v25 package in SPSS. Following Hair et al. (2016), we assessed internal consistency using Exploratory Factor Analysis, Cronbach's Alpha, Average Variance Explained (AVE) and Composite Reliability (CR). Generally, factor loadings above 0.50, Cronbach's alphas exceeding 0.70, AVEs above 0.50 and CR values above 0.70 are considered satisfactory (Fornell & Larcker, 1981; Nunnally & Bernstein, 1994). All our constructs were first-order, and as shown in Table 1, all returned satisfactory measures. As evidence of convergent validity, we have all loadings above 0.50. As evidence of discriminant validity, we found no strong cross loadings above 0.30 and we report no correlations between factors above 0.60.

Table 1 - Evaluation of constructs.

Latent Variable	Item	Factor						Cronbach's Alpha	C.R.	AVE
		1	2	3	4	5	6			
Digitalization (DIGI)	DIGI01				0.816			0.80	0.80	0.51
	DIGI02				0.832					
	DIGI03				0.608					
	DIGI04				0.573					
Boundary Size (BS)	BS01					0.797		0.82	0.81	0.59
	BS02					0.787				
	BS03					0.718				
	RBM01						0.589	0.75	0.73	0.59

Relational Boundary Management (RBM)	RBM02		0.909			
	CBM01	0.706		0.89	0.89	0.53
	CBM02	0.682				
	CBM03	0.71				
Cultural Boundary Management (CBM)	CBM04	0.779				
	CBM05	0.735				
	CBM06	0.786				
	CBM07	0.676				
Technological Boundary Management (TBM)	TBM01		0.617		0.88	0.87
	TBM02		0.567			0.64
	TBM03		1.009			
	TBM04		0.917			
Business Model Innovation (BMI)	BMI01	0.604		0.88	0.87	0.57
	BMI02	0.653				
	BMI03	0.904				
	BMI04	0.812				
	BMI05	0.771				

Notes: Extraction method for the factor loadings used was Maximum Likelihood, Promax rotation with Kaiser normalization. KMO measure of sampling adequacy 0.882. Bartlett's test of sphericity Chi-square 3444.251, df 300, $p < 0.000$. Goodness-of-fit Test Chi-Square 317.844, df 165, $p < 0.000$. All communalities values were below 0.350. Total variance explained 60.10%.

To further assure the validity of our multi-dimensional constructs, we also conducted Confirmatory Factor Analyses (CFA) using maximum likelihood estimation. Following the most recent indications in the literature (Caputo, Ayoko, Amoo, & Menke, 2019), we ran a number of tests for model fit that show that our measurement model meets the acceptable threshold for all tests. In particular, our SRMR is 0.0533, our RMSEA is 0.055, our PCLOSE is 0.139, our CIF is 0.997 and our CMIN/DF is 1.766.

In order to check for multicollinearity issues among our variables, we followed Hair et al. (2016) and examined whether there are bivariate correlations above 0.90 or several bivariate correlations above 0.70. The highest correlation among our variables is 0.616, as seen in the correlation matrix in Table 2. Thus, we concluded that there are no multicollinearity problems.

Table 2. Descriptive Statistics and Correlation Matrix.

	Mean	S.D.	CR	AVE	MSV	MaxR(H)	BS	CBM	BMI	TBM	Digi	RBM
BS	2.663	0.667	0.824	0.609	0.325	0.824	0.781					
CBM	2.354	0.485	0.886	0.53	0.323	0.901	0.357	0.728				
BMI	2.636	0.647	0.882	0.601	0.325	0.893	0.57	0.458	0.776			
TBM	2.481	0.697	0.884	0.66	0.312	0.934	0.441	0.488	0.559	0.812		
Digi	3.367	0.597	0.807	0.516	0.124	0.831	0.301	0.217	0.299	0.352	0.718	
RBM	3.256	0.721	0.748	0.598	0.323	0.752	0.269	0.568	0.439	0.385	0.243	0.773

Notes: Square-root of AVEs are in the diagonals.

5. Results

We tested our hypotheses through a Structural Equation Model based on our theoretical model with SPSS AMOS v25. Prior to this test, we tested for outliers through a Cook's distance analysis, and we did not find influential outliers in our set of predictor variables (all below 0.05). Two popular methods used to detect mediation are the Sobel test (Sobel, 1982) and the causal approach utilized by Baron and Kenny (1986). However, the Sobel test has often been criticized because it requires that the sampling distribution of the indirect effect should be normal, while the causal approach has been criticized because of low statistical power (Fritz & MacKinnon, 2007; Hayes, 2009). We followed the indication to use bootstrapping (Hayes, 2009), especially when the sample is large enough ($n=250$), reducing the risk of committing a type 1 error, which is a criticism of this technique (Koopman et al., 2015).

We undertook our mediation test using the AMOS SPSS v25, using 2,000 bootstrap samples, maximum likelihood estimators, a bootfactor of 1 and 95% bias-corrected confidence intervals. Overall, this structural mediation model explains the data well ($\chi^2 = 10.274$, $\chi^2/df = 3.425$, $p = 0.016$, CFI = 0.987, RMSEA = 0.099, SRMR = 0.048). Digitalization explains the medium level of variance in boundary size ($R^2 = 0.125$), which in turn explains medium levels of

variance in boundary management variables (TBM, $R^2 = 0.245$; CBM, $R^2 = 0.166$; RBM, $R^2 = 0.113$). Altogether, they explain the relatively high variance in BMI ($R^2 = 0.566$).

Table 3. Structural model assessment.

Constructs	R^2		
Boundary Size (BS)	0.125		
Technological Boundary Management (TBM)	0.245		
Cultural Boundary Management (CBM)	0.166		
Relational Boundary Management (RBM)	0.113		
Business Model Innovation (BMI)	0.566		
Relation	Beta	<i>t</i> values	<i>p</i> values
Digi – BS	0.354	5.966	0.001
BS – TBM	0.430	7.581	0.001
BS – CBM	0.407	7.039	0.001
BS – RBM	0.335	5.618	0.001
BS – BMI	0.414	8.402	0.001
TBM – BMI	0.275	5.227	0.001
CBM – BMI	0.044	0.735	0.462
RBM – BMI	0.223	3.990	0.001

Our results indicate significant direct effects of digitalization on boundary size (H1 – 0.354***), of boundary size on technological (H2a – 0.430***), cultural (H2b – 0.407***), relational boundary management (H2c – 0.335***), and BMI (H3 – 0.414***). Therefore, our data supports hypotheses 1, 2a, 2b, 2c and 3. Our analysis also shows that technological (H4a – 0.275***) and relational boundary management (H4c = 0.223***) have significant direct effects on BMI, while cultural boundary management (H4b) does not demonstrate a significant effect. Therefore, we reject hypothesis 4b while supporting hypotheses 4a and 4c.

Regarding indirect effects, we tested mediation of TBM, CBM and RBM in the relationship between boundary size and BMI. Our results show that TBM and RBM mediate this relationship, with an effect of 0.114 ($p = 0.000$) and 0.072 ($p = 0.000$) respectively, while the indirect effect of CBM was not significant. We also did a post-hoc power analysis which showed that our analysis has very good statistical power (Observed statistical power = 1.0, $p = 0.05$) to detect existing significant effects. Hence, we are confident that the insignificant effect of CBM on BMI is truly

insignificant. Our results for the indirect effects support hypotheses 5a and 5c and reject hypothesis 5b.

6. Discussion

The results of this study confirm the proposed theoretical model which links competitive dynamics and trends deriving from digitalization with the changes of SMEs boundaries' size and management (Berglund & Sandström, 2013; Cohen & Kietzmann, 2014; Levina & Vaast, 2017). Indeed, the findings demonstrate how interaction between the analyzed variables effects BMI, and thus contribute to a better understanding of the main role of boundary management capabilities for BMI in SMEs.

The defined theoretical model tested confirms most of the research hypotheses. The results supporting H1, indicating that digitalization affects the companies' boundary size, allow us to assert that also for SMEs the digital technologies shift attention to new forms of strategic development in which boundaries are the site of new value creation and value appropriation pathways. In particular, as the literature suggests, new competitive contexts and digital convergence are able to develop intra and inter-organizational boundaries that shift the attention of firms to the business processes periphery (Porter & Heppelmann, 2015; Schotter et al., 2017; van Gils & Rutjes, 2017). This result supports the concept that digital innovations increase firms' boundary size; therefore, our findings suggest that digital technology developments do not make boundaries disappear, rather they change and increase boundaries' relevance (Caputo, Fiorentino, et al., 2018; Garzella, 2000).

The results supporting H2 demonstrate that the boundary size of SMEs affects technological, cultural and relational management capabilities. In this perspective, we confirm the

argument of previous studies which claims that managing boundaries requires a set of capabilities that guarantees balance and harmony between various internal and external forces and resources (Fiorentino, 2016; Schotter et al., 2017). To manage effectively, it is necessary to invest in personnel management attitudes, thus highlighting the importance of governing relational, cultural and technological factors.

The results supporting H3 validate that, in the context of SMEs, boundary size positively affects BMI. Some authors have already stated that a firm's size is a variable influencing value capture from business models (Bouncken & Fredrich, 2016; Dooley et al., 2016). We add that boundary size enlargement is an element enhancing the permeability of firms' boundaries and pushing SMEs towards the implementation of innovative business models (Anwar, 2018; Dilger, 2016).

Moreover, results related to H4 pertain to the role of management and boundary managers in developing BMI. According to the literature, what emerges is the relevance of using all relational, communicational, technological and technical capabilities that we can consider as dynamic capabilities at the boundary level (Teece, 2018). This scenario is significant when SMEs cannot self-generate the innovation needed to effectively respond to market needs, often due to a lack of funds. Additionally, through the results of H5, we assert that technological and relational management capabilities have a mediating role in affecting the correlation between SMEs' boundary size and BMI.

On the contrary, cultural boundary management (CBM) capability is not confirmed as positively affecting BMI. The results of our empirical analysis reject H4b and H5b, which consider the relationships between CBM capability and SMEs' BMI. These results regarding the mediating role between boundary size and BMI deserve an in-depth discussion as they are quite

counterintuitive. Digitalization forces are found to be positively related to CBM capability; hence, such pressures help CBM development. However, the cultural aspect of boundary management does not play any role in supporting the innovation of the business model. Considering the determinants of BMI, the changes in boundary size and the expansion of the boundary area have been confirmed as relevant, together with the push of digitalization. In this context, only relational and technological capabilities prove relevant, while cultural variables – such as entrepreneurship, creativity, leadership - are not significantly correlated to boundary size and BMI.

We note how the specific focus of the research relates to the understanding of why the hypotheses related to cultural capability are rejected. This could be explained by the specific context of SMEs. Digitalization has led to an expansion and a review of firms' boundaries such as to impose a rethinking of the business model. Technological and relation boundary management capabilities are relevant, while factors such as entrepreneurship, creativity, and leadership skills (CBM capabilities) do not seem to impact BMI. Nevertheless, it could be possible to argue that, unlike prior studies, SMEs face BMI issues by taking the “starting” input from elsewhere. For this reason, SMEs should attend to relational and technological boundary capabilities, in order to be linked to the “real” business model innovators more than to entrepreneurship, creativity and innovation. Therefore, most SMEs might transpose, based on relational boundaries and technological skills, the changes in the business models that larger firms have introduced. An alternative interpretation of the findings showing a lack of correlation between CBM and BMI could argue that management of CBM capabilities is less relevant for BMI due to a lack of internal relational and technological capabilities in SMEs on the one hand, and due to internal cultural capabilities are already well grounded in SMEs on the other.

7. Conclusions

This paper enriches the literature on BMI, innovation in SMEs and boundary management by confirming the relevance of boundary size and capabilities to the elaboration and implementation of innovative BMs in the SMEs context. Firstly, our study contributes to the growing literature on boundary management within the field of business models by presenting one of the first empirical research projects on this topic. Furthermore, this study contributes to the body of knowledge on innovation in SMEs by providing new insights on the differences between SMEs and large organizations. Finally, our project opens the door for future studies to deepen the investigation into the role of CBM capabilities. In particular, future scholars could test arguments that claim CBM capability is not relevant for BMI in SMEs.

This study also offers important practical implications. Our findings should push SMEs to give even more attention to how boundaries are impacting their business models currently and in the future. SMEs can make central in their strategy the management of the boundaries and the development of boundary management capabilities, also by exploiting the opportunities offered by digital technologies. Therefore, enlargement of boundary size affects the organization of the supply chain and results in new ways of creation and appropriation of value. Moreover, as outputs, SMEs obtain also the reduction of risks and funding issues because the enhancement of boundary management capabilities amplifies the creative process and leads businesses to overcome fundamental challenges on their digital transformation implementing innovative business models.

One limitation of our study is that it is a single country study of Italy. Nevertheless, our sample size is robust, the response rate is 11%, and the respondents are professionals also engaged in international debate. Another limitation of our research is that our study is cross-sectional; future studies should examine a longitudinal effect of boundary management capabilities on BMI.

In sum, our study demonstrates a close correlation in changes and the expansion of boundary size with digitalization and the implementation of innovative business models. Boundary management stands out as a relevant issue in current competitive contexts, highlighting the need for a paradigm shift in regards to the management of resources which neither internal nor external and can be physiologically placed in the boundary area.

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