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ICT-DRIVEN BUSINESS MODEL INNOVATION IN SMEs: THE ROLE OF ORGANIZATIONAL CAPABILITIES, FIRM SIZE AND AGE

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Abstract Research has shown that business model innovation (BMI) can create competitive advantages and enhance firm performance. However, many small and medium-sized enterprises (SMEs) fail to supreme their performance. BMI can create unexpected consequences for businesses and their ecosystem. Therefore, knowing how and under what circumstances BMI affects a firm's performance is a primary concern for managers/owners of SMEs. Using data from 460 European SMEs, this paper aims to examine three paths through which ICT-driven BMI can impact firm's performance. Introducing organisational capabilities as a mediator, this study has extended prior literature on BMI by showing that organisational capabilities are as strong as other existing mediators of revenue and efficiency growth regarding improving the firm's performance. The findings provide guidelines for practitioners to execute informed-decisions about the implementation of BMI based on their firm's strategies and the available capabilities while considering contingent factors of firm size and age.

Keywords:
business
model
innovation,
digital
transformation,
firm
performance,
mediating
factors,
organizational
capabilities,
SME

1 Introduction

Performance improvement is at the heart of any firm, and according to scholars (Hartmann et al., 2013; Karimi and Walter, 2016) BMI positively contributes to firm performance. Some classic examples of innovation in BMs and their association with the firm's performance are Dell, Wal-Mart, Uber, and Southwest. All these companies developed a novel BM by either introducing or reorganising key components of their BM. The changes to core components or to the architecture of a firm's BM (Nair et al., 2013), in comparison to innovations in product, service, and process, have been associated with high risk and uncertainty (Chesbrough, 2010; Waldner et al., 2015). So, if not handled properly, a well-formulated BM may fail to lead to improved performance (Chesbrough, 2010; Knab and Rohrbeck, 2014). Christensen et al. (2016) revealed that more than 60% of BMI efforts did not deliver the expected performance. So BMI can have both positive and negative outcomes. Hence, knowing how and when to innovate a BM is a serious challenge for managers/owners of firms (Hartmann et al., 2013).

In this paper, we focus on '*how*' firms exploit or modify their BMs to improve their overall performance. Therefore, we have two objectives: (a) to develop and examine a conceptual framework that illustrates the complex mechanisms through which implementation of strategic BMI decisions related to a focus on efficiency or growth, as well as organizational capabilities, influences a firm's overall performance, and (b) to explore whether specific characteristics of the firm (i.e., size, age) have a different impact on performance.

We contribute to the BM literature in three ways. First, by examining the proposed model using empirical data, we contribute to both the practical knowledge and theoretical enrichment. Second, by considering the mediating effect of organizational capabilities, this research attempts to understand how managers can ensure that BMI provides more benefits to their firms in terms of performance. Third, by focusing specifically on SMEs, we contribute to the body of knowledge on BMI in relation to SMEs.

This paper is structured as follows. First, a systematic literature review on mediating factors between BMI and performance is presented. The research method is then described. Next, the research results are presented. The paper ends with some conclusions, a discussion of limitations and suggestions for future research.

2 Literature Review and Hypotheses Development

A business model, which uses as a tool to communicate and implement strategic choices, is seen as a realized expression of strategy and articulates how available resources can be used more effectively, how costs can be managed and reduced, and how new sources of revenues can be leveraged (Chesbrough, 2007). Although a significant number of companies have gained advantages from BMI, there are many more that have performed extremely poorly, failed to meet their objectives or even exited business.

To explore the causal mechanism, our in-depth analysis of 37 articles resulted in 12 distinct mediating factors through which the BMI indirectly influences a firm's overall performance. Analysing the factors, we found that some mediators mainly were related to generating revenue by increasing the firm's sales, by a combination of exploring new markets, new customers and new value propositions, and by new ways of service, product and price bundling; we, therefore, called them '*Revenue growth*.' Other mediators focus on efficiency – that is, by introducing new ways to minimise cost, increasing productivity, or reducing time to market – are referred to as '*Efficiency growth*.' The last two foci, were related but not identical to the design of efficiency- and novelty-oriented BMs as highlighted in BMI literature (Heikkila et al., 2018; Zott and Amit, 2008).

However, we identified some more generic mediators that do not belong to mediators related to revenue or efficiency growth groups, e.g., organisational learning, opportunity recognition, organizational culture; these mediators enable companies to increase their revenue and efficiency. We called this group of concepts '*Organisational capabilities*', which is vital to long-term performance of business, since a culture of openness and knowledge sharing reinforce a high level of cooperation within the firm and its associated network and contribute to a firm's readiness to change, and in particular to its ability to survive in the longer term, rather than merely achieving short-term growth (Latifi et al., 2021).

Scholars and practitioners agree that the BM is vital to, for example, the success of organisations, and especially to those that wish to grow (Teece, 2010), to gain competitive advantage, to enhance long-term performance (Bock et al., 2012) and as a new source of innovation (Zott, 2011). However, recent studies have produced inconclusive results when testing the strength of the relationship between BMI and firms' performance in different regions and industries. We, therefore, to examine whether BMI impacts the performance of SMEs in the European context, propose the following hypothesis:

H1: If an SME engages in BMI, its overall performance will improve.

Heikkilä et al. (2018) stress that BMI influences firm performance occurs when there is a strategic focus on efficiency. Their findings confirm the research by Zott and Amit (2007) on the impact of efficiency-centred BM design on a firm's overall performance. BMI can take ICT ventures to complete their transactions efficiently, by reducing transaction costs within the firm and with its outsiders (Ladib and Lakhal, 2015). According to Chesbrough (2007), BMI leverages performance not only by reducing production costs but also by utilising available resources more effectively. Gronum et al. (2016) and Wei et al. (2017) also found that BM designs that focus on efficiency enhance a firm's performance by reducing inventory costs – thus benefitting both customers and suppliers – and decreasing marketing, sales, and other communication expenditures. In light of this, we propose the next hypothesis:

H2: Efficiency growth mediates the relation between BMI and an SME overall performance

However, the focus can also be on implementing a growth strategy by attracting new customers and expanding the firm's markets (Heikkilä et al., 2018). Some scholars argue that BMI, through the creation of new value propositions (Teece, 2010; Wei et al., 2017) or opportunity recognition (Guo et al., 2017) can attract new customers by exploring a market niche not addressed by competitors (Zott and Amit, 2007). These could occur via new ways of market penetration or new ways of market development. Moreover, BMI by combining existing and new channels in a smart way can create new value (Ladib and Lakhal, 2015). Based on this review, we propose the following hypothesis:

H3: *Revenue growth mediates the relation between BMI and an SME's overall performance*

The capacity to innovate is seen as one of the key factors that improve business performance (Burns and Stalker, 1966). An organisation's culture – norms, values, and beliefs as expressed within the organisation – can boost behaviour that is ultimately related to business performance (Hult et al., 2004). A culture that supports the implementation of a strategic attempt and encouraged by the enthusiastic support of all employees is not easy to imitate and can lead to a sustainable competitive advantage (Anning-Dorson, 2017). A large number of studies found a significant relationship between firm innovativeness and performance in different types of organisations (Rubera and Kirca, 2012). Hult et al. (2004) concluded that innovativeness appeared to be a key mediator in their empirical research. The role of opportunity-sensing and seeking behaviour in BMI has also been emphasised in several studies (Chesbrough, 2010). Several studies investigated the direct effects of corporate entrepreneurship on performance (George and Bock, 2011). However, BMI as a mediator of the relationship between corporate entrepreneurship and a firm's performance was also considered by Karimi and Walter (2016). So the concepts might have a direct or a mediating effect, here we consider entrepreneurship as belonging to this group of mediators. We, therefore, propose to consider organisational capability, as discussed for innovativeness, opportunity recognition, and culture, as an alternative group of mediating factor:

H4: *Organisational capabilities mediate the relation between BMI and an SME's overall performance.*

A summary of the identified mediating factors that indirectly affect the relationship between BMI and a firm's overall performance is presented in the Appendix. Figure 1 illustrates the proposed conceptual research model, which is based on the literature review.

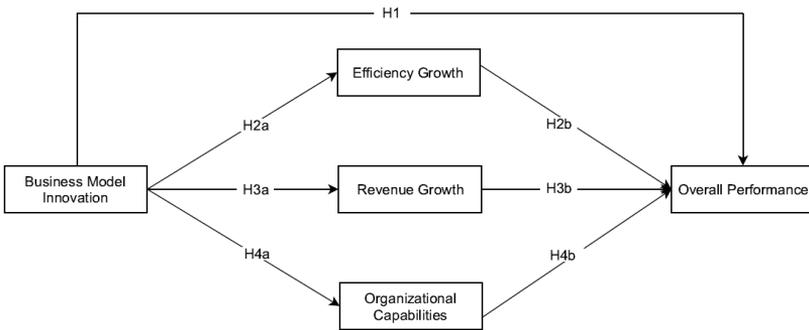


Figure 1: Research conceptual model: BMI mechanism to boost firms’ performance

3 Research Method

An extensive literature review in the domains of entrepreneurship, innovation management, and BMs was conducted to assemble a comprehensive list of reliable measures. The research constructs were measured by using existing items in the literature. Since firm size and firm age could impact the relationship between BMI and firm’s overall performance (Hartmann et al., 2013; Zott and Amit, 2007), it is appropriate to account for their impact on the path relationships identified in Fig.1.

3.1 Survey administration, sample and data collection

This study's population are European SMEs in any industry engaged in business model innovation in the previous 24 months and used ICT to enable their product and service offering. The sample was based on Dun and Bradstreet’s database. Firms were randomly selected from this sample frame an established quotas for micro-enterprises, small and medium-sized enterprises resulting in a final distribution of 36%, 32%, and 31%, respectively. Data was collected by a professional research agency that uses native speakers and computer-aided telephone interviewing. The final dataset contains 460 SMEs in 17 different industries in 13 European countries engaged in BMI. The questionnaire was based on the previously mentioned scales and was pretested in each of the 13 countries by reading aloud to managers and academics to improve the clarity of the questions and to prevent any potential ambiguous expressions.

4 Data analysis

All constructs fulfill the requirement for Cronbach's alpha, i.e., 0.70 or higher (Hair et al., 2014) and for composite reliability (CR) (0.70 or higher) (Table 1). Convergent validity is represented by average variance extracted (AVE), which is recommended to be at least 0.50 (Hair et al., 2011). (Table 2). Discriminant validity guarantees the uniqueness of a measuring construct and indicates that the phenomenon of interest is not captured in other measures (latent variables) within the research model (Hair et al., 2010). For assessing discriminant validity, an alternative criterion is HTMT. An HTMT value close to 1 indicates a lack of discriminant validity. The HTMT values are lower than 0.85. We, therefore, conclude that discriminant validity is not an issue.

5 Results

To test the hypotheses, we employed structural equation modelling (SEM) using SmartPLS v.3 software. The mediation analyses with regard to three variables, namely efficiency growth, revenue growth, and the organisational capability, were also computed. Additionally, a multi-group analysis was conducted to evaluate the role of control variables (i.e., firm size and age).

In the path model analysis, the firms' overall performance is explained by a variance of 30%, and the three mediators – namely efficiency growth, organisational capabilities, and revenue growth – are explained by a variance of 24%, 27%, and 37%, respectively, in the model. Consistent with our expectations, the direct path

Table 1: Descriptive statistics, convergent validity, consistency and reliability of items

Constructs	Items	Factor Loadings	t-statistics	Cronbach's alpha	CR	AVE
Overall performance	The sales growth of the enterprise	0.82	48.40	0.91	0.93	0.65
	The profit growth of the enterprise	0.83	53.41			
	Market share	0.75	26.16			
	Speed to market	0.71	26.37			
	Penetration rate	0.77	33.73			
	Market value	0.79	42.02			
	Net income	0.81	37.51			
	Return on Investment (ROI)	0.79	34.67			
Business model innovation	Introduced new products as a new value proposition	0.72	16.52	0.73	0.81	0.54
	Introduced new services as a new value proposition	0.74	21.80			
	Started to collaborate with new business partners	0.66	15.25			
	Shared new responsibilities with business partners	0.67	13.82			
	Created new revenue streams	0.71	12.61			
	Introduced a new pricing mechanism	0.69	12.61			
	Focused on a completely new market segment	0.76	21.23			
Revenue growth	Introduced new ways to transact with customers	0.70	25.47	0.75	0.83	0.60
	Introduced new ways of organising relations with customers	0.73	30.14			
	Advertising products and services in a new way	0.71	26.26			
	Scale up your business	0.71	27.98			
	Focus your product offering	0.70	18.40			
Efficiency growth	Introduced new ways to reduce fixed costs	0.71	13.71	0.71	0.82	0.54
	Introduced new ways to reduce variable costs	0.72	14.85			
	Business processes standardisation	0.81	29.99			
	Business processes integration	0.82	34.42			
Organisational capabilities	Managers encourage employees to think outside the box	0.76	21.41	0.87	0.90	0.53
	Our corporate culture is focused on constant innovation	0.78	33.96			
	Our enterprise shows perseverance in turning ideas into reality	0.74	28.08			
	Our enterprise ability to identify new opportunities	0.76	34.13			
	Our enterprise aims to create multiple innovations annually	0.78	37.25			
	Our enterprise introduces innovations that are completely new to the market	0.75	36.02			
	Creating more than one innovation at the same time is common practice in our enterprise	0.73	31.11			

Note: CR = Composite reliability; AVE = Average variance extracted

between BMI and the firm's overall performance is significant (in the absence of mediators); thus, H1 is supported by the model ($\beta = 0.41$, $t = 10.52$, $p < 0.001$). However, this direct path between BMI and the firm's overall performance is not significant when the three mediators are included in the analysis. As shown in Figure 2, all six paths from BMI to efficiency growth, revenue growth, and organisational capabilities, and from these mediators to the firm's overall performance, are statistically significant ($p < 0.001$).

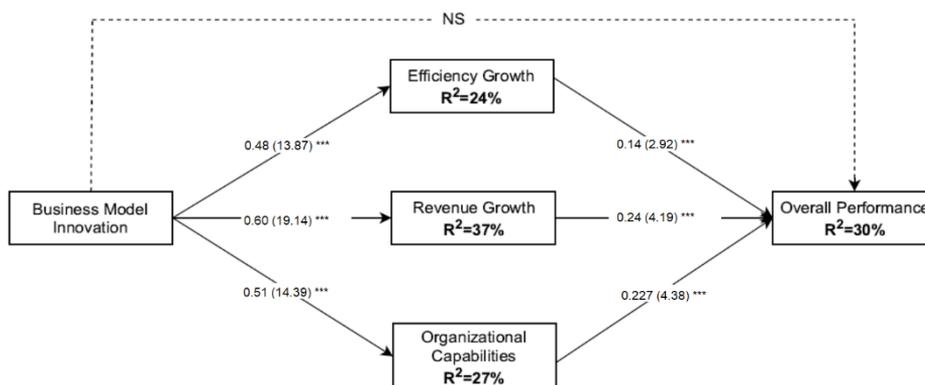


Figure 2: Structural model results (Significance levels: * $p < 0.001$, and NS means not significant)**

Mediation analysis showed a significant direct relationship between BMI and the firm's overall performance. Therefore H1 was supported confirming that the independent variable (BMI) is a significant predictor of the dependent variable (firm's overall performance). Satisfying this condition provides the ground to test the mediation relationship between BMI and the firm's overall performance. Based on the SEM results, when the mediators are included in the analysis, the direct path between BMI and overall firm performance is not significant (see Figure 2). Moreover, as we hypothesized, the mediation test results show that the path between BMI and the firm's overall performance is fully mediated by three variables (i.e., efficiency growth, revenue growth, and organisational capabilities) in our proposed model. The individual effects of each mediator can be seen in Table 2; thus hypotheses H2, H3, and H4 are supported by the model.

When considering the size of firms, in our multi-group analysis, we found a significant direct relationship between BMI and overall performance for different sizes. Table 3 shows that the mediation effect of efficiency growth is significant only for micro-sized firms, and revenue growth mediates the relationship between BMI and the overall performance of both small and medium-sized firms. However, firm

Table 2: The mediation results between BMI and a firm’s overall performance

Mediation paths	β	t-Statistics	p-values	Mediation
BMI → Efficiency growth → Overall performance	0.07	2.91	0.005	Full
BMI → Revenue growth → Overall performance	0.14	4.15	0.001	Full
BMI → Organisational capabilities → Overall performance	0.12	4.29	0.001	Full

size has no significant effect on the mediation of organisational capabilities; therefore, organisational capabilities mediate between BMI and performance in firms of all sizes.

Table 3: The effect of firm size on mediation relationships

Paths	All Firms	Contingency factor: Firm Size		
		Micro	Small	Medium
BMI → Efficiency growth → Overall performance	0.07 (2.91) ***	0.09 (2.47) **	NS	NS
BMI → Revenue growth → Overall performance	0.14 (4.15) ***	0.18 (2.71) **	0.14 (2.70) **	0.17 (2.67) ***
BMI → Organisational capabilities → Overall performance	0.12 (4.29) ***	NS	0.23 (4.77) ***	0.16 (2.61) ***

NS = Not Significant

Considering firm age as a moderator, none of the three factors mediate the relationship between BMI and the firm’s overall performance in newly-established firms. While efficiency and revenue growth mediate the path between BMI and firm’s overall performance for young and well-established firms, the organizational capabilities mediate this relationship solely in well-established firms (Table 4).

Table 4: The effect of firm age on mediation relationship

Paths	All Firms	Contingency factor: Firm Age		
		Newly-established	Young	Well-established
BMI → Efficiency growth → performance	0.07 (2.91) ***	NS	.12 (2.26) **	.07 (2.28) **
BMI → Revenue growth → Performance	0.14 (4.15) ***	NS	NS	.15(3.76) ***
BMI → Organisational capabilities → Performance	0.12 (4.29) ***	NS	0.12 (2.24) **	.13(3.79) ***

NS: Not Significant

6 Conclusion

This study proposes a model that would enable researchers and practitioners to understand causal mechanisms through which business model innovation (BMI) influences firm performance, specifically when SMEs which use digital technologies are concerned. Our findings contribute to the literature and confirm that ‘efficiency growth,’ ‘revenue growth,’ and ‘organisational capabilities’ are relevant mediators for SMEs that engage in BMI to increase firm’s overall performance. We contribute to the literature by considering organisational capabilities as a mediator between BMI and firms’ overall performance. The research findings also enhance our understanding by demonstrating the importance of firm size and age as moderators between BMI and SME performance. However, we did not find any significant difference in the influence of the contingency factors of firm size and firm age on the direct relationship between BMI and firms’ performance; the results showed that well-established firms achieve better performance through developing organisational capabilities by doing BMI. Moreover, efficiency improvement is not the primary goal of newly-established firms (start-ups) that implement BMI to improve performance, although it is for young (scale-up) and well-established firms.

Although various organisational capabilities exist, we investigated only the entrepreneurial orientation, innovativeness, and organisational culture. However, other capabilities that might mediate the relation between BMI and performance – for example, employees’ training and leadership style – are worth further investigation. Furthermore, the focus of the present study was on exploring mediation factors, and only a limited number of contingency factors (i.e., firm size and firm age) were taken into consideration. In particular, we did not take into account the industry characteristics or the BMI implementation skills within firms, for instance, employees’ knowledge and skills, management support and the use of

BMI tooling (Latifi and Bouwman, 2018). This could be an interesting avenue for further research.

Our results have implications both for the academic literature on BMI and for practitioner discussions. First, by considering mediating effects, the model elucidates how managers can ensure that BMI brings more benefits to their firms in terms of performance. Second, by examining the proposed model using empirical data from 17 different industries in 13 European countries, we could add practical knowledge along with theoretical enrichment. Third, by focusing specifically on SMEs, we contribute to SMEs' knowledge of BMI. Fourth, by taking into account the influence of firm size and age on the relationship between BMI and the performance of firms, we provide insight that the owners/managers of firms need to carefully assess their specific situation in order to take appropriate measures to improve the effect of BMI on performance and to choose a focus on growth or efficiency to exploit all benefits of BMI efforts fully. Moreover, managers need to be aware of the organizational capabilities related to BM Innovation. This also clarifies that generic advice of consultants or training programs on BMI needs to take differences in foci as well as capabilities, age, and size into account. More tailored programs are advisable.

This study also has some limitations that should be considered when interpreting the findings. First of all, although cross-sectional data are used extensively in business and management research, such data represent a single point in time and hardly allows the cause and effect or the impact of changes over time to be determined. Second, although the respondents – mainly the firms' top managers/owners – possessed a high degree of relevant knowledge, all of the measures were self-reported using a self-assessed scale, which may represent a potential source of common method bias. Future research should collect objective measurements to eliminate common method bias.

While the business world is constantly changing in terms of technology, regulations and customer's needs, we believe that these results advance BMI research by opening the black box of the causal relationship between BMI and a firm's overall performance to better understand the BMI phenomenon, how it works and how we can gain the greatest benefit from it. We hope that our work leads to improved managerial practices and helps future research to probe more deeply into these constructs in small and medium-sized firms.

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