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PUTTING BUSINESS MODELS INTO PRACTISE: THE INFLUENCE NEW STRATEGIES HAVE ON EXISTING OPERATIONS

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ABSTRACT

Business models (BMs) help firms to translate abstract strategic decisions into their daily operations. Because BMs mediate between strategy and operations, BM Innovation involves both high-level strategic experiments and low-level implementation Into operations and technologies. However, most existing empirical studies regarding BM innovation focus exclusively on strategic management and marketing theory. This article examines whether the performance implications of BM experimentation are mediated by the time and effort spent on implementing BMs into operating models and enterprise architectures. We adopt an empirical approach, by analyzing the results of a large-scale, representative survey among European small and medium-sized enterprises (SMEs). In line with the existing literature, the research confirms that spending time and effort experimenting with new BMs has a positive impact on the firm performance. An important new finding is that impact is in part mediated by BM implementation (L.e., translating new BMs into operating models and enterprise architectures). This article provides empirical support for the argument that BM innovation is not just a matter of strategic thinking and experimenting with BM components and BM architecture, but that is also involve aligning BMs to operations and enterprise architectures. Our findings call for future research into the process of BM innovation from a business modeling, an enterprise architecting and engineering management perspective, with a focus on information exchange, business processes, and supporting IT applications and infrastructure.

I. INTRODUCTION

WHILE established firms increasingly spend time and effort innovating their business models (BMs) [1]-[3], they often struggle to implement their new BMs in their daily operations [4]. BMs describe how firms create, deliver, and capture value from their (technological) resources and operations [5]. A BM can be seen as a snapshot implementation of a firm's strategic direction [6]-[8], whereas a BM in itself is implemented into the operations and processes of the firm [9]. In other words, BMS mediate between high-level firm strategy on the one hand, and low-level technical implementation on the other. Earlier studies show that established firms often struggle to align their operations, architectures, and technologies to their newly designed BMs [4], [10]. These problems become more evident when digital transformation forces firms to reconsider their BMs [11].

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To understand why BM innovation (BMI) may not produce the desired outcomes, it is important to understand the implementation process of new BMs. Given the mediating role of BMs between strategy and processes, such an understanding should include everything from strategy inception to low-level implementation. However, the BMI strategic management literature focuses only on the first part (i.e., translating strategies. into BMs) and largely ignores how BMs are implemented into processes and operations, e.g.. [6]. Furthermore, as suggested by Van Putten et al. [12] and Lindner et al. [13], most studies adopt a static perspective on BMI, and rarely consider BMI as a dynamic process [14]. It is only recently that scholars have begun to explore the process of BMI, focusing on the dynamic interplay between high-level strategy and BMs [15]-[18]. Those studies that do adopt a dynamic perspective on BMI tend to focus exclusively on the strategic aspects, e.g.. [19], [20], as they analyze the process through which firms come up with new, creative BMs [21], [22]. As a result, there are very few studies that adopt both a dynamic or process perspective on BMI and consider the implementation of BMs into processes and operations.

The aim of this article is to examine the effect of BMI on the business performance of small and medium-sized enterprises (SMEs), with a particular focus on the analysis of the performance implications of (strategy-level) activity in BM experimentation (BMEX) versus (operational-level) BM imple- mentation (BMIM). Within BMIM, two interrelated aspects of a firm's operations are taken into account, i.e., 1) the operating model (OM), which revolves around the translation of opera- tional strategy on process levels within and between involved key partners in BMI, and 2) the enterprise architecture (EA), which focuses on the implementation of a technical strategy [23]. As such, the main research question is as follows.

TABLE I
RELATED WORK ADDRESSING BMI AS A PROCESS

BMI activities	Approach	Reference
Design, Implementation	Linear	[45]
Idea generation, Model articulation, Risk identifi- cation and task prioritization, Experimentation	Linear, Stage-gate	[46]
Six-step approach	Linear	[47]
Concept design, Detail design, Implementation	Linear	[48]
Design, Execution, while considering the "Three A's": Aligned, Analytical, Adaptable	Semi-structured	[49]
Experimentation based on BM CANVAS elements	Semi-structured	[50]
Execution innovation development	Semi-structured	[51]
Experimentation	Semi-structured	[52]
Experimentation, in front-end (externally-oriented) and back-end (internally-oriented) innovation	Mixed approach	[53]
Tooling, Idea generation	Method and tool oriented	[54]
Multi-step, through "Drifting" and "Leaping"	Learning trajectories	[55]

To answer the research question, data are analyzed from a survey among a representative sample of SMEs that recently changed their BM. SMEs are firms with fewer than 250 employ- ees and a turnover below € 43 million. Although they represent a relatively heterogeneous group, SMEs contribute to the job and wealth creation and economic performance. However, unlike large companies, they have limited financial, technical, and human resources, limited access to relevant knowledge and R&D facilities, skills, and learning capabilities, and often struggle to align information technology with business practices. As a result, they have a hard time implementing common applica- tions, such as social media and big data (analytics), as well as more complex innovations related to digitalization, for instance, robotics, Internet of Things, augmented reality, and deep learn- ing, in their BMs, daily operations and information technology.

This article sheds light on how strategic-level BM experiments and operational-level BMIM efforts contribute to the firm per- formance, which is important to justify new studies into issues involving BMIM, in addition to existing research on BMEX and strategy-making. This article also provides an empirical contri- bution, in light of the fact that the increasing interest in BMI in SMEs (e.g.. [19], [20], [24]-[27]), by collecting and analyzing primary data on a large, representative sample of European SMES engaged in BMI, where existing quantitative empirical studies on the process of BMI rely on proxies from available secondary data [28], [29] or retrospective expert validation [30].

The rest of this article is organized as follows: A the oretical background on BM, BMI. EA, and OM is pro- vided in Section II. while hypotheses are developed in Section III Section IV addresses the method of the study. followed by the results in Section V The findings are discussed in Section VI and Section VII concludes this article.

II. BACKGROUND

A. Business Models and Business Model Innovation

Despite more than 20 years of BM research, the debate is still ongoing as to what constitutes a BM and what are its components [31]-[35]. Several scholars have attempted to come up with an overview of the existing literature and provide insights into different BM typologies and classifications [33], [35]. A central element in most definitions is that BMs describe how a firm creates value [36] and captures value [37], [38]. Some authors mention value delivery as an additional element [5], [39]. In this article, a BM is defined as the description of how a firm creates, delivers, and captures value.

The notion of BMI is also ambiguous. Foss and Saebi [31] mention four ways in which BMI is being discussed. First, schol- ars see BMI as a new source of innovation, in addition to process, product, and organizational innovation (e.g., [40]). A

second ap- proach views BMI as an organizational change process compris- ing different phases [41], while a third approach focuses on the outcome of BMI, describing examples of innovative BMs within a certain context [42], and the fourth approach addresses the performance-related implications of BM [43], which is also the approach adopted in this article. Against this background, BMI is defined as "the activity of designing, i.e., creating, implement- ing, and validating a BM that is new-to the firm" [3]. Within this definition, BMI is seen as a process rather than a single act producing a discrete change (i.e., the redesigned BM). BMI is a continuous, dynamic innovation process that requires companies to invest time and resources in changing their BM [44].

Table I provides an overview of related work that studied BMI as an innovation process.

Within an innovation process-perspective to BMI, scholars consider different activities and resources to constitute BMI dimensions [52], [56]. Although most studies describe distinct phases of activities, others have argued that, in practice, these activities take place in parallel [55] and there are many iter- ations [18]. Relatedly, there is still debate on whether BMI occurs through cognition, action or both [55]. This article con- siders BMI as a forward-looking, innovative learning process. in which experimentation forms the basis for implementation [56]. While this may be a simplification of reality [15], [55]. this approach is in line with the dominant discourse in the literature [31].

Within the forward-looking process perspectives on BMI, some studies conceptualize BMI as a linear process. Enkel and Mezger [45] distinguish a design and an implementation phase, while others separate the design phase into concept design and detail design [48]. Mentink proposes a circular BMI framework consisting of initiation, ideation, integration, and implementa- tion [57].

Another set of studies adopt a semistructured approach to guide the BMI process. This can involve questioning techniques and experimental trial-and-error loops [58]. In this regard, schol- ars have argued in favor of active experimentation and propose the use of the nine elements of BM CANVAS as a template [50]. Sinfield and colleagues [52] discuss questions that can be used to guide the creative BMI process. Günzel and Holm [53] divide BMI into two innovation activities, which they refer to as front-end and back-end BMI, and argue that there is a need for a mixed approach. Finally, there are some scholars who focus

on the methods and tools that facilitate the BMI process [54]. [59]. The latter proposes tools to evaluate the feasibility of BMs. creative methods that can be used for systematic idea generation and tooling with a focus on the implementation of BMI. Although there are various ways in which the BMI process can

be conceptualized, there are two phases that appear to reoccur in most of the work: (1) a design/experimentation phase, followed by (2) an implementation/execution phase. These are also two distinct phases that are core elements of the conceptualization of BMI in this article.

B. BM Experimentation

McGrath [15] argues that it is necessary to experiment to dis- cover new BMs. Others argue that experimentation is a phase that precedes actual changes in the BM [22], which helps generate new BM ideas [60]. It is argued that experimentation encourages firms to start with business transitions and helps evaluate estab- lished business components [22]. Christensen [61] emphasizes the importance of allocating resources to new innovative projects with new experimental BMs, leaving the core business of the company untouched. Osterwalder et al. [62] compare BMEX to playing with a box of Lego blocks, which can lead to new designs that are "limited only by imagination and the pieces supplied." Chesbrough [1] argues BMEX helps to overcome barriers to change in the process of BMI. In short, BMEX is an important step in the BMI process, in which firms experiment with ideas and concepts before implementing the redesigned BM. Empirical work shows that BMEX includes a number of activ

ities. Some scholars adopt a narrow view on BMEX and only in clude experiments that involve new product formats in a market. without reference to experiments with BM components or their configuration [63], while others discuss activities involving ini- tial designs and trial-and-error improvements more extensively [21] or examine whether there are certain communalties and pathways in the way SMEs experiment with BM components. depending on the goal of the company [18]. And there are those who distinguish experimentation from learning, defining BMEX as researching technical challenges and performing new prac tices, and BM learning as acquiring new knowledge, discussing new ideus, and interacting with and contacting others [22] In one empirical study, BMEX is found to consist of the following three activities: retrieving information about the environment, encouraging new ideas, and learning from mistakes [18], [64].

BMEX can be viewed as examining alternative BMs [52], and as such is closely related to the innovation process rather than the discrete outcome (ie., the innovated BM that needs to be implemented). An extensive analysis of several cases shows that there are many iterations, fallbacks, and redefinitions of BM components, as well as changes in the BM architecture during the BMEX phase, and that innovation paths and processes are far from linear [18], [55]. Baden-Fuller and Morgan [60] argue that BMEX has a purposive character and their comparison of relevant studies shows that BMEX contains both theoretical and practical experiments. As a result, BMEX is defined as the purposive effort to methodologically examine changes in BMs and (the configuration of) BM components, which means that there is a need to allocate

budgets for experimentation, to enable an activity that may be carried out by a specific team. In turn, these experimentations can lead to the identification of potentially fruitful opportunities that can evolve into efforts of BMIM.

C. BM Implementation

Experiments may lead to new BM designs. To benefit from these new designs, the new BM should be put into practice. Whether or not an intended BM can be realized depends on the alignment between the BM and the business processes and supporting IT applications and infrastructure [4], [65]. Whereas BMs describe what a firm should do to create value, the how- question is addressed during the implementation of the BM [38]. Although BMEX and BMIM can been seen as discrete steps, the activities involved may be closely related, since practical consideration of implementation may play a role in discussions and experiments during the experimentation phase.

BMIM to a large extent depends on the operational business activities and processes at various organizational levels [38]. [66], which together have been referred to as business operations [4], [67]. These activities are complex and depend very much on the context of the firm [4]. The activity involved in BMIM is captured by changes in a firm's operational model (OM) and EA. The EA reflects the company's OM and formalizes the or- ganizing logic for business processes and IT infrastructure [10]. [23].[68].[69]. Together, these domains explain how operational business processes are managed and executed. As argued by Ross and colleagues [23] the OM defines the integrations and standardization of requirements that serve as input for how the EA is formed.

Work involving EA concerns the design and realization of the firms' organizational processes, (infra) structure and systems [70]. EA has been defined as "the organizing logic for business processes and IT infrastructure, reflecting the integration and standardization requirements of the company's OM" [23]. While early work on EA focuses on the technology architecture [71]. later work focuses on the broader information, application, and business architecture [72], and on visualization, giving EA a multidisciplinary scope that incorporates strategic concepts [73]. Because of the detail required for full-scale implementation, existing EA models tend to be very large and complex [74]. Ross and colleagues [23] conceptualize EA at a high level of ab- straction with regard to its different aspects: business processes and structure; business process standardization and integration; internal controls to monitor processes; ICT, application and infrastructure, which is leading in our empirical research.

III.HYPOTHESES DEVELOPMENT

In this section, our hypotheses, which are based on the back-ground as discussed in Section II, are presented, starting withthe core hypothesis. BMEX, being the initial process involved in BMI, leads to new BMs,

which in turn can improve the performance. BMEX allows firms to redefine their core BM and identify new business opportunities [41], [62]. As such, the relationship can be hypothesized as follows.

HI: BMEX does lead to discrete, redesigned BMs that affects firm performance in a positive way

Next, the discrete and redesigned BM has to be implemented. As discussed earlier, in the BMIM phase, there are two im- portant concepts that interact with each other. OM and EA There is partial overlap between these concepts, because of their similar role in implementing BM changes. As argued by Ross and colleagues [23], the OM defines the business process integrations and standardization requirements that serve as input for forming the EA, whereas the EA represents the logic for business processes, IT applications, and infrastructure reflecting the OM. At the same time, the EA postulates the core capabilities that guide further execution of the BM at an application and IT infrastructure level. Hence, it is proposed that the following:

BMEX is viewed as a source for the implementation of redesigned BMs. Earlier studies on BMEX suggest that these efforts can lead to changes in information exchange and pro- cesses within the organization under examination or the ecosys- tem within which the core firm operates, as well as in IT- infrastructure, as part of both the OM and the EA [9]. Con- sequently, it is hypothesized the following:

H3a: BMEX leads to changes in the OM

H3b: BMEX leads to changes in the EA.

Like BMEX, BMIM plays an important role in the BMI pro- cess [45], [48]. Research shows that paying attention to the way BMs are implemented at an operational level is a prerequisite to benefiting from BMI [9]. The correct implementation of BM changes allows a firm to adapt and improve its existing BM. which can have beneficial consequences firm, both in terms of reducing operational problems and creating new opportunities, thanks to increased modularity and flexibility, which in turn lead to growth and increased profit, as argued by Heikkilä et al. [18]. Hence, this relationship can be hypothesized as follows

H4 BMIM positively affects the form performance.

BMIM is translated into two interrelated activities in relation to the OM and the EA (see Section II B). As a result, it is expected that BMIM has a positive impact on the outcome of BMEX in terms of the firm performance, based on the mediating effects of the OM and EA:

H5a: Changes in the OM mediate the positive effect of BMEX on firm performance

H5b: Changes in the EA mediate the positive effect of BMEX on firm performance

Fig. 1 summarizes the hypotheses in a conceptual model.

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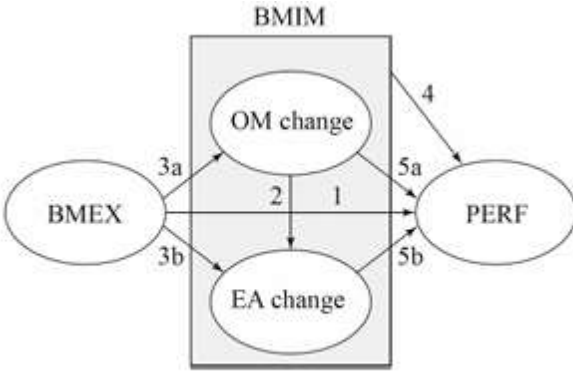

Fig. 1. Conceptual model.

IV. METHODOLOGY

A. Sample

The data used in this article was collected in 2016 by a professional research agency, as part of a Horizon 2020 project, in compliance with European and national privacy regulations. The research agency involved used native speakers to gather data in 13 different European countries to obtain a representative dataset regarding European SMEs. The countries involved are Sweden, Finland and Lithuania, U.K., France and The Netherlands, Spain, Italy and Portugal, Poland and Slovenia, and Austria and Germany. To begin with, the Dun and Bradstreet database directory, which contains all SMEs in Europe, was used as a sample frame, from which 5704 usable entries were collected. The research team used cluster sampling to guarantee an even distribution across the continent and to include large and smaller countries, and based on an equal proportional sampling approach with country quota, and quota for microenterprises, SME (33%-33%-33%) to have a representative sample for each company size. However, no quota was defined for industry sectors and some of sectors were initially excluded from data collection, e.g.. agriculture, public administration, and non- market household activities. The survey gathered information regarding size and industry sector, to make sure the companies being approached were indeed part of our intended population.

In a second step, the SMEs willing to participate were screened at the start of each interview, because the study focuses exclusively on the population of companies that made changes to their BM during the last two years. That period of two years was used to assure that a longer term assessment of the performance and lagged effects could be tracked. Since most managers in SMEs are not aware of the BM concept, in addition to a generic question regarding BMI, four filter questions formulated in a way that made them easy to understand, were asked. Each filter question reflects one dimensions of BMs, i.e., value proposition and product offering (24% made this change), the role of the firm's eco-system in value creation (69% made this change), the enabling role of information technology in value delivery (58% made this change), and the role of pricing mechanisms and revenue models in capturing value (50% made this change). Finally, a total of 1604 companies matched the selection criteria and the data collection process resulted in 584 usable responses, representing a response rate of 34%, which is acceptable accord- ing to other academic studies. Companies that did not respond indicated that they had no time or the responsible manager was not available. Responses were collected through a

telephone interview from the firm's owner or BMI manager, with the respondent being the manager, owner of or another core manager within the SME. The respondents were predominantly males. For reliability reasons, we tried to contact a second interviewee in each company, but only succeeded in doing so in 40 cases. These responses were excluded from further analyses.

The final sample consists of 584 SMEs. The oldest firm was founded in 1836. the youngest in 2016, the year of the data collection, so there was a broad range in terms of maturity While the firms were distributed across the range between the two extremes, most of them were established around 2000, with 1994 being the median of the sample size, which indicated a median age of 22. The distribution across industries was relatively skewed. While there was only one company actively engaging in BMIs in the mining and quarrying sector, the service industry, including financial services, manufacturing, wholesale and retail, and construction were represented by 22%, 15%, 13%, and 11%, respectively, of the sample. Because of the meager low response from some industries, it was decided not to use industry as a control variable.

TABLE II
MEASURES

Construct	Question-wording	Reference
BMEX	*During last year, our enterprise …*	
	Experimented with the (implementation of) their BM	[21]
	Had a specific team to manage BM changes	[21]
	Allocated budgets for BM experimentation	[21]
OPMO	*To what extent did changes in your BM lead to new ways of…*	
	Standards how you deliver products/services to customers	[23]
	Division of work between your enterprise and external partners	[23]
	Ways to manage cost to deliver products/services profitably	[79]
	Ways to execute processes	[79]
	Organizational structures	[79]
ENAR	*To what extent did changes in your BM lead to changes in your…*	
	Key Business processes	[23]
	Information Technology	[23]
	Internal controls to monitor processes	[23]
	Business processes standardization	[23]
	Business processes integration	[23]
	ICT applications	[23]
	ICT infrastructure	[23]
	Social media usage	[81]
	Business/organization structure	[81]
PERF	*What is the level of agreement? I am satisfied with …*	
	the sales growth of the enterprise	[82]
	the profit growth of the enterprise	[76]

B. Operationalization

Table II provides an overview of items used for construct op- erationalization. The list of questions is the result of an iterative process with managers and academics giving input to improve the understanding of the questions. Most items were measured on seven-point Likert scales (from 1 totally disagree to 7= totally agree) and, as

indicated, were based on the literature on innovation, entrepreneurship, and strategic management. Alter- native scales for BMI, as developed by Clauss [75] and by Spieth and Schneider [32], were published while questionnaire design and pretesting were finalized and data collection was already ongoing

The business performance can be studied along different di- mensions, such as customer performance, market performance, and financial performance. However, since our data include a very heterogenic set of firms that can use BMI in various ways, the focus is exclusively on financial criteria as a measure of the business performance. The heterogeneity of our population of firms engaged in BMI makes it difficult to directly com- pare financial figures across companies. To accommodate this, perceived business performance, where measures for financial growth rely on the managers' evaluation of the financial situa- tion, is used as a proxy. The firm performance is often measured as a relative firm performance (the performance of a firm in relation to its competitors) [76], [77], and as McDermott and Prajogo [78] suggest, using subjective measures of the perfor- mance is a valid proxy for objective performance measures. The use of these perception-based performance measures is, however, heterogeneous across studies, based on either Likert or Semantic differentiation scales. The advantage of using in- dicators that rely on perception is that figures can be compared and that there are no outliers that may upset results. Further- more, managers can take historical growth into account, while this kind of information cannot be gleaned by looking at the financial ratios of one year. On a practical level, combining our data to performance data available from national statisti- cal and tax offices was not allowed, due to European privacy

TABLE III
VALIDITY AND RELIABILITY IN THE MEASUREMENT MODEL

		Factor loadings	Cronbach' salpha	Composite reliability	Average variance extracted	Maximal shared variance	Maximal reliability	PERF	BMEX	BMIM
PERF	PERF1 PERF2	0.945 0.717	0.816	0.816	0.689	0.164	0.816	**0.830**		
BMEX	BMEX1 BMEX2 BMEX3	0.706 0.713 0.782	0.784	0.785	0.550	0.445	0.891	0.358	**0.742**	
BMIM	OM1 OM2 OM3 OM4 OM5	0.756 0.601 0.787 0.790 0.634	.0850 (OPMO)	0.820	0.696	0.445	0.930	0.405	0.667	**0.834**
	EA2 EA6 EA7	0.722 0,884 0,883	0.886 (ENAR)							

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C. Measurement Model

Exploratory analysis shows that the items for EA and OM are strongly correlated (>.7), which is understandable when we consider their overlapping role in the implementation process of new BMs. That is why BMIM is modeled as a second-order reflective construct constituted by EA and OM as first-order reflective latent factors. A confirmatory factor analysis (CFA) for the resulting model shows good fit (X2: 82.17, df: 48, CFI: 0.99, SRMR: 0.026, RMSEA: 0.035). A configural invariance test revealed adequate goodness of fit when analyzing a freely

estimated model across the groups of firms differing in firm characteristics. Convergent validity was obtained as evidenced by the av- erage variance extracted (>0.5), and reliability as indicated by Cronbach's alpha are all above 0.70, while the composite reliability values (>0.7) and maximal reliability values (>0.8) fulfill normative requirements. Discriminant validity is sufficient since the square root of the average variance extracted exceeds any of the interfactor correlations (see diagonals in Table III).

D. Outlier Analysis

After validation of the measurement model, factor scores were imputed using linear regression in AMOS. in order to detect outliers. Firms reporting low (or high) satisfaction or activity in certain items would receive a low (or high) score for the variable. To identify potential influential records in the imputed dataset, linear regressions, and investigated Cook's distances for the two latent variables that relate to the dependent performance variables, were used. Although the outliers for BMEX to PERF were the same as they were for BMIM to PERF, none of these re-lations resulted in observations having Cook's Distances greater than 0.1 (max 0.038), indicating the imputed data did not con- tain abnormal records. Likewise, analysis of the Mahalanobis distance did not reveal severe abnormalities with an average value of 2.0 and a max of 11.3. Collinearity diagnostics revealed variable inflation factors of 2.35 and tolerance values above 0.42. Considering these numbers, no respondents were removed, and subsequent analyses were performed on the remaining 584 firms.

TABLE IV
EVIDENCE FOUND FOR HYPOTHESES

	Type	Hypothesis	Evidence	Conclusion
H1	Direct	BMEX -> PERF	$\beta = 0.16$, $P = 0.043$	Supported
H2	Direct	OM changes -> EA changes	-	Not tested
H3	Direct	BMEX -> BMIM	$\beta = 0.67$, $P < 0.001$	Supported
H4	Direct	BMIM -> PERF	$\beta = 0.30$, $P < 0.001$	Supported
H5	Mediation	BMEX -> BMIM -> PERF	$\beta = 0.17$, $P = 0.001$	Supported

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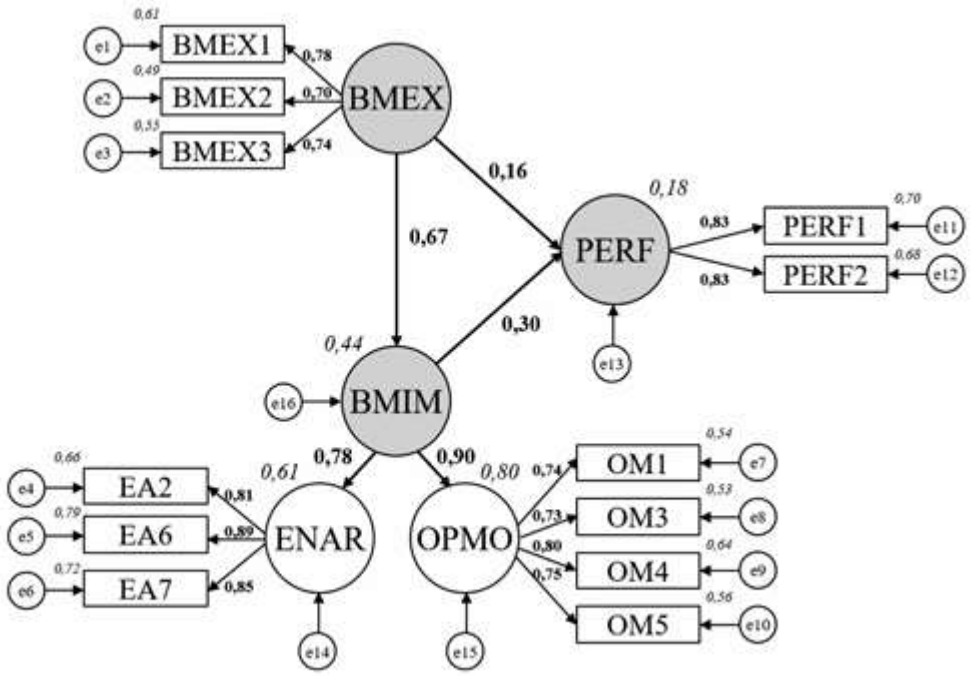

Fig. 2. SEM model results.

V. RESULTS

The structural model of the overall sample (N = 584) was fitted in AMOS 23. The model explained 44% and 18% of the variance, as indicated by the squared multiple correlations of BMIM and PERF, respectively (see Fig. 2). Direct effects were examined by their regression weights and significance levels. Evidence was found that BMEX has a positive effect on PERF (beta = 0.16, P 0.043). Likewise, BMIM was found to have a strong effect on PERF (beta = 0.30. P<0.001).

The mediation effect of BMIM was tested following the Bootstrapping method. The indirect effect measured in a bias- corrected 90% confidence interval was 0.17 and appeared to be significant (P 0.001).

The results support all hypotheses, with the exception of H2 (see Table IV), which was not measured since OM and EA were modeled as first-order constructs belonging to BMIM, which meant their individual impact on firm performance could not be tested. As a consequence, hypotheses 3a-3b, 4a-4b, and 5a-5b could also not be tested for the original distinction between OM and EA. Both constructs are now summarized under BMIM.

The robustness of our findings was examined by conducting multigroup analysis on relevant background characteristics of the SMEs in the dataset. To that end, four firm

characteris- tics were selected: the size of the SME (ie., micro, small, or medium-sized); the gender of the CEO; the age of the firm (dis- tinguishing firms founded before 2000 from those established later); and the label denoting whether or not an SME was a family business. Controls for industry, technology-intensity, or relevance of IT infrastructure for processes were not possible. For the multigroup comparisons, a chi-square difference test was used where the two models except constraining the main paths (BMEX PERF. BMEX> BMIM, BMIM-> PERF) were freely estimated. None of the moderators was found to show significant differences in this test.

Since a posthoc power analysis was used to detect significant effects that may have existed beforehand, we are confident that nonsignificant effects were truly not significant. Both for PERF as BMIM the statistical power was above 0.99 based on the R. the number of predictors, sample size, and probability level (0.001).

VI. DISCUSSION

This article shows that engaging in BMI has a positive impact on the firm performance. For firms that have recently changed their BM, the more resources and time they commit to the process of innovating their BM, the better their perceived perfor- mance. This main finding is important, as few studies consider the performance implications of the BMI process [31], and it is consistent with the handful of prior studies [19], [83] that do.

Our primary contribution is that the distinction between two fundamental processes within BMI, e.g., BMEX and BMIM, in operations and enterprises architectures are confirmed, confirm- ing insights from Al-Debei and Avison [9] and others. There is a direct relationship between BMEX and BM performance, but this relation is also mediated by BMIM and the assumption that BMIM consists of two distinct processes (operations and implementation) in the EA is confirmed by the measurement model, which provides empirical support to our assumption that these are in fact two distinct processes. In other words, spending effort and resources on implementing BMs into the operation models and EAS of a firm amplifies the impact of BMEX. This finding is important, as it lends support to ideas in the information systems (IS) literature that BMS mediate between high-level strategy and daily operations and technology 19] and that it is worthwhile to extended BM thinking with a focus on operations and processes, as both are also part of EA thinking. Practical approaches by lacob er al [68] and Fritscher and Pigneur [10] and intermediate solutions, as advocated by Solaimani et al. [4], are valuable.

To summarize, it can be concluded that both the process management community and IS scholars play an important role in advancing the understanding of the link between BMS and operations architecture, and technology, among other things in the perspective of digital transformation. Thus für more engineering-oriented research on BMI has provided important contributions, including

approaches involving brainstorming about new BM ideas [84] and revelatory case studies on how firms deal with BMI in practice [4], [18], [85]. In the BM field, which at the moment is dominated by strategy scholars, it is important for engineering and IS scholars to convey the message that a formalized and structured implementation of BMs into architectures and operations is at least as important as high-level strategic brainstorming.

Contrary to our expectations, we found that BMIM activities cannot be empirically divided into paying attention to OM and EA. Instead, BMIM is modeled as a second-order construct that includes both OM and EA. One explanation for this is that, in practice, OM and EA overlap. Conceptually, however, the EA should support the OM and, vice versa, the OM poses require-ments to the EA, while EA may impose limitations on OM. Future qualitative research may want to examine the interplay of changing the OM and EA and the catalyst role that BMEX plays

This article was based on a broad and large sample of Eu- ropean SMEs that recently changed their BM. A multigroup analysis shows that our findings are robust across our sample. regardless of the age and size of the enterprise, the question whether or not a firm is a family business. or the gender of the CEO. The effect sizes of our findings are likely underestimated. since we did not focus on viable versus nonviable BM ideas in our sample, or on the likelihood that positive performance effects may come later [86] Alternatively, it could be argued that paying more attention to the implications of BM ideas on OMs and EAS helps managers to identify potential implementation problems and recognize unfeasible BMs at an early stage.

This article is a first to show empirically that consecutive activities in BMI have a separate positive impact on the firm performance. The mediating role played by BMIM suggests that BMI involves separate yet causally linked practices. Next steps would be to further zoom in on more advanced phases or substeps, such as testing a specific BM and its implications on EA and OM, paying attention to processes within the frim and between partners in the eco-system. Alternative theoriza tions and empirical research may also be further developed. especially regarding reverse causality and feedback loops. For instance, higher performance may free up resources or legitimize the BMI process, which creates a positive feedback loop. In addition, lagged effects can be theorized and examined, as the lag between BMI and performance may be substantial, depending on contextual variables [31], [80]. In particular investments in changing the EA and OM typically pay off in the form of better performance after some time, and initially may even have a negative impact on the performance because, for instance, employees need to learn new routines. Longitudinal panel stud- ies and case studies would help to understand these complex causal processes.

VII. CONCLUSION

Our analysis showed that engaging in BMI has a positive effect on the (perceived)

performance of SMEs. BMI was comprised of the following two related activities: BMEX and BMIM into a firm's EA and OM. Both activities have a positive effect on the firm performance, and BMIM partly mediates the effect of BMEX. This finding was important in understanding the connection between BMI, operations, architecture, and technology [87]. Specifically, to reap the full performance gains from BMEX, firms should also engage in BMIM.

This article was a first to theoretically divide BMI into two separate yet interrelated activities. It was also one of the first to provide evidence of the distinct performance benefits that arise from implementing BMs into EA and OM. This article provides a basis for future research into the interplay of strategy. BMs, operations, and technology. Our findings also suggest that BMI should not only be a concern of strategy researchers, but of engineering management scholars as well. They have a role to play.especially in executing longitudinal (case) studies designed to uncover the complex, lagged and reverse causal interplay, and in qualitative studies for disentangling more subtle subactivities that compose these activities.

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