Chapter 24
Business Model Innovation in SMEs: A Cluster Analysis

D. Ibarra, J. I. Igartua, and J. Ganzarain

Abstract This paper presents an exploratory analysis focused on identifying and characterizing business model innovation (BMI) in small and medium enterprises (SMEs), a phenomenon that has gained increasing attention in management and challenges many companies' competitiveness. Based on a purposive sample of 84 SMEs participating in public-supported BMI projects, we explore different BMI-related elements using a two-step cluster analysis, along with an examination of the predictors' importance and mean differences. The results underline the relevance of BMI management and BMI capabilities in SMEs, as well as stating a degree of importance in the prediction of clusters, suggesting further research opportunities. The research shows two different groups of SMEs that are statistically significant for all clustering variables. The value of this ongoing research lies in its contribution to the quantitative research of BMI in SMEs, as well as in the study of this strategic phenomenon.

Keywords Business model innovation (BMI) · Business model · Business model advantage · SMEs

24.1 Introduction

It is commonly accepted that business models (BMs) describe the business logic of a firm in terms of value creation, delivery and capture [32]. Therefore, in this study, business model innovation (BMI) is defined as the discovery of new and significantly different ways of value creation, delivery and capture within an established business model [34]. BMI can be a source of business opportunities for SMEs, allowing them to respond quickly to market changes, redefine their existing markets or even create new ones by commercializing innovations through new business model configurations [2, 10]. Consequently, BMI can become a source of competitive advantage and superior firm performance [15].

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C. Avilés-Palacios and M. Gutierrez (eds.), *Ensuring Sustainability*,
Lecture Notes in Management and Industrial Engineering,
https://doi.org/10.1007/978-3-030-95967-8_24

Despite the potential benefit and relevance of BMI, our understanding of the phenomenon remains limited in relation to SMEs; as is as our knowledge of the factors and processes for its development [15]. Moreover, BMI literature has largely kept a success-driven perspective on large firms, while research on SMEs has only started to gain attention in recent years [4, 8, 12, 24, 29].

SMEs face unique challenges when implementing BMI due to their limited resources [6, 23], manager's influence [4] and environmental contingencies [30]. In addition, organizational inertia and path dependencies can constrain the organizational restructuring and managerial decisions that BMI implies. Nevertheless, the literature suggests that certain drivers related to a firm's behavior [5, 7, 20] and dynamic capabilities [12, 19, 29] could help SMEs overcome those challenges. It is, therefore, essential to understand how SMEs' everyday practices, in the form of capabilities and management, impact on BMI, as well as how they are linked to BMI and its performance [15].

In addition, the research developed to date is based on conceptual works and case studies [3, 35], so scholars are calling for more empirical research, larger samples and replicability of the studies to address these gaps [11, 31, 36].

To succeed in BMI, SMEs need to manage the challenges related to the reconfiguration of their established BM, which demands actions from the top managers and adequate knowledge, capabilities and skills within the company, in order to sense and seize BMI opportunities [25, 33].

24.2 Business Model Innovation in SMEs

Compared to larger companies, SMEs generally have less time, fewer resources and lack a capability-structured approach to innovation [1]. These limitations can represent a challenge for BMI. However, SMEs can compensate for these difficulties by finding ways to develop innovation capabilities and relying on the strengths associated with their size: a more receptive climate, fewer bureaucratic procedures, more flexible structures and greater adaptability [4, 21]. As part of an ongoing project about BMI in SMEs, the following key elements are considered to establish the background of the present research.

Business Model (BM): efers to the internal consistency fit among BM components concerning how value is delivered, created and captured in the SME [26].

Business Model Innovation (BMI): is defined as "designed, novel, non-trivial changes to the key elements of a firm's business model and/or the architecture linking these elements" ([15], p. 17).

Business Model innovation management (BMIM): refers to managerial orientation and an SME's innovative culture. A CEO's individual characteristics and beliefs might influence an SME's capabilities for BMI [4]. An organizational culture that

encourages innovation and creativity will lead SMEs' members to take risks, sense new opportunities and pursue new ideas, thereby stimulating BMI [1].

Business Model Innovation Capabilities (BMIC): refers to the set of resources and routines SMEs deploy to (1) sense customer needs, (2) scan technological options, (3) experiment, (4) collaborate and (5) align BMI with their strategy. Rooted in the dynamic capabilities theory [33], these capabilities are considered to drive BMI [4, 15, 25].

Business Model Advantage (BMA): It refers to the business model's predominance toward providing customers with superior benefits than their competitors. This occurs when the BM (1) offers a high value that is perceived as such by customers, (2) is exclusive or provides greater advantages than the competition, (3) allows access to new markets and/or (4) is difficult to imitate [22, 32].

24.3 Objectives and Methodology

The aim of the current study is twofold: (1) to distinguish groups of SMEs according to the BMI elements previously described (BM, BMI, BMIM, BMIC and BMA) and (2) to analyze barriers and drivers for BMI in different groups of SMEs.

The present research, exploratory in nature, aims to explore the phenomenon of BMI in SMEs. The population of interest was SMEs of a Basque Region (Gipuzkoa) that were actively engaged in BMI for at least the last three years. Since the population frame was unknown, purposive sampling was adopted. The sample comprises 267 SMEs that participated (from 2016 to 2018) in some of the Basque Country Regional Government's funding programs for improvement of competitiveness through innovation in value propositions and business models.

An online questionnaire based on a five-point Likert scale was developed to collect data. Variables measuring BM, BMI, BMIM, BMIC and BMA were adopted from previously validated multi-item scales, with slight adaptions to comply with the BMI context. Questions addressing drivers and barriers were developed based on the European Commission Innovation Survey [28] and the Regional Government's strategic concerns.

For data validation, the common method variance was checked using Harman's single-factor test [17]. The factor obtained (14.30%) was below the established limits.

The final sample comprised 84 cases (final valid responses = 31.46%). The survey was mostly completed by senior managers (82.1%). The main participating companies are in the manufacturing industries (59%), followed by companies related to industrial services (18%), ancillary services (7.7%) and ICT industries (10.3%). The sample is predominantly composed of small firms (70.5%), followed by medium-sized firms (25.6%) and micro- (3.8%) according to the EU commission categorization (EU [14]).

24.4 Results

To develop the cluster classification, we used the methodology suggested by previous researchers [27]. We used the two-step cluster analysis [13], with a previous descriptive statistical analysis to test needed conditions. In order to automatically calculate the best number of clusters, both the log-likelihood distance measure and the Schwarz grouping method (BIC) were selected. Afterward, once the number of clusters were fixed, the Euclidean distance was selected for the final membership clustering. Every time, a membership variable was created to perform some of the analyses shown in this paper.

Once the cluster's formation had been validated and identified, the variables with the strongest influence were analyzed (difference between two means). All the analyses presented in this section were carried out using the statistical software SPSS, version 23.

Thus, before proceeding with the cluster analysis, we check for multicollinearity, analyzing the correlation between clustering variables [18].

Correlations (Table 24.1) show a maximum value of 0.719, lower than the limit of 0.90 [18], and it can, therefore, be considered that there are no problems of collinearity between the variables.

The construction of the cluster initially considered four variables (BMIC, BMIM, BM, BMI) and BMA as an evaluation field. Table 24.2 presents the cluster analysis for all cases.

The analysis suggests the creation of two different groups with good quality (silhouette measure of cohesion and separation = 0,54), a value above + 0.5 that lets us assume that the clustering was successful. Note that, the largest number of cases is in the second cluster (transformed SMEs) according to the cluster distribution. Transformed SMEs represent the 65.5% of the SMEs participating in improvement of competitiveness and business transformation public project programs. BMIC is the variable with the greatest impact (Table 24.2). Furthermore, it is worth observing

Table 24.1 Clustering variables correlations

Measures	Means ± SD	BMIC	BMIM	BM	BMI	BMA
Z-value BMI capabilities (BMIC)	3.49 ± 0.51	1	0.719**	0.426**	0.599**	0.570**
Z-value BMI management (BMIM)	3.15 ± 0.62		1	0.390**	0.662**	0.565**
Z-value business model (BM)	3.72 ± 0.51			1	0.394**	0.354**
Z-value business model innovation (BMI)	3.19 ± 0.69				1	0.532**
Z-value business model advantage (BMA)	3.28 ± 0.62					1

**Correlation is significant at the 0.01 level (2-tailed). All Spearman's coefficients

Table 24.2 Frequency and variables position in cluster analysis

Cluster	Cases	BMIC		BMIM		BMI		BM	
		Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
1	29 (34.5%)	2.9767	35.985	2.5323	39.643	2.5607	56.461	3.3479	49.210
2	55 (65.5%)	3.7665	33.159	3.4775	43.435	3.5265	48.177	3.9122	41.219
Combined	84 (100%)	3.4938	50.785	3.1512	61.654	3.1931	68.700	3.7174	51.485

Table 24.3 Predictor importance in cluster analysis

Variable	Predictor importance	Significant order	
		Cluster 1: ongoing SMEs	Cluster 2: transformed SMEs
BMIC	1	1	2
BMIM	0.96	2	1
BMI	0.76	3	3
BM	0.43	4	4
BMA	0.38	–	

how the order of the variables between BMIC and BMIM changes when analyzing their importance in each of the clusters (Table 24.3).

As outlined in Table 24.4, the mean differences of the main key variables for the configuration of the two clusters (BMIC, BMIM, BMI and BM) and the evaluation field (BMA) were calculated. The differences between means were statistically significant in all cases.

The graphs (Fig. 24.1) show the cluster analysis scatter plot of BMI and the two most significant variables according to the analysis (BMIC and BMIM).

Other elements highlighted in the BMI literature refer to the barriers and drivers for BMI [9]. Thus, based on the two clusters, an analysis of both elements was performed. Although average barrier perception was lower for "transformed SMEs" (2.81 compared to 2.89), no statistical significance was found when analyzing each of the barriers.

As regards the drivers for BMI, although all driver values are higher for "transformed SMEs", only three statistically significant mean differences were found (Table 24.5).

Thus, higher and significant values were identified for drivers regarding diversification of BM (DIV), digital transformation of the BM (DIG) and talent as a BMI driver (TAL).

Table 24.4 Mean differences for the clustering variables

Measures	Cluster 1: ongoing SMEs	Cluster 2: transformed SMEs
	Means ± SD	Means ± SD
BMIC—business model innovation capabilities	2.98 ± 0.36	3.77 ± 0.33
BMIM—business model innovation management	2.53 ± 0.40	3.48 ± 0.43
BMI—business model innovation	2.56 ± 0.56	3.53 ± 0.48
BM—business model	3.35 ± 0.49	3.91 ± 0.41
BMA—business model advantage	2.86 ± 0.59	3.50 ± 0.51

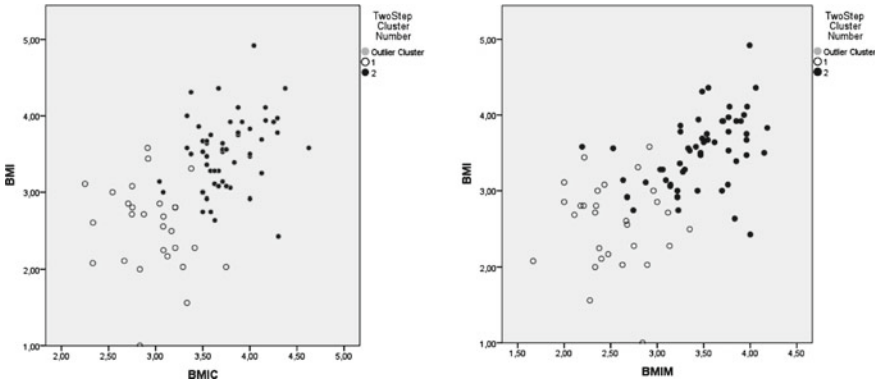

Fig. 24.1 Two-step cluster analysis scatter plot

Table 24.5 Significant drivers for BMI

Measures	Cluster 1: ongoing SMEs	Cluster 2: transformed SMEs
	Means ± SD	Means ± SD
Diversification as BMI driver (DIV)	3.31 ± 0.89	3.85 ± 0.70
Digitalization as BMI driver (DIG)	3.24 ± 0.99	3.95 ± 0.83
Talent management and generational renewal as BMI driver (TAL)	3.83 ± 0.89	4.22 ± 0.71

24.5 Discussion, Conclusions and Further Research

In this study, we extend the BMI research to SMEs, exploring the relationships between different elements using a cluster analysis. We support the classification of SMEs based on variables that in the literature are interconnected in the literature and studies have been considered independently. More precisely, the cluster analyses, based on a sample of convenience of companies already involved in BMI, confirm that, although there might be difficulties in assessing the experiences developed, two clear groups could be considered: (1) on-process SMEs and (2) transformed SMEs.

Based on several variables defined in the literature, we have empirically tested the existence of two groups of SMEs with a good quality estimation. We have also evidenced the order of the dimensions, with the highest significant level for BMIC and BMIM. With regard to those variables, it is important to highlight the changing position of the BMIC and BMIM variables for the two cluster groups.

Transformed SMEs represent the biggest group according to the sample ($n = 55$) with the highest values (higher than 3.48) in all four variables used for the cluster analysis, as well as in the variable used for evaluation. On-process SMEs ($n = 29$) show lower values with values under 3.0 for all variables but one. These statistically significant results (Table 24.4) indicate the effective existence of two different SME groups in relation to the BMI phenomenon.

Our findings highlight the importance of BMIC and BMIM when introducing BMI in companies. Mean differences for the clustering support the role of these two elements when developing BMI. On the contrary, the BM variable with lower mean differences and high values in both clusters (higher than 3.3) indicates that the value creation, value delivery and value capture in both groups of SMEs are consistent. It, therefore, seems that SMEs reconfigured their established BM for the sake of BMI [16]. In the lack of further research, the results suggest that transformed SMEs might have established strategies or developed pilot experiences, which would have allowed them to generate the dynamic capabilities required for BMI. Similarly, ongoing SMEs might not have deployed these capabilities.

The results also explore, based on the cluster configuration, the role of barriers and drivers for SMEs confronting the BMI phenomenon. Although barrier values are higher in the first cluster (on-process SMEs), no statistical significance has been found. On the contrary, the analysis regarding the drivers for BMI suggests the major importance of diversification, digital transformation of the business and talent management. These results are aligned with recent research emphasizing the influence of internal capabilities and managerial actions enabling SMEs to address BMI proactively [4, 15, 25, 32]. Besides, questions over the role of new business trends, such as servitization and circular economy, although analyzed, have not shown statistical significance as BMI drivers. This is turn raises some questions regarding the capability of SMEs to embrace these opportunity streams.

This study characterizes SMEs according to dimensions identified in the literature and based on an analysis of different variables that could lead to further research and the definition of a structured framework that might help to distinguish companies involved in business model innovation.

The limitations of this study are due to time and resources. Further phases will aim to analyze in detail the moderating impact of other context factors, such as management practices, and BMI activities. The value of this ongoing research lies in its contribution to the quantitative research of BMI in SMEs, together with the study of associated elements and their interconnections.

Compliance with Ethical Standards This article does not contain any studies with human participants; all data was gathered from an organizational perspective (position level—1, 2, 3 and years of experience of the respondent), with no personal data in the questionnaire. Companies' data was also anonymized. Participating companies were informed about the process and data management policy though a presentation letter, voluntarily agreeing to participate in a research study by filling in and returning a questionnaire. The authors declare that they have no conflict of interest, nor work for, consult, own shares in or receive funding from any company or organization that would benefit from this article and have disclosed no relevant affiliations beyond their academic appointment. The Research Ethics Committee of Mondragon Unibertsitatea (Ref. IEB-20201201) approved the entire procedure used in the research process.

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