

Development routes of resource and capability configurations in small and medium-sized enterprises

András Rideg, Gábor Márkus

ABSTRACT

Objective: The objective of the article is to identify and analyse the competitiveness of small and medium-sized enterprises (SMEs) in an international context by classifying 785 firms from eight countries into configurations based on performance across ten resource and capability pillars, linking configurations to competitiveness, and analytically inferring plausible, path-dependent development routes between them.

Research Design & Methods: We drew on the Global Competitiveness Project (GCP) dataset. We collected data between 2016 and 2020 in Bosnia and Herzegovina, Colombia, Costa Rica, the Czech Republic, France, Hungary, Mexico, and Spain through structured face-to-face interviews with SME owners or top executives. We classified firms into four configurations (Balanced, Core Competence, Harmonised, Bottleneck) based on skewness and relative variance across the ten pillars, quantified using GCP interview-based measures. We applied one-way Analysis of Variance (ANOVA) and binary logistic regression models to assess configuration differences in competitiveness and to support inferences about potential development routes.

Findings: The analysis revealed statistically significant differences in competitiveness across configurations: Harmonised firms displayed the highest competitiveness, whereas Balanced firms exhibited the lowest. The models suggest two main development logics. Balanced firms may reduce pillar dispersion and strengthen Technology, Decision-making, Marketing, and Networks to move towards a Harmonised configuration, or they may prioritise Technology (and, in some cases, Decision-making and Human Capital) in ways that generate a Bottleneck configuration. Core Competence firms may move towards Bottleneck by further reinforcing Technology, or towards Harmonised by broadening and aligning key pillars. However, some transitions appear economically unattractive, as the costs of incremental configuration change may outweigh competitiveness gains.

Implications & Recommendations: SME development strategies should strengthen configuration-specific pillars. Managers can use the identified configurations to diagnose their position and prioritise targeted improvements. Policymakers and practitioners should support SMEs in recognising their configuration and implementing focused interventions that improve the effectiveness of resource and capability deployment.

Contribution & Value Added: The study adds to resource-based view (RBV) and configuration-based research on SME competitiveness by linking an established competitiveness index to a four-type configuration scheme, including a Balanced configuration. It proposes a systematic, configuration-based framework for assessing how specific pillars shape competitiveness and for analytically inferring non-linear development routes between configurations, thereby refining GCP-related evidence and offering actionable guidance for SMEs.

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INTRODUCTION

The resource-based view (RBV) has emerged as the preeminent framework in the internal factor-based literature on competitive advantage, particularly for examining firm-level resources and capabilities in recent decades (Barney, 1991, 2001; Barney *et al.*, 2011, 2021; Peteraf, 1993; Prahalad & Hamel, 1990; Rugman & Verbeke, 2002; Wernerfelt, 1984). The RBV asserts that differences in firm performance and industry results stem from the resources and capabilities that firms can acquire, develop, and efficiently utilise. This approach emphasises core competencies, highlighting the importance of specific resources and capabilities that provide a competitive advantage. Some academics concentrate on specific variables of resources and capabilities, whereas others, such as those linked to the Global Competitiveness Project (GCP), promote the use of composite RBV indices. Composite methodologies provide a systematic framework for analysing configurations, as emphasised by Miller (1986, 1996). This approach is especially relevant for SMEs, because resources and capabilities are frequently not inherently distinctive and are often easily replicable or accessible (*e.g.*, Luo & Child, 2015).

Empirical investigations conducted by GCP researchers (*e.g.*, Alonso-Ubieta *et al.*, 2021; Bayon & Aguilera, 2021; Horváth & Lafuente, 2021; Lafuente *et al.*, 2020a, 2020b) into the practical implications of configurational theory underscore its significance in evaluating SMEs' competitive capacity. These results indicate that future research should concentrate on the configurational dimensions of competitiveness, analysing how the alignment and interaction of resources and capabilities affect business performance. Thorough investigations must examine the mechanisms by which organisations assimilate new and existing resources and ascertain the circumstances under which these configurations bolster competitiveness. Moreover, studies must examine how strategic resource allocation and the adjustment of configurations to external constraints influence competitive results across diverse business settings, market dynamics, and legislative interventions. This work seeks to address this call and enhance understanding of the configurations' dynamic characteristics.

Building on this research stream, the present article makes three contributions. Firstly, it extends prior GCP-based work by introducing a four-type configuration scheme – Balanced, Core Competence, Harmonised, and Bottleneck – derived from the skewness and relative variance of ten competitiveness pillars, and by explicitly identifying a Balanced configuration that combines markedly high- and low-performing pillars within the same firm. Secondly, it links these configurations systematically to an established competitiveness index, thereby providing a unified framework for assessing how specific pillars are associated with different configuration profiles and competitiveness levels. Thirdly, using cross-sectional data and a combination of ANOVA and binary logistic regression models, the study analytically inferred plausible development routes between configurations, which are interpreted as conceptual, path-dependent patterns rather than longitudinally observed trajectories.

Against this background, we pursued both descriptive and analytical objectives. On the descriptive side, we identified how SMEs' resources and capabilities aggregate into distinct configurations and how these configurations differ in terms of overall competitiveness and the underlying competitiveness pillars. On the analytical side, we explored whether and how the pillar structure of the configurations allowed us to infer potential development routes between them, and to what extent these routes can be interpreted as path-dependent patterns of configuration change.

Accordingly, we addressed the following research questions (RQ1-RQ3, Figure 1):

- RQ1:** How do resource- and capability-based configurations of SMEs differ in their overall competitiveness?
- RQ2:** How do the ten competitiveness pillars differ across the identified configurations?
- RQ3:** What plausible development routes between configurations can one analytically infer from their pillar profiles, and to what extent do these routes exhibit conceptual path-dependent patterns based on cross-sectional evidence?

By answering these research questions, the study aims to elucidate how SMEs manage strategic resources and capabilities through distinct configurations to improve their competitive positioning.

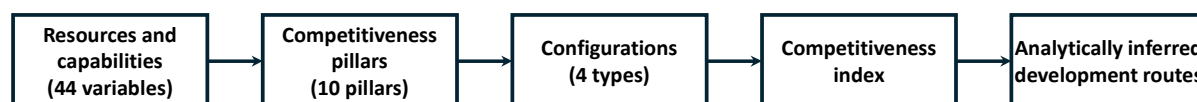


Figure 1. Conceptual framework of the study

Source: own elaboration.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The Resource-based View, Configurations, and Path Dependency

Since the 1980s, firm-level resource and capability configurations have emerged as a central theme in the literature on competitive advantage. Early strategy research, including Porter's (1980) generic strategies and their subsequent developments (Dess & Davis, 1984), together with the contingency perspective of Hambrick (1983), provided the foundation for Miller's (1983, 1986) configuration theory, which has become one of the most widely cited approaches in the field. Miller and Whitney (1999) argue that, in line with internal factor-based theories of competitive advantage, a firm's resources and capabilities should be analysed in relation to each other within an integrated framework, as one cannot understand the system by examining its isolated components. Configuration research is particularly important because configurations are more difficult for competitors to imitate than individual resources or capabilities, thereby supporting the creation of defensible competitive positions in a Porterian sense (Porter, 1980). The literature suggests that integrating strategy and structure creates complementarities among configuration elements, which can provide a competitive advantage for the firm. This is especially crucial for SMEs, as a focused differentiation strategy is often the only feasible generic strategy.

Configuration generally denotes recurring arrangements of firm-level attributes (Meyer *et al.*, 1993, p. 1175). More narrowly, we may understand it as the alignment between a firm's external environment, its resources and capabilities, the entrepreneur's characteristics, and the managerial practices used, along with their suitability for specific tasks or objectives. This alignment constitutes a distinctive multidimensional feature of each enterprise (Miller, 1986; 1996).

The RBV and the discovery-oriented strategy approaches both focus on internal drivers of competitive advantage but emphasise different strategic levers. The resource- and capability-based paradigm (*e.g.*, Barney, 1991; Peteraf, 1993; Wernerfelt, 1984) stresses the quality and performance of resources and capabilities in executing tasks, while discovery-oriented perspectives (*e.g.*, McGrath, 2013) highlight the value of diversity in resources and capabilities. McGrath (2013) argues that diversity enables managers to recombine resources and capabilities in response to unforeseen threats or opportunities. In this study, we followed Barney's (1991) performance-oriented RBV logic for quantifying the performance of resources and capabilities, while acknowledging McGrath's insight that highly developed resources and capabilities may constrain strategic flexibility and limit managerial choice. If RBV logic is genuinely path dependent, this path dependency should also be observable at the level of configurations, implying that the 'path' is reflected in the development of resource and capability combinations rather than in isolated resources.

Dynamic Capabilities and Resource Orchestration

The literature on dynamic capabilities and resource orchestration further elaborates on the path-dependent nature of configurations. Sirmon and Hitt (2009) show that deviations from competitive norms in resource investment levels can be risky but may improve performance when aligned with appropriate strategies. The key dimensions of resource alignment include search, selection, configuration, and deployment (Helfat *et al.*, 2007). Thus, the dynamic capabilities of managers – the ability to create, integrate, configure, and reconfigure resources and capabilities – are central to achieving competitive advantage, adapting to changing market conditions, and enhancing the value of resources (Sirmon & Hitt, 2009).

Subsequent elaborations of this perspective by Sirmon *et al.* (2010, 2011) gave rise to resource orchestration theory, which combines resource management and asset orchestration models. Resource orchestration emphasises not only the stock and quality of resources and capabilities, but also

the processes by which managers structure, bundle, and leverage them over time. Therefore, this theoretical framework links RBV-based configuration ideas with discovery-driven strategy logic by focusing on how resource–capability combinations are actively shaped and re-shaped.

There is also a close theoretical connection between configuration theory, business model perspectives, and resource orchestration. The RBV-based configuration theory seeks to identify effective, synergistic combinations of resources and capabilities that generate internal consistency. Resource orchestration introduces a dynamic, processual view by integrating resource acquisition, development, and deployment with managerial decision-making. Business model theories further extend this perspective by incorporating external stakeholders and environmental conditions to explain how firms achieve both internal and external coherence in value creation (Klang *et al.*, 2014; Teece, 2010). These theoretical strands jointly suggest that configurations of resources and capabilities are both a source of competitive advantage and subject to path-dependent evolution over time, especially in SMEs whose resource bases are constrained (Luo & Child, 2015).

Empirical Evidence on SME Configurations and Competitiveness

Empirical research on resource and capability configurations faces challenges due to the lack of a unified conceptual framework and inconsistencies in measurement (Miller *et al.*, 2013), as well as practical difficulties in operationalising models built around key competencies (Bhamra *et al.*, 2010). Nevertheless, configurational approaches offer a valuable lens for understanding value creation in both strategic management and new venture contexts (Kraus *et al.*, 2011). In the early stages of the firm lifecycle, legal formation and market entry reflect management's assumptions about how market opportunities align with value propositions, internal resources and capabilities, and transformation processes; these assumptions jointly define an initial configuration of resources and capabilities, or (more generally) the firm's first business model (Teece, 2010). As firms evolve, it becomes increasingly challenging to maintain and upgrade key capabilities. Organisations must adapt to changing environments by modifying and selectively retaining patterns of strategic action (Pentland *et al.*, 2012), while continuously developing organisational routines that embed resources and capabilities in everyday operations (Klang *et al.*, 2014). Maintaining tight integration across levels of organisational hierarchy is also crucial for achieving both efficiency and effectiveness (Salvato & Rerup, 2011).

The empirical literature emphasises the need for continuous maintenance and upgrading of key capabilities and the adaptive reconfiguration of resources and capabilities in response to environmental change. Studies highlight a contextual balance between conformity (similarity) and diversity (differentiation), suggesting that stable environments favour conformity, whereas uncertain and heterogeneous environments require greater diversity. Analysing 113 Austrian tourism SMEs, Kallmuenzer *et al.* (2019) identified optimal configurations combining entrepreneurial orientation, financial resources, and professional networks, with their effectiveness depending on environmental uncertainty. Lorentz *et al.* (2016) used cluster analysis on 190 Finnish manufacturing SMEs to distinguish reactive partial innovators, suppliers/subcontractors, and manufacturing–technical service providers, finding that flexibility and service capabilities are particularly important during macroeconomic shocks. Raymond *et al.* (2010) identified entrepreneurial, technical, and administrative configurations for 292 manufacturing SMEs in Canada, showing that entrepreneurial configurations relying on strategic competences such as product development and market building outperform other groups.

Qualitative work also underscores the role of configurational diversity. Pfeifer *et al.* (2017) found that configurational diversity enhances competitiveness among Croatian micro firms in creative industries, particularly in advertising, architecture, and design. Hagen *et al.* (2017), examining 550 SMEs in Italy, Finland, and Greece, identified four strategic postures and show that innovation- and technology-oriented configurations are more adaptive to global challenges. Forsman (2011), studying 708 Finnish micro and small firms, reported substantial internal diversity in configurations, even when manufacturing and service sectors differ only modestly on average. From a demand-side perspective, Sohl *et al.* (2020) showed that business model diversification improves profitability in heterogeneous demand contexts, highlighting the benefits of diversity under unstable conditions. Kim and Min (2015) pro-

posed a 'discriminative alignment thesis' for incorporating complementary (conforming) and competing (divergent) elements into existing business models, arguing that complementary elements can be integrated directly, whereas competing elements may require separate organisational units.

GCP-based Evidence on Resource and Capability Configurations

The empirical analysis in this article relies on the international dataset of the GCP. Over the past decade, GCP researchers have published a growing number of studies on resource and capability configurations and their relationship with firm-level competitiveness and efficiency (*e.g.*, Alonso-Ubieta *et al.*, 2021; Bayon & Aguilera, 2021; Horváth & Lafuente, 2021; Lafuente *et al.*, 2020a, 2020b). Analysing 625 Hungarian SMEs, Lafuente *et al.* (2020a) showed that firms possessing one or two outstanding resources or capabilities benefit most from further strengthening these areas, whereas firms lacking strong resources or capabilities should prioritise alleviating bottlenecks. Alonso-Ubieta *et al.* (2021) used non-parametric data envelopment analysis (DEA) on 231 Costa Rican SMEs and found that efficiency and balanced resource allocation, together with innovation, are central to competitiveness. Using DEA on 115 Spanish SMEs, Horváth and Lafuente (2021) demonstrated that configurations of resources and capabilities are closely associated with efficiency: on average, firms could improve their competitiveness by 53.53% through optimising key capabilities. Human capital and strategic planning are particularly important for manufacturing and construction, whereas innovation is crucial for knowledge-intensive business services.

Applying cluster analysis to 62 Mexican SMEs, Bayon and Aguilera (2021) highlighted that managers' perceptions of the strategic relevance of resources and capabilities strongly influence firm competitiveness. Lafuente *et al.* (2020b) stressed the importance of competitive configurations in enhancing efficiency in a DEA analysis of 103 KIBS firms in Hungary, Spain, Colombia and Costa Rica, showing that optimising strengths and addressing weaknesses could increase efficiency by 47.43%. Together, these GCP studies emphasise the need to consider differences arising from industry, demand, and regional characteristics, and called for more comprehensive empirical work on resource and capability configurations at the business model level.

Earlier GCP studies focused mainly on high-performing key capabilities, low-performing bottlenecks and harmonised configurations of resources and capabilities in between. The present study advances this literature by identifying and analysing a novel 'Balanced' configuration, defined as a configuration that combines a similar number of markedly high- and low-performing resources and capabilities relative to the firm's overall resource and capability profile, in addition to the Core Competence, Harmonised, and Bottleneck configurations.

Research Gap and Hypotheses

The above literature review highlights three main points. Firstly, RBV, configuration theory, resource orchestration, and business model perspectives jointly suggest that firm-level configurations of resources and capabilities constitute key determinants of competitiveness and are likely to evolve in path-dependent ways. Secondly, empirical SME studies, including GCP-based research, show that differences in resource and capability configurations are associated with differences in competitiveness and efficiency. Thirdly, despite this progress, there is still limited evidence on how different configuration types relate systematically to an established competitiveness index, and how one can infer potential development routes between configurations from the structure of competitiveness pillars, especially when introducing a Balanced configuration alongside Core Competence, Harmonised, and Bottleneck types.

Against this background, we formulated three hypotheses that correspond directly to the research questions.

There is substantial evidence that the structure of resources and capabilities is linked to competitiveness. Configuration theory suggests that the integration of resources and capabilities into coherent systems can generate competitive advantage because such systems are difficult to imitate (Miller, 1986, 1996; Miller & Whitney, 1999). Dynamic capabilities and resource orchestration perspectives further argue that the way in which resources and capabilities are configured and reconfigured over time is central to performance (Helfat *et al.*, 2007; Sirmon & Hitt, 2009; Sirmon *et al.*, 2010, 2011). Empirical results

from GCP-based and related studies (*e.g.*, Alonso-Ubieta *et al.*, 2021; Horváth & Lafuente, 2021; Lafuente *et al.*, 2020a, 2020b) confirm that more effective utilisation and alignment of resources and capabilities are associated with higher competitiveness. This led us to the first pair of hypotheses:

H1a: There is a connection between configuration and the level of competitiveness.

H1b: There is a significant difference in the level of competitiveness between the configurations.

If configurations are related to competitiveness, it is reasonable to expect that they also differ in the underlying pillars that define the competitiveness index. Prior research indicates that some pillars, such as technology, innovation, human capital, networks, or strategic orientation, can be particularly important drivers of competitiveness and efficiency in SMEs (*e.g.*, Forsman, 2011; Hagen *et al.*, 2017; Kallmuenzer *et al.*, 2019; Raymond *et al.*, 2010). The GCP studies also point to specific pillars whose improvement yields disproportionate gains (Lafuente *et al.*, 2020a, 2020b). Accordingly, we expect that at least some of the ten pillars will differ significantly across configuration types:

H2: There are significant differences in the competitiveness pillars between the configurations.

Finally, McGrath's (2013) observation that resources and capabilities may constrain strategic flexibility, together with RBV-based arguments about path dependency, raises the question of whether configurations can be changed freely or whether there are particular 'routes' between configurations that are more plausible than others. The literature on dynamic capabilities and resource orchestration implies that configuration change is not random but conditioned by existing structures of resources and capabilities and by managerial choices (Helfat *et al.*, 2007; Sirmon *et al.*, 2010, 2011). Building on these ideas, we examined whether the estimated models would allow us to infer plausible, path-dependent development routes between the identified configurations based on their pillar profiles. This led to our third hypothesis:

H3: There are development 'routes' between configurations.

RESEARCH METHODOLOGY

Data Collection and Sample

The empirical analysis relies on a unique primary dataset from a research project on the competitiveness of SMEs funded by the European Union (EFOP-3.6.2-16-2017-00017). We collected the data between 2016 and 2020 in eight countries: Bosnia and Herzegovina (127 firms), Colombia (53), Costa Rica (156), the Czech Republic (94), France (80), Hungary (186), Mexico (40), and Spain (49). The explicit objective of the data collection was to analyse firm-level competitiveness in an international SME context by assessing the performance of resources and capabilities. The GCP designed the international data collection protocol (Global Competitiveness Project, n.d.). Detailed information on the sampling and survey procedures is available in Lafuente *et al.* (2020a, 2020b). A team at the Faculty of Business and Economics, University of Pécs, Hungary, compiled and managed the final dataset used in this study.

Data collection proceeded in two stages. Firstly, we contacted firms by telephone to obtain permission to participate. Secondly, we conducted a face-to-face interview with the business owner (if part of the top management team) in firms with fewer than 20 employees, and with a top executive in firms with 20 or more employees, regardless of ownership status. The survey took the form of a structured, self-administered questionnaire in which managers responded mainly to closed-ended questions. The questionnaire has been extensively used in Hungary since 2013 for research purposes, and its translated versions have been refined to minimise ambiguous or misleading items.

We carefully filtered the raw data. We retained only observations with complete information for all variables used in the analysis, and excluded firms with fewer than five employees. The resulting final sample comprised 785 SMEs. The average firm employed 42 people and had 16 years of market experience. Regarding sectoral composition, 27.9% of the firms operated in agriculture and industry, 16.7% in retailing, and 55.4% in professional services. To assess non-response bias, we compared early and late respondents in terms of firm size (employees), firm age and revenues across sectors; we found no significant differences.

Variables and Measurement

We derived two main groups of variables from the questionnaire. The first group captured the performance and strategic relevance of various resources and capabilities. The second group included key firm characteristics: country, sector (NACE classification), firm size (number of employees), and firm age.

Following Irwin *et al.* (1998) and Douglas and Ryman (2003), we asked respondents to evaluate the strategic importance of different resources and capabilities on a Likert-type scale from '0' to '4'. A value of '0' indicates that the focal resource or capability has no strategic relevance, whereas values from '1' to '4' capture increasing levels of strategic importance. The scale reflects the notion that the value of resources and capabilities is contingent on managerial perceptions (Priem & Butler, 2001). The subdivision of positive scale points (from '1' to '4') allows for sufficient differentiation in the assessment of the variables (Lederer *et al.*, 2013). In total, we collected 44 resource- and capability-related variables for each SME. We provide the complete list of variables in Appendix 1.

Construction of the Competitiveness Index

We measured firm-level competitiveness using a composite competitiveness index consistent with earlier GCP-related work (Lafuente *et al.*, 2020a; Szerb *et al.*, 2014; Szerb & Hornyák, 2016). The index had a two-layer structure: four main fields (market orientation, manufacturing, demand, and strategic decision-making) and ten second-layer pillars. Figure 2 presents the structure of the index.

We computed the competitiveness index in six steps:

1. Identification of variables and calculation of raw values.
2. Normalisation of all variable values to the [0, 1] range.
3. Calculation of pillar scores by averaging the relevant normalised variables.
4. Normalisation of pillar scores to the [0, 1] range.
5. Adjustment of normalised pillar scores to a common average across pillars by raising them to the same power of k .
6. Calculation of the final competitiveness score by summing the adjusted pillar values.

This procedure yields a firm-level competitiveness score and ten pillar scores for each SME, enabling both overall and pillar-specific analyses.



Figure 2. Structure of the SME competitiveness index

Source: Szerb and Hornyák (2016, p. 313).

Configuration Construction

The core objective of the study was to classify SMEs into resource- and capability-based configurations and examine how these configurations relate to competitiveness (RQ1-RQ3; H1a-H3). We based the configuration analysis on the ten competitiveness pillars. We aimed to form four config-

uration groups of approximately equal size using the distributional properties of the pillar scores. The classification proceeded in two stages.

1. In the first stage, we calculated the skewness of the ten pillar scores for each firm. We assigned SMEs with the highest skewness values to configuration group 1 ('Core Competence'), while those with the lowest skewness values were assigned to configuration group 4 ('Bottleneck').
2. In the second stage, we split firms with intermediate skewness values into two equal groups based on their relative variance (the within-firm variance of the ten pillar scores divided by the firm's overall competitiveness score). We classified SMEs with low relative variance as configuration group 2 ('Harmonised'), while those with high relative variance as configuration group 3 ('Balanced').

We chose the cut-off points to yield four groups of approximately equal size and to operationalise the intended distributional contrasts: the upper and lower quartiles of firm-level skewness define Core Competence and Bottleneck, while firms in the interquartile range were split by the median of the relative-variance measure into Harmonised and Balanced configurations. This procedure followed the logic of constructing theoretically interpretable configurations while avoiding a purely level-driven grouping.

Table 1 summarises the criteria and resulting group sizes. Table 2 presents descriptive statistics for the four configuration groups.

Table 1. Criteria for building configuration groups of SMEs

Configuration group	Skewness	Variance (relative)	N
1. Core Competence	> 0.523	–	196
2. Harmonised	-0.423 – 0.523	< 0.032	197
3. Balanced	-0.423 – 0.523	> 0.032	196
4. Bottleneck	<-0.423	–	196

Source: own study.

Table 2. Descriptive statistics of competitiveness scores by configuration of SMEs

Configuration group	N	Min.	Max.	Mean	St. dev.	Median	Mode
Balanced	196	1.690	6.783	4.405	1.119	4.392	1.690
Core Competence	196	1.677	7.841	4.777	1.226	4.680	1.677
Bottleneck	196	1.879	8.589	5.669	1.415	5.667	1.879
Harmonised	197	3.104	8.302	5.999	1.128	6.162	3.104

Source: own study.

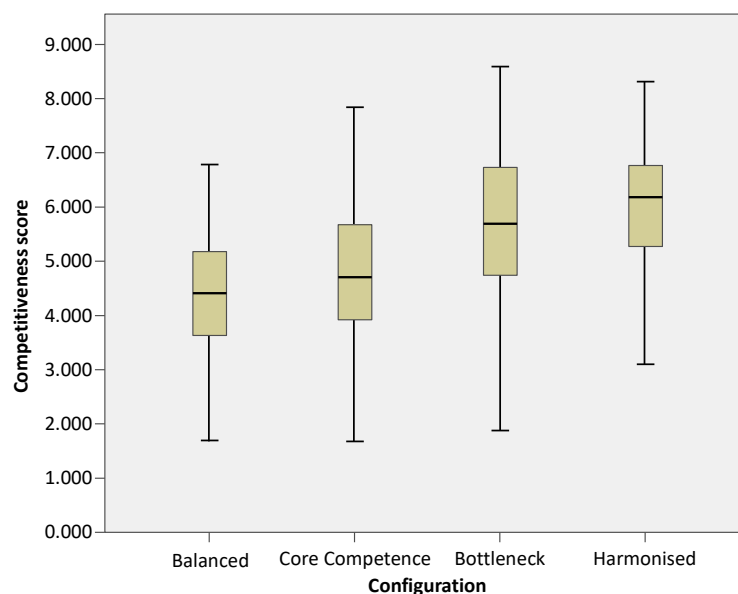


Figure 3. Distribution of competitiveness scores by configuration of SMEs

Source: own elaboration.

Importantly, the classification procedure was designed to be independent of the absolute level of competitiveness. Equal skewness values could occur at different levels of pillar scores, and the variance measure was normalised by the competitiveness score to reduce the influence of overall competitiveness on the configuration assignment. The empirical question, addressed in the next section, was whether the resulting configurations nonetheless exhibited systematic differences in competitiveness and pillar values (H1a, H1b, H2), and whether they would allow us to infer analytically plausible development routes (H3).

Analytical Approach

The empirical analysis proceeds in three steps, aligned with the research questions and hypotheses.

Firstly, to test whether configurations were associated with different levels of competitiveness (RQ1; H1a, H1b), we examined the relationship between configuration and competitiveness using chi-square tests and one-way ANOVA. Figure 3 and Figure 4, together with Appendix 2, report the descriptive and inferential results, including post-hoc comparisons between configurations.

Secondly, to examine whether the ten competitiveness pillars differentiate configuration membership (RQ2; H2), we estimated a set of binary logistic regression models in which the dependent variable was a binary indicator contrasting a more competitive configuration (Bottleneck or Harmonised) with a less competitive reference configuration (Balanced or Core Competence). We report odds ratios ($\text{Exp}(B)$) and p-values. An odds ratio greater than 1 indicated that higher values of the corresponding pillar were associated with higher odds of belonging to the more competitive configuration relative to the reference category. As a robustness check, we re-estimated the binary logistic regression models with country and industry (NACE) controls. The estimated pillar associations and the implied configuration contrasts were substantively unchanged; accordingly, the inferred development routes were not affected.

Thirdly, to infer plausible development routes between configurations (RQ3; H3), we interpreted the estimated logistic regression models by comparing more and less competitive configurations. The models were estimated with reference categories corresponding to the less competitive configurations (Balanced and Core Competence), and the odds ratios ($\text{Exp}(B)$) indicated how changes in pillar values affect the likelihood of belonging to a more competitive configuration (Bottleneck or Harmonised). By combining these results with the ANOVA-based competitiveness differences, we derived analytically plausible, path-dependent development routes between configurations, as visualised in Figure 5. Accordingly, route 'directionality' was interpreted as model-consistent plausibility, not as observed temporal transition.

RESULTS AND DISCUSSION

Configurations and Competitiveness

The first step of the analysis examined whether the four configuration types differed in their overall competitiveness levels (RQ1; H1a, H1b). Although the configurations were constructed to be independent of competitiveness scores, it was still possible that they would be systematically associated with different competitiveness levels.

Appendix 2 reports the chi-square tests on the association between configuration and categorical competitiveness levels. The Pearson chi-square test was highly significant ($\chi^2 = 153.836$, $df = 6$, $p < 0.001$), and the ordinal association measures (Somers' d, Kendall's tau and Gamma) also indicated a positive and statistically significant relationship between configuration and competitiveness. This suggests that configurations were not randomly distributed across competitiveness levels, providing initial support for H1a.

We then used one-way ANOVA to compare mean competitiveness scores across the four configurations. Table 2 and Figure 3 present the descriptive statistics, while Figure 4, Table 3¹ and Appendix 2 summarise the ANOVA results and post-hoc tests. Mean competitiveness increased monotonically from Balanced (4.405) and Core Competence (4.777) to Bottleneck (5.669) and Harmo-

¹ Levene test is significant at any level, equal variance cannot be assumed, Tamhane post-hoc was used. Other corresponding tests are presented in Appendix 2.

nised (5.999). Figure 4 highlights that the Balanced configuration exhibited the lowest competitiveness, whereas the Harmonised configuration achieved the highest.

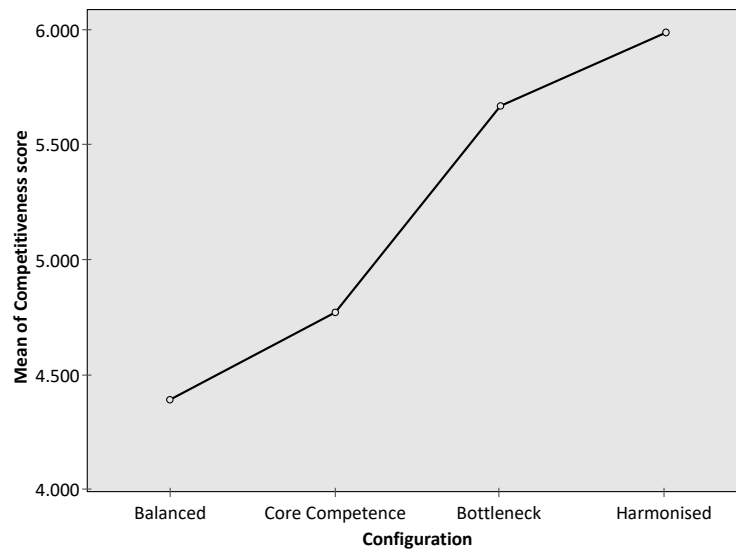


Figure 4. Mean of competitiveness scores by configuration of SMEs

Source: own elaboration.

Table 3. Post-hoc comparisons of competitiveness scores between configurations of SMEs

Post-Hoc	(I) Configuration	(J) Configuration	Mean Difference (I-J)	Std. Error	Sig.
Tamhane	Balanced	Core Competence	-0.372**	0.119	0.011
		Bottleneck	-1.264*	0.129	0.000
		Harmonised	-1.594*	0.113	0.000
	Core Competence	Balanced	0.372**	0.119	0.011
		Bottleneck	-0.892*	0.134	0.000
		Harmonised	-1.222*	0.119	0.000
	Bottleneck	Balanced	1.264*	0.129	0.000
		Core Competence	0.892*	0.134	0.000
		Harmonised	-0.330***	0.129	0.064
	Harmonised	Balanced	1.594*	0.113	0.000
		Core Competence	1.222*	0.119	0.000
		Bottleneck	0.330***	0.129	0.064

Notes: *, **, *** indicate significance at the 1%, 5% and 10% significance levels, respectively.

Source: own study.

Post-hoc comparisons using Tamhane's, Dunnett's T3, Games–Howell, and Dunnett C tests confirmed that the mean differences between most configuration pairs were statistically significant. The difference between Balanced and Core Competence was significant at the 5% level, and the difference between Bottleneck and Harmonised was marginally significant at around the 6-7% level; all other pairwise differences were significant at conventional levels. These results show that configurations were associated with distinct competitiveness levels, despite being constructed without reference to competitiveness scores, thereby supporting H1b.

At the same time, the reverse relationship did not hold deterministically: competitiveness was not fully determined by configuration. As Figure 3 indicates, firms with a Balanced configuration could still be found in the upper competitiveness range, just as some Harmonised firms did not reach the highest scores. However, the probability of attaining high competitiveness was much lower for Balanced firms (11.2%) than for Harmonised firms (56.3%). Thus, configurations capture systematic but not deterministic differences in competitiveness, consistent with the notion that configurations indicate, but do not fully determine, performance outcomes.

Pillar-level Differences Between Configurations

Having established that configurations differ in their average competitiveness levels, in the next step, we investigated whether and how the underlying competitiveness pillars differ across configurations (RQ2; H2). To this end, we estimated a series of binary logistic regression models, using pillar scores as predictors and configuration membership as the dependent variable.

The main results are summarised in Table 4² (with additional detail in Appendix 3), which reports odds ratios (Exp(B)) from the binary logistic regression models estimated for each pairwise comparison of competitiveness configurations (see Appendix 3 for full model outputs). For transparency and ease of reading, we documented the reference category and reporting conventions in the Table notes.

Table 4. Binary logistic regression results: Competitiveness pillars distinguishing configurations of SMEs

Competitive pillars	Bottleneck		Harmonised		Bottleneck		Harmonised		Significant models (5%)	Significant models (1%)
	to Balanced				to Core Competence					
	Model 1 Exp(B)	Model 1 p	Model 2 Exp(B)	Model 2 p	Model 4 Exp(B)	Model 4 p	Model 5 Exp(B)	Model 5 p		
Competitive Strategy	–	–	8.130*	0.003	–	–	15.315*	0.000	2	2
Decision-making	4.767*	0.006	4.132**	0.035	–	–	-	-	2	1
Human Capital	5.074**	0.016	4.292***	0.053	–	–	-	-	1	–
Internationalisation	–	–	–	–	–	–	4.044***	0.055	–	–
Marketing	3.503***	0.071	5.464**	0.032	–	–	–	–	1	–
Networks	-	-	4.049**	0.034	4.303*	0.009	5.340*	0.009	3	2
Product	3.545**	0.037	3.774***	0.054	–	–	–	–	1	-
Technology	10.485*	0.007	10.638**	0.015	53.514*	0.000	23.371*	0.001	4	3
Chi-square test	105.151	–	155.394	–	71.092	–	112.408	–	–	–
Nagelkerke R ²	0.314	–	0.435	–	0.221	–	0.332	–	–	–
H&L test	0.195	–	0.373	–	0.521	–	0.577	–	–	–
Correctly predicted (%)	70.2	–	74.6	–	67.6	–	70.7	–	–	–
ROC AUC	0.777	–	0.837	–	0.738	–	0.792	–	–	–
Observations	392	–	393	–	392	–	393	–	–	–

Note: Odds ratios (Exp(B)) and p-values are reported; the configuration shown in italics is the reference category. An odds ratio greater than 1 indicates that higher values of the pillar increase the odds of belonging to the non-reference configuration relative to the reference configuration.

Odds ratios are reported for one-unit increases in pillar scores; given that pillar scores are bounded and constructed on a normalised scale, seemingly large odds ratios should be interpreted as reflecting the scale of the underlying metric rather than as literal marginal effects over an unconstrained range.

*, **, *** indicate significance at the 1%, 5% and 10% significance levels, respectively.

ROC AUC = receiver operating characteristic area under the curve.

Source: own study.

Across the models, the goodness-of-fit statistics, predictive accuracy and explanatory power indicated that configurations were meaningfully differentiated by the pillars. The Nagelkerke R² values range from 0.221 to 0.435 for the core models, and correctly classified cases range from 67.6 to 74.6%. The Hosmer–Lemeshow tests suggest acceptable model fit, and the ROC AUC values indicate acceptable-to-good discriminating power (AUC = 0.738–0.837 in the core models and 0.570–0.593 in the auxiliary models). A consistent pattern of results emerged.

Firstly, in the core comparisons in Table 4 (with Balanced or Core Competence as the reference), the effects are directionally consistent: higher pillar scores are associated with a greater likelihood of belonging to the more competitive configuration, with odds ratios above 1 throughout these contrasts. This supports the substantive interpretation that stronger pillar profiles systematically co-vary with competitiveness across the main baseline comparisons. A notable exception was the

² Pairwise comparison generates altogether six models. Because of the poor statistics, we present Model 3 and Model 6 only in Appendix 3. Partial results of ‘enter’ and ‘backward’ modelling are available upon request.

Bottleneck–Harmonised contrast, where the association reverses (odds ratios below 1 for the relevant pillars). This is theoretically meaningful rather than definitional: it suggests that, in this specific pairing, higher pillar scores align with lower odds of membership in the more competitive configuration, consistent with configuration-contingent trade-offs between bottleneck-relief and harmonisation logics. This finding reinforces the classification logic and supports H2.

Secondly, seven out of the ten pillars had a statistically significant effect at the 5% level in at least one of the models, and four out of ten were significant at the 1% level. Technology stood out as the most influential pillar. Its odds ratios ($\text{Exp}(B)$) were the largest across the four core models, and it was significant in all four core comparisons at the 5% or 1% level. Competitive Strategy had a smaller but still noteworthy effect. Networks and Decision-making exerted moderate yet robust effects across several models. Human Capital, Marketing, Product and, to a lesser extent, Internationalisation also played significant roles in specific configuration comparisons.

Thirdly, the models failed to identify stable and statistically meaningful relationships in some configuration pairs. In particular, we were unable to derive a satisfactory model distinguishing between the lower-competitive Balanced and Core Competence configurations on the one hand, and between the higher-competitive Bottleneck and Harmonised configurations on the other, based on pillars alone. This suggests that not all configuration transitions are equally well supported by the pillar structure, which has implications for the analysis of development routes.

Taken together, these results show that configurations are associated with distinct profiles across the ten competitiveness pillars and that specific pillars – above all Technology, but also Competitive Strategy, Networks, and Decision-making – are especially important in differentiating more and less competitive configurations. This evidence supports H2.

Analytically Inferred Development Routes Between Configurations

The final step of the analysis addressed RQ3 and H3 by examining whether the logistic regression results, combined with the competitiveness differences, would allow us to infer plausible development routes between configurations. These routes represent conceptual, path-dependent patterns that align with the cross-sectional results, rather than empirically observed changes over time.

The increase in pillar scores had two main effects: (1) higher pillar values raised the overall competitiveness index, and (2) they increased the probability of belonging to a more competitive configuration. The second effect could occur in two ways. Firstly, firms could reduce dispersion across pillars, moving towards a more harmonised distribution (lower relative variance). Secondly, firms may strengthen specific pillars to such an extent that those pillars become dominant, generating a Bottleneck configuration.

SMEs with a Balanced configuration were characterised by a symmetric distribution of pillar scores with relatively high variance: they exhibited a mix of markedly low and high-performing pillars within the same firm. The models comparing Balanced with Bottleneck and Harmonised configurations indicated two primary development routes:

- Route Balance1 (towards Harmonised): Firms can aim to reduce disparities between pillar scores by adopting a revised competitive strategy that emphasises Technology, Decision-making, Marketing, and Networks. Strengthening these pillars while narrowing inter-pillar gaps leads to a Harmonised configuration, characterised by a symmetric distribution with low relative variance. In this route, firms primarily seek to align and level up pillars rather than to create a single dominant pillar.
- Route Balance2 (towards Bottleneck): Alternatively, firms may focus on Technology and/or Decision-making, followed by Human Capital and/or Product, in a way that makes these pillars particularly strong and salient. In this case, the distribution becomes right-skewed, with one or a few pillars acting as a bottleneck for further development. This leads to a Bottleneck configuration, in which further competitiveness gains require addressing remaining weaker pillars.

Small and medium-sized enterprises with a Core Competence configuration displayed a left-skewed distribution, with a small set of relatively strong pillars and several weaker ones. The models comparing Core Competence with Bottleneck and Harmonised configurations suggested two analogous development routes:

- Route Core Competence 1 (towards Bottleneck): Firms may concentrate on Technology (and potentially on Networks) and intensify investment until Technology becomes the dominant pillar that constrains further progress. This leads to a Bottleneck configuration where technological capabilities are strong, but other pillars lag and limit additional competitiveness gains.
- Route Core Competence 2 (towards Harmonised): Alternatively, firms may adopt a revised competitive strategy that continues to emphasise Technology while simultaneously strengthening Networks and, potentially, Internationalisation. By raising the weaker pillars and reducing variance across pillars, firms can move towards a Harmonised configuration, where pillar scores are more evenly aligned at a higher level.

Incompatible Configuration Transitions and Cost Considerations

Importantly, the empirical results also suggest that not all configuration transitions are equally plausible or cost-effective. The lack of robust logistic models between Balanced and Core Competence, and between Bottleneck and Harmonised, indicates that some configuration changes may not be supported by clear pillar-based patterns.

From a practical perspective, this implies that certain configuration changes are unlikely to be pursued in an incremental and economically justified manner. For example, an SME with a Balanced configuration but relatively high competitiveness may not benefit from small adjustments aimed solely at reaching a Core Competence configuration with similar competitiveness. Given the modest expected competitiveness gains, the costs of such reconfiguration may outweigh the benefits. A similar logic applies to firms attempting to move from Bottleneck to Harmonised when their competitiveness levels are already close.

These observations are consistent with the idea that configuration changes are path dependent and constrained by the existing combination of pillars and the associated adjustment costs. Therefore, the empirically observed patterns support H3: there appear to be development ‘routes’ between configurations that are more plausible than others, and these routes are shaped by the structure and relative strength of specific pillars.

Figure 5 synthesises these routes by integrating the competitiveness differences (Figure 4) with the pillar-level effects from the logistic regressions (Table 4). The thickness of the arrows represents the explanatory strength of each model, and the most influential pillars, especially Technology, Decision-making, Networks, and Competitive Strategy, are highlighted.

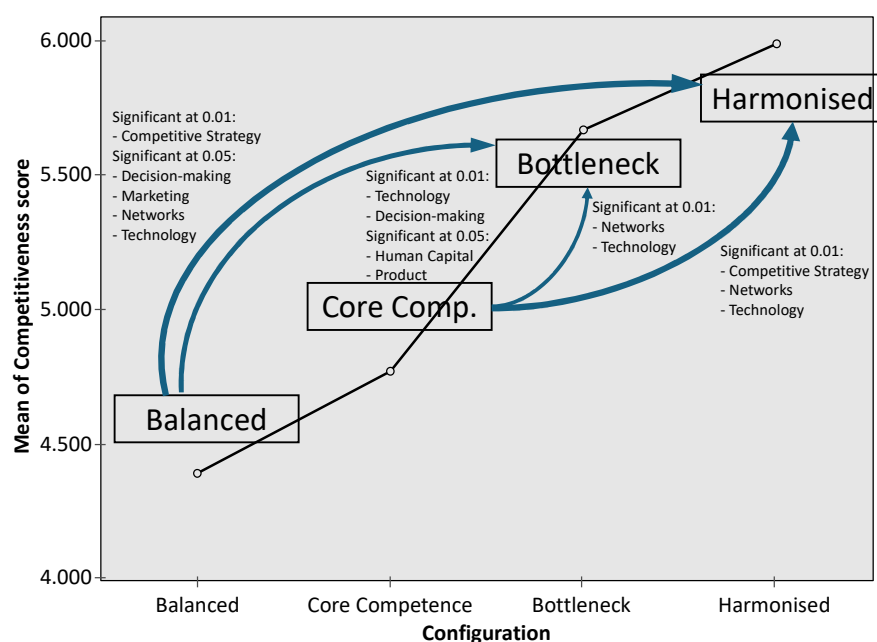


Figure 5. Analytically inferred development routes between configurations of SMEs

Source: own elaboration.

Overall, the results show that configuration is not a managerial choice variable in the narrow sense: firms do not select a configuration directly. Nonetheless, it is shaped by the way SMEs build and deploy their resources and capabilities. Configurations indicate the prevailing pattern of pillar strengths and weaknesses at a given point in time. By targeting specific pillars, SMEs can, in principle, nudge their configuration towards more competitive patterns, although not all routes are equally accessible or economically viable. This interpretation is consistent with RBV and dynamic capability arguments about path dependency and with the empirical evidence obtained from our cross-sectional analysis.

CONCLUSIONS

We analysed the competitiveness of small and medium-sized enterprises (SMEs) using a cross-country dataset of 785 firms from eight countries collected within the Global Competitiveness Project. Building on an RBV- and configuration-based perspective, we examined organisational resources and capabilities through ten competitiveness pillars derived from forty-four underlying variables, and classified SMEs into four configuration types (Balanced, Core Competence, Harmonised, and Bottleneck) based on the skewness and relative variance of their pillar scores. We then linked these configurations to an established competitiveness index and used ANOVA and binary logistic regression models to explore how specific pillars shape competitiveness differences and to analytically infer plausible development routes between configurations.

The empirical results reveal substantial differences in competitiveness across the four configuration types. Harmonised firms, characterised by relatively high and aligned pillar scores (low relative variance), displayed the highest average competitiveness, whereas Balanced firms, which combine markedly high and low pillar values (high relative variance), occupied the lowest position. Core Competence firms performed moderately better than Balanced firms, while Bottleneck firms were somewhat less competitive than Harmonised firms but still clearly outperformed the two less competitive configurations. At the same time, competitiveness was not mechanically determined by configuration: firms in all configurations could attain relatively high or low index values, although with different probabilities. This pattern supports H1a and H1b by confirming a robust association between configurations and competitiveness levels, while also indicating that configurations delimit but do not fully fix competitive outcomes.

At the pillar level, the findings support H2 by showing that configurations differ systematically in several key competitiveness pillars. Technology emerged as the most influential discriminator between configurations, followed by Competitive Strategy, Networks, and Decision-making, with Human Capital, Marketing, Product and, to a lesser extent, Internationalisation also playing a role. Higher scores in these pillars simultaneously raise the competitiveness index and increase the odds of belonging to more competitive configurations. Importantly, we did not find evidence that reducing pillar scores, for example, in the name of greater ‘balance,’ would improve competitiveness, which reinforces the internal consistency of the configuration scheme.

On this basis, we interpret H3 in terms of plausible, analytically inferred development routes between configurations. The estimated models suggest that less competitive firms can move towards more competitive structures through two main types of changes in their pillar profiles: (1) reducing internal dispersion by upgrading weaker pillars while preserving existing strengths, and (2) further reinforcing one or a few key pillars to the point where they become critical bottlenecks for further development. However, not all configurations appear to be mutually attainable in a cost-effective manner. In particular, incremental shifts from Balanced to Core Competence or from Bottleneck to Harmonised configurations seem less plausible; in such cases, the marginal gains in competitiveness may not justify the required reconfiguration costs. Therefore, we interpret the development routes as patterned but non-deterministic: they highlight more likely directions of change, conditioned by existing capability structures and managerial choices.

From a theoretical perspective, the study refines RBV- and configuration-based views of SME competitiveness in three ways. Firstly, it conceptualises configurations as path-dependent bundles of resources and capabilities, whose internal structure, captured by the distribution of pillar scores, both

enables and constrains future strategic options. Secondly, it differentiates explicitly between Harmonised and Balanced profiles among firms with broadly similar overall competitiveness ranges: while Harmonised configurations combine high pillar levels with low dispersion, Balanced configurations embody mixed internal strengths and weaknesses, which is associated with lower average competitiveness. Thirdly, by analytically inferring development routes between configurations based on pillar patterns and model results, the study offers a structured way to think about non-linear, path-dependent configuration change in SMEs, without assuming that such routes are unique or inevitable.

Methodologically, the article contributes by applying and extending a skewness–variance-based approach to configuration analysis. Using skewness to distinguish Core Competence and Bottleneck configurations, and relative variance to separate Harmonised and Balanced profiles among firms with intermediate skewness, allowed us to go beyond level-based typologies and incorporate distributional properties of capability portfolios into the classification. Integrating this four-type scheme with a composite competitiveness index offers a replicable framework for assessing how pillar structures translate into different configuration profiles and competitiveness outcomes. The use of binary logistic regressions, with configurations as dependent variables and pillars as predictors, provides a transparent way to identify which pillars are most strongly associated with more competitive configurations and to construct model-based inferences about potential development routes.

The empirical results also carry configuration-specific managerial implications. For Balanced firms, which combine strong and weak pillars, the priority is to reduce internal dispersion. Managers of such firms should focus on upgrading the weakest pillars while deliberately strengthening Technology, Decision-making, Marketing, and Networks to move towards a Harmonised configuration, where high and internally aligned pillar values support higher competitiveness. Alternatively, Balanced firms may intentionally specialise by concentrating on Technology (and in some cases Decision-making, Human Capital or Product), accepting a Bottleneck configuration in which one or a few pillars become dominant but also critical constraints for further growth.

For Core Competence firms, which exhibit one or two particularly strong pillars alongside weaker supporting domains, managers face a strategic choice between deepening and broadening. One route is to further reinforce Technology (and possibly Networks), moving towards a Bottleneck configuration where a narrow capability base underpins relatively high competitiveness but also increases dependence and potential vulnerability. The other route is to progressively broaden and align capabilities by continuing to emphasise Technology while strengthening Networks and, potentially, Internationalisation, thereby reducing pillar dispersion and approximating a Harmonised configuration. The choice between these routes reflects managerial preferences regarding specialisation versus diversification of capabilities and the firm's exposure to environmental uncertainty.

As the most competitive configuration, Harmonised firms should focus on maintaining and selectively upgrading their balanced capability structure. For these firms, the key challenge is not to create balance but to avoid erosion or excessive concentration of capabilities. Managers should monitor whether investments in specific pillars (*e.g.*, Technology or Networks) begin to generate new bottlenecks or imbalances, and ensure that improvements are accompanied by appropriate enhancements in complementary domains such as Decision-making, Human Capital, and Competitive Strategy. In this sense, the main managerial task is dynamic capability maintenance rather than radical reconfiguration.

For Bottleneck firms, whose high competitiveness rests on one or a few outstanding pillars, managerial priorities revolve around managing dependence and mitigating risk. One option is to further exploit the existing bottleneck by deepening investments in the dominant pillar (typically Technology and/or Networks), while progressively strengthening selected supporting pillars to reduce vulnerability. Another option, albeit more demanding, is to gradually broaden the capability base and move closer to a Harmonised configuration by upgrading weaker pillars without undermining the key advantage. In both cases, managers should be aware that attempts to transform Bottleneck into Core Competence or Balanced profiles through small adjustments are unlikely to be efficient, given the structure of the configurations and the modest competitiveness gains such shifts would bring.

The study has several limitations that suggest avenues for future research. Firstly, the analysis relied on cross-sectional data from eight countries and a fixed set of ten competitiveness pillars,

which constrained the generalisability of the findings and limited our ability to observe actual configuration transitions over time. Secondly, the measurement of resources and capabilities was based on managerial perceptions, which may have been affected by subjective biases despite the use of a standardised and extensively tested questionnaire. Thirdly, while the logistic models capture important associations between pillars and configurations, their explanatory and predictive power is necessarily partial, and contextual factors such as sector, country and institutional environment may further shape configuration–performance relationships.

These limitations open up several promising directions for future work. Longitudinal and mixed-method designs could track configuration trajectories over time and empirically test the development routes and path-dependent patterns hypothesised in this study. Sector-specific and country-comparative applications of the framework could examine how industry dynamics and institutional conditions influence the prevalence and performance of different configurations. Finally, further methodological refinements, for example, multi-level modelling or alternative clustering and classification techniques, could deepen our understanding of how resource and capability pillars interact in shaping SME competitiveness.

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Appendix 1:**List of resource and capability pillars and variables for SMEs' competitiveness**

Pillar	Code	Variable description
Human Capital	H2	The problems with employees
	H3	The share of employees participating in training programmes
	H4	The sophistication of compensation systems
	H5	The uniqueness of human capital
Product	P1	Product innovation
	P2	Activities/effort concerning the introduction of new or amended product
	P3	The share of new product in sales
	P4	The uniqueness of firm's product and continuous innovation
Domestic Market	DM1	The geographic scope of selling
	DM2	The level of firm's competition in the market
	DM3	The expected growth of the target market in five years
	DM4	The intensity of competition
	DM5	Quick response to customers' demand
Networks	N1	The number of economic cooperation and innovation agreements
	N2	The time of networking as compared to the establishment of the firm
	N3	The reliance on outside help in business development
	N4	Uniqueness of networking relationship
Technology	T1	The level of firm's technology
	T2	The age of available technology used by the firm and technological innovation
	T3	Environmental investment and quality assurance
	T4	The level of application of ICT tools
	T5	Uniqueness of applied technology, possession of license or know-how, product management and quality assurance
Decision-making	D1	The application of the different sources of information
	D2	The application of financial analyses in the business
	D3	Information sharing
	D4	Consultation in decision-making
	D5	Administrative routines/operations, knowledge sharing of the business organisation
Competitive Strategy	S1	The direction of strategy (defensive, proactive)
	S2	Growth strategy based on the number of business units
	S3	The leader's entrepreneurial traits
	S4	The uniqueness of firm's proactive strategy
Marketing	M1	The uniqueness of products
	M2	The pricing of the main product
	M3	Sophistication of distribution channels
	M4	Applied marketing and communication tools
	M5	Marketing innovation
	M6	The uniqueness of marketing methods
Internationalisation	I1	The significance of foreign buyers
	I2	The share of export in sales
	I3	Language capabilities at business level
	I4	The uniqueness of location
Online Presence	O1-2	Web 1.0 (speed, complexity and appearance of online presence)
	O3	Web 2.0 (Mail, Apple, GPlus, Facebook, Twitter, Instagram)
	O4	Online marketing applications

Source: Lafuente *et al.*, 2020a.

Appendix 2: Statistical tests of the relationship between configuration and competitiveness

Connection between configuration and competitiveness I.

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	153.836 ^a	6	0.000
Likelihood Ratio	163.132	6	0.000
Linear-by-Linear Association	6.166	1	0.013
N of Valid Cases	785	–	–

Notes: a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 65.17.

Source: own elaboration.

Directional Measures	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Symmetric	0.077	0.031	2.504	0.012
Somers' d Configuration Dependent	0.081	0.032	2.504	0.012
Competitiveness Dependent	0.072	0.029	2.504	0.012

Notes: a. Not assuming the null hypothesis; b. Using the asymptotic standard error assuming the null hypothesis.

Source: own elaboration.

Symmetric Measures	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	0.077	0.031	2.504	0.012
Kendall's tau-c	0.081	0.032	2.504	0.012
Gamma	0.105	0.042	2.504	0.012
N of Valid Cases	785	–	–	–

Notes: a. Not assuming the null hypothesis; b. Using the asymptotic standard error assuming the null hypothesis.

Source: own elaboration.

Connection between configuration and competitiveness II.

Configuration group	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Balanced	196	4.405	1.119	0.080	1.690	6.783
Core Competence	196	4.777	1.226	0.088	1.677	7.841
Bottleneck	196	5.669	1.415	0.101	1.879	8.589
Harmonised	197	5.999	1.128	0.080	3.104	8.302
Total	785	5.214	1.386	0.049	1.677	8.589
Random Effects	–	–	–	–	–	–

Source: own elaboration.

Post-Hoc	(I) Configuration	(J) Configuration	Mean Difference (I-J)	Std. Error	Sig.
Tamhane	Balanced	Core Competence	-0.372*	0.119	0.011
		Bottleneck	-1.264*	0.129	0.000
		Harmonised	-1.594*	0.113	0.000
	Core Competence	Balanced	0.372*	0.119	0.011
		Bottleneck	-0.892*	0.134	0.000
		Harmonised	-1.222*	0.119	0.000
	Bottleneck	Balanced	1.264*	0.129	0.000
		Core Competence	0.892*	0.134	0.000
		Harmonised	-0.330	0.129	0.064
	Harmonised	Balanced	1.594*	0.113	0.000
		Core Competence	1.222*	0.119	0.000
		Bottleneck	0.330	0.129	0.064
Dunnett T3	Balanced	Core Competence	-0.372*	0.119	0.011
		Bottleneck	-1.264*	0.129	0.000
		Harmonised	-1.594*	0.113	0.000
	Core Competence	Balanced	0.372*	0.119	0.011
		Bottleneck	-0.892*	0.134	0.000
		Harmonised	-1.222*	0.119	0.000
	Bottleneck	Balanced	1.264*	0.129	0.000
		Core Competence	0.892*	0.134	0.000
		Harmonised	-0.330	0.129	0.064
	Harmonised	Balanced	1.594*	0.113	0.000
		Core Competence	1.222*	0.119	0.000
		Bottleneck	0.330	0.129	0.064
Games-Howell	Balanced	Core Competence	-0.372*	0.119	0.010
		Bottleneck	-1.264*	0.129	0.000
		Harmonised	-1.594*	0.113	0.000
	Core Competence	Balanced	0.372*	0.119	0.010
		Bottleneck	-0.892*	0.134	0.000
		Harmonised	-1.222*	0.119	0.000
	Bottleneck	Balanced	1.264*	0.129	0.000
		Core Competence	0.892*	0.134	0.000
		Harmonised	-0.330	0.129	0.053
	Harmonised	Balanced	1.594*	0.113	0.000
		Core Competence	1.222*	0.119	0.000
		Bottleneck	0.330	0.129	0.053
Dunnett C	Balanced	Core Competence	-0.372*	0.119	—
		Bottleneck	-1.264*	0.129	—
		Harmonised	-1.594*	0.113	—
	Core Competence	Balanced	0.372*	0.119	—
		Bottleneck	-0.892*	0.134	—
		Harmonised	-1.222*	0.119	—
	Bottleneck	Balanced	1.264*	0.129	—
		Core Competence	0.892*	0.134	—
		Harmonised	-0.330	0.129	—
	Harmonised	Balanced	1.594*	0.113	—
		Core Competence	1.222*	0.119	—
		Bottleneck	0.330	0.129	—

Source: own elaboration.

Appendix 3:

Detailed results of the binomial logistic regression

Competitive pillars	<i>Balanced to</i>				<i>Core Competence to</i>				<i>Bottleneck to</i>			
	Bottleneck		Harmonised		Core Competence		Bottleneck		Harmonised		Harmonised	
	Model 1 Exp(B)	Model 1 p	Model 2 Exp(B)	Model 2 p	Model 3 Exp(B)	Model 3 p	Model 4 Exp(B)	Model 4 p	Model 5 Exp(B)	Model 5 p	Model 6 Exp(B)	
Competitive Strategy	–	–	8.130*	0.003	–	–	–	–	15.315*	0.000	4.566**	0.011
Decision-making	4.767*	0.006	4.132**	0.035	–	–	–	–	–	–	–	–
Human Capital	5.074**	0.016	4.292***	0.053	–	–	–	–	–	–	–	–
Internationalisation	–	–	–	–	–	–	–	–	4.044***	0.055	–	–
Marketing	3.503***	0.071	5.464**	0.032	–	–	–	–	–	–	2.915***	0.087
Networks	–	–	4.049**	0.034	–	–	4.303*	0.009	5.340*	0.009	–	–
Product	3.545**	0.037	3.774***	0.054	2.667**	0.036	–	–	–	–	–	–
Technology	10.485*	0.007	10.638**	0.015	–	–	53.514*	0.000	23.371*	0.001	0.266***	0.066
Chi-square test	105.151	–	155.394	–	4.442	–	71.092	–	112.408	–	12.847	–
Nagelkerke R2	0.314	–	0.435	–	0.015	–	0.221	–	0.332	–	0.043	–
H&L test	0.195	–	0.373	–	0.010	–	0.521	–	0.577	–	0.469	–
Correctly predicted (%)	70.2	–	74.6	–	54.1	–	67.6	–	70.7	–	55.7	–
ROC AUC	0.777	–	0.837	–	0.570	–	0.738	–	0.792	–	0.593	–
Observations	392	–	393	–	392	–	392	–	393	–	393	–

Note. Odds ratios (Exp(B)) and p-values are reported; the configuration shown in italics is the reference category. An odds ratio greater than 1 indicates that higher values of the pillar increase the odds of belonging to the non-reference configuration relative to the reference configuration.

Odds ratios are reported for one-unit increases in pillar scores; given that pillar scores are bounded and constructed on a normalised scale, seemingly large odds ratios should be interpreted as reflecting the scale of the underlying metric rather than as literal marginal effects over an unconstrained range.

*, **, *** indicate significance at the 1%, 5% and 10% significance levels, respectively.

ROC AUC = receiver operating characteristic area under the curve.

Source: own elaboration.

Authors

The contribution shares of the authors are equal and amount to 50% for each author.

András Rideg – conceptualisation, literature writing, Gábor Márkus – methodology, calculations, discussion.

András Rideg (corresponding author)

Associate Professor and Researcher at the Department of Management Science, Faculty of Business and Economics, University of Pécs. His research interests include RBV-based SME competitiveness and SME strategy.

Correspondence to: Dr. habil. András Rideg, Faculty of Business and Economics, University of Pécs, Rákóczi út 80, Pécs, Hungary. Postcode: 7622, e-mail: ridega@tkk.pte.hu

ORCID  <https://orcid.org/0000-0001-7332-7803>

Gábor Márkus

Assistant Professor and Researcher at the Department of Finance and Accounting, Faculty of Business and Economics, University of Pécs. His research interests include SME competitiveness, financial performance and international accounting standards.

Correspondence to: Dr. Gábor Márkus, Faculty of Business and Economics, University of Pécs, Rákóczi út 80, Pécs, Hungary. Postcode: 7622, e-mail: markus.gabor@tkk.pte.hu

ORCID  <https://orcid.org/0000-0001-8132-1129>

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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