Article:

Lisboa, A, Skarmeas, D and Saridakis, C (2016) Entrepreneurial orientation pathways to performance: A fuzzy-set analysis. Journal of Business Research, 69 (4). pp. 1319-1324. ISSN 0148-2963

https://doi.org/10.1016/j.jbusres.2015.10.099

Entrepreneurial orientation pathways to performance: A fuzzy-set analysis

Ana Lisboa, Instituto Politécnico de Leiria

Dionysis Skarmeas, Athens University of Economics and Business

Charalampos Saridakis, University of Leeds

Revision: August 2015

The authors thank George Baltas, Athens University of Economics and Business, and Constantinos Leonidou, University of Leeds, for their careful reading and suggestions. The authors also acknowledge the support of FCT (within the project UID/Multi/04044/2013) and Centre for Rapid and Sustainable Product Development (CDRsp-IPL). Send correspondence to Ana Lisboa, Escola Superior de Tecnologia e Gestão, Instituto Politécnico de Leiria, Campus 2 – Morro do Lena, Alto Vieiro, Apartado 4163, 2411-901 Leiria, Portugal (ana.lisboa@ipleiria.pt); Dionysis Skarmeas, Athens University of Economics and Business, Department of Marketing and Communication, 12 Derigny Str., Athens 10434, Greece (dskarmeas@aueb.gr); Charalampos Saridakis, Leeds University Business School, University of Leeds, Maurice Keyworth Building, Leeds LS2 9JT, United Kingdom (b.saridakis@leeds.ac.uk).

Abstract

Most prior research on entrepreneurial orientation (EO) aggregates its features into a gestalt construct to investigate its influence on firm performance. This study deconstructs EO into innovativeness, proactiveness, and risk-taking dimensions, and focuses on the causal mechanisms by which those factors collectively affect performance. By drawing on the resource-based view of the firm and its dynamic capabilities extension, the study identifies multiple paths of complex causal recipes that can lead to certain organizational capabilities, competitive advantages, and performance. To do that, the study uses fuzzy-set qualitative comparative analysis (fsQCA), a technique that provides a holistic view of the examined interrelationships, compared to traditional net effect approaches that assume symmetric and linear relationships among variables. The study provides key conclusions and insightful implications for managers and researchers.

Keywords: entrepreneurial orientation; exploitation; exploration; competitive advantage; performance; fuzzy-set qualitative comparative analysis.

1. Introduction

Firms are under constant pressure to develop new product offerings that match customer needs better than their competitors (Yalcinkaya et al., 2007). The literature suggests that adopting an EO may help firms in this regard (Soriano & Huarng, 2013). EO refers to the philosophy and decision-making processes that guide a firm's activities, and encompasses values and behaviors such as innovativeness, proactiveness, and risk taking (Covin & Slevin, 1989).

Yet, although research provides substantial evidence relating EO possession to firm performance, little understanding exists of how EO influences performance (Zahra et al., 2006). Most studies merge the components of EO into a combined gestalt construct when examining its direct link to performance (Wu, 2013) or the role of mediating variables in this link (Li et al., 2010). However, a firm can simultaneously present high levels of innovativeness and/or proactiveness and relatively low levels of risk taking; such variances between the components are essential for understanding the role of EO in explaining firm outcomes (Hughes & Morgan, 2007).

Further, a review of the literature reveals that, although some studies examine the links between the different dimensions of EO and firm performance (Theoharakis & Hooley, 2008), no research investigates the alternative complex combinations (i.e., causal recipes) of the individual dimensions of EO that lead to high performance.

In seeking to address these shortcomings, this study draws on the resource-based view (RBV) and dynamic capabilities (DC) theories to investigate the multiple pathways of complex antecedent conditions by which EO components facilitate product-development capabilities, new-product advantage, and performance (Figure 1).

Figure 1 here.

2. Theoretical background

2.1. RBV theory

The RBV theory envisions the firm as a unique combination of resources and capabilities, which serve as sources of competitive advantage and superior performance (Peteraf, 1993). Resources are tangible or intangible assets that firms use to conceive of and implement their strategies (Peteraf, 1993); capabilities are embedded, complex bundles of skills and processes that enable firms to deploy resources (Eisenhardt & Martin, 2000).

EO refers to a firm’s strategic orientation, reflecting the decision-making styles, practices, and methods that direct its activities (Lumpkin & Dess, 1996). An entrepreneurial firm engages in product-market innovation, assumes risks, and has an opportunity-seeking perspective (De Clercq & Zhou, 2014). Accordingly, the core components of EO are innovativeness, proactiveness, and risk taking (Covin & Slevin, 1989). Innovativeness reflects the firm’s tendency to embrace new ideas, favor change, and encourage experimentation (Hurley & Hult, 1998). Proactiveness conveys a forward-looking perspective that aims to spot, anticipate, and act on future market changes (Li et al., 2010). Risk taking reflects the firm’s willingness to take bold actions and devote resources to pursue opportunities with uncertain outcomes (Lumpkin & Dess, 1996). Thus, innovativeness, proactiveness, and risk taking embody a set of values and beliefs that shape how the firm intends to conduct business and compete (Hughes & Morgan, 2007). As such, they serve as key strategic resources that guide the firm's attempts to achieve superior performance.

2.2. DC theory

The DC theory suggests that possession of resources is a necessary but not sufficient condition for value creation (Newbert, 2007) and maintains that the capabilities through which firms develop and deploy resources, rather than resources per se, help create a competitive advantage and enjoy superior performance (Morgan, Vorhies, & Mason, 2009).

Exploration and exploitation capabilities can serve as the internal processes through which firms deploy innovativeness, proactiveness, and risk taking to match their market environment and facilitate the development of competitive advantage (Eisenhardt & Martin, 2000). Product-development explorative capabilities entail pursuing new product-development skills, processes, and knowledge, whereas product-development exploitative capabilities involve refining and extending existing product-development skills, technologies, and paradigms (Atuahene-Gima, 2005; Cui et al., 2014). Thus, product-development exploration and exploitation are the value-creating mechanisms that allow the firm to gain competitive advantage (Atuahene-Gima, 2005; Zahra et al., 2006).

2.3. New-product advantage and performance

This study focuses on two key features of new-product advantage: differentiation and speed to market. New-product differentiation refers to the quality and uniqueness of a firm's product-development efforts (Ramaswani et al., 2009), and new-product speed to market reflects the time efficiency of the firm's product introduction into the market (Fang, 2008). To succeed in the highly competitive global-market environment, firms need not only to develop new offerings with features that are meaningful to customers but also to introduce them into the marketplace in a time-efficient way (Fang, 2008). New-product differentiation and speed to market are powerful determinants of firm performance (Yalcinkaya et al., 2007). Profitability, which refers to return on investment, return on sales, and profits, serves as an ultimate measure for firm performance and success (Vorhies & Morgan, 2005).

3. Method

3.1. Measures and sampling

The measures of innovativeness, proactiveness, and risk taking derived from Covin and Slevin's (1989) work. The items used to measure product-development explorative and exploitative capabilities came from the studies by Atuahene-Gima (2005) and Yalcinkaya et al. (2007). The items used to measure new-product differentiation and speed to market originated from Ramaswami et al. (2009). Profitability items came from Vorhies and Morgan (2005).

This study focuses on manufacturing firms in Portugal. The random sample from the Portuguese National Statistics Institute database contained 2931 firms. The research team contacted all firms by telephone to check their eligibility, explain the study's purpose, identify key informants, and check the accuracy of their email addresses. This process resulted in 1271 eligible firms. Then, the identified key informants received an invitation email requesting them to follow a link and participate in the survey. The online survey consisted of an introductory page, an instruction page, four pages of questions, and an ending page. The initial email, together with two reminder emails (sent from the same email address), yielded 263 usable responses (20.69% response rate). Respondents commonly held senior-management positions, including managers (32%), chief executive officers (31%), and general managers (13%).

A comparison of respondents and a random group of 48 non-responding firms with respect to firm demographics showed no significant differences between the groups. Additionally, the results of Harman's one-factor test suggest that common method bias is not a significant threat to the validity of this study.

3.2. Overview of fsQCA

Contrary to correlational methods, such as structural equation modeling (SEM), which estimate the net effect of an independent variable on a dependent variable, fsQCA identifies the conditions that lead to a given outcome (Cheng et al., 2013; Schneider et al., 2010; Stokke, 2007). In this way, fsQCA supplements conventional correlational analyses thanks to its three main advantages: (1) asymmetry (i.e., the relationships between independent and dependent variables are treated as asymmetric); (2) equifinality (i.e., multiple pathways lead to the same outcome); and (3) causal complexity (i.e., combinations of causal antecedent conditions lead to the outcome, and hence, the focus is not on net effects, but on combinatorial effects) (Fiss, 2011; Ganter & Hecker, 2014; Pajunen, 2008; Skarmeas et al., 2014).

4. Analysis

4.1. Measurement validation

The maximum likelihood estimation procedure in EQS assesses the validity of the measures. The measurement model results reveal a good fit ($\chi^2_{(709)}$=1506.86, p< 0.001; NFI = 0.93; CFI = 0.96; IFI = 0.96; TLI = 0.95; RMSEA = 0.06). The study constructs have adequate composite reliability (ρ >0.79) and average variance extracted (ρvc(n)>0.56) scores. The average loading size of each item on its intended construct is 0.80, which provides evidence of convergent validity. In addition, all possible pairs of constructs passed Fornell and Larcker's (1981) test of discriminant validity.

4.2. Implementing fsQCA

Table 1 presents the derived complex solutions that illustrate the causal recipes (i.e., sufficient conditions), which lead to high membership in the five outcome conditions. Complex solutions, contrary to the parsimonious and intermediate solutions, make no simplifying assumptions (Elliott, 2013). After calculating the consistency scores for all possible complex causal combinations that lead to the five outcome conditions, a comparison with the usual cut-off consistency score of 0.80 follows. Combinations with consistency scores higher than this threshold remain in the final solution. Table 1 suggests that all five models (solutions) are rather informative. All consistency values are higher than 0.75 and most coverage values range between 0.25 and 0.65, as Woodside (2013) suggests.

Table 1 here.

4.2.1. Pathways to product-development exploration

Two pathways lead to high product-development exploration. The first one indicates that high innovativeness relates to high membership scores for product-development exploration. This pathway is fairly consistent (consistency =0.82) and explains a satisfactory amount of cases with high product-development exploration (coverage =0.77). The second pathway indicates that high proactiveness, with low risk taking also results in high product-development exploration. This pathway is slightly more consistent than the previous one (consistency =0.83), and explains a satisfactory amount of cases with high product-development exploration (coverage =0.45). The solution as a whole has a satisfactory consistency of 0.80 and a coverage of 0.83. Although high innovativeness is sufficient for high product-development exploration, no simple antecedent conditions (i.e., EO dimensions) are necessary for this outcome to occur.

4.2.2. Pathways to product-development exploitation

The solution for high product-development exploitation indicates two pathways. The first pathway suggests that high innovativeness and high proactiveness result in high product-development exploitation. Additionally, high innovativeness and high risk taking may also lead to high product-development exploitation. The solution is fairly consistent at 0.83, with a coverage value of 0.75. Innovativeness is a necessary (though not sufficient) condition for high product-development exploitation.

4.2.3. Pathways to new-product differentiation

Regarding new-product differentiation, the results suggest two pathways. The first one indicates that high innovativeness and high risk taking, with low product-development exploration and high product-development exploitation result in high new-product differentiation (consistency=0.89; coverage=0.31). The second pathway indicates that high innovativeness and low proactiveness, with high product-development exploration and high product-development exploitation may also lead to high new-product differentiation (consistency=0.89; coverage=0.36). The solution as a whole has high consistency of 0.87 and a satisfactory coverage of 0.43.

4.2.4. Pathways to new-product speed to market

The solution for new-product speed to market derived two pathways. The first one indicates that low innovativeness and high proactiveness, with low risk taking and high product-development exploration result in high new-product speed to market (consistency=0.89; coverage=0.33). The second pathway indicates that high innovativeness and low risk taking, with low product-development exploration and high product-development exploitation can also lead to high new-product speed to market. The second pathway is more consistent (consistency=0.90) and explains a satisfactory amount of cases (coverage=0.31). Overall, the solution has a high consistency of 0.88 and a satisfactory coverage of 0.40.

4.2.5. Pathways to profitability

The model examining high profitability suggests four pathways. The first one indicates that if all three EO components are high, and product-development exploration with product-development exploitation are also high, along with low new-product speed to market, profitability will be also high (consistency=0.92; coverage=0.32). The second pathway indicates that high innovativeness, high risk taking, high product-development exploration, high product-development exploitation, along with high new-product differentiation and high new-product speed to market, will also result in high profitability (consistency=0.92; coverage=0.37).

Also, the derived pathways suggest that, under certain conditions, low innovativeness may also lead to high profitability (see the third and fourth pathways). For example, low innovativeness, low proactiveness, low product-development exploration, low product-development exploitation, and low new-product speed to market, may lead to high profitability, as long as risk taking and new-product differentiation are high (third pathway-consistency=0.91; coverage=0.24). Finally, low innovativeness and low risk taking may also lead to high profitability, provided that proactiveness, product-development exploration, product-development exploitation, new-product differentiation, and new-product speed to market are all high (fourth pathway-consistency=0.94; coverage=0.23). The solution as a whole has a high consistency of 0.89 and a very satisfactory coverage of 0.53.

4.3. Illustration of SEM results

Table 2 presents relevant results of a supplementary analysis of the proposed research model using SEM. Innovativeness positively relates to product-development exploitation ($\beta = 0.43$, $p< 0.01$). Innovativeness and risk taking positively relate to product-development exploration ($\beta = 0.39$, $p< 0.00$ and $\beta = 0.19$, $p< 0.01$, respectively).

In addition, innovativeness and product-development exploration positively relate to new-product differentiation ($\beta = 0.43$, $p < 0.00$ and $\beta = 0.30$, $p < 0.01$, respectively), whereas product-development exploitation negatively relates to new-product differentiation ($\beta = -0.29$, $p < 0.01$). Proactiveness positively relates to new-product speed to market ($\beta = 0.30$, $p < 0.01$), whereas risk taking negatively relates to new-product speed to market ($\beta = -0.20$, $p < 0.05$). Finally, proactiveness, and product-development exploitation positively relate to profitability ($\beta = 0.26$, $p < 0.05$ and $\beta = 0.35$, $p < 0.00$, respectively).

Table 2 here.

5. Discussion and conclusion

SEM can merely show the existence of a statistically significant, monotonically increasing or decreasing relationship between two variables. However, net effects do not reflect all aspects of reality because, in any given dataset, not all cases support an exclusive negative or positive relationship between the independent and the dependent variables (Woodside, 2013). Table 3 illustrates the recipes that associate with high membership scores in the five outcome conditions.

Table 3 here.

Regarding the influence of EO dimensions on product-development exploration, the solution suggests that high innovativeness is a sufficient (though not necessary) condition for high product-development exploration. Interestingly enough, the results also suggest that even a low risk-taking firm, which is less willing to take bold actions, may also have high product-development explorative capabilities, as long as the firm simultaneously behaves in a proactive, forward-looking manner. Indeed, a forward-looking, proactive firm, which spots, anticipates, and acts timely on future market changes, may compensate for its low risk-taking behavior, and therefore develop product-development explorative capabilities.

Regarding the influence of EO dimensions on product-development exploitation, innovativeness is a necessary, though not sufficient condition (as opposed to the finding for explorative capability). High levels of product-development exploitative capabilities require innovation’s combination with either a proactive or a risk-taking posture. Again, the results reveal the existence of a substitute relationship between a forward-looking and a risk-taking behavior.

Conventional wisdom assumes that an entrepreneurial posture facilitates only discovery-led activities. However, firms that adopt a combination of innovative and proactive posture or a combination of innovative and risk-taking posture can also develop an incremental type of firm innovation. The firm’s openness to new ideas, products, or processes acts as a springboard to invest in product-enhancing technologies and progressive improvements in product quality. The proactive posture sets the stage for firm action and renewal of existing product skills and knowledge. Further, the risk-taking posture enables the firm to take bold actions and devote resources to refine and extend its current knowledge bases and routines. Thus, the results show that under certain conditions, all three dimensions of EO provide an enriching environment for product-development exploitation.

Taken together, the pattern of results supports the argument that treating EO as a multidimensional construct makes sense. Indeed, different combinations of EO dimensions lay the foundation for different types of product-development capabilities.

Regarding the antecedent conditions for new-product differentiation, the results suggest two causal recipes. High innovativeness and high product-development exploitation appear in both recipes. An innovative posture, combined with exploitative capabilities, is a necessary (though not sufficient) condition for high new-product differentiation advantage. The influence (positive or negative) of product-development explorative capabilities on new-product differentiation seems to depend on the combination of additional antecedent conditions. More specifically, the results suggest that a high risk-taking posture can counterbalance a firm's low explorative capability, and therefore lead to high new-product differentiation advantage (first pathway). Alternatively, the merits of a firm's high explorative capability can compensate for a low proactive posture, and also lead to high new-product differentiation advantage (second pathway). The results reveal a non-linear relationship between product-development explorative capabilities and new-product differentiation advantage, with the moderating action of the firm's EO posture (i.e., pro-active or risk-taking). These findings provide new insights into the existing literature, which so far acknowledges exploration, by promoting discovery and experimentation of new ideas, as a necessary source of differentiated, unique products (Yalcinkaya et al., 2007).

Contrary to the antecedent conditions for new-product differentiation, innovative posture is not a necessary condition for new-product speed to market. Low innovativeness can lead to new-product speed to market advantage if the firm combines a highly proactive posture with product-development explorative capabilities. However, if innovativeness is high, a firm can achieve a new-product speed to market advantage, even if the firm has low product-development explorative capabilities. Also, the results indicate that low risk taking is the only necessary (though not sufficient) simple antecedent condition for high new-product speed to market, because this condition appears in both pathways. Yet, the expected positive effects of product-development exploration and product-development exploitation on new-product speed to market depend on the combination of additional antecedent conditions that occur in specific causal recipes. Again, fsQCA reveals the existence of asymmetric relationships among variables. Firms can counterbalance the disadvantage of low explorative capabilities in experimenting on new alternatives by adopting an innovative posture that favors creativity. By virtue of favoring change and improving existing product skills and technologies, firms can achieve time synergies and benefits from prompt introduction of enhanced products into the market.

Finally, the results reveal multiple configurations to high profitability. The derived pathways suggest that (i) no necessary simple antecedent conditions exist for high profitability and (ii) EO dimensions, product-development capabilities, and new-product advantages can contribute either positively or negatively to profitability depending on the combination of simple antecedent conditions that occur in any given recipe. For example, literature suggests that both new-product differentiation and new-product speed to market have beneficial effects on firm performance (Sheng et al., 2013). The study findings show that new-product differentiation can lead to high profitability under certain conditions; however, this competitive advantage may not be necessary (first pathway). Regarding new-product speed to market, two of the pathways suggest a beneficial effect on profitability, whereas two other pathways reveal a deleterious effect. The findings on EO components and product-development capabilities suggest similar conclusions. Managers operating in complex environments can achieve high profitability through several pathways comprising different combinations and levels of EO dimensions, product-development capabilities, and new-product advantages. FsQCA reveals new patterns in the dataset, beyond the obvious net effects of regression-based techniques, and therefore provides information that is of greater value to managers and researchers.

References

Atuahene-Gima, K. (2005). Resolving the capability-rigidity paradox in new product innovation. Journal of Marketing, 69(4), 61–83.

Cheng, C.F., Chang, M.L. & Li, C.S. (2013). Configural paths to successful product innovation. Journal of Business Research, 66(12), 2561–2573.

Covin, J.G. & Slevin, D.P. (1989). Strategic management of small firms in hostile and benign environments. Strategic Management Journal, 10(1), 75–87.

Cui, A.P., Walsh, M.F. & Zou, S. (2014). The Importance of strategic fit between host-home country similarity and exploration exploitation strategies on small and medium-sized enterprises' performance: A contingency perspective. Journal of International Marketing, 22(4), 67–85.

De Clercq, D. & Zhou, L. (2014). Entrepreneurial strategic posture and performance in foreign markets: The critical role of international learning effort. Journal of International Marketing, 22(2), 47–67.

Eisenhardt, K.M. & Martin, J.A. (2000). Dynamic capabilities: What are they? Strategic Management Journal, 21(10–11), 1105–1121.

Elliott, T. (2013). Fuzzy set qualitative comparative analysis: An introduction. Research notes, Statistics Group, UCI.

Fang, E. (2008). Customer participation and the trade-off between new product innovativeness and speed to market. Journal of Marketing, 39(8), 1384–1394.

Fiss, P.C. (2011). Building better causal theories: A fuzzy set approach to typologies in organization research. Academy of Management Journal, 54(2), 393–420.

Fornell, C., & Larcker, D. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Ganter, A., & Hecker, A. (2014). Configurational paths to organizational innovation: Qualitative comparative analyses of antecedents and contingencies. Journal of Business Research, 67(6), 1285–1292.

Hughes, M., & Morgan, R.E. (2007). Deconstructing the relationship between entrepreneurial orientation and business performance at the embryonic stage of firm growth. Industrial Marketing Management, 36(5), 651–661.

Hurley, R.F., & Hult, G.T.M. (1998). Innovation, market orientation, and organizational learning: An integration and empirical examination. Journal of Marketing, 62(3), 42–54.

Li, Y., Wei, Z., & Liu, Y. (2010). Strategic orientations, knowledge acquisition, and firm performance: The perspective of the vendor in cross-border outsourcing. Journal of Management Studies, 47(8), 1457–1482.

Lumpkin, G., & Dess, G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. Academy of Management Review, 21(1), 135–172.

Morgan, N.A., Vorhies, D.W. & Mason, C.H. (2009). Market orientation, marketing capabilities, and firm performance. Strategic Management Journal, 30(8), 909–920.

Newbert, S.L. (2007). Empirical research on the resource-based view of the firm: An assessment and suggestions for future research. Strategic Management Journal, 28(2), 121–146.

Pajunen, K. (2008). Institutions and inflows of foreign direct investment: A fuzzy-set analysis. Journal of International Business Studies, 39(4), 652–669.

Peteraf, M.A. (1993). The cornerstones of competitive advantage: A resource-based view. Strategic Management Journal, 14(3), 179-191.

Ramaswami, S.N., Srivastava, R.K., & Bhargava, M. (2009). Market-based capabilities and financial performance of firms: Insights into marketing's contribution to firm value. Journal of the Academy of Marketing Science, 37(2), 97–116.

Schneider, M. R., Schulze-Bentrop, C., & Paunescu, M. (2010). Mapping the institutional capital of high-tech firms: A fuzzy-set analysis of capitalist variety and export performance. Journal of International Business Studies, 41(2), 246–266.

Sheng, S., Zhou, K.Z., & Lessassy, L. (2013). NPD speed vs. innovativeness: The contingent impact of institutional and market environments. Journal of Business Research, 66(11), 2355–2362.

Skarmeas, D., Leonidou, C.N., & Saridakis, C. (2014). Examining the role of CSR skepticism using fuzzy-set qualitative comparative analysis. Journal of Business Research, 67(9), 1796–1805.

Soriano, D.R., & Huarng, K.-H. (2013). Innovation and entrepreneurship in knowledge industries. Journal of Business Research, 66(10), 1964–1969.

Stokke, O.S. (2007). Qualitative comparative analysis, shaming, and international regime effectiveness. Journal of Business Research, 60(5), 501–511.

Theoharakis, V., & Hooley, G. (2008). Customer orientation and innovativeness: Differing roles in new and old Europe. International Journal of Research in Marketing, 25(1), 69–79.

Vorhies, D.W., & Morgan, N.A. (2005). Benchmarking marketing capabilities for sustainable competitive advantage. Journal of Marketing, 69(1), 80–94.

Woodside, A.G. (2013). Moving beyond multiple regression analysis to algorithms: Calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory. Journal of Business Research, 66(4), 463–472.

Wu, C.-W. (2013). Global-innovation strategy modeling of biotechnology industry. Journal of Business Research, 66(10), 1994–1999.

Yalcinkaya, G., Calantone, R.J., & Griffith, D.A. (2007). An examination of exploration and exploitation capabilities: Implications for product innovation and market performance. Journal of International Marketing, 15(4), 63–93.

Zahra, S.A., Sapienza, H., & Davidson, P. (2006). Entrepreneurship and dynamic capabilities: A review, model and research agenda. Journal of Management Studies, 43(4), 917–955.

Table 1. Complex solutions for the outcome conditions

COMPLEX SOLUTION	Raw coverage	Unique coverage	Consistency
Product-development exploration findings			
Model: f_explorat=f(f_innovat, f_proact, f_risk)			
f_innovat	0.772488	0.381454	0.820427
f_proact*~f_risk	0.451221	0.060187	0.827299
solution coverage: 0.832675; solution consistency: 0.796893			
frequency cutoff: 10.000000; consistency cutoff: 0.853007			
Product-development exploitation findings			
Model: f_exploita=f(f_innovat, f_proact, f_risk)			
f_innovat*f_proact	0.688088	0.090097	0.835917
f_innovat*f_risk	0.659544	0.061553	0.851292
solution coverage: 0.749641; solution consistency: 0.824159			
frequency cutoff: 10.000000; consistency cutoff: 0.854590			
New-product differentiation findings			
Model: f_npdiffer=f(f_innovat, f_proact, f_risk, f_explorat, f_exploita)			
f_innovat*f_risk*~f_explorat*f_exploita	0.312468	0.066545	0.894682
f_innovat*~f_proact*f_explorat*f_exploita	0.359195	0.113272	0.890339
solution coverage: 0.425740; solution consistency: 0.873912			

frequency cutoff: 1.000000; consistency cutoff: 0.900176

New-product speed to market findings

Model: f_npspeed=f(f_innovat, f_proact, f_risk, f_explorat, f_exploita)

~f_innovat*f_proact*~f_risk*f_explorat	0.334717	0.095773	0.890741
f_innovat*~f_risk*~f_explorat*f_exploita	0.306113	0.067170	0.899734

solution coverage: 0.401887; solution consistency: 0.882645

frequency cutoff: 1.000000; consistency cutoff: 0.901635

Profitability findings

Model: f_profit=f(f_innovat, f_proact, f_risk, f_explorat, f_exploita, f_npdiffer, f_npspeed)

f_innovat*f_proact*f_risk*f_explorat*f_exploita*~f_npspeed	0.320047	0.064764	0.922484
f_innovat*f_risk*f_explorat*f_exploita*f_npdiffer*f_npspeed	0.367042	0.097077	0.916881
~f_innovat*~f_proact*f_risk*~f_explorat*~f_exploita*f_npdiffer*~f_npspeed	0.243757	0.050014	0.905916
~f_innovat*f_proact*~f_risk*f_explorat*f_exploita*f_npdiffer*f_npspeed	0.229624	0.028540	0.936486

solution coverage: 0.531284; solution consistency: 0.891550

frequency cutoff: 4.000000; consistency cutoff: 0.905916

Table 2. SEM results

Relationship	Standardized estimate (t-value)
Innovativeness→Product-development exploration	0.39 (4.32)*
Innovativeness→Product-development exploitation	0.43 (4.79)*
Innovativeness→New-product differentiation	0.43 (3.82)*
Innovativeness→New-product speed to market	-0.00 (-0.02)
Innovativeness→Profitability	-0.14 (-1.29)
Proactiveness→Product-development exploration	0.11 (1.13)
Proactiveness→Product-development exploitation	0.18 (1.89)
Proactiveness→New-product differentiation	0.14 (1.27)
Proactiveness→New-product speed to market	0.30 (2.51)*
Proactiveness→Profitability	0.26 (2.31)*
Risk-taking→Product-development exploration	0.19 (2.42)*
Risk-taking→Product-development exploitation	0.12 (1.53)
Risk-taking→New-product differentiation	0.01 (0.06)
Risk-taking→New-product speed to market	-0.20 (-2.18)*
Risk-taking→Profitability	-0.14 (1.49)
Product-development exploration→New-product differentiation	0.30 (2.95)*

Product-development exploration→New-product speed to market	0.08 (0.84)
Product-development exploration→Profitability	0.03 (0.35)
Product-development exploitation→New-product differentiation	-0.29 (-2.74)*
Product-development exploitation→New-product speed to market	0.15 (1.65)
Product-development exploitation→Profitability	0.35 (3.27)*
New-product differentiation→Profitability	0.16 (1.86)
New-product speed to market→Profitability	-0.04 (-0.57)

* $p < 0.05$.

Table 3. Configurations for achieving high levels of the outcome conditions.*

	Solutions and pathways for high membership score in the outcome conditions																
	Outcome condition																
	Product-development exploration			Product-development exploitation			New-product differentiation			New-product speed to market			Profitability				
Antecedent condition	1st	2nd	Conclusion	1st	2nd	Conclusion	1st	2nd	Conclusion	1st	2nd	Conclusion	1st	2nd	3rd	4th	Conclusion
Innovativeness	•		Ø	•	•	●	•	•	●	○	•	Ø	•	•	○	○	Ø
Proactiveness		•	Ø	•		Ø		○	Ø	•		Ø	•		○	•	Ø
Risk-taking		○	Ø		•	Ø	•		Ø	○	○	◯	•	•	•	○	Ø
Product-development exploration							○	•	Ø	•	○	Ø	•	•	○	•	Ø
Product-development exploitation							•	•	●		•	Ø	•	•	○	•	Ø
New-product differentiation														•	•	•	Ø
New-product speed to market													○	•	○	•	Ø

*Black circles indicate high presence of a condition, and white circles indicate low presence (i.e., absence) of a condition. Large black (white) circles indicate a core-necessary condition of presence (absence). "Ø" indicates a peripheral (not necessary) condition. Blank spaces in a pathway indicate "don't care".

Figure 1. Conceptual model