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BUSINESS MODEL CONFIGURATIONS AND ORGANIZATIONAL PERFORMANCE

Abstract. The paper presents and analysis of the business model configurations associated with performance by conducting a qualitative comparative analysis of university spin-off companies. The purpose of this paper is to identify and describe business model configurations, analyze their associations with high and low firm performance, and explore the nature of these associations. The configurations comprising business models leveraging high level human resources and having a wide access to financial resources are associated with high performance was found. In addition, the extracted business models are not featured in any of the two configurations associated with low performance.

Keywords: business model, configurations, university spin-off company, qualitative comparative analysis

KONFIGURACJE MODELI BIZNESU A EFEKTYWNOŚĆ FUNKCJONOWANIA ORGANIZACJI

Streszczenie. W artykule przedstawiono i przeanalizowano konfiguracje modeli biznesu powiązanych z efektywnością funkcjonowania organizacji. Badania przeprowadzono przy wykorzystaniu jakościowej analizy porównawczej na podstawie akademickich przedsiębiorstw odpryskowych. Celem artykułu jest zidentyfikowanie i opisanie konfiguracji modeli biznesu wraz z analizą ich powiązań z wysoką i niską efektywnością badanych przedsiębiorstw. Stwierdzono, że konfiguracje modeli biznesu wykorzystujące wysokiego poziomu zasoby ludzkie i posiadające szeroki dostęp do zasobów finansowych są powiązane z wysoką efektywnością. Ponadto wyodrębnione modele biznesu nie występują w żadnej z dwóch konfiguracji powiązanych z niską efektywnością.

Słowa kluczowe: modele biznesu, konfiguracje, akademickie przedsiębiorstwa odpryskowe, jakościowa analiza porównawcza

1. Introduction

Business models connect the technological and economic domains of a business by articulating "a value proposition latent in the new technology"[1]. Although the role of business models is increasingly recognized[2] our understanding of the relationship between business models and firm performance in technology-based environments (i.e., contexts where firms are pressured to constantly innovate their technology to compete) is still incomplete. Previous studies of business models have devoted relatively little attention to the fact that firms often run multiple business models simultaneously, thus implementing configurations of business models. Business model configurations are especially important in technology-based environments where firms often "require distinct business models that operate in tandem"[3] to develop multiple revenue streams with the same technology. A configurational approach is valuable because it indicates when a firm's business models are complementary – i.e., when the joint adoption of two or more business models is associated with higher firm performance than the separate adoption of each business model[4].

Extant literature has overlooked the configuration of a firm's business models as a salient unit of analysis to better understand firm performance, mostly focusing on the performance implications of single business models considered in isolation[5]. In addition, the exact nature of the complementarities underpinning high-performing configurations has not been fully unpacked in previous studies[6], so that we do not have a systematic understanding of why high-performing business model configurations are associated with high performance. Accordingly, in this paper the following research question was investigated: Which configurations of business models are associated with high and low levels of firm performance in a technology-based environment?

The author address these questions with a qualitative comparative analysis of the business model configurations adopted by the 23 Polish USOs. The role of USOs in the economic development of Poland is the subject of much controversy among researchers and policy-makers. It should be noted that enterprises referred to as USOs came to being in the Polish

[1] Chesbrough H., Rosenbloom R.S.: The role of the business model in capturing value from innovation: Evidence from Xerox corporation's technology spin-off companies. "Industrial and Corporate Change", Vol. 11, No. 3, 2002, p. 529-555.

[2] Klang D., Wallnöfer M., Hacklin F.: The business model paradox: A systematic review and exploration of antecedents. "International Journal of Management Reviews", No. 16, 2014, p. 454-478.

[3] Casadesus-Masanell R., Tarzijan J.: When one business model isn't enough. "Harvard Business Review", No. 90, 2012, p. 132-137.

[4] MacDuffie J.P.: Human resource bundles and manufacturing performance: Organizational logic and flexible production systems in the world auto industry. "Industrial and Labor Relations Review", No. 48, 1995, p. 197-221; Kogut B., MacDuffie J.P., Ragin C.: Prototypes and strategy: Assigning causal credit using fuzzy sets. "European Management Review", No. 1, 2004, p. 114-131.

[5] Klang D., Wallnöfer M., Hacklin F.: op.cit.

[6] E.g. Grandori A., Furnari S.: A chemistry of organization: Combinatory analysis and design. "Organization Studies", No. 29, 2008, p. 459-485.

economy along with economic transformations in the early 90s. More than twenty years that have passed since that time are not marked, however, by their luxuriant growth. The exact estimation of the size of the USOs sector in Poland is difficult due to the lack of reliable statistic data. It is estimated, however, that there may be at least several dozen of them. In terms of their economic characteristic, these firms do not deviate from the European spin-off standard. Usually, these are small-size firms employing fewer than 10 workers and often using outsourcing. The incomes of spin-off firms are running on average at a level from 250 to 500 thousand EUR per year. The founders of these firms are chiefly people with higher technical education, often having also an academic degree and deriving from the academia. Links with academic centres constitute an important source of innovation and information to them. Many of them have retained their university positions and are participating in academic research. These enterprises fill the gap in the advanced technology production and services. They also provide consultancy services at a high level comparable to that of similar centres abroad.

The peculiarity of the knowledge of the development of USOs always results in inconsistencies in the policies towards spin-off activities from universities. In spite of the absence of reliable quantitative data on the establishment of spin-offs in Poland, a relatively low interest of academics in economic processes in a macro- or microeconomic context can be noticed. Moreover, what can be visible in Poland is some reluctance to making changes and the opinion that science is the value in itself and there is no need for it to enter into any deeper interactions with the world of business, since this might be to the prejudice of the scientific nature itself or the conducted research. Many argue that USOs are too risky (compared with IP licensing and contract research) and even unnecessary for university technology transfer; by contrast, others argue that the unproductiveness of USOs should be ascribed to the absence of an entrepreneurial environment (including the tolerance of failure), the huge cultural gap between the universities and enterprises, and lack of sufficient innovation competence (including complementary technology and resources)[7]. In this paper, therefore, claims that it will be of great interest to investigate the phenomenon of USOs in Poland, identify and describe business model configurations, analyze their associations with USOs performance, and explore the nature of these associations. In other words, main focus is not on identifying precise causal patterns but rather on qualitatively investigating the mechanisms underlying the associations between business model configurations and USOs

[7] Tamowicz P.: Przedsiębiorczość akademicka. Spółki spin-off w Polsce. Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2006; Banerski G., Gryzik A., Matusiak K.B., Mażewska M., Stawasz E.: Przedsiębiorczość akademicka (rozwój firm spin-off, spin-out) – zapotrzebowanie na szkolenia służące jej rozwojowi. Raport z badania. Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2009; Grębosz M., Makowska A., Kasieczka-Burnecka M.: Raport z badań nad identyfikacją barier wewnętrznych i zewnętrznych ograniczających przedsiębiorczość akademicką. Polska Izba Gospodarcza Zaawansowanych Technologii, Warszawa 2010; Matusiak K.B., Guliński J. (red.): System transferu technologii i komercjalizacji wiedzy w Polsce siły motoryczne i bariery. Polska Agencja Rozwoju Przedsiębiorczości, Poznań-Łódź-Wrocław-Warszawa 2010.

performance. Therefore the purpose of this paper is to identify and describe business model configurations, analyze their associations with high and low firm performance, and explore the nature of these associations. The author believe that this research will address an important research gap (USOs in Poland), which will contribute to the existing literature by adding sound evidence, and help to strengthen the robustness of the existing models in order to extend the boundaries of knowledge.

This empirical inquiry followed two steps. First, by coding archival data and interviews with USOs founders, the business model configurations adopted by USOs firms were identified. Second, these configurations and their association with firm performance via qualitative comparative analysis (QCA), a configurational, case-oriented, method[8] well-suited to address this research questions, were analyzed.

2. Theoretical background

The business model construct is under research for more than two decades[9]. In spite of this several problems remain unsolved, most prominently the relationship between business models and firm performance[10]. This issue is complex because, especially in technology-based environments, firms run multiple business models simultaneously to leverage the multiple commercial uses of the same technology[11]. Evaluating how business model choices affect firms' performance can be challenging when business models cannot be considered in isolation and should be understood within the configuration of the other business models that the firm implements[12].

In order to study the relationship between business model and performance, it is essential to move the discussion toward a configurational approach in the analysis of business model success. The configurational approach has occupied a central role in organization and strategic research[13]. Overall, the configurational approach is based "on the fundamental

[8] Ragin C.C.: The comparative method: Moving beyond qualitative and quantitative strategies. University of California Press, 1987; Ragin C.C.: Redesigning Social Inquiry: Fuzzy Sets and Beyond. Wiley Online Library, 2008.

[9] Ghaziani A., Ventresca M.J.: Keywords and Cultural Change: Frame Analysis of Business Model Public Talk, 1975-2000. "Sociological Forum", Vol. 20, No. 5, 2005, p. 523-559.

[10] E.g. Zott C., Amit R.: Business model design and the performance of entrepreneurial firms. "Organization Science", Vol. 18, 2007, p. 181-199.

[11] Sabatier V., Mangematin V., Rousselle T.: From recipe to dinner: Business model portfolios in the European biopharmaceutical industry. "Long Range Planning", Vol. 43, No. 2-3, 2010, p. 431-447.

[12] Markides C., Charitou C. D.: Competing with dual business models: A contingency approach. "The Academy of Management Executive", Vol. 8, 2004, p. 22-36.

[13] E.g. Doty D.H., Glick W.H., Huber G.P.: Fit, equifinality, and organizational effectiveness: A test of two configurational theories. "Academy of Management Journal", Vol. 36, 1993, p. 1196-1250; Ketchen D.J., Thomas J.B., Snow C.C.: Organizational configurations and performance: A comparison of theoretical approaches. "Academy of Management Journal", Vol. 36, 1993, p. 1278-1313.

premise that patterns of attributes will exhibit different features and lead to different outcomes depending on how they are arranged"[14]. It assumes complex causality and nonlinear relationships and those variables that are casually related in one configuration may be differently related or even unrelated in other configurations[15]. Consequently, relationship between elements of a configuration are not necessarily symmetric and can involve synergistic effects. The configurational approach puts also emphasis on the argument of equifinality, i.e. the situation where "a system can reach the same final state – e.g. the same level of organization effectiveness, from differing initial conditions and by a variety of different paths"[16]. In other words, there is no optimal configuration but different configurations can be equally successful. In sum, the assumptions at the base of the configurational approach appear to be aligned with the current development of the business model literature.

Although consultants often refer to the business model adopted by start-up, the academic literature largely ignores it[17]. D. Bower[18] was probably the first to explicitly refer to the business model of spin-off companies as a subject of study. C. Druilhe, E. Garsney[19] more systematically analysed the different business models at start-up in sample of spin-offs from the University of Cambridge. In the same vein, A. Heirman, B. Clarysse[20] linked business model to growth in a sample of Belgian new technology based firms.

Research within this perspective can be divided into three groups[21]. The first group of studies centres around activities undertaken within spin-off companies. Studies conducted by R. Stankiewicz[22] distinguish spin-offs performing chiefly advisory, and product and technology-oriented functions. The literature reports also studies that distinguish spin-off oriented to product or service; for example, in their study of Italian spin-off companies, V. Chiese, A. Paccaluga[23] established a half distribution in the population studied. P. Mustar[24]

[14] Fiss P.C.: A set-theoretic approach to organizational configurations. "Academy of Management Review", Vol. 32(4), 2007, p. 1180-1198.
[15] Meyer A.D., Tsui A.S., Hinnings C.R.: Configurational approaches to organizational analysis. "Academy of Management Journal", Vol. 36, 1993, p. 1175-1195.
[16] Katz D., Kahn R.L.: The social psychology of organizations. Wiley, New York 1978.
[17] Zott C., Amit R.: Business model, [in:] Hitt M., Ireland D (eds.): The Blackwell Encyclopaedia of Management: Vol III, Entrepreneurship. Blackwell Publishing, Oxford, p. 20-24.
[18] Bower D.: Business model fashion and the academic spinout firm. "R&D Management", Vol. 33(2), 2003, p. 97-105.
[19] Druilhe C., Garnsey E.: Do academic spin-outs differ and does it matter? "Journal of Technology Transfer", Vol. 29(3-4), 2004, p. 269-285.
[20] Heirman A., Clarysse B.: How and why do research-based start-ups differ at founding? A resource-based configurational perspective. "Journal of Technology Transfer", Vol. 29, No. 3-4, 2004, p. 247-268.
[21] Wright M., Clarysse B., Mustar P., Lockett A.: Academic entrepreneurship in Europe. Edward Elgar, Cheltenham 2007.
[22] Stankiewicz R.: University firms: Spin-off companies from universities. "Science and Public Policy", Vol. 21, 1994, p. 99-107.
[23] Chiesa V., Piccaluga A.: Exploitation and diffusion of public research: the general framework and the case of academic spin-off companies. "R&D Management", Vol. 30, 2000, p. 329-340.
[24] Mustar P.: Spin-off enterprises: How French academics create hi-tech companies: the conditions for success or failure. "Science and Public Policy", Vol. 24, 1997, p. 37-43.

introduced a typology covering the categories of spin-off companies oriented to product, service, research and to end customers.

The second group of studies concentrate around the development orientation of spin-off companies. C. Tiler, S. Metcalfe, D. Connell[25], as also underlined by M. Wright, B. Clarysse, P. Mustar, A. Lockett[26], identify three ways of fast, medium and slow spin-off development.

The third group of studies centre around the means by which technology and knowledge can be transformed into a market value. One of the approaches made in these studies is to distinguish companies having an externally driven strategy that focuses on seeking the acceptance of the investor at early stages of development. A. Heirman, B. Clarysse[27] point out that the majority of intensively developing spin-offs have negative financial results due to the use of a considerable part of the capital for the development of the technology itself rather than for business or marketing activity or for sales. Another approach concerns those ventures that offer goods and services being often and quickly chosen by customers, which yields them a considerable income already in the first years of existence in the market. These ventures use less cash and quickly gain considerable profits for the investors[28]. The third model focuses on spin-offs oriented to product[29]. In their analysis of new technology companies, A. Heirman, B. Clarysse note that these companies start activity based on a single product, and then develop their technological base. Usually, the founders of this type of companies have business experience and try to bring the product closer to the customer without their parent entity's support, which might be caused by e.g. the product not fitting into the main strategy of that entity, failure to convince the parent entity's management, or requirements for the market size. The fourth and last of the distinguished models relies on the studies by C. Druilhe, E. Garnsey concerning the interrelations between the knowledge and experience of the entrepreneurs and the resource demands. Importantly, when adapting the dynamic perspective within the examination of how interrelations in these dimensions form a business model, it was concluded that these models were modified, depending on how the entrepreneurs develop their knowledge of resources and capabilities. It means that a considerable part of spin-offs do not have clearly define ideas about the means of creating values, especially in the case where the entrepreneurs originate from the academic environment and have no adequate managerial knowledge. In developing a technology and examining various market assumptions, these companies may be regarded as leaders[30].

[25] Tiler C., Metcalfe S., Connell D.: Business expansion through entrepreneurship: the influence of internal and external barriers to growth, [in:] Dodgson M., Rothwell R. (eds.): "International Journal of Technology Management", Special Publication on Small Firms and Innovation, 1993, p. 119-132.
[26] Wright M., Clarysse B., Mustar P., Lockett A.: op.cit.
[27] Heirman A., Clarysse B.: op.cit.
[28] Bower D.: Business model fashion and the academic spinout firm. "R&D Management", Vol. 33(2), 2003, p. 97-105.
[29] Chiesa V., Piccaluga A.: op.cit.
[30] Wright M., Clarysse B., Mustar P., Lockett A.: op.cit.

In this paper was based on the above considerations and followed the conceptualization of M. Wright, B. Clarysse, P. Mustar and A. Lockett in specifying six elements of business model: investor vs market acceptance, mode of value – capturing and technology, financial, human and social resources.

3. Data and methods

The type of research selected by the authors was the multiple case study, in which several cases were studied simultaneously within a single research undertaking. A consequence of the selected research method was the non-random, intentional choice of a sample from USOs in Poland. The selection of enterprises was guided by the following criteria: the selected enterprises are relatively new, developing business ventures relying on the transfer of knowledge (as seen from the aspect of the transfer of intellectual assets, and not only technologies), set up by young persons being final-project students, doctoral students, or academics. The research was conducted in the form of interviews with the founders or management representatives of twenty three firms. Information collected from the surveys and from other sources (e.g. the internal documentation of the enterprises, archival data, websites) was used for carrying out an analytical procedure using Qualitative Comparative Analysis (QCA).

QCA is an inductive analytic technique, relying on set theory[31]. QCA facilitates the identification of multiple configurations of variables associated with an outcome of interest. In this study, QCA is used to identify business model configurations that contribute towards high/low performance in twenty three Polish USOs. In theoretical and empirical terms, it is a novel context in which to use QCA. To explore the ways in which business model configurations might influence the performance outcomes of USOs, QCA treats each possible configuration of key variables as a single case and identifies the necessary and sufficient causal conditions associated with each configuration. Through comparison, these cases are reduced to the minimum combinations of causal factors necessary for an outcome to occur (e.g. performance outcome). The analysis also uses consistency and coverage as two key parameters for assessing the fitting of the QCA results to the underlying data.

The analysis presented here is further structured to consider whether the factors responsible for the presence of a performance outcome are the same as those causing the absence of performance. The causes leading to the presence of an outcome of interest may be quite different from those leading to the absence of the outcome[32]. This is referred to as causal asymmetry. It has been suggested that analyzing asymmetric set relations can extend

[31] Ragin C.C.: The comparative method: Moving beyond qualitative and quantitative strategies. University of California Press, 1987.

[32] See also Fiss P.C.: Building better causal theories: A fuzzy set approach to typologies in organization research. "Academy of Management Journal", Vol. 54(2), 2011, p. 393-420.

knowledge gained from calculating the net effects of independent variables in linear models from a symmetric perspective, such as when using correlation and multiple regression-based approaches. Although the use of interaction terms in linear regression models can be used to test asymmetric hypotheses, the analysis of asymmetric set relations offers the potential for a much crisper assessment of the distinguishing characteristics associated with the presence or absence of a key outcome. In this paper the conceptual framework was developed, within which an attempt was made to isolate elements for the study of the business model configurations of USOs (Table 1), along with output variable related with outcome measure.

Table 1

Items used to operationalize elements of business model configurations and output

Elements	Description
Outcome	
Performance	Performance (as compared to next best competitor) in the past three years in sales growth, employment growth, dynamics of the market share, return on sales, return on equity, gross profits (the scales for measuring firms' performance was adapted from B. Antonic, R.D. Hisrich and G.N. Chandler, S.H. Hanks[33])
Elements of business model configurations	
Investor acceptance	Companies that mainly look for investor acceptance in their first years after start-up
Market acceptance	Companies that are pursuing market acceptance
Optimize time to break even and future trade sale value	Mode of value-capturing based on the framework developed by D. Teece[34]: the degree to which an innovative start-up can capture value is a function of its appropriability regime (includes the degree to which the start-up can protect its idea) and its easy of acquiring complementary assets to bring its idea to the market
Optimize profit	
Technological (physical) resources	1. Degree of innovation (technological revolution; a new product based on a non-revolutionary technology, or a new product based on an already existing solution) 2. Scope of technology (a single leading product or a wide range of products) 3. Stage of product/service development (the phase of a company's product/service cycle life; an early, not completely defined stage; a prototype; a nearly market-ready product)
Financial resources	1. Support in the form of venture funds (the company has obtained, or not, support in the form of capital coming from so called venture funds) 2. Financing source (level of external shares, through financial commitments, intensive use of subventions, internal financing, liabilities, loans)
Human resources	1. Experience in management (the founders' experience in management) 2. Scientific experience (the founders' experience in a given scientific field) 3. Market experience
Social resources	1. Partnership (partnership and connections with the shareholders: VC, technology suppliers, etc.) 2. Network connections (formal and informal contacts with industrial partners)

Source: Based on Wright M., Clarysse B., Mustar P., Lockett A.: Academic entrepreneurship in Europe. Cheltenham: Edward Elgar, 2007, p.75-76.

[33] Antoncic B., Hisrich R.D.: Privatization, corporate entrepreneurship and performance: Testing a normative model. "Journal of Developmental Entrepreneurship", Vol. 3, 2003, p. 197-218; Chandler G.N., Hanks S.H.: Measuring the performance of emerging businesses: a validation study. "Journal of Business Venturing", Vol. 8, 1993, p. 391-409.

[34] Teece D.: Capturing value from technological innovation: integration, strategic partnering and licensing decisions, [in:] Guile B., Brooks H. (eds): Technology and Global Industry. National Academy Press, Washington, DC 1987, p. 65-95.

The condition and outcome variables differed in their underlying forms and were recoded for inclusion in the analysis on a continuous scale from 0 to 1. Subsequently, a direct coding method was utilized to code individual case data points. The direct method focuses on the three qualitative anchors that structure the degree of membership to the focus set. These are: (1) the threshold for full non-membership; (2) the threshold for full membership and; (3) the cross-over point, where there is some ambiguity about membership. The next analytic step is the consideration of causal combinations/configurations of conditions and the outcome, here elucidated through truth tables. The truth table represents logically possible combinations of included conditions and is the key tool of set-theoretic analysis[35]. It describes cases' diversity. However, this is often 'limited diversity' where all theoretically possible configurations are not represented in empirical reality due to 'causal conditions' tendency to fall into coherent patterns'.

There are two issues with respect to the information in a truth table. Firstly, the identification of which cases are most strongly associated with which configuration is determined by assigning 1 to degree of membership values > 0.5, and 0 to those < 0.5 (hence, each case can only be associated to one combination in terms of strong membership). Secondly, the decision of which configurations are considered strongly associated with high performance and ~performance (low performance), is based on the consideration of the respective raw consistency. The important point to reiterate here is that the rows in each truth table, are not specifically representing individual cases, but the logical configurations for which they were strongly associated at each one case. The raw consistency measures the proportion of memberships in the outcome explained by each logical configuration, and is computed for each logical configuration from the degree of membership data by dividing the sum of consistent membership in the logical configuration by the sum of membership in the outcome. The choice of a threshold value for this raw consistency variable to effect those configurations considered strongly associated with a respective outcome impacts on the degree of evidence used to identify the necessary and sufficient conditions.

Next, the causal conditions most strongly linked with the performance and ~ performance outcomes were considered. This fundamentally comes down to seeing what combinations of causes discern those configurations. Prior to this, consideration has to be given to those configurations which are not included in the respective truth table. These are configurations that are theoretically plausible, but not empirically present. The inclusion or exclusion of remainders in set-theoretic analyses is a contentious issue. The inclusion of the remainders in the analysis, by considering their association with the absence of the outcome, leads to what is called the 'complex' solution. An alternative is to exclude the remainders from the analysis. This is termed the parsimonious solution. Between these there is a solution 'guided by theory', which attempts to assign the outcome to logical remainders, termed the intermediate

[35] Ragin C.C.: op.cit.

solution. Importantly, the different treatments of these logical remainders lead to different solution formulas. However, all formulas are logically true because they do not contradict the available empirical information contained in the truth table.

4. Results

In the paper the parsimonious and intermediate solutions were presented and analyzed. The results from the parsimonious and intermediate solutions can be summarized using a configuration chart – Table 2. Utilizing the notation system from C.C. Ragin and P.C. Fiss[36], each column in Table 2 represents a configuration of conditions linked to the respective outcomes. Full circles (●) indicate the presence of a condition, while barred circles (⊖) indicate a condition's absence. Further, core and complementary conditions are distinguished by the symbols' size: larger circles indicate core conditions that are part of parsimonious solutions. Smaller circles indicate complementary conditions that only occur in intermediate solutions. Each panel represents the alternative causal combinations or recipes for the outcome. These are consecutively numbered S1, S2, etc.

Table 2

Configuration chart

	Performance		**~ Performance**	
Conditions	**S1**	**S2**	**S1~**	**S2~**
Financial resources	●	●	⊖	⊖
Technological resources	•	•	⊖	⊖
Human resources	●	●	⊖	⊖
Social resources	•		•	
Investor acceptance	•		⊖	⊖
Market acceptance		•	⊖	⊖
Optimize time to break even	•			
Optimize profit		•		
Consistency	0.911197	0.926282	0.960784	0.895288
Raw Coverage	0.527964	0.646532	0.292246	0.169980
Unique Coverage	0.008949	0.127517	0.050696	0.064612
Solution Consistency	0.927215		0.970545	
Solution Coverage	0.655481		0.655070	

Source: Own elaboration.

In brief, consistency measures the degree to which cases sharing a given condition agree in displaying an outcome. Raw coverage measures the overall coverage of a combination that may overlap with other combinations. Unique coverage refers to coverage uniquely due to a combination. Solution consistency measures the degree to which membership in the solution

[36] Ragin C.C., Fiss P., Net effects versus configurations: an empirical demonstration, [in:] Ragin C.C. (ed.): "Redesigning Social Inquiry", Vol. 1, 2008, p. 190-212, University of Chicago Press, Chicago-London.

(the set of solution terms) is a subset of membership in the outcome. Lastly, solution coverage refers to the combined coverage of all combinations leading to the outcome.

Table 2 indicates that there are two core conditions[37] associated with high performance, namely the presence of financial and human resources. In fact, these two conditions combine in all two of the solutions derived by this analysis (S1 and S2). In terms of peripheral conditions associated with high performance, the table suggests that in S1 the core conditions are complemented by technological and social resources with presence of investor acceptance and optimize time to break even and future trade sale value. So, this group includes firms in which the scientific mastery combines with the managerial talent, being grounded not only on considerable, broad experience (in the market, in management, and in a given scientific discipline), but also on numerous contacts and network links with the shareholders, industrial partners or support units. These firms have also innovative technologies, manufacture technologically advanced products, chiefly on their own, and have substantial market share, not only in the domestic but also the world's market. These firms have obtained considerable capital support, coming mainly from investors. For S2, the core conditions are complemented by technological resources with presence of market acceptance and optimize profit. The idea of this firms is not easy to protect and it seems difficult to build up a position in value chain. Therefore money is needed to find out how to position the company in the value chain and capture (part of) the profits.

The results presented in Table 2 highlight also that there are core conditions associated with low performance, namely the absence of sufficient financial resources without investor or market acceptance. This condition exists in each of the solutions obtained in the analysis (S1~ and S2~). Regarding the peripheral conditions associated with low performance, the table shows that for S1~ the absence of sufficient technological and human resources complements the absence of sufficient financial resources, despite the presence of social resources. In the group examined, firm founders who, in most cases, derive from the academia, are characterized by poor preparation for conducting business activity, especially in the formal and legal aspect, and a low level of motivation for further development, being dictated primarily by great reluctance to take risk. The founders have no idea for the further development of the firm, which often relies on the commercialization of a single specific product. In the case of S2~, the absence of sufficient financial resources is complemented by insufficient human and technological resources. This group includes firms that have just started their activity and are at the stage of building an entrepreneurial team and acquiring funds, while the technology is in a nascent phase (with an incompletely defined product or a prototype).

[37] P.C. Fiss argues that it is important to distinguish between the core and peripheral configurations of causal conditions in a set-theoretic analysis, especially those pertaining to the derivation of configurations. According to him, core configurations are those 'causal conditions for which the evidence indicates a strong causal relationship with the outcome of interest'. By contrast, those causal conditions for which the causal relationship is weaker can be regarded as peripheral configurations.

5. Conclusions

The present study, through the use of QCA, sought to improve our understanding of the business model-performance link by investigating the following main issues. First, it demonstrates how business model elements are configured in the area of the initiation and growth of USOs in Poland. Second, it enables one to examine how these configurations are associated with high and low performance outcomes. This analysis has identified four alternative causal combinations of business model configurations, two of which lead to high performance outcomes, while the other two lead to low performance outcomes. Author believe that this findings provide a number of interesting insights for entrepreneurship research, especially in respect of the initiation and growth of USOs.

At the same time, one of the first set-theoretic analyses of business model configurations and their impact on the performance of USOs were offered, by developing a set of findings that illustrate the causal asymmetry between the presence and absence of a key focal outcome. In this instance, the results of this analysis suggest that the presences of financial and human resources are strongly associated with high performance in Polish USOs, while the absence of financial resources without investor or market acceptance are strongly associated with low performance. P.C. Fiss emphasizes that by allowing causal asymmetry, set-theoretic analyses offer the potential for a much enriched theoretical comprehension of the nature of business model configurations. At the same time, causal asymmetry can underpin the development of better-targeted practical recommendations for senior managers making strategic choices about organization improvements.

Despite the strengths of the results that were presented here, this findings do raise many questions about the nature of business model configurations and their impact on the performance of USOs, which are worth further research. In this study, author has drawn upon QCA to investigate two focal outcomes: performance and ~performance. At the same time, it might happen that attributes other than those that were considered in this analysis are equally able to distinguish between high and low performance outcomes in the case of USOs. What is more, to illustrate the performance outcomes, organizational effectiveness was used. This measure could also change and, as a multidimensional construct, might encompass different performance dimensions. Variables such as, for example, internal or external knowledge are all identified as business model elements in the literature[38]. Set-theoretic analyses that brought together the measures of these variables with those that are identified as core conditions in this analysis, would cast valuable new light on the nature of business models. For now though, it was found that QCA offers a powerful means for theorizing and testing for the presence of complex configurations of attributes in organizations.

[38] Aversa P., Furnari S., Haefliger S.: Business model configurations and performance: A qualitative comparative analysis in Formula One racing, 2005-2013. "Industrial and Corporate Change", Vol. 24, No. 3, 2015, p. 655-676.

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