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Framework for Explaining the Formation of Knowledge Intensive Entrepreneurial Born Global Firm: Entrepreneurial, Strategic and Network Based Constituents

Abstract

The nature of the knowledge based entrepreneurship relates to its essential reliance on research and development, deployment and maximization of research and development returns via technology development, and its commercialization via venturing. The paper aims to provide the empirically grounded framework for the analysis of the key determinants leading to the formation of R&D intensive entrepreneurial born global firm with a special focus on entrepreneurial firm and network theories. The unit of analysis chosen is the firm, while the focus is set on the firm behavior and strategic choices rather the business conditions per se. The paper aims to propose the definition of a born global firm as a specific form of entrepreneurial firm that forms while combining entrepreneurial, strategy and network constituents in a specific globally oriented constitution. Multiple case study was applied in order to build evidence on the interplay of strategy, networks and entrepreneurial constituents in the formation of knowledge intensive entrepreneurial born global firm. Qualitative data analysis of 13 cases allowed to extract the essential factors. The small catching up country perspective adds on dynamics of the constituents as the framework and competitive conditions rapidly change in an uncertain direction.

Keywords: Born Global Firm; Network; Strategy; Knowledge Intensive Entrepreneurship

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Introduction

Knowledge-based entrepreneurship is referring to the new and innovative firms with high knowledge intensity in their activities, involved in the process of transforming knowledge into innovation - new or significantly improved goods and services that may enter in market (Kanellos 2013; Witt and Zellner 2005; Johansson 2005). Knowledge based entrepreneurial activity relies strongly on R&D as a core resource, and its commercialization via entrepreneurial activities, either deploying and maximizing R&D returns via development of new technologies. R&D globalization, and speed of new technology development, the need to deal with extremely complex conditions in searching and exploiting market, institutional and technological opportunities, the need to exploit R&D resources and their return globally leads to the new approaches towards R&D based entrepreneurship, namely the born global firms. The term of born global is applied for firms that operate internationally from at or near their inception. These firms did not seem to follow the traditional internationalization theories such as Uppsala Internationalisation Process Model, which considers the internationalisation of firms as gradual and evolutionary (Eurofound 2012; Dib et al. 2010). Rather, they follow an early and accelerated process of internationalisation.

Recent empirical studies allow to distil the core characteristics of born global firm, such as high activity in international markets from or near the founding (Cavusgil and Knight 2009; Gabrielsson et al. 2008; Gabrielsson and Pelkonen 2008), operation from the SME basis (Sullivan Mort et al. 2012; Eurofound 2012; Cavusgil and Knight 2009) with limited financial and other material resources (Sullivan Mort et al. 2012; Cavusgil and Knight 2009), industrial variety (Sullivan Mort et al. 2012; Eurofound 2012; Cavusgil and Knight 2009; Crick 2009), strong international outlook of managers and international entrepreneurial orientation

(Eurofound 2012; Cavusgil and Knight 2009; Gabrielsson et al. 2008; Weerawardena et al. 2007), emphasis on differentiation strategy (Cannone et al. 2012; Eurofound 2012; Cavusgil and Knight 2009; Schulz et al. 2009), emphasis on superior product quality and innovations (Eurofound 2012; Sullivan Mort et al. 2012; Gabrielsson and Kirpalani 2012; Cavusgil and Knight 2009; Schulz et al. 2009; Gabrielsson et al. 2008), knowledge intensity (Gonzalez-Menorca et al. 2012; Jones et al. 2011; Kudina et al. 2008), utilization of advanced ICT (Gabrielsson and Kirpalani 2012; Mettler and Williams 2011; Cavusgil and Knight 2009), belonging to networks (Eurofound 2012; Renda 2011; Schulz et al. 2009), using external independent intermediaries for distribution in foreign markets (Taylor and Jack 2012; Cavusgil and Knight 2009), global niche market orientation (Bailetti 2012; Gonzalez-Menorca et al. 2012; Olejnik and Swoboda 2012).

After systematic literature review on factors shaping the formation of born global firms in R&D intensive settings (Dlugoborskyte and Petraite 2013) we define the R&D intensive entrepreneurial born global firm as setting that conduct international business at or near the founding of the firm and create new value for the market while transferring unique knowledge to innovative products or services through commercializing its R&D activities.

The eclectic composition of empirically found common characteristics of born global firm suggests that entire firms are not occasionally emerging, but are global by design and thus could be defined and explained while analysing the firm from the internal perspective that shapes the formation of R&D intensive entrepreneurial born global start up, and later firm. Based on this problem formulation, *the paper aims to provide the empirically grounded framework for the analysis of the key determinants leading to the formation of R&D intensive entrepreneurial born global firm with a special focus on entrepreneurial firm and network*

theories while the early internationalisation is approached as a consequence of the latter.

The factors shaping the formation of R&D intensive entrepreneurial born global firms was extracted via systematic literature review and synthesis, with a primary focus on the findings from empirical studies (Dlugoborskyte and Petraite 2013; Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009; Kudina et al. 2008; Varma 2010). A comprehensive view of born global R&D intensive firms, from distinctive features of knowledge-based entrepreneurship and born global firms, to their early internationalisation issues considering conditions and factors causing such pathway, to theoretical grounding resulted in creating a systemic factors portrayal for the formation of enterprises under study. This systematic approach revealed that external factors, which are influencing rapid internationalization decision and the formation of R&D intensive entrepreneurial born global firm, mainly arise from the impacts of globalisation (Halldin 2012; Cannone et al. 2012; Mets and Kelli 2011; Cavusgil and Knight 2009). Thus further study rather focus on explaining the internal factors constructing conceptual framework that represents the factors relevant for the formation of R&D intensive entrepreneurial born global firms grouped into three blocks, i.e. entrepreneurial behaviour of a founder, firm's strategy, and use of network. The grouping of internal factors derived from the importance of an entrepreneur and his behaviour in young globally oriented firms on their inception, firm's strategic choices, enabling it to compete in the global market, and its attitude towards networks. This analytical framework to study R&D intensive born global firms was grounded by Dlugoborskyte et al. (2015) via the literature analysis and extraction of the characteristics of born global firms, as well as by the analysis of factors that affect global orientation and the conditions influencing the choice of an early and accelerated internationalization path.

The study context chosen is an open economy in transition. So far the phenomenon of born global firm was mainly studied in economically developed countries. Little attention has been given on the formation of such enterprises, especially in the post-soviet countries, where specific evolutionary conditions apply (Malerba et al. 2015). Thus the paper aims at exploring the field in a new set of conditions, which has been purely studied before. Distinctiveness of born global firm enables entrepreneurs from small transition countries to overcome natural market, size, and resource limitations, acquire knowledge globally and benefit from participation in high value added production chains worldwide. This either supports rapid catch up of economy from resource and productivity based competitiveness towards innovation based competitiveness. Even though the main aim of the article is not to focus on external factors which influenced the formation of born global firms in R&D intensive settings, the entrepreneurial behaviour, organization strategies and networking are strongly related to a specific time period and territory. The specific context for this study is offered by the transition of Lithuania over the period starting 1990 up to 2015 which featured a dramatic transformation in former communist country, resulting in its reintegration into the global economy. Thus the year of establishment of born global firms which formation in the global path up to today was being studied in the paper was no earlier than 1990. The study of Lithuania, a relatively young market economy, rises particular interest because of rapid catch up of the economy within the European Union accession period, and the specific role assigned to the R&D intensive firms in the process. Lithuania over 25 years of independence has transitioned from the post-soviet economy with labour intensity driven competitiveness and low income country towards the productivity and innovation driven economy with the Global Competitiveness rank No 36 represented with high income and innovation driven exports

(World Economic Forum 2015), while overall innovativeness of the economy remains rather low.

The research methodology adopted - the case study, best suited to the objectives of our study: constructing theoretical approaches and revealing still relatively unknown aspects of the relationships being studied. The multiple case study method allowed triangulation between the cases under study and enabled to find richer explanations and a deeper insight into phenomenon. Empirical objective determined entrepreneurial born global firms in R&D intensive sectors to be targeted. Following the scientific literature on distinctive features of born global firms and the determined specific external (i.e. country in the catching up period) and internal (i.e. R&D intensive firm) context in which these firms should have started to operate, five criteria in order to select the case studies were identified: small or medium size of the firm; R&D intensity; early internationalization (export activities within three years from the establishment); exclusion of post – soviet restructuring based companies from the sample (year of company establishment no earlier than 1990); global vision and strong international entrepreneurial orientation, which stands for global activities from the inception of an enterprise. Overall 13 in-depth case studies were conducted, based on multiple sources of secondary information and semi-structured in-depth interviews with the founders or CEOs of R&D intensive born global firms from various industries. After individually described cases were then cross-compared using MAXQDA software in order to reveal their similarities and differences. Such analytic approach allows the generalization of the results from all of the cases to disclose factors for the formation of R&D intensive entrepreneurial born global firm. The paper is structured as follows. In the first part we provide the framework for the analysis of the formation of the born global firm, whereas the entrepreneurial, strategic, and network

based factors are conceptually linked. The analytical model proposes the analysis of strategic choices as defining factors at the level of entrepreneurial behaviour, firm strategy, and network. The case study methodology is provided in a part two. The third part of the paper provides the empirical linkages of entrepreneurial, strategy based and network factors' manifestations in R&D intensive entrepreneurial born global firms. These are followed by discussion and conclusions enclosing empirically grounded framework that explains the emergence of R&D intensive entrepreneurial born global firms from a perspective of entrepreneurial firm and network theories.

Linking Entrepreneurial, Strategy, and Network Constituents in Explaining the Formation of Born Global Firm in Knowledge Intensive Sectors

The concept of R&D intensive born global firm defines the need to dedicate specific attention to the rising variety of networks, and knowledge acquisition and generation strategies in innovation processes. The firm's networking and knowledge acquisition attitudes to a large extent define the innovation management models within an organization (Hagedoorn et al. 2006; Fukugawa 2006; Gassler and Nones 2008; Love and Roper 2001; Van de Vrande et al. 2006; Williams and Lee 2009). The interrelation between the firm specific internal capabilities and external partnership impact on innovation is also an important issue that has been studied by Vega-Jurado et al. (2009). The impact of the contextual conditions on the firm's innovative behavior was proven to be an important factor, that affects firms search activities and innovation management approaches (Tidd 2001; van Beers et al. 2008; Gassler and Nones 2008). The choices of strategic orientations of high technology firms in transitional economies was also analysed by Lau et al. (2008), who again proved the existence of the important link between the development, institutional factors and firms behaviors. The

industry specific factors, and specifically the strategic groups and their behaviors were studied by the large number of authors (for example, Erden et al. (2009) and Zhang et al. (2007) in their studies provide the strategic group analysis, linkage and alliance formation behaviors in the biopharmaceutical industry; the specifics of R&D based innovation behavior in the electronic industries of catching up economies was also studied by Kriaucioniene and Ragauskas (2008)). The role of public policy and interrelations of R&D, growth and internationalization of new technology based firms was also presented in the study of Filatotchev and Piesse (2009), whereas authors focus on the determinants of growth and success of the new technology firms at the different maturity stages basing their analysis on the evidence of advanced countries.

After systematic literature review of factors shaping the formation of born global R&D intensive firms, the set of systemic factors were extracted and categorized into three groups, representing *industry/firm*, *organization/strategy* and *individual/entrepreneur* (Dlugoborskyte and Petraite 2013). *External industry/firm* group factors portray the global market profile and market conditions for pushing or pulling for becoming born global firm, certain customer characteristics, internationalization level of competitors and distinctiveness of industry profile in which firm operates. *Internal organization/strategy* group factors encompass product characteristics that are significant for international markets and trading, international orientation of management either managing resources internationally in an effective way, knowledge intensity and networking as a basis in value creating processes. *Individual/entrepreneur* level factors stand for such characteristic features as *global vision*, *proactiveness*, indicating the ability to recognize potential in foreign markets, as well as international *networking skills* based on international network of professional contacts used

for business development. In this systematic view external factors help to explain the resource acquisition strategies of firm, with a particular focus on internationalization, globalization and networked knowledge economy, while internal factors rely on the theories of entrepreneurship and organization, with the specific focus on dynamic capabilities, networks, organisational learning and knowledge management.

In the second step of literature review the conceptual framework was constructed (Dlugoborskyte et al. 2015) with respect to characteristics of born global R&D intensive settings and systemic factors influencing the emergence of born global R&D intensive firm, and incorporating Dib et al. (2010) framework, which was created in their study in order to explain the emergence of born global firms. External factors are excluded from the further study in order to deepen the analysis of born global phenomenon from “inside-out” and explain the core variables and their linkages, formed by strategic choices leading towards born global firm. Furthermore, the literature review disclosed that the entire link between external factors influencing rapid internationalization decision and the formation of born global R&D intensive firm is based on the impacts of globalisation. At the entrepreneurial firm level the response to globalization is based on global networks (Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009), which are considered as crucial conditions for early internationalization within our framework. Globalisation creates a number of pull and push factors affecting the emergence of born global settings, as well as conditions for early internationalisation of the firm, such as decreased trade and investment barriers in a global scale (Halldin 2012; Mets and Kelli 2011; Cavusgil and Knight 2009), increasing homogeneity among particular industries (Cannone et al. 2012), global information flows (Mets and Kelli 2011), growing mobility of human capital (Cannone et al. 2012; Mets and

Kelli 2011), knowledge globalization (Halldin 2012), emergence of *global niche markets* (Halldin 2012; Dib et al. 2010; Cavusgil and Knight 2009), *global networks* (Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009), which are tested from the entrepreneurial opportunity exploitation perspective from our framework, but not as independent variables.

Following the intention to investigate born global R&D intensive firms from internal perspective, the entrepreneurial, strategic, and networking factors supporting the emergence of born global R&D intensive firm were extracted (see Figure 1). These specific groups of internal factors has been previously extracted in the scientific literature (Eurofound 2012; Dib et al. 2010) to study born global firms after raising the importance of an entrepreneur in young globally oriented firms and significance of networks in international entrepreneurship and born global firms, besides their strategic composition. Each group of factors relates to a greater list of sub-factors as characteristics, which were grounded by the literature analysis and extraction of the characteristics born global firms, as well as by the analysis of factors that affect global orientation and the conditions influencing the choice of an early and accelerated internationalization path.

The entrepreneurial factors list a number of relevant features of an entrepreneur that leads the firm to a global path. The recent empirical studies underline high activity in international markets from or near the founding (Tanev 2012; Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009; Gabrielsson et al. 2008; Gabrielsson and Pelkonen 2008), strong international outlook of managers and international entrepreneurial orientation (Eurofound 2012; Cavusgil and Knight 2009; Gabrielsson et al. 2008; Weerawardena et al. 2007) as the core characteristics of born global firm. International orientation possessed by entrepreneur is highlighted to be one of the most relevant internal factor that may influence the choice of an

early and accelerated internationalization path (Dib et al. 2010), and a desire to be involved in international business is claimed to impact the formation of born global firm (Eurofound 2012; Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009). So particularly global firm profile from inception is supported by the core individual entrepreneur level factor – possession of *global vision*, where international orientation goes together with managerial competences to exploit the opportunities in global markets (Eurofound 2012; Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009). The changing nature of customers and markets towards global level also changes the *competitive environment* where firms operates nowadays, and either causes the need to scale returns from international markets, in order to remain competitive also in the conventional markets, while acquiring the resources for keeping up with the R&D and innovation speed globally (Kudina et al. 2008). *Proactiveness* and ability to recognize potential in foreign markets (Eurofound 2012; Cannone et al. 2012; Kudina et al. 2008), and tolerance to risk (Dib et al. 2010) enables such entrepreneurial activity. That is usually strengthened by such personal management characteristics as *networking skills*, leading towards creation and exploitation of strong personal international network of professional relationships (Eurofound 2012; Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009; Kudina et al. 2008), experience in international business (Cannone et al. 2012; Dib et al. 2010; Kudina et al. 2008), education abroad, as well as technical know-how (Dib et al. 2010). In sum, entrepreneur level factors emphasize global vision, proactiveness in recognition and exploitation of opportunities globally, international networking as characteristics of top management that actually form the internal environment of the firm. Thus entire entrepreneurial variables from the literature review were extracted: global vision, international orientation, international experience from the inception of an

enterprise, tolerance to risk, proactiveness, superior know-how, use of personal and professional relationships and networks.

Consequently strategic and organizational factors define specific characteristics of a firm to born global in R&D intensive settings that are excluded and highly linked in between in the scientific literature. Many of these are already underlined as the core characteristics of the born global firm, such as knowledge intensity (Gonzalez-Menorca et al. 2012; Jones et al. 2011; Kudina et al. 2008), industrial variety (Sullivan Mort et al. 2012; Eurofound 2012; Cavusgil and Knight 2009; Crick 2009), emphasis on differentiation strategy (Cannone et al. 2012; Eurofound 2012; Cavusgil and Knight 2009; Schulz et al. 2009), emphasis on superior product quality and innovations (Eurofound 2012; Sullivan Mort et al. 2012; Gabrielsson and Kirpalani 2012; Cavusgil and Knight 2009; Schulz et al. 2009; Gabrielsson et al. 2008), utilization of advanced ICT (Gabrielsson and Kirpalani 2012; Mettler and Williams 2011; Cavusgil and Knight 2009), global niche market orientation (Bailetti 2012; Tanev 2012; Gonzalez-Menorca et al. 2012; Olejnik and Swoboda 2012). Particularly emergence of *global niche markets* (Halldin 2012; Eurofound 2012; Dib et al. 2010; Varma 2010; Cavusgil and Knight 2009) are identified as the core market based factors influencing the formation of born global firm. In these settings market opportunities are explored globally for the unique R&D intensive solutions either as the advantage to occupy global market niches in order to *leverage returns from R&D* investments is taken, which stands as one of the core factors for such enterprises formation (Halldin 2012; Cavusgil and Knight 2009). Certain *product* features are essential factors allowing the exploitation of global market opportunities with the niche based competition, these are unique and high value added products creating a significant first mover advantages. Knowledge intensity and management are manifested in continuous learning and

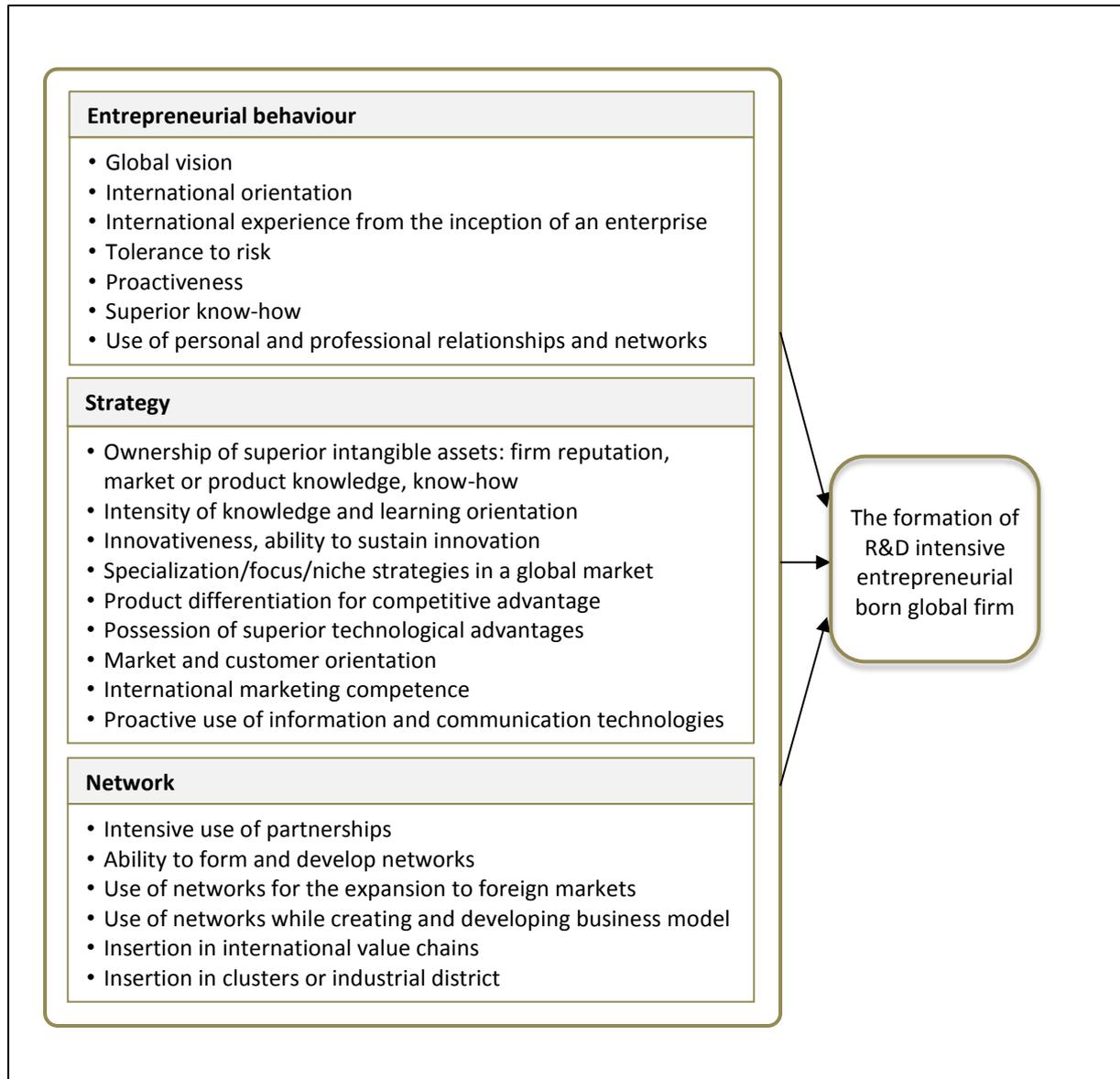
knowledge acquisition from foreign partners in order to develop knowledge intensive unique products and speed up innovation processes (Cannone et al. 2012). Particularly innovativeness, specialization and focus, customer orientation, product differentiation, technological advantages possessed by the firm, either the use of information technologies as well as all the spectrum of unique intangible assets acquired in the company are not only highlighted in the scientific literature investigating born global phenomenon but either are these variables excluded by Dib et al. (2010) and certified in their study as internal factors that influence the choice of an early internationalization path of the firm. Characteristics mentioned and in the conceptual framework excluded as strategic level factors in order for the firm to form as global from inception help the most frequently small and constrained by lack of tangible resources born global firm to successfully compete in global markets while commercializing the R&D activities and creating very specific but high value added products. Entire organization and strategy based factors from the literature review were extracted: ownership of superior intangible assets: firm reputation, market or product knowledge, know-how, intensity of knowledge and learning orientation, innovativeness, ability to sustain innovation, specialization/focus/niche strategies in a global market, product differentiation for competitive advantage, possession of superior technological advantages, market and customer orientation, international marketing competence, proactive use of information and communication technologies.

Networking factors derive from networking theory inherent to a born global phenomenon. The recent empirical studies allow to distil belonging to networks (Eurofound 2012; Renda 2011; Schulz et al. 2009) as one of the core characteristics of born global firm. Rapid internationalization decision is based on the supposed or existing impacts of *global networks*

(Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009). Networking is essential in acquiring and exploiting resources in R&D activities, innovation development and market access globally. Thus the ability of the firm to develop networks and use them for growth is a core factor for the success of born global firm (Halldin 2012; Cannone et al. 2012; Cavusgil and Knight 2009; Kudina et al. 2008). Network can be reflected in various ways which stand for use of partnerships, business and personal networks, as well as participation in clusters (Dib et al. 2010), insertion in international value chains either expanding to foreign markets or developing business model in order to achieve a competitive position in a global market. All network level factors stress the ability to form, develop and use professional and personal networks, as well as partnerships what is significantly important in order to start international activities from the inception and to compete with global players while being relatively small and new entrant. Entire networking variables from the literature review were extracted: intensive use of partnerships, ability to form and develop networks, use of networks for the expansion to foreign markets, use of networks while creating and developing business model, insertion in international value chains, insertion in clusters or industrial district.

Extracted research factors are synthesized in the conceptual framework proposed in Figure 1. The groups were later used for shaping empirical research methodology and testing the dynamics and interdependencies between factor groups.

Figure 1. Conceptual Framework on Entrepreneurial, Strategy and Network Based Factors Affecting the Formation of R&D Intensive Entrepreneurial Born Global Firm



Source: Compiled by authors based on Dib et al. (2010) and Dlugoborskyte et al. (2015).

Methodology of the Study

The nature of the investigating topic determined the multiple case study method to choose: multiple case-based research serves as a basis for empirically testing previous theories (Cannone et al. 2012), it allows to analyse pattern-matching properties between the cases under study (Rialp et al. 2005), enables to find richer explanations and a deeper insight into

phenomenon and to use both literal and theoretical replication. In order to fulfil empirical objective, a particular type of firms was targeted - born global in R&D intensive settings, where companies conduct international business at or near the founding of the firm and create new value for the market while transferring unique knowledge to innovative products or services through commercializing their R&D activities.

Research efforts have been dedicated to the extraction of core characteristics of born global R&D intensive firm, such as a time span between foundation and the start of international business operations, relevance of international activities to the business model design, geographic scope of international operations (Dib et al. 2010), the firms' vision (Gabrielsson and Kirpalani 2012) of a global market place and management focus on global rather local operations and networks. Incorporating these distinctive features of born global firms with the specific external (i.e. country in the catching up period) and internal (i.e. R&D intensive firm) context, determined by the aim of the research, five criteria in order to select the case studies were identified: small or medium size of the firm; R&D intensity; early internationalization (export activities within three years from the establishment); exclusion of post – soviet restructuration based companies from the sample (year of company establishment no earlier than 1990); global vision and strong international entrepreneurial orientation, which stands for global activities from the inception of an enterprise. Cases were selected for extending existing theories by being typical representatives of the pursued population rather than by random selection. 13 cases were conducted, operating on global markets with IPR protected R&D intensive products (see table A1).

Data collection involved two main sources: multiple sources of secondary information, e.g. articles, websites and press releases, which provide more accurate and unbiased information

and semi-structured interviews with entrepreneurs. Relying on different sources of information allowed data triangulation to ensure the validity of the study and to obtain a more comprehensive and accurate view of the topic analysed. Semi-structured in-depth interviews with the founders or CEOs - key decision makers in each firm were conducted, as they possess the most comprehensive knowledge of the characteristics of the organization, its strategy and performance. The interviews ranged in time from 60 to 90 minutes and were semi-structured, allowing for collection of both factual information, such as major events in the firm's history, and narrative data. Most of the questions asked were open-ended, allowing the informants to describe and explain stories related to the firm's internationalization or personal characteristics. An interview guide was used to ensure the completeness of data. Interviews were recorded and later on rewritten to transcripts.

The qualitative data from each case was analysed using qualitative content analysis, where sub-variables from the conceptual model of the study were as categories to group the information. Subsequently cases were first briefly individually described following the model of the study and then cross-compared in order to explore the replication. MAXQDA software was used to code factors in order to analyse their manifestations within and between the cases and their relations. Such cross-case synthesis was used to determine similarities and differences in terms of the characteristics mentioned in the model and their impact on the formation of the enterprise. The analytic approach used allowed the generalization of the results from the cases and disclose essential factors for the formation of R&D intensive entrepreneurial born global firm.

Interaction of Entrepreneurial, Strategy and Network based Constituents within the R&D Intensive Born Global Firms: Key Findings and discussion

The data from 13 analysed cases of born global firms has proven all factors presented in the conceptual framework plays a role in the formation of these R&D intensive entrepreneurial settings. In Figure 2 larger or smaller square in the axis of each factor shows it's coding frequency within the cases, combined and separately. Unified data from all of the cases distinguishes the most frequent, yet important, factors for the formation of born global firms. "*Intensive use of partnerships*" from the network factors group is underlined to be the most important factor from the list. Further, strategic choices of the firm such as "*Innovativeness and ability to sustain innovation*" and "*Market and customer orientation*" as well as "*International orientation*" of an entrepreneur can either be underlined. Still, the analysis also shows factors that were less common, were not so frequently coded in the content analysis. "*International experience from the inception*" and "*Use of personal and professional relationships and networks*" from the entrepreneur's perspective, organisation's "*Proactive use of information and communication technologies*" and it's network formed for "*Insertion in cluster or industrial district*" were found to be the most sparsely coded from the interviews or secondary data as factors that would explain the formation of the firm. However, factor frequency in separate cases shows that the same factor can play a different role for the firm. While analysing each of the case the same factor that was important in the combined view can be significantly less important in an actual case, and opposite. The dynamics of factor frequencies in each case shows them all to be of different significance, yet all important as most of the factors can be seen in each case. Such repetitive manifestation of factors proves

the conceptual framework expose core elements to explain how the R&D intensive entrepreneurial global firm is being born.

Figure 2. Internal Factors for R&D Intensive Entrepreneurial Born Global Firm Formation (Evidence from 13 Cases)

Factors	Cases	All	A	B	C	D	E	F	G	H	I	J	K	L	M
Entrepreneurial behaviour															
Global vision					■	■									
International orientation		■	■	■	■	■		■			■		■		
International experience from the inception													■		
Tolerance to risk					■					■					
Proactiveness												■		■	
Superior know-how							■			■		■		■	
Use of personal and professional relationships and networks												■	■		
Strategy															
Ownership of superior intangible assets		■					■		■				■	■	■
Intensity of knowledge and learning orientation		■							■						
Innovativeness and ability to sustain innovation		■	■	■		■					■	■	■	■	■
Specialization/focus/niche strategies in a global market															
Product differentiation for competitive advantage															
Possession of superior technological advantages				■											
Market and customer orientation		■	■	■		■	■	■	■						■
International marketing competence															
Proactive use of information and communication technologies															
Network															
Intensive use of partnerships		■	■	■	■	■			■	■	■	■	■	■	■
Ability to form and develop networks		■		■					■				■	■	
Use of networks for the expansion to foreign markets												■			
Use of networks while creating and developing business model													■		
Insertion in international value chains															
Insertion in clusters or industrial district															

Source: Compiled by authors, original calculations using MAXQDA.

The analysis of the relationships between factors revealed the interrelationship and dynamics between entrepreneurial, strategy, and network based factors, and allowed to distinguish critically important ones, that act as linking variables in the formation of R&D intensive entrepreneurial born global firms (Figure 3) from the general set of variables. The program calculated the overlapping in coded factors (i.e. how close each factor was mentioned in the interview, and how frequently). This allows to find connections or relationships between coded factors and to define their strength what highlights their importance compared with the rest in the list. Factors that showed the strongest relationships within each factor group, i.e. entrepreneurial behavior, strategy or network, are understood as crucial components of that factor group. These factors as well as their connections between the groups are actually

disclosing how R&D intensive entrepreneurial born global firm is being formed. Therefore these observed linkages are exposed in the unified framework in Figure 3.

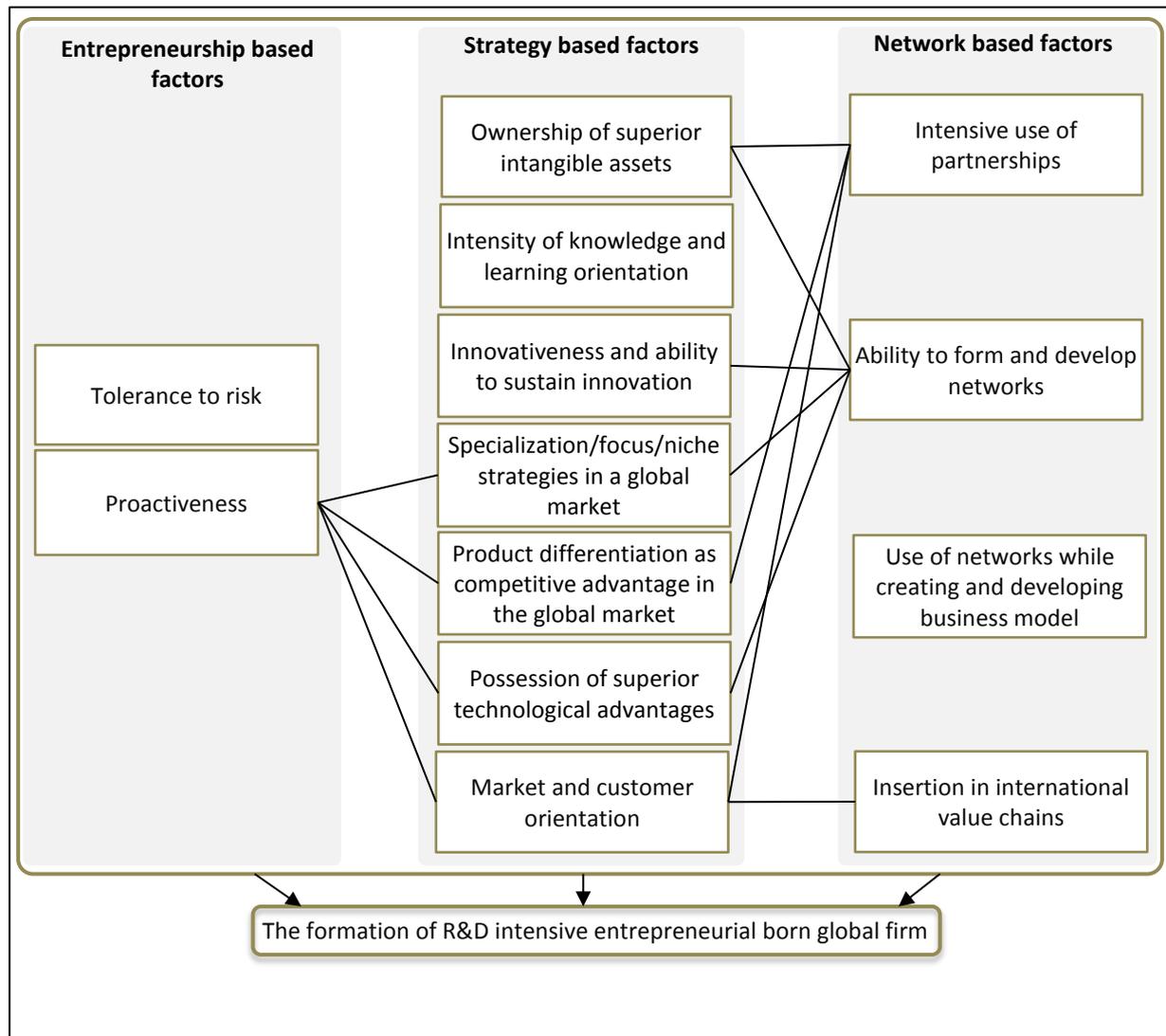
The relationships of factors highlighted stronger links inside the single factor groups, i.e. entrepreneurial behaviour, strategy, network. The strongest relations of internal factors for the formation of R&D intensive entrepreneurial born global firm demonstrate the behavior patterns that later are discussed along entrepreneurial, strategy and network constituent axes.

The key drivers affecting the global orientation from the entrepreneurial behavior stand point manifested through highly relating factors “*tolerance to risk*” and “*proactiveness*”. From the strategy and organizational capabilities perspective, “*Ownership of superior intangible assets*” demonstrated strong relation with “*intensity of knowledge and learning orientation*”, as well as moderate relation with “*innovativeness and ability to sustain innovation*”, in this way the intrinsic capabilities of the firm resulting at higher importance than strategy orientations such as “*market and customer orientation*” and “*intensity of knowledge and learning orientation*”. “*Market and customer orientation*” of a firm specifically demonstrates moderate relationship with adoption of “*specialization/focus/niche strategies*” and “*product differentiation as competitive advantage*” in the global market, i.e. indicating the global niche player strategy adoption. “*Specialization/focus/niche strategies in a global market*”, “*innovativeness and ability to sustain innovation*” and “*possession of superior technological advantages*” at a firm level are connected together at a moderate level resulting in a combined R&D driven competitiveness in a global niche. The networks result as a tool for strategy execution, whereas firm’s choice to *use partnerships intensively* shows an exceptional relationship with its “*ability to form and develop networks*”; and the need of “*insertion into international value chains*” is achieved via “*Intensive use of partnerships*” as strongly related

factors demonstrate. Both factors are interrelated together and with “*use of networks for creating and developing business model*” at a moderate level, which indicates the openness of the business model and interactive dynamics of strategy as an adaptive behavior within the network.

Nevertheless, the dynamics of relations among factors demonstrate that in the formation of R&D intensive entrepreneurial born global firm entrepreneurial, strategy and network constituents are interrelated through particular specific variables rather than a full set of factors. “*Proactiveness*” as an entrepreneurial behaviour parameter and firm’s networking patterns indicated through “*intensive use of partnerships*” and “*ability to form and develop networks*” have linkages with a number of various strategic choices of the firm provided in a conceptual model. “*Market and customer orientation*” adopted by the firm can be highlighted as a strategic parameter which has the most linkages with entrepreneurial behaviour and networking choices of a firm. The orientation is caused by the “*superior know how*” and “*proactiveness*” of an entrepreneur and later manifests through “*intensive use of partnerships*” and “*insertion in international value chains*”. Furthermore, the “*use of personal and professional relationships and networks*” from entrepreneurial behaviour factor group demonstrated relationship with “*intensive use of partnerships*” from network factor group.

The strongest relations within internal factor groups disclose the essential factors for the formation of R&D intensive entrepreneurial born global firm which are the basis of newly formed framework, whereas interrelations between factors in different factor groups reveal logical sequence in which this formation happens. As it can be seen from the framework, entrepreneur’s proactiveness leads to different strategies adopted by the firm that dictate the way the born global firm use its network in order to reach strategic goals.

Figure 3. Framework for the Formation of R&D Intensive Entrepreneurial Born Global Firm

Source: Compiled by authors, based on original calculations using MAXQDA.

The quantity and strength of relations between strategic factors and entrepreneurial and network groups leads to the observation that a firm strategy acts as a moderating factor, while entrepreneurship acts as an independent variable, and network behaves as a dependent variable. Entrepreneurial factors are then observed to be as a starting and independent variable impacting strategy, while network is formed as a strategically intended resource for the firm. However, these points should be further investigated in a research to be firmly proven.

Conclusions

The study of the interplay of entrepreneurial, strategy and network constituents has revealed the strategy and organizational capabilities of the firm as a determining factor for the formation of R&D intensive entrepreneurial born global firm.

Within each category, i.e. entrepreneurial, strategy and networks, of the constituents, critical factors leading to the formation of R&D intensive entrepreneurial born global firm were extracted. The essential entrepreneurial constituents are *tolerance to risk* and *proactiveness* of an entrepreneur. The most important strategy and organization based constituents are *ownership of superior intangible assets, intensity of knowledge and learning orientation, innovativeness and ability to sustain innovation, specialization/focus/niche strategies, product differentiation as competitive advantage in the global market, possession of superior technological advantages, market and customer orientation*. Network based constituents are *intensive use of partnerships, ability to form and develop networks, use of networks while creating and developing business model, and insertion in international value chains*.

The critical interconnections between variables with regard to the formation of R&D intensive entrepreneurial born global firm were structured following the proposition: *entrepreneurial behaviour acts as a trigger to develop proactive strategy based on firm innovative and dynamic capabilities that would link the firm with specific network of strategic importance*.

Thus empirically testing the initial conceptual framework, that emanated from synthesis of scientific literature on characteristics of born global firms, factors that affect global orientation and the conditions influencing the choice of an early and accelerated internationalization path, the key determinants leading to the formation of R&D intensive entrepreneurial born global firm were enclosed. An internal focus to the strategically

important firm decisions from the perspective of entrepreneurial firm and network theories, provided a distinct view on how entrepreneurial, strategy and network constituents are combined forming a specific globally oriented firm from the inception. A proposed framework helps to deepen our knowledge on how global firms in knowledge intensive sectors born.

Research limitations derive from the sample formation of relatively disadvantaged latecomer economy (Lithuania), which has transited to the high level income country in 2015 (OECD). However, this also demonstrates the strategies of R&D intensive firms that actually contributed to the transition. Still, the case studies demonstrate the directions of future research. It should focus on the exploration of the global interaction patterns and development of the typologies of born global firm. In terms of practical implications, the paper offers an insight into the design and strategies facilitating the formation of born global firms, including the opportunities for policy interventions in shaping the dynamics of global R&D intensive entrepreneurial SMEs.

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Annex

Table A1. Profiles of R&D intensive entrepreneurial born global firms

	Core product	Year of establishment	Size of the company
Company A	Computer accessories, small home appliances and lighting solutions	1998	Medium enterprise
Company B	Laser optics, crystals, laser and opti-mechanical products	1996	Medium enterprise
Company C	Wheat starch, gluten and wheat gluten feed	2008	Medium enterprise
Company D	Cosmetics	1990	Medium enterprise
Company E	Biotechnology company providing R&D and cGMP manufacturing services for biopharmaceuticals	2004	Medium enterprise
Company F	Laser, laser systems and components	1992	Medium enterprise
Company G	High-tech, disruptive electronics and automated control systems technology	1991	Medium enterprise
Company H	Appstore	2004	Micro enterprise
Company I	Medical devices for respiratory support	1994	Medium enterprise
Company J	Laser, laser systems and components	1994	Medium enterprise
Company K	Robotics	2009	Small enterprise
Company L	Molecular biology	1994	Medium enterprise
Company M	Non invasive intracranial blood pressure measurement device	2002	Micro enterprise

Source: Compiled by authors based on the analysis of the cases.

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