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The Dynamics of Entrepreneurial, Strategic and Network Based Factors in the Formation of R&D Intensive Entrepreneurial Born Global Firms

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Abstract

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Abstract. The nature of the knowledge based entrepreneurship relates to its essential reliance on R&D, deployment and maximization of R&D returns via technology solution development, and its commercialization via venturing. From the small country perspective, R&D globalization, 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 formation of born global R&D driven entrepreneurial firms. The paper aims to provide the empirically grounded framework for analysing the key internal determinants leading to the formation of R&D intensive entrepreneurial born global firm with a special focus on entrepreneurial firm and network theories rather than only on early internationalisation of the firm. The paper argues that born global firm as a specific form of entrepreneurial firm occur via linking entrepreneurial, strategy and network factors, and are strategically designed to be global from scratch. Qualitative data analysis allowed to extract essential factors and specific combinations that lead to the drivers patterns of R&D intensive entrepreneurial born global development. The multi-case study disclosed that entrepreneurial factors act as a starting and independent variable impacting strategy, while network is formed as a strategically intended resource for the firm. Moreover, distinctive behavioural patterns were observed revealing the ways network is used as a critical resource for exploitation of knowledge in the global market place.

Key words: R&D intensive innovation, born global firm, network, strategy, entrepreneurship

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 & Zellner, 2005; Johansson, 2005). A distinguished nature of the knowledge based entrepreneurial activity relates to its essential reliance 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.

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 & Knight, 2009; Gabrielsson et al., 2008; Gabrielsson & Pelkonen, 2008), operation from the SME basis (Sullivan Mort et al., 2012; Eurofound, 2012; Cavusgil & Knight, 2009) with limited financial and other material resources (Sullivan Mort et al., 2012; Cavusgil & Knight, 2009), industrial variety (Sullivan Mort et al., 2012; Eurofound, 2012; Cavusgil & Knight, 2009; Crick 2009), strong international outlook of managers and international entrepreneurial orientation (Eurofound, 2012; Cavusgil & Knight, 2009; Gabrielsson et al., 2008; Weerawardena et al., 2007), emphasis on differentiation strategy (Cannone et al., 2012; Eurofound, 2012; Cavusgil & Knight, 2009; Schulz et al., 2009), emphasis on superior product quality and innovations (Eurofound, 2012; Sullivan Mort et al., 2012; Gabrielsson & Kirpalani, 2012; Cavusgil & 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 & Kirpalani, 2012; Mettler & Williams, 2011; Cavusgil & Knight, 2009), belonging to networks (Eurofound, 2012; Renda, 2011; Schulz et al., 2009), using external independent intermediaries for distribution in foreign markets (Taylor & Jack, 2012; Cavusgil & Knight, 2009), global niche market orientation (Bailletti, 2012; Gonzalez-Menorca et al., 2012; Olejnik & Swoboda, 2012).

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 firm from internal environment shaping 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 analysing the key internal determinants leading to the formation of R&D intensive entrepreneurial born global firm with a special focus on entrepreneurial firm and network theories rather than only on early internationalisation of the firm.

The systemic framework of factors shaping the formation of R&D intensive entrepreneurial born global firms was provided via systematic literature review and synthesis, with a primary focus on the findings from empirical studies (Halldin, 2012, Cannone, Costantino, Pisoni & Onetti, 2012, Cavusgil & Knight, 2009, Kudina, Yip & Barkema, 2008, Travinsky, 2012, Varma, 2010). In this systematic approach 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 basically rely on theories of entrepreneurship and organization, with the specific focus on dynamic capabilities, networks, organisational learning and knowledge management. Thus external factors are excluded from the further study as the reason is twofold: the intention to deepen the analysis of born global phenomenon from “inside-out” while explaining the core factors and their linkages, formed by strategic choices, that leads towards born global; and the indication originated from the literature review that the entire link between external factors influencing rapid internationalization decision and the formation of R&D intensive entrepreneurial born global firm is based on the impacts of globalisation (Halldin, 2012, Cannone et al., 2012, Mets & Kelli, 2011, Cavusgil & Knight, 2009).

The constructed conceptual framework represents the factors grouped into three levels - entrepreneurial, strategy and organization, and network based constituents. Each group 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 research methodology adopted is 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 nature of the investigating topic determined the multiple case study method to choose: it serves as a basis for empirically testing previous theories, allows analysing pattern-matching properties between the cases under study, and enables to find richer explanations and a deeper insight into phenomenon. In order to fulfil empirical objective, a particular type of firms was targeted – entrepreneurial born global in R&D intensive sectors, where companies conduct international business at or near 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.

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. Overall 13 in-depth case studies were analysed. Data collection involved multiple sources of secondary information and semi-structured in-depth interviews with the founders or CEOs. After primary and secondary data from each case is analysed using qualitative content analysis following the conceptual model of the study for categorization, cases are first briefly individually described and then cross-compared (using MAXQDA software). Such cross-case synthesis was used to determine similarities and differences in terms of the factors mentioned in the model and their impact on the formation of the enterprise. The analytic approach allows the generalization of the results from the cases and discloses factors for the formation of R&D intensive entrepreneurial born global firm.

The chapter 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 Variables in Explaining the Formation of Born Global Firms in R&D Intensive Sectors

The idea of open innovation fits particularly well the concept of "born global firm" R&D intensive enterprise, and defines the need to dedicate specific attention to the rising variety of networks, and firms 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, Fukugava, 2006, Gassler, Nones, 2008, Love & Roper, 2001, Van de Vrande et al., 2006, Williams & 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 Su et al. (2009), 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, 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 was studied by the large number of authors (for example, Erden et al., 2009, 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 recently 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.

The systemic framework of factors shaping the formation of born global R&D intensive firms was provided via systematic literature review and synthesis, with a primary focus on the findings from empirical studies (Halldin, 2012, Cannone, Costantino, Pisoni & Onetti, 2012, Cavusgil & Knight, 2009, Kudina, Yip & Barkema, 2008, Travinsky, 2012, Varma, 2010). 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. In the first step of literature analysis, the set of systemic factors were extracted and categorized into three groups, representing industry/firm, organization/strategy and individual/entrepreneur. 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 approach 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 basically 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 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, Rocha & Silva (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 as the reason is twofold: the intention to deepen the analysis of born global phenomenon from “inside-out” while explaining the core variables and their linkages, formed by strategic choices, that leads towards born global firm; and the indication originated from the literature review 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 (Halldin, 2012, Cannone et al., 2012, Mets & Kelli, 2011, Cavusgil & Knight, 2009). At the entrepreneurial firm level the response to globalization is based on global networks (Halldin, 2012, Cannone et al., 2012, Cavusgil & 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 & Kelli, 2011, Cavusgil & Knight, 2009), increasing homogeneity among particular industries (Cannone et al., 2012), global information flows (Mets & Kelli, 2011), growing mobility of human capital (Cannone et al., 2012, Mets & Kelli, 2011), knowledge globalization (Halldin, 2012), emergence of global niche markets (Halldin, 2012, Dib et al., 2010, Cavusgil & Knight, 2009), global networks (Halldin, 2012, Cannone et al., 2012, Cavusgil & 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). 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 & Knight, 2009, Gabrielsson, Kirpalani, Dimitratos, Solberg & Zucchella, 2008, Gabrielsson & Pelkonen, 2008), strong international outlook of managers and international entrepreneurial orientation (Eurofound, 2012, Cavusgil & Knight, 2009, Gabrielsson et al., 2008, Weerawardena, Sullivan Mort, Liesch & Knight, 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 & 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 & 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 & 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, Fernandez-Ortiz & Clavel San Emeterio, 2012, Jones, Coviello, & Tang, 2011, Kudina et al., 2008), industrial variety (Sullivan Mort, Weerawardena, & Liesch, 2012, Eurofound, 2012, Cavusgil & Knight, 2009, Crick 2009), emphasis on differentiation strategy (Cannone et al., 2012, Eurofound, 2012; Cavusgil & Knight, 2009, Schulz, Borghoff & Kraus, 2009), emphasis on superior product quality and innovations (Eurofound, 2012, Sullivan Mort et al., 2012, Gabrielsson & Kirpalani, 2012, Cavusgil & Knight, 2009, Schulz et al., 2009, Gabrielsson et al., 2008), utilization of advanced ICT (Gabrielsson & Kirpalani, 2012, Mettler & Williams, 2011, Cavusgil & Knight, 2009), global niche market orientation (Bailetti, 2012, Tanev, 2012, Gonzalez-Menorca et al., 2012, Olejnik & Swoboda, 2012). Particularly emergence of global niche markets (Halldin, 2012, Eurofound, 2012, Dib et al., 2010, Varma, 2010, Cavusgil & 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 & 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 & 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 & 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.

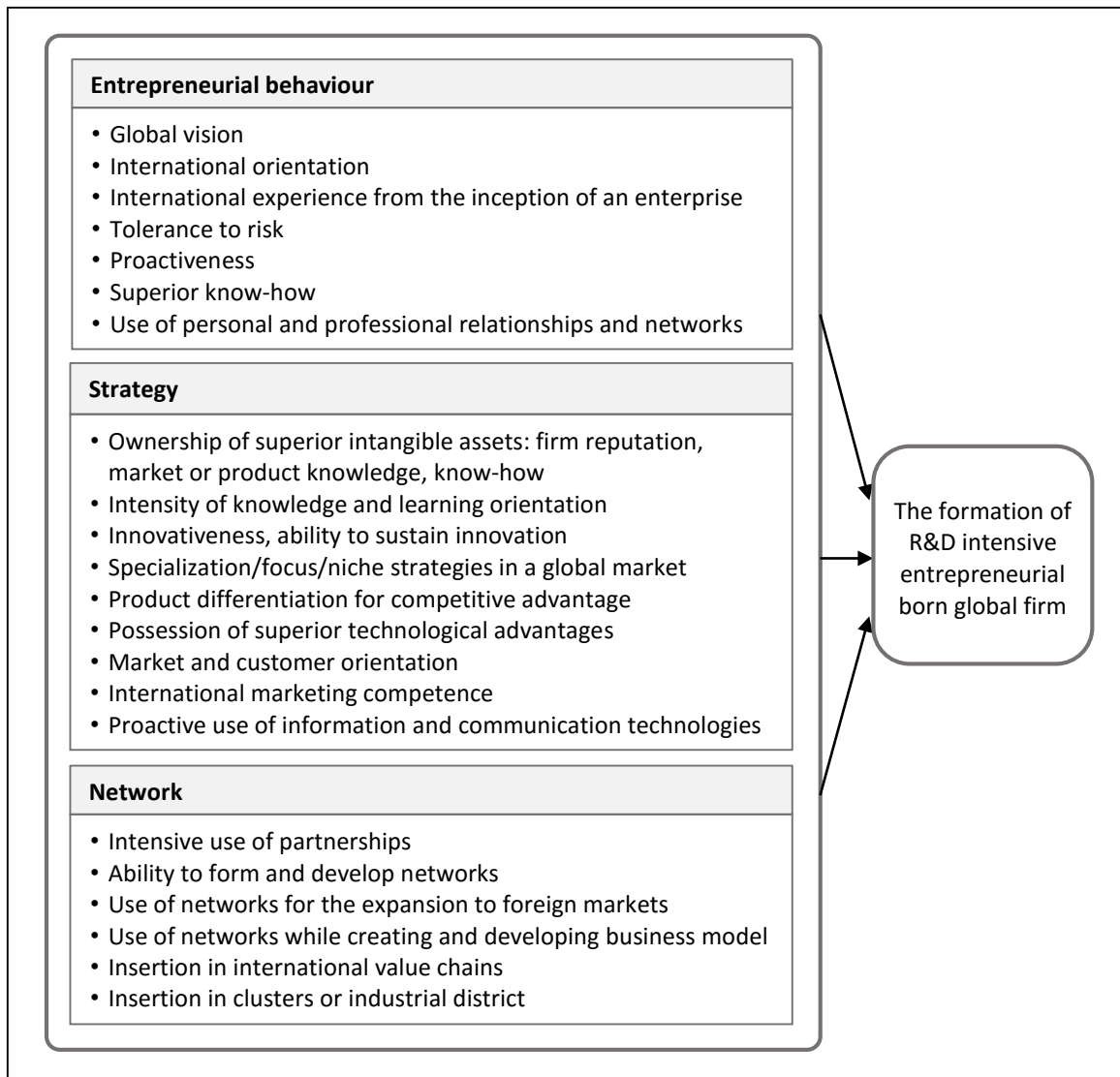


Figure 1. Conceptual Framework on Entrepreneurial, Strategy and Network Based Factors Affecting the Formation of R&D Intensive Entrepreneurial Born Global Firm

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, Rialp & Knight, 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. 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.

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 and identify IV patterns of their formation.

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

The data from 13 analyzed cases of born global firms has proven all factors presented in the conceptual framework actually 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 its 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 its 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 totally different role for the firm. While analyzing 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 very 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.

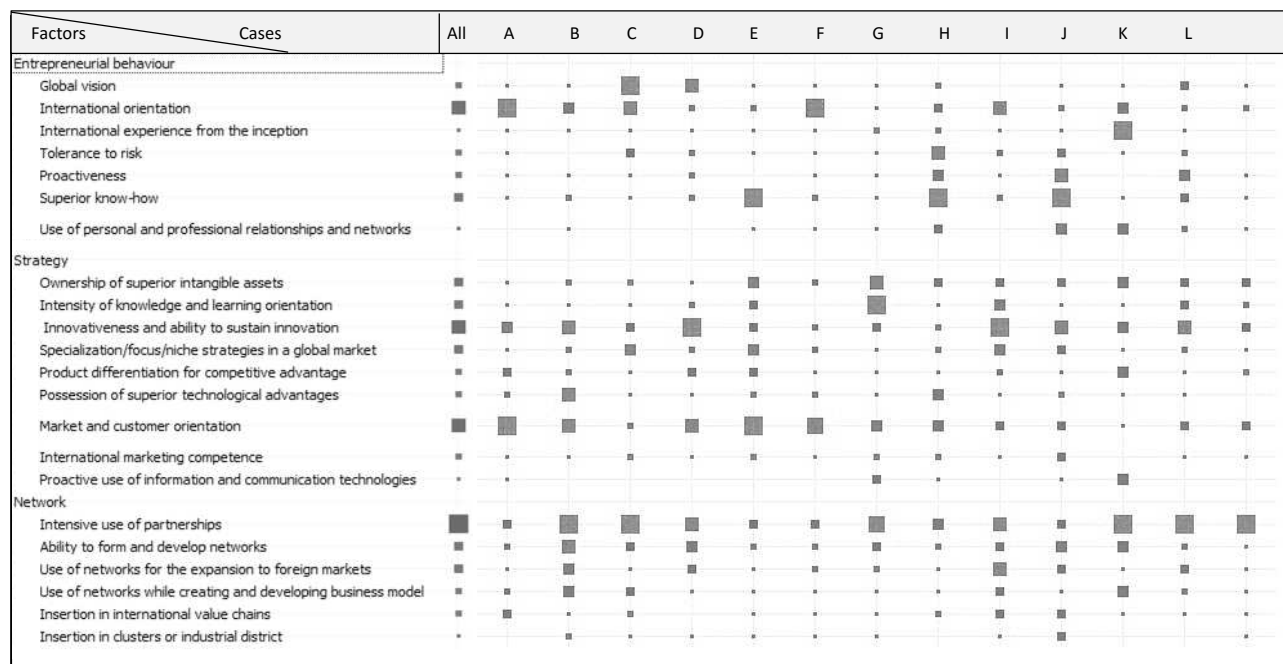


Figure 2. Internal Factors for R&D Intensive Entrepreneurial Born Global Firm Formation (Evidence from 13 Cases)

The analysis of the relationships between factors revealed the interrelationship and dynamics between entrepreneurial, strategy, and network based factors (Figure 3), and allowed to distinguish critically important ones, that act as linking variables in the formation of R&D intensive entrepreneurial born global firms (Figure 4) from the general set of variables. In Figure 3 larger or smaller squares located on each factor's axis show their overlapping. 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. Thus 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 4.

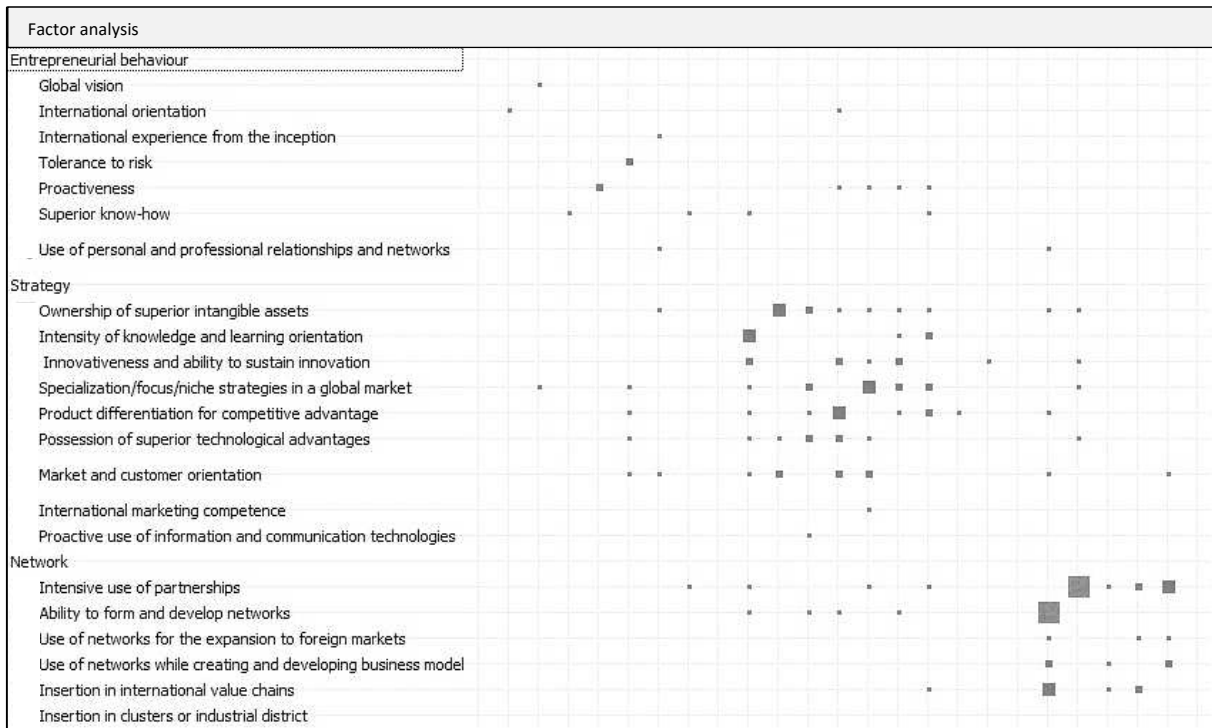


Figure 3. Relations between Internal Factors for R&D Intensive Entrepreneurial Born Global Firm Formation (Evidence from 13 Cases)

The factor analysis 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 following behavioural patterns of such firm:

- Entrepreneurial behaviour is expressed through highly relating factors “tolerance to risk” and “proactiveness”;
- “Ownership of superior intangible assets” in a firm shows a strong relation with “intensity of knowledge and learning orientation”, as well as moderate relation with its “innovativeness and ability to sustain innovation” and is either linked with a number of other strategic factors;
- Firm’s strategic choices, “market and customer orientation” and “intensity of knowledge and learning orientation”. relate at a moderate level;
- “Market and customer orientation” of a firm either shows a moderate relationship with adoption of “specialization/focus/niche strategies” and “product differentiation as competitive advantage” in the global market;
- Strategic factor to adopt “specialization/focus/niche strategies” has a moderate relation with “product differentiation as competitive advantage” in the global market;
- “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 relation;
- Firm’s choice to use partnerships intensively shows an exceptional relationship with its “ability to form and develop networks”;
- “Intensive use of partnerships” in a firm shows a strong relation with its “insertion into international value chains”. Moreover, all two factors are interrelated together with “use of networks for creating and

developing business model” at a moderate relation.

Nevertheless, the dynamics of factor relations expose that in the formation of R&D intensive entrepreneurial born global firm entrepreneurial behaviour, strategic choices or firm’s network use are interrelated through particular 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, that has the most linkages with entrepreneurial behaviour and networking choices of a firm. The orientation is dictated by “superior know how” and “proactiveness” of an entrepreneur and later manifests through “intensive use of partnerships” and “insertion in international value chains”. Furthermore, in no coincidence “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.

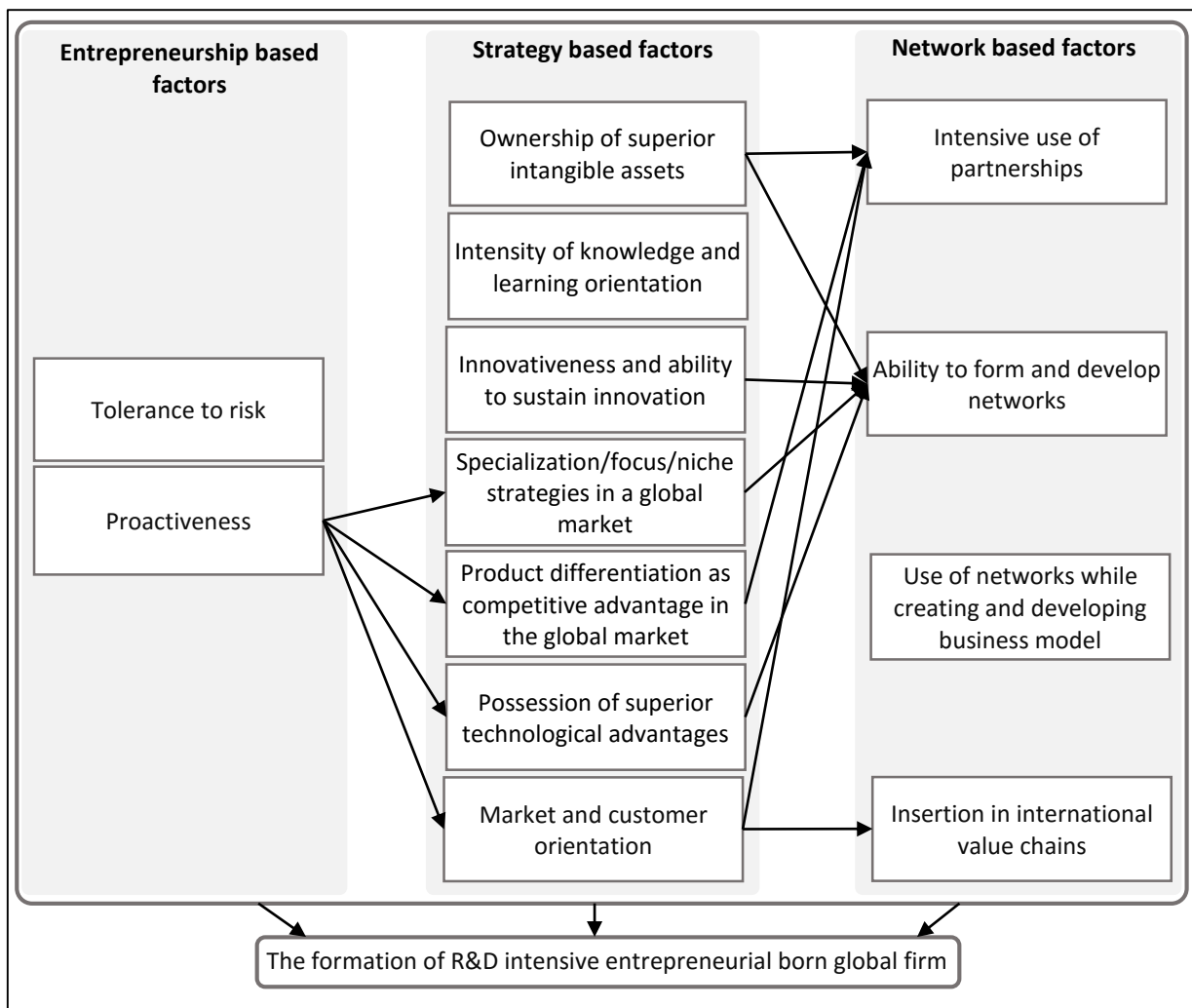


Figure 4. Framework for the Formation of R&D Intensive Entrepreneurial Born Global Firm

The quantity and direction of relations between strategic factors and entrepreneurial and network groups point to the firm strategy as a moderating factor, while entrepreneurship acts as an independent variable, and network behaves as a dependent variable, which was further used for the analysis of specific network formation patterns, as a dependent variable formed via strategy. Entrepreneurial factors act as a starting and independent variable impacting strategy, while network is formed as a strategically intended resource for the firm. Following this, four specific network behaviour patterns were extracted, that are presented further.

Behaviour Patterns within R&D Intensive Born Global Firms

The dynamics in factor manifestations within analysed cases enabled to observe certain patterns that differentiate R&D intensive entrepreneurial born global firms from each other (Figure 5). Actually, the diversity of coding frequencies were not a coincidence, but rather dictated by distinct behaviours of born global firms. Therefore 13 cases were grouped in 4 different patterns based on coding frequencies: pattern I that includes 3 firms which stand out for intensive use of network while forming; pattern II with 3 firms that stressed the superior know how of an entrepreneur who established a firm; pattern III with 2 firms which showed innovativeness as a main factor during their formation as born globals; pattern IV that includes 3 firms for which market and customer orientation had a significant influence to be global from the inception.

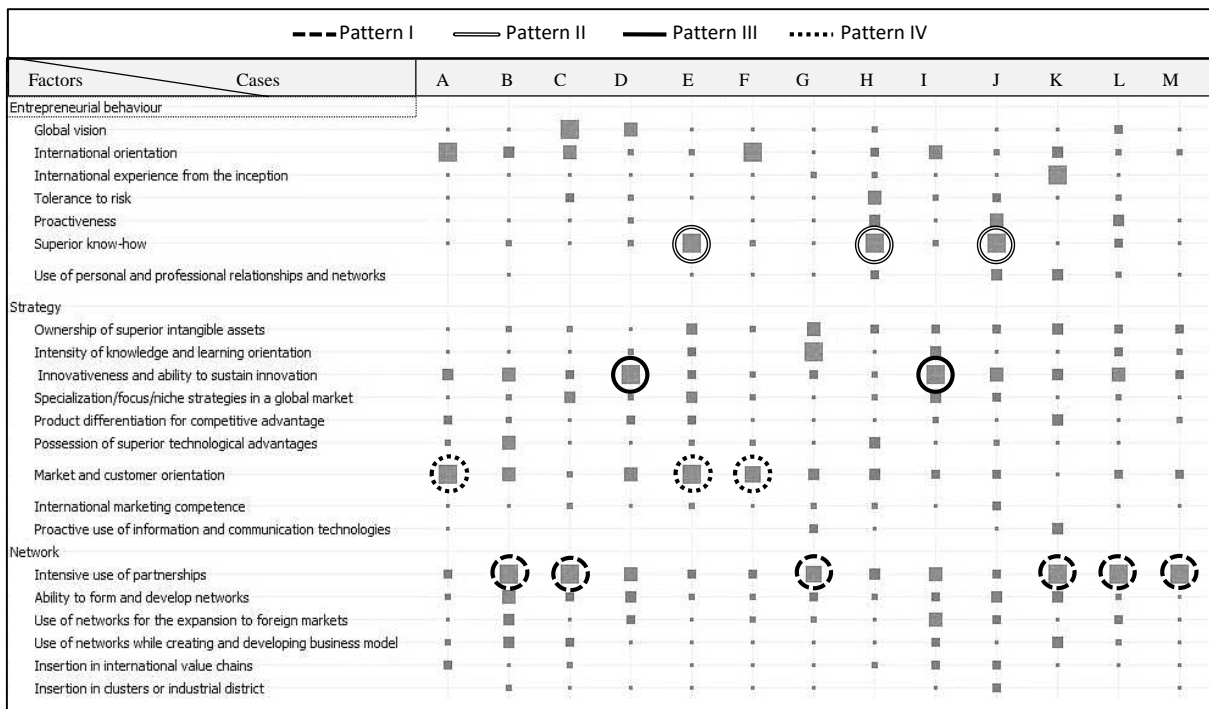


Figure 5. Emerging Behavioural Patterns of R&D Intensive Entrepreneurial Born Global Firms

Pattern I - Global R&D intensive networker: relations of internal factors

Global R&D intensive networker has the most similar relations between internal factors to the findings from the total sample (see Annex 1). In this pattern the relations are stronger inside the factor groups as well. The strongest relations between factors remain the same as in the total sample at

entrepreneurial behaviour and network groups, whereas the list of strategic factors shortens. Despite this, the same relation of entrepreneurial behaviour factors, especially “proactiveness”, with strategic factors can be seen. However, network factors are related only inside the group and, differently from the relations of a total sample, are not linked with strategic or entrepreneurial behaviour factors.

The analysis of internal factor relationships inside strategic factors of Global R&D intensive networker in some way repeats the relations of a total sample: “ownership of superior intangible assets” in a firm is strongly related to “intensity of knowledge and learning orientation”; “innovativeness and ability to sustain innovation”, “specialization/focus/niche strategies in a global market” and “product differentiation for competitive advantage” are interrelated all together. However, relations between “ownership of superior intangible assets” or “market and customer orientation” and other strategic factors that were seen in the total sample disappear.

The analysis of the formation of Global R&D intensive networker discloses that entrepreneurial behaviour, especially proactiveness, defines the global strategy of a firm, which is achieved through the network (Figure 6). In this way the pattern matches the relations of a total sample, even though the distinct links of strategic and network factors were not discovered. As the firms in pattern I were distinguished by their intense use of networks, it can be stated that these firms perceive network as given from the inception and specific strategic choices do not influence the use of possibilities provided by networking – these firms use networks throughout all of their activities.

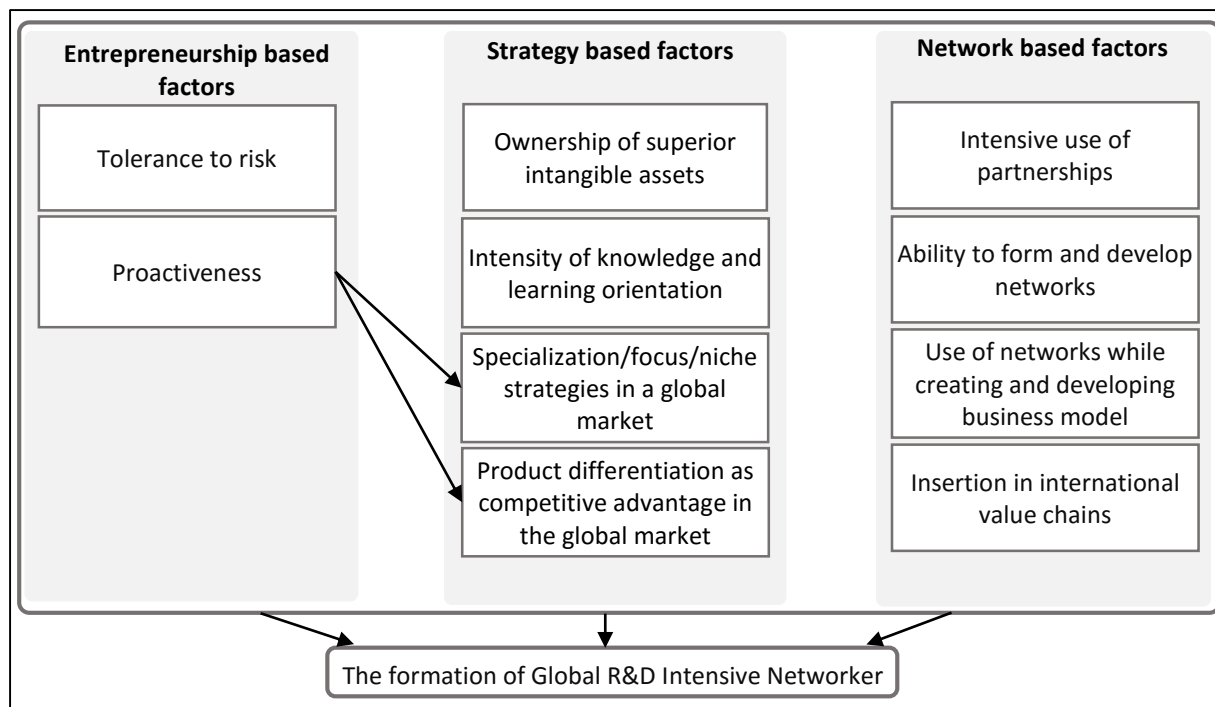


Figure 6. Pattern I - Global R&D Intensive Networker: Internal Factors for Its Formation

Pattern II - Superior know-how based global market explorer: relations of internal factors

The factor analysis of the formation of Superior know-how based global market explorer shows interrelation of strategic factors as in a total sample and pattern I (see Annex 2). Even though the relations of certain factors are weaker than in the other patterns, in pattern II all observed relations are not weaker than moderate. Entrepreneurial behaviour has showed no relations with strategy of a firm - opposite as in a total sample or Global R&D intensive networker formation. However, “intensive use of partnerships” from network factors group is connected with “use of personal and professional relationships and networks” from entrepreneurial behaviour group - the same connections that were seen in a total sample and lost in

Global R&D intensive networker formation.

One of the most interesting findings in this pattern is that particularly “use of personal and professional relationships” as an entrepreneurial behaviour element works as a moderating factor between “superior know-how” of an entrepreneur who established the firm and “intensive use of partnerships” as a networking choice. Furthermore, the pattern II repeats a total sample with all complex relationships of strategic factors inside the group and with network factors, especially “ability to form and develop networks” (which surprisingly do not relate with other network factors), as well as the linkages between adopted “market and customer orientation” and networking behaviour, such as “intensive use of partnerships” and “insertion in international value chains”.

The analysis of the formation of Superior know-how based global market explorer shows that in these firms networks are developed through personal relationships and either depends on firm’s strategy (Figure 7). However, these networks are important not for the expansion to foreign markets, but for the insertion into international value chains. Superior know-how of an entrepreneur is a core factor which pushes the created product of a firm to reach the global market through formed network. If in the pattern I the firm possess a learning orientation or use a network to develop its business model, the pattern II firm is oriented to the market and the network in order to find the right place for its product in a global value chain.

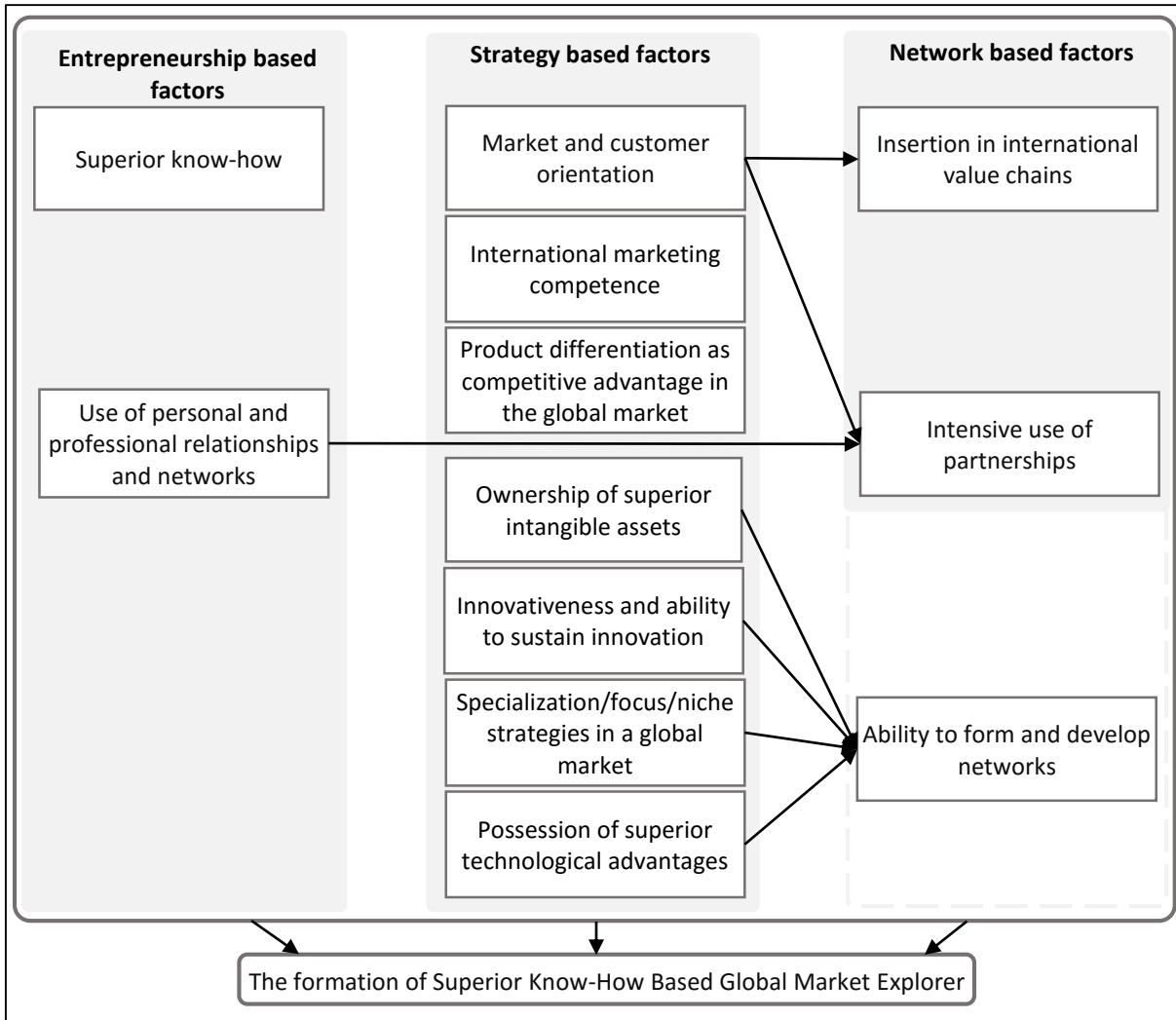


Figure 7. Pattern II - Superior Know-How Based Global Market Explorer: Internal Factors for Its Formation

Pattern III - Global R&D intensive innovator: relations of internal factors

Relations of internal factors of Global R&D intensive innovator have similarities with previously discussed patterns (see Annex 3). However, in this pattern a lower number of relations is observed inside each group of factors and between them. The factor analysis suggests that entrepreneurial behaviour is not essential for the formation of Global R&D intensive innovator. Similarly to Superior know-how based global market explorer, “superior know-how” of an entrepreneur is connected with his intention to “use of personal and professional relationships”, but no relations between entrepreneurial behaviour and network behaviour were disclosed. In this way pattern III is similar to pattern I, Global R&D intensive networker, especially since “intensive use of partnerships” and “ability to form and develop networks” either show the strongest relation in factor analysis. Moreover, as Superior know-how based global market explorer, Global R&D intensive innovator has linkages between strategic and network factors, even if in this pattern totally different factors are related.

“Innovativeness and ability to sustain innovation”, the most frequently coded factor in this pattern, does not possess any relations with other factors. However, the majority of connections inside the strategic factors group derive from “product differentiation for competitive advantage”. In the formation of Global R&D intensive innovator the latter factor either works as a moderator between two related factors, “specialization/focus/niche strategies in a global market” and “market and customer orientation”, and possession of “international marketing competence” (a newly emerging essential factor in the observed patterns). Moreover, in these firms “product differentiation for competitive advantage” and “ownership of superior intangible assets” relates with firms’ network behaviour. Since majority of factors within network group have no relations, it can be stated that Global R&D intensive innovator uses network for acquisition of intangible assets in order to differentiate firm’s product in a global market and get a competitive advantage or to commercialize their innovative product to the global market.

The analysis of the formation of Global R&D intensive innovator shows that the strategy in these firms is based on the differentiation of a product and the networks are used to acquire superior intangible assets in order to be competitive in a global market or to commercialize it through developed partnerships in order to reach their global customer (Figure 8). Even though the role of entrepreneur in the formation process of such type of born global firm is not exposed, innovativeness and intense use of the network in order to sustain innovation or get returns from their innovative product in these firms are set by an entrepreneur who has superior knowledge and is tend to network by himself.

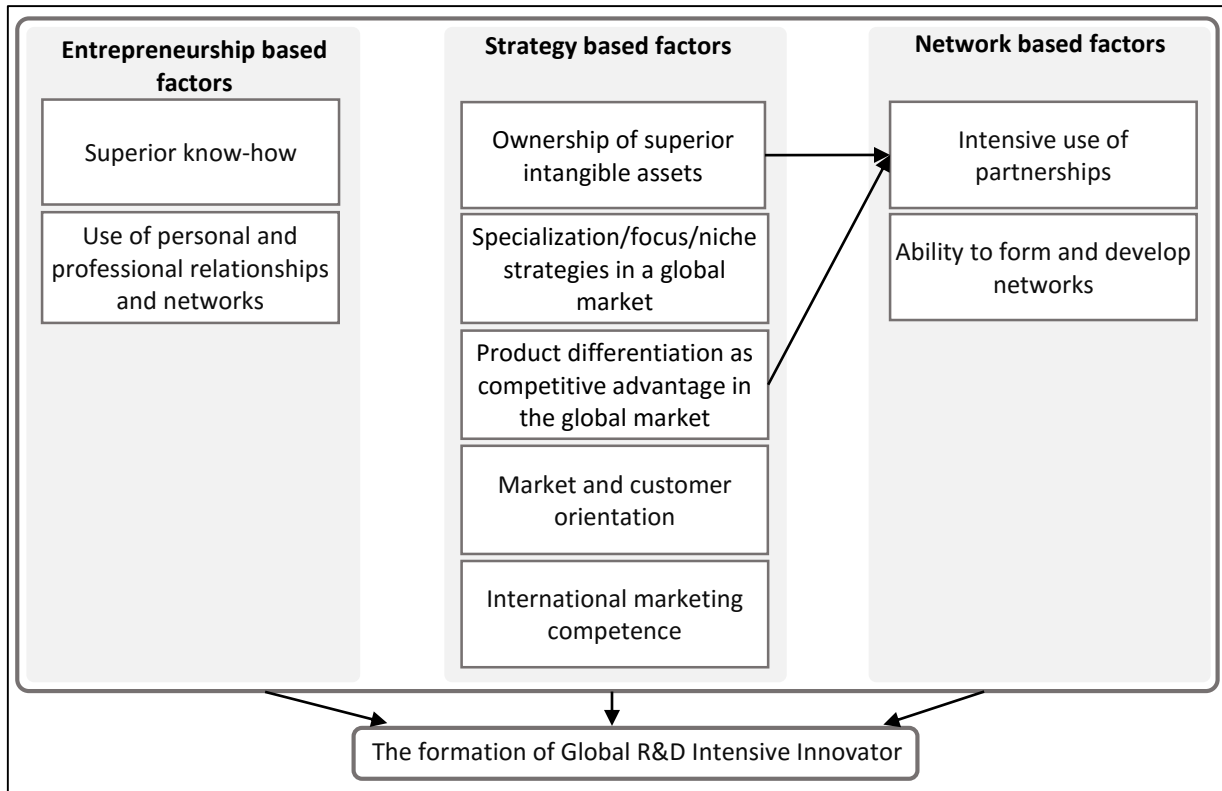


Figure 8. Pattern III - Global R&D Intensive Innovator: Internal Factors for Its Formation

Pattern IV - Global market oriented value creator: relations of internal factors

The factor analysis explaining the formation of Global market oriented value creator is the most exclusive since no relevant relations emerged from network factors and entrepreneurial behaviour factors are not interrelated within a group (see Annex 4). However, the majority of linkages in this pattern derives from “market and customer orientation”. This particular factor either connects entrepreneurial behaviour and strategy. Thus it is dictated by “proactiveness” and “superior know-how” of an entrepreneur. Moreover, analyzing interrelations between strategic group factors, the strongest relationship is found between “market and customer orientation” and “intensity of knowledge and learning orientation”. The linkages of the latter factors and “ownership of superior intangible assets” or “possession of superior technological advantages” were revealed as well.

The analysis of the formation of Global market oriented value creator shows that in this pattern market and customer orientation plays an essential role and has basically come from entrepreneurial behaviour (Figure 9). Combined with intensity of knowledge and continuous learning this firm is able to acquire superior intangible assets and technological advantages, thus high value products are created. Exactly market and customer and learning orientations within a firm weakens the role of network factors in the formation of Global market oriented value creator since for these firms the market and customers are seen as a network itself.

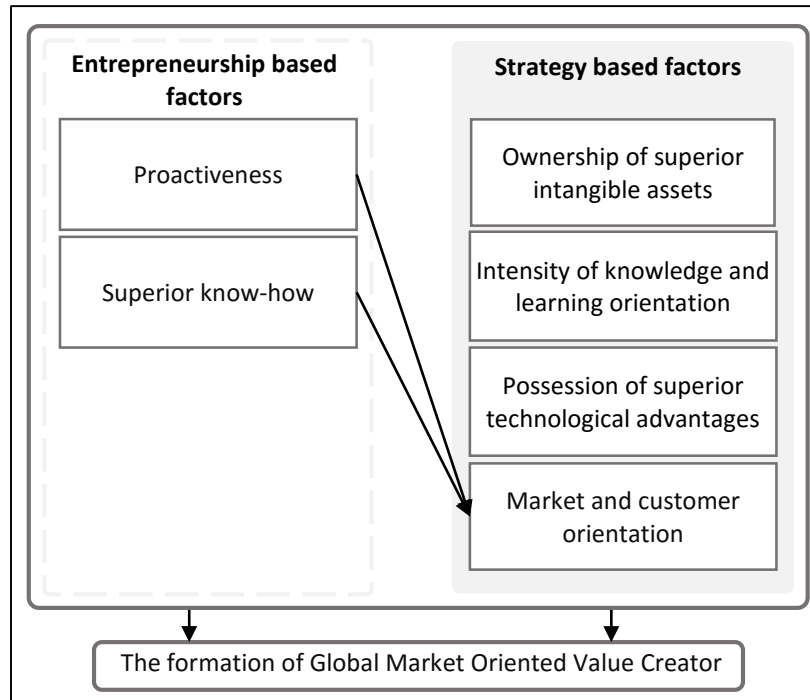


Figure 9. Pattern IV - Global Market Oriented Value Creator: Internal Factors for Its Formation

Discussion and conclusions

It is essential to mention that the study identified strategy as a determining factor for the formation of R&D intensive entrepreneurial born global firm, and leads to the born global firm setting by design.

The critical factors leading to the formation of R&D intensive entrepreneurial born global firm are:

- Entrepreneurial: tolerance to risk, proactiveness;
- Strategy and organization based: 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: Intensive use of partnerships, ability to form and develop networks, use of networks while creating and developing business model, 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 as follows within the following proposition: entrepreneurial behaviour acts as a trigger to develop proactive strategy based and dynamic capabilities that would link the firm with specific network of strategic importance. Moreover, visible differences were observed between strength of the internal factors that demonstrate and opposite relationship between exclusivity of knowledge obtained and the networking intensity: i.e., firms that stress the importance of superior internal know-how use partnerships less intensively than the ones that do not and vice versa.

The typical R&D based firm advantages as a superior internally obtained know-how at the stage of inception is not the critical factor for the born global firm formation, as compared to tolerance to risk and proactiveness, as it also can be obtained as a consequence of strategic learning, i.e.:

- Firms that stress the importance of superior internal know-how use partnerships less intensively than the ones that do not and vice versa;
- Ownership of superior intangible assets is directly related to intensity of knowledge and learning orientation;

- Specialization/focus/niche strategies relate with innovativeness, ability to sustain innovation and possession of superior technological advantages;
- Market and customer orientation relates with intensity of knowledge and learning orientation in a firm.

Further, the typical R&D based firm knowledge exploitation strategies follow the need to sustain core competence and unique profile of the firm, i.e.:

- Specialization/focus/niche strategies leads to product differentiation as competitive advantage in the global market;
- Specialization/focus/niche strategies relate with innovativeness, ability to sustain innovation and possession of superior technological advantages;
- Market and customer orientation relates with specialization/focus/niche strategies and product differentiation as competitive advantage in the global market;
- Partnerships leads to the insertion into international value chains.

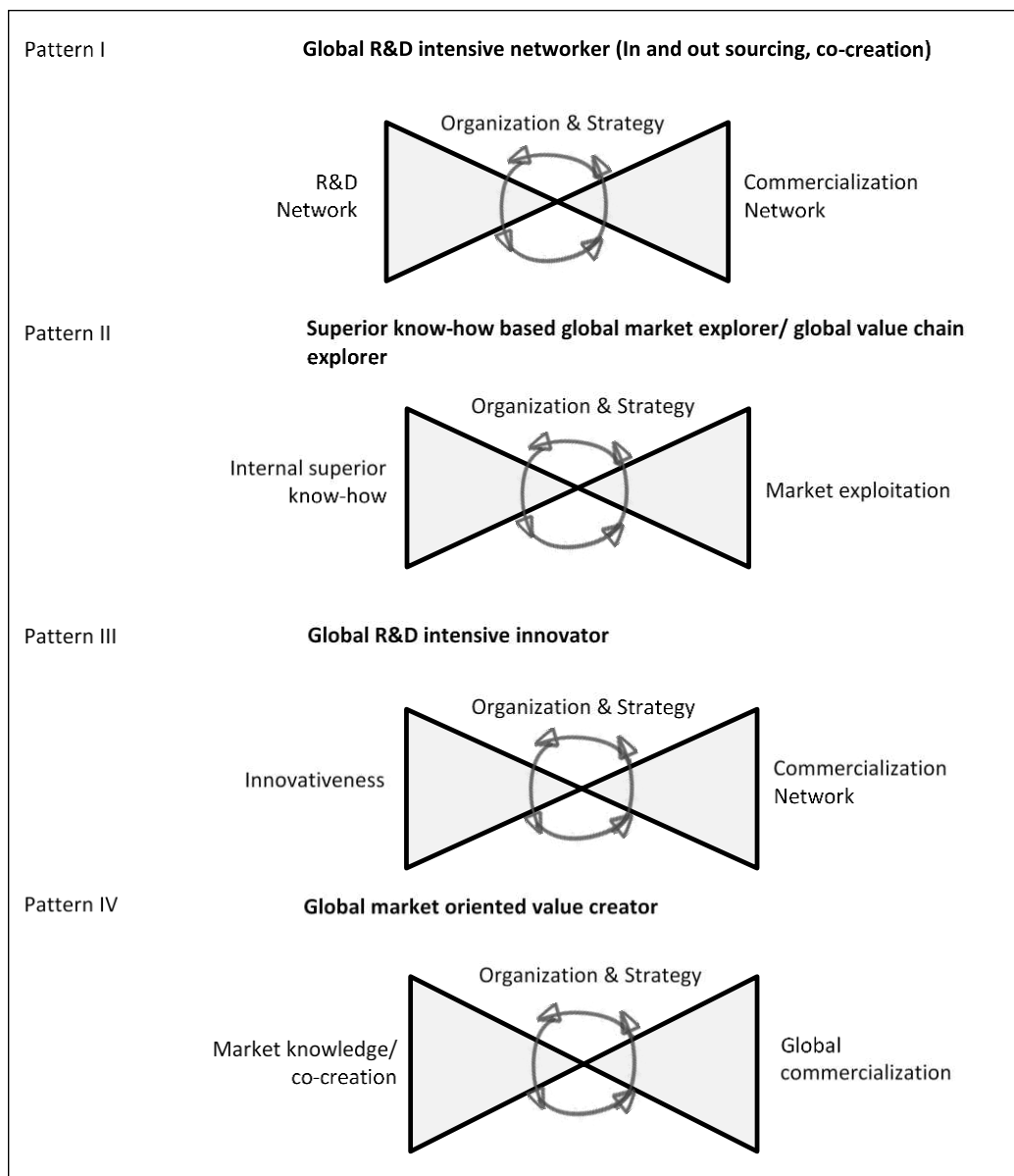


Figure 10. Observed Patterns of R&D Intensive Entrepreneurial Born Global Firms

Therefore, the dynamics between the entrepreneurial, strategy, and network variables is defined via strategy function, in order to design the firm's actions and network behaviour so as to exploit core capabilities via strategic setting. However, in all of the extracted cases network is used as a critical resource for exploitation of knowledge that is either generated within the R&D network and transferred into the commercialization network (pattern I), either internal original knowledge is being exploited in the market via network actions (pattern II), or more traditional tracks, such as R&D driven innovation or market driven innovation commercialisation networks (Pattern III, IV) in the global marketplace (see Figure 10).

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 we were able to extract from the initial sample, and development of the typologies of born global firm. Second important research direction should focus on linking the particular patterns with firm productivity and growth rates on a global scale.

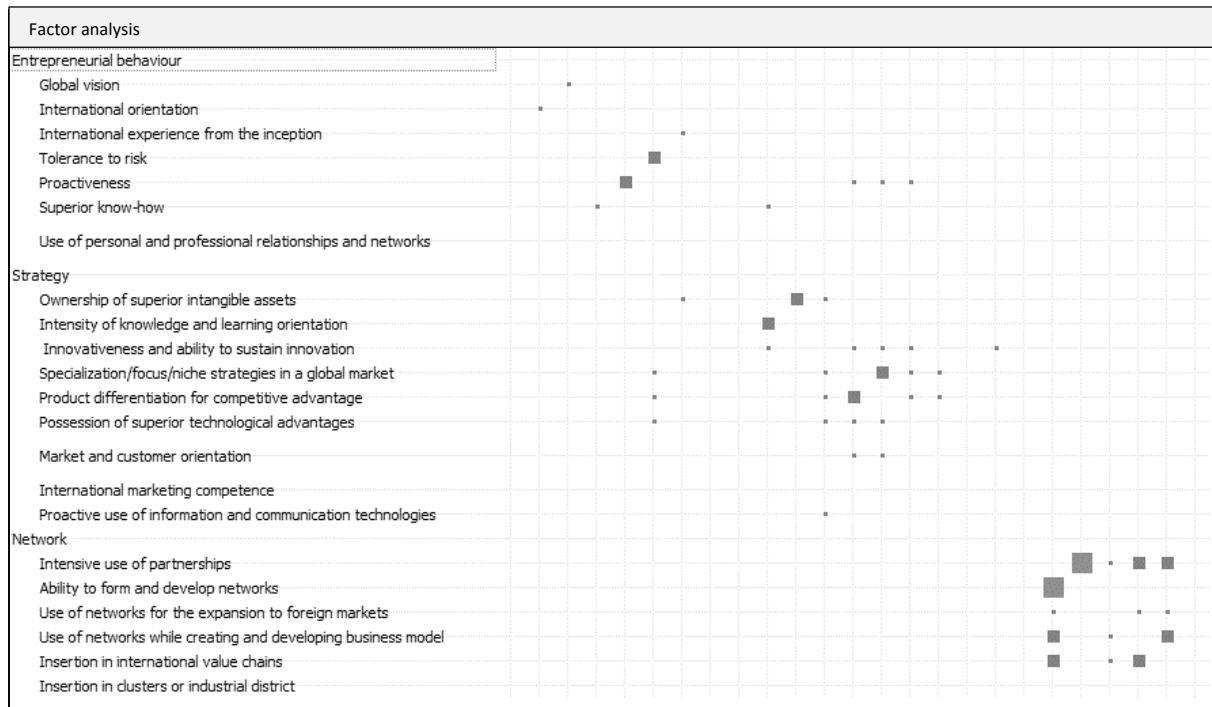
In terms of practical implications, the paper offers an insight into the design and strategies facilitating the formation of born global firms, including the opportunities for policy interventions in shaping the dynamics of global R&D intensive entrepreneurial SMEs.

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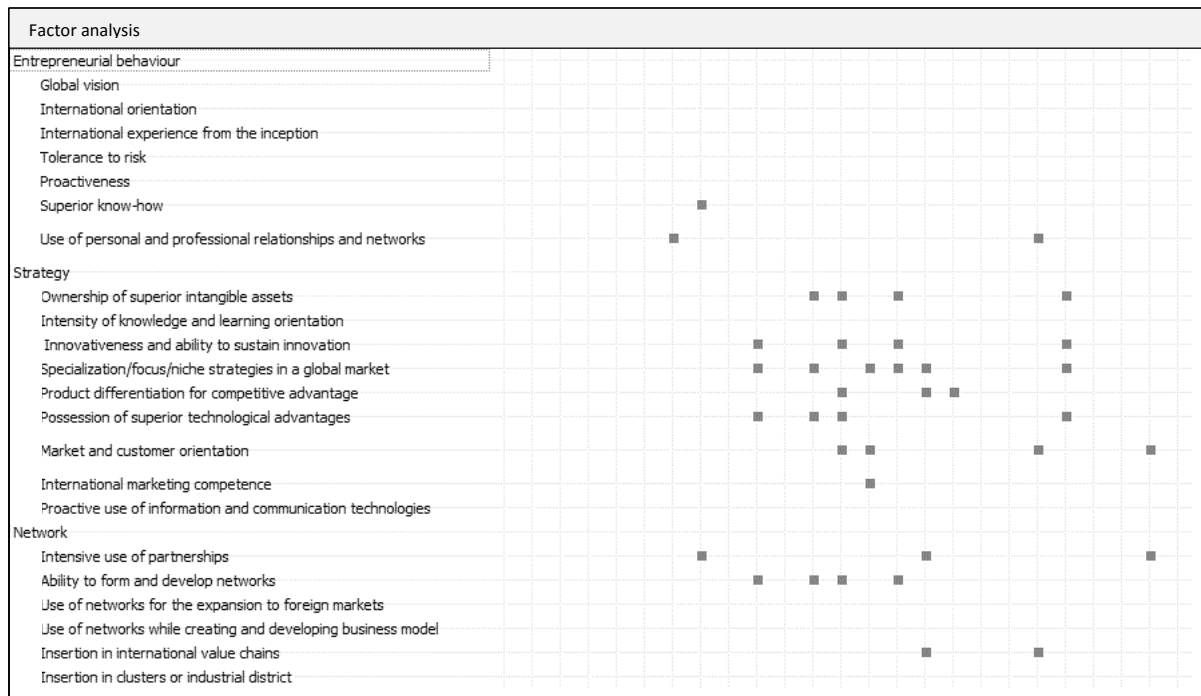
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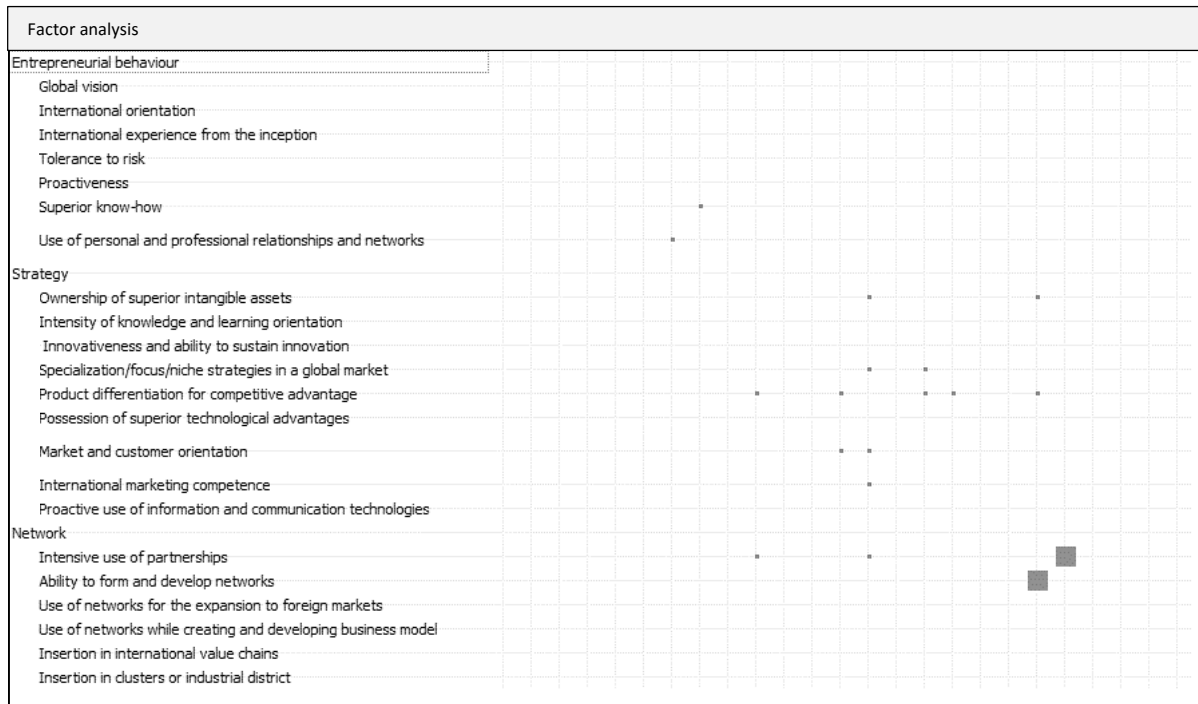


Annex 1. Pattern I - Global R&D Intensive Networker: Relations of Internal Factors

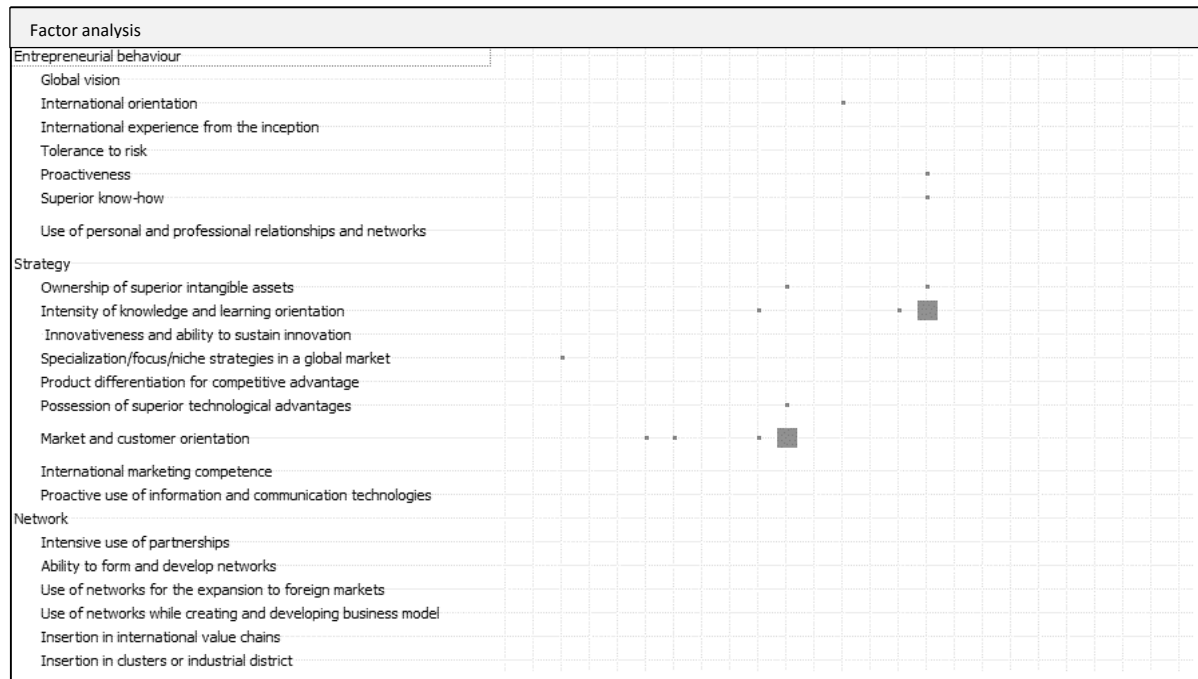


Annex 2. Pattern II - Superior Know-How Based Global Market Explorer: Relations of Internal

Factors



Annex 3. Pattern III - Global R&D Intensive Innovator: Relations of Internal Factors



Annex 4. Pattern IV - Global Market Oriented Value Creator: Relations of Internal Factors