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Exploring the Concept of Born to Be Global in the Context of Technological Entrepreneurship

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Abstract

The early internationalization of businesses has become a significant phenomenon, which emphasizes the importance of the born-global concept and the need for researchers and practitioners to find the factors that influence the success of global technology start-ups. The scientific purpose of the study is to presents a discussion of the theoretical framework concerning the born-global enterprises. The attention was focused on the interpretation of the term and the multidimensionality of this phenomenon. The author suggests that the process of creating global technology-based companies is relevant to the concept of technological entrepreneurship understood as a process involving greater practical usefulness of scientific research findings on modern technologies. The activities of entrepreneurs relate to the identification of potential entrepreneurial opportunities arising from technological development, and the exploitation of these opportunities through the successful commercialization of innovative products in the rapidly changing global business environment. The empirical part of the paper is a qualitative case study analysis of a technology start-up and indicates the key attributes of born-global enterprises. The application of this empirical method has made it possible to characterize the essence of global technology start-ups and illustrate the progress and development of the studied phenomenon in business practice. The cognitive aim of the paper is to present innovative and creative ICT solutions as well as interactive devices designed and commercialized by the analyzed technology start-up on the international market. The paper concludes with practical recommendations and directions for the future development of the company. Considerations of the study may provide a starting point for an in-depth empirical research and contribution to the discussion on the methodological dilemmas associated with conducting research of global technology start-ups.

Keywords: born-global enterprises, early internationalization of businesses, innovative ICT solutions, creativity, fog screens, technological entrepreneurship, technological innovation, technology start-ups, interactive communication.

Introduction

Creative and innovative entrepreneurship involves processes through which organizations generate value from their intellectual capital and knowledge-based assets. An important problem in the process of developing and increasing the competitiveness of companies is the level of technological innovativeness and uniqueness of products and services. Innovative companies recognize the importance of effective knowledge management, which constitutes an essential and dominant element in the entire innovation process. It is also important to enrich internal knowledge resources (which constitute the innovative potential of enterprises) with the external ones. There is a close relationship between an

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innovative potential and activity in this area and the quantity and the quality of knowledge resources accumulated by the company. The creativity, capabilities, dynamism, and innovativeness of the entrepreneurs in a country are important aspects of the absorptive capacity, which is such a distinctive characteristic of successful development experiences (Szirmai, Naudé, & Goedhuys, 2011). The global economy provides the opportunity for internationalization from birth for the new technology-based companies. The global entrepreneurs must take advantage of the Global Intellectual Property as a competitive advantage, and access global markets thorough the ways that another have learned and created (Etzkowitz, Solé, & Piqué, 2007).

Oviatt and McDougall (1994) and McDougall et al. (1994), the authors of the International New Ventures theory, define the new global ventures 'as a business organization that form inception seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries.' Innovative and internationally oriented companies, so-called 'born globals,' face the challenge of developing a global value proposition, and attending global markets. The current empirical literature note several trends that contribute to an increasingly early internationalization of new technology-based companies. The ways to be global can include platforms that another has used or experience of other companies or managers.

The modernity of products and services provided by Polish technology start-ups depends largely on the creating of entrepreneurship culture, which is the basis for the development of innovativeness by people with funds, who are able to take risks. The key competences of technology firms are undoubtedly located in the resources of knowledge and skillful use of these resources to create added value and value for customers. Indeed, creative people are capable to recombine multiple knowledge and domain areas in different and unique ways from one discipline into another (Brazdauskaite & Rasimaviciene, 2015). Moreover, the expert knowledge is a fundamental resource that controls the processes of reconfiguration and multiplication of other resources, constitutes a platform of shared values and is fundamental for building trust in a company.

The scientific purpose of the study is to compile the views of scholars on born-global enterprises. The attention was focused on the interpretation of the term and the multidimensionality of this phenomenon. The author contributes to the discussion and suggests that the process of creating global technology-based companies is relevant to the concept of technological entrepreneurship understood as a process involving greater practical usefulness of scientific research findings on modern technologies. The empirical part of the paper is a qualitative case study analysis of a technology start-up and indicates the key attributes of born-global enterprises. The application of this empirical method has made it possible to characterize the essence of global technology start-ups and illustrate the progress and development of the studied phenomenon in business practice. The cognitive aim of the publication is to present innovative and creative ICT solutions as well as interactive devices designed and

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commercialized by the analyzed technology enterprise. The purposeful selection of the company resulted from the clarity of the explained phenomenon and was aimed at identifying cases relevant to the research objectives. Considerations of the study may provide a starting point for an in-depth empirical research and contribution to the discussion on the methodological dilemmas associated with conducting research in this area. This paper is an extension of work originally presented in the "Proceedings of the International Business Conference 2016: Searching for Innovative and Creative Business Solutions."

This paper is organized into six sections. The first part presents some reflections on new technology-based ventures in the context of technological entrepreneurship. Then follows a discussion of the theoretical framework concerning the born-global enterprises. Attention was paid to a widely accepted conceptual apparatus in foreign literature. The paper then describes the methods used for carrying out the study. The next section exemplifies the theoretical background using a case-study of the technology start-up – Leia Display System. The study provides the examples of how to use the potential of organization to create and implement innovative ICT solutions in the rapidly changing global business environment. Then the unique and modern technology solutions of Leia will be presented. The paper concludes with practical recommendations and directions for the future development of the start-up.

New technology-based ventures in the context of technological entrepreneurship

The activities of entrepreneurs relate to the identification of potential entrepreneurial opportunities arising from technological development, and the exploitation of these opportunities through the successful commercialization of innovative products (Petti, 2012) in the rapidly changing global business environment. The author of this paper suggests that the process of creating new technology-based companies with global reach is relevant to the concept of technological entrepreneurship understood as a process involving greater practical usefulness of scientific research findings on modern technologies. It is based on increasing innovation, new assets and competitiveness through more efficient use of research results leading to development of products and services (Badzińska, 2016). An essential element of this process is effective cooperation between research institutions, research and development centers, capital market institutions, business-related sphere and enterprises in order to diffuse knowledge and scientific potential into commercial solutions regarding technological innovations (Badzińska, 2015). The basis for the development of technological entrepreneurship is formed, therefore, by interactions between science, technology and the commercial world (Poznańska, 2010). This is a creative and innovative ability of knowledge-based companies and an adaptation response to the real business environment (Nacu & Avasilcăi, 2014).

The process of creating innovative business solutions is conditioned largely by endogenous factors of organizations, including primarily the qualifications and

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expertise of employees and their ability to implement new technological solutions into business practice. A significant impact on the development of innovative entrepreneurship is also made by business ecosystem covering a wide spectrum of cooperation with business environment institutions (Badzińska, 2014) and by external factors that influence the formation of technology firms (Bailetti, 2012). It is important to ensure optimal conditions for the commercialization of research results and their usage in enterprises in the form of new products and services through effective collaboration with research centers and the business-related sphere.

Creative entrepreneurship which must be combined with innovativeness is an ability to allocate resources efficiently. It can be argued that competitive advantage of technology firms is derived from their employees' unique knowledge, skills and especially the ability to implement them in practice, as well as specific organizational competencies and research experience. These companies successfully bridge the gap in the creation of innovative business solutions with the support of ICT and, above all, seek to obtain global market acceptance for their offer. The creation of new technology-based companies with global reach becomes a key tool in generating wealth in international business environment. However, the young ventures need the support groups such as chambers of commerce and other institutions that promote the internationalization of entrepreneurship. Therefore, it is necessary to skillfully combine innovative ideas with effective governance and relevant funding sources. It is undeniable that creative global entrepreneurship and the accompanying innovativeness have been and will be the driving forces in the rapidly changing global business environment.

Technological entrepreneurship as a complex phenomenon that encompasses not only multiple disciplines and levels of analysis to be investigated using different perspectives, but also a case-by-case approach for the analysis to be meaningful. According to Petti (2009), the concept of technological entrepreneurship incorporates four main sets of activities relating to (i) creating new technologies or identify existing technologies (but previously undeveloped), (ii) the recognition and matching of opportunities arising from the application of these technologies to emerging market needs, (iii) technology development or application, (iv) business creation.

The dominant theme of world articles on technological entrepreneurship focuses on small technology firms and on external factors that influence the formation of technology firms (Bailetti, 2012). Another theme addresses the consequences of technology based business and engineering entrepreneurship (Nicholas & Armstrong, 2003). Important theme is the interdependence between small-firm initiatives and the external infrastructure that contributes to science and technology advances. This theme describes the systems that support the foundation of new technology firms, establishment of a new technology venture and different types of technical entrepreneurs (Jones-Evans, 1995). Liu et al. (2005) represent ways in which entrepreneurs draw on resources and structures

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to exploit emerging technology opportunities. The other articles cover topics on: university and business incubators, firm spin-off and technology transfer mechanisms, government programs that support technological entrepreneurship and entrepreneurship education. In the literature, the terms: technological entrepreneurship, technology entrepreneurship, technical entrepreneurship and techno-entrepreneurship are used synonymously (Petti, 2012).

Bailetti (2012) argues that technology entrepreneurship is an investment in a project that assembles and deploys specialized individuals and heterogeneous assets that are intricately related to advances in scientific and technological knowledge for the purpose of creating and capturing value for a firm. The project exploits or explores scientific and technology knowledge. External and internal individuals and organizations co-produce the project's outputs. According to Lindenberg and Foss (2011), technological entrepreneurship is about managing joint exploration and exploitation, where each individual has roles and responsibilities in cooperatively moving forward toward accomplishing shared goals. It focuses on investing in and executing the firms' projects, not just recognizing technology or market opportunities.

Technological entrepreneurship is understood therefore, as a joint-production phenomenon that draws from a team of specialized individuals from multiple domains, some or all of whom become embedded in the technology path they try to shape in real time (Garud & Karnøe, 2003). The firm's owners and employees have no way of knowing or predicting the relevant attributes of all the assets. Asset attributes need to be created by the whole team. Technological entrepreneurship identifies, selects, and develops new attributes for the purpose of creating value for the firm and for customers. What distinguishes technology entrepreneurship from other entrepreneurship types is the collaborative experimentation and production of new products, assets, and their attributes, which are related to advances in scientific and technological knowledge and the firm's asset ownership rights (Bailetti, 2012).

The born-global perspective – theoretical background

The early internationalization of businesses has become a significant phenomenon, which underscores the importance of the born-global concept and the need for researchers and practitioners to understand the factors that influence the success of global technology start-ups. It is a complex phenomenon that encompasses not only multiple disciplines and levels of analysis to be investigated using different perspectives, but also a case-by-case approach for the analysis to be meaningful.

The discussion of the theoretical framework is based on international literature review concerning the born-global enterprises and related concepts, to compare different definitions and the views of scholars on this research object. A new method of the process of internationalization and a type of company were identified by a study (Rennie, 1993), which proved that many firms began to export within a couple of years of their establishment due to globalization and

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technological advances (Cavusgil & Knight, 2009). Such findings contradicted the traditional internationalization theory categorized as gradual and evolutionary – the 'stages theory' (Johanson & Vahlne, 1990). They contributed to further research on this topic.

Being a relatively new concept, there is no single, generally accepted definition of born-global enterprises in the subject literature. They are referred to as 'born globals,' international new ventures (Oviatt & McDougall, 1994), global start-ups (McDougall et al, 1994), infant multinationals (Madsen & Servais, 1997) or innate exporters (Mettler & Williams, 2011). The vast majority of the reviewed literature sources assume that such entities are micro, small or medium-sized firms. For this reason they are also referred to as 'micro multinationals' in some publications (Varian, 2011; Mettler & Williams, 2011). There is also some literature classifying born-global firms into those set up by 'born industrialists' (industrial practitioners starting their business with an innovative product) and those set up by 'born academicians' (researchers developing the product) whose common denominator is the fact that they are located close to academic centers or in IT regions, accentuating their technology orientation (Nordman & Melén, 2008). However, this is a rather controversial issue in the literature (Zucchella et al, 2007). For simplification and readability reasons, the term 'born-global enterprises' will be used in this study.

The available research suggests that a born-global enterprise is a venture launched to exploit a global niche soon after inception. It is established with the capability to compete internationally and coordinate resources across countries (Coviello, McDougall, & Oviatt, 2011). Furthermore, it is a growth-oriented business with a strong innovative capacity that achieves high export shares in several foreign countries. The born-global enterprises are likely to be considered global innovators or companies following an innovative way of doing business at a global level from the very early stages of their business activity (Oviatt & McDougall, 2005; McDougall et al, 1994; Cavusgil & Knight, 2009). They fill important gaps in global value chains, are strongly driven by the global mindset of their managers and the need to attract more business than they can achieve in their domestic markets. As a consequence, they could be considered as helping to stabilize economic development and recovery (Mettler & Williams, 2011). The intensity of the way in which these firms undertake international business can differ. Varying definitions of born-global enterprises applied in selected research differ in their maximum time spent before starting international activity (e.g. between two and three years (Rennie, 1993; Knight & Cavusgil, 1996; Madsen et al, 2000), in minimum share of foreign sales as a percent of total sales (Luostarinen & Gabrielsson, 2006; Loane et al, 2007), and in the number and location of the markets served (Pla-Barber & Escriba-Esteve, 2006; Gabrielsson and Kirpalani, 2012).

The research mainly investigates the specific features of this type of enterprises, the reasons for their emergence and the main challenges they face. Attention is given to their survival and growth potential, knowledge intensive

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business services, global vision of management from the outset, and global growth path. One of the most commonly accepted features of born global firms is that they are founded and managed by highly proactive, risk-taking entrepreneurs who are eager to discover and exploit opportunities abroad in order to pursue competitive advantage (Pock & Hinterhuber, 2011; Harveston et al, 2000). Some reports focus on the efficiency of their internationalization model (Lejko & Bojnec, 2011), and some have compared them with other enterprises' internationalization pathways (Harris & Li, 2007; Mettler & Williams, 2011; Cavusgil & Knight, 2009). Most of the studies follow a qualitative approach (interviews, case studies) or include small sample sizes for standardized questionnaires. Due to the lack of a uniform definition of 'born-global' and standardized data dealing with this enterprise form, it is possible to provide only an approximation of their extent and their contribution to the economy.

Because of their young age, born-global enterprises tend to be mainly micro or small in size. They can be found in all sectors of the economy, but their product or service portfolio is characterized by a high level of innovation, modern technology and exclusive design. Irrespective of their type of activity, such companies are found to possess high innovation capacity and the ability to serve customers in an innovative way (Leonidou & Samiee, 2012). Furthermore, they are observed to possess high job creation potential. It is widely acknowledged that it is mainly small and young innovative companies that create most jobs. Born-global enterprises are heavy users of internet-based services like Google Apps, Skype and Amazon delivery (Mettler & Williams, 2011; Schneor, 2012) in their communication, distribution, marketing and knowledge management. A social capital build up through networks is essential for such companies, as well as networking and online collaboration tools that provide new opportunities for multinational cooperation (Renda, 2011). Consequently, born-global enterprises are embedded in international networks, and such well-functioning cross-border relations are an important factor for their success. Moreover, such companies are customer-oriented enterprises that determine the breadth of their product offering and the standardization of their marketing strategy across several foreign markets by taking into account the dynamics of their target market (Gabrielsson et al, 2012).

The author emphasizes the important role of technological entrepreneurship for the development of the complex phenomenon of born-global enterprises. Technology start-ups with academic origin represent the mainstream of innovative entrepreneurship and one of the active mechanisms of the commercialization of research results. The owners and employees of these enterprises are able to turn interdisciplinary knowledge into practical use, to perceive gaps and market opportunities, achieve forward-looking, search for change and respond to it and use it to implement innovative solutions in various areas of global environment (Badzińska, 2014, 2016). Current expertise and interdisciplinary knowledge in conjunction with the skill necessary for their development constitute a basis for shaping competitive advantage on the

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international market.

Research design and methods

The first part of the study is both theoretical and analytical. A review of scientific literature has been conducted along with the analysis of secondary research results on the nature of born-global enterprises. Attention has been drawn to the concept and the characteristics of this phenomenon. The following methods were used: defining, comparing, attribute analysis, inference. A further part of the study is empirical in its nature as it is based on a qualitative case study analysis of a technology start-up that indicates the key attributes of born-global enterprises. The cognitive aim of this research is to identify and analyze the qualitative functionality of the innovative devices and ICT solutions, designed and commercialized by Leia Display System.

In order to ensure the reliability of data, the triangulation principle was adopted. The confrontation of multiple data sources justifies the cyclical nature of data collection procedures in the case under examination. Qualitative data was obtained from in-depth interview conducted with the owner of the analyzed enterprise, who is responsible for interaction development. An interview questionnaire was prepared. Semi-structured interview guide contained the following (i) general questions about the company and its organizational structure, (ii) questions about all innovation products and projects, (iii) questions about idea generation, idea selection and project development, (iv) questions about the sources of financing innovative projects and the cooperation with business environment institutions and different enterprises. To expand the database on the company an analysis of materials from the available secondary sources was also conducted. They included websites, publications and opinions of Internet users.

The wide problem area of creative and innovative entrepreneurship requires the acceptance of the limitations of the study area. The empirical method makes use of a case study involving the analysis of processes implemented in the selected enterprise (Dyer & Nobeoka, 2000). The rationale for the use of a case study is its usefulness related to the timeliness of the analyzed phenomenon and the dynamism of its effects. There is a need to conduct a practice-oriented empirical research for better understanding of reality and to help managers choose their own path (Czakon, 2011). The analyzed technology start-up and its innovative ICT solutions ware selected with a purposeful sampling technique (Merriam, 1998; Maxwell, 2005). The purposeful selection of Leia Display System resulted from the following (i) the pragmatic criterion of availability of data, (ii) clarity of the explained phenomenon of born-global enterprises, (iii) the diagnosed innovative and creative ICT solutions. The above criteria lead to the conclusion that a single case study would help to attain the objectives of the research. The applied case study has helped to recognize the analyzed phenomenon under real conditions (Yin, 1984), and its purpose has been practical orientation (executive research) of the concept of born-global

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enterprises. Both descriptive and explanatory techniques were used in the presented case study.

To exemplify the innovative entrepreneurship in the born-global perspective, the following research question was erected: how is the required potential of the technology start-up to create and implement innovative ICT solutions in the rapidly changing global business environment. The obtained quantitative and qualitative data were the basis for creating the characteristics of innovative devices and ICT solutions of Leia Display System. The diagnosed functionality and uniqueness of Leia Display S-95 and X-300 were presented in a synthetic way in the following part of the paper.

Research results and discussion

The subject of the study is the technology Start-ups Leia Display System. It is a young Polish company manufacturing innovative multimedia devices and interactive applications. Leia Display System is a technology patented by the company that enables a display of an image in the air on a thin layer of water vapor, which acts as a carrier (Leiadisplay.com). The founders (two men) of the technology start-up, who, on the basis of interdisciplinary knowledge and experience related to the IT industry, have created a modern business model. The technology Start-up has been on the market since 2013. In its solutions the company uses modern tools of interactive communication and focuses on the customization of services dedicated to individual business customer needs. The solutions offered by Leia are distinguished in the global market by their ingenuity and the quality of applied technology. Entrepreneurs from Leia are characterized by an innovative approach and the use of latest technology. The involvement of the team, a shared vision of the present and the future of the company, the focus on technological innovations and paying attention to customer satisfaction constitute the basis for the development of the organization and directly translate into global market success.

The key attributes of born-global enterprises in the studied company

In order to obtain an answer to the research question on the kind of potential necessary for a company to create and implement innovative ICT solutions in the rapidly changing global business environment, an attempt has been made to diagnose such a potential and the born to be global attributes in the analyzed company. The competence of the company to compete internationally depends on a set of endogenous as well as exogenous factors. The obtained results are presented synthetically in Table 1.

Table 1: Own study based on the qualitative research.

The born-global potential	**Technology Start-up Leia Display System**
Endogenous factors	
Professional	- interdisciplinary and professional knowledge

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knowledge and unique skills of staff members	- qualifications and expertise of employees - experience related to the IT and entertainment industry
Creation and development of innovative business solutions with the support of ICT	- innovative multimedia devices (Fog screens) - the unique method of producing a laminar stream of steam in Fog screens - interactive ICT solutions freely customized and designed in accordance with customer needs - comprehensive assistance by IT projects
Ability to implement new technological solutions into business practice	- creativity and openness to the implementation of the latest technology - the ingenuity and the quality of applied technology - differentiation strategies by developing specialized and customized devices and applications - offering of high-quality services to satisfy the specific needs of global customers
Organizational culture	- building a global oriented organizational culture - partnership relations between staff members - the awareness of the importance of knowledge and commitment to shared values - the great determination of managers and staff to reach their objectives
Entrepreneurship culture	- strategic thinking and willingness to take risks - an innovative approach to seeking better ICT solutions - the pro-innovation attitude of managers and staff - a culture of creative thinking to support the development of innovative global business solutions
Exogenous factors	
Cooperation with business partners	- relationships between the local operation of the enterprise and its foreign sales representatives - external, independent intermediaries for distribution in foreign markets - the search for new solutions and external sources of information - good relationships (mutual trust) with clients, suppliers, facilitators and partners
Cooperation with business environment institutions	- building a network with scientific institutions for the exchange of information - cooperation with the business ecosystem to support the transfer of technology and the commercialization of innovative solutions - consultations in the field of financing innovative devices with venture capital - the ability to cope with changing environment and financing innovative multimedia devices - exploring new opportunities in the global business environment

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Award in prestigious competitions	- Internet Beta 2013, LBA Start-up Meeting Point 2014 - Investor Presentation Contest – Lewiatan Business Angels 2014 - Think Big UPC Business contest 2015

The very important role is played by the human factor and, more precisely, by the potential of staff members based on professional knowledge and international experience. The creativity of the team facilitates the generation of new ideas and solutions and improves adaptation to the changing business environment. The young entrepreneurs from Leia Display System (LDS) attach great importance to building their own developmental base (both physical and intellectual one) and to the commercialization of solutions and applications designed by employees. An innovative approach to seeking better solutions along with the implementation of the latest technology and great determination of managers to reach their objectives, constitute the challenges for Leia.

The concept of early internationalization is permanently inscribed in the strategy of the company. They generally had, from the outset, a plan for engaging in intensive international activities, which implies a good level of strategic thinking and willingness to take risks. The main purpose of the team of young entrepreneurs is to create and promote innovative projects that will explore new opportunities and offer unique solutions with the support of ICT in the global business environment. The mission of the team is to break standards, avoid boilerplate solutions and undertake interesting challenges. The basis for the creation of new ICT solutions is to build a climate of dialogue, partnership relations and free flow of information and technological knowledge. A significant role is played by relationships between the local operation of the enterprise and its foreign sales representatives. Ultimately, it is not about the number of networks or contacts, but about their quality in terms of good relationships (mutual trust) with clients, suppliers, facilitators or partners (Gruber-Mücke, 2011). The company uses external, independent intermediaries for distribution in foreign markets. Such networks are important sources of knowledge from professionals that are spread out internationally. Since the launch of the devices in 2014 the company has managed to acquire distributors on foreign markets in such countries as: Benelux, France, India, Saudi Arabia, United Arab Emirates, South Korea.

The offering of high-quality services to satisfy the specific needs of global customers is one of the attributes of born-global enterprises. An important aspect here is also the consistency of operations and customer-oriented employees, who pay high attention to the quality of services. A common vision of development strategy shared by the managers in Leia concerns the creation of new ICT solutions per requests of different groups of consumers, freely customized and designed in accordance with customer needs. The devices are manufactured to order and the company uses differentiation strategies by developing specialized and customized applications. By building a global oriented

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organizational culture the analyzed enterprise creates its own patterns of behavior and patterns of action, thus gaining unique expertise and the ability to cope with changing environment. The basis of organizational culture is the awareness of the importance of knowledge, commitment to shared values and the creation of an attitude of cooperation with external partners. These are the necessary conditions to create a culture of creative thinking to support the development of innovative business solutions on the international market.

An important aspect in the rapidly changing global market is to study the environment in terms of demand for new ICT solutions and look for external sources of information to fill gaps in intellectual resources. In this context, the significant role is played by cooperation with selected research institutions and organizations supporting technology transfer. The external environment potential determines the development of technological innovations in the analyzed company. Company managers attach great importance to building a network for the exchange of information, to creating an attitude of openness to new solutions and to the dissemination of information and communication technologies. The pro-innovation attitude is something more than just a search for new solutions in a changing environment. Among the activities undertaken by the company in the field of cooperation with the business ecosystem to support the transfer of technology and the commercialization of innovative solutions, it is necessary to mention the participation in prestigious competitions e.g. Internet Beta 2013, LBA Start-up Meeting Point 2014 or Investor Presentation Contest – Lewiatan Business Angels. In February 2015 Leia reached the final of the II edition of Think Big UPC Business contest, where it scored 2nd. This is a special award for entrepreneurs who, through their creativity and openness to new technological thought, bring innovative solutions to the market. The cooperation with the institutions of business environment in consulting, organizing and financing innovative ICT solutions constitute for the company the condition for global development. These examples confirm that endogenous factors and external environment undoubtedly play the important role in building of entrepreneurial orientation and in the process of early internationalization.

Innovative and creative business solutions of Leia Display System

Leia Display System is a unique technology solution on a global scale. The very idea of fog screens is not new, but the method of producing a laminar stream of steam is quite innovative and has been patented by its inventor. This innovative technology – based on solutions in the field of aerodynamics and computer science – allows the projection of any media content on a thin layer of water vapor. Very thin projection surface (about 6mm) makes possible to project hi definition pictures. The use of unique applications to enable screen interactivity is also innovative. The official premiere of Leia Display System took place in October 2014. Approximately six months later the company was able to acquire distributors in eight countries.

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Existing solutions display a picture on steam using a curtain of dense smoke. The projected image is displayed, but remains fuzzy and unreadable. Leia is the first system with a truly transparent and stable image carrier (Leiadisplay.com). The chief designer and Co-owner of Leia developed and patented a unique solution for producing a laminar stream of water vapor. Leia technology makes the emitted mist beam laminar even at a distance. The row of neighboring jets of water vapor produces a very thin, large screen, which remains almost invisible and it perfectly captures even the smallest details of the image. In turn, the Co-founder and Lead Developer at Leia created interactive applications. The image displayed on a thin layer of steam is interactive due to the use of motion sensors that observe the object within the plane of the screen, or in front of it. This allows the interaction with the image suspended in space by means of movements and gestures (see Figure 1).

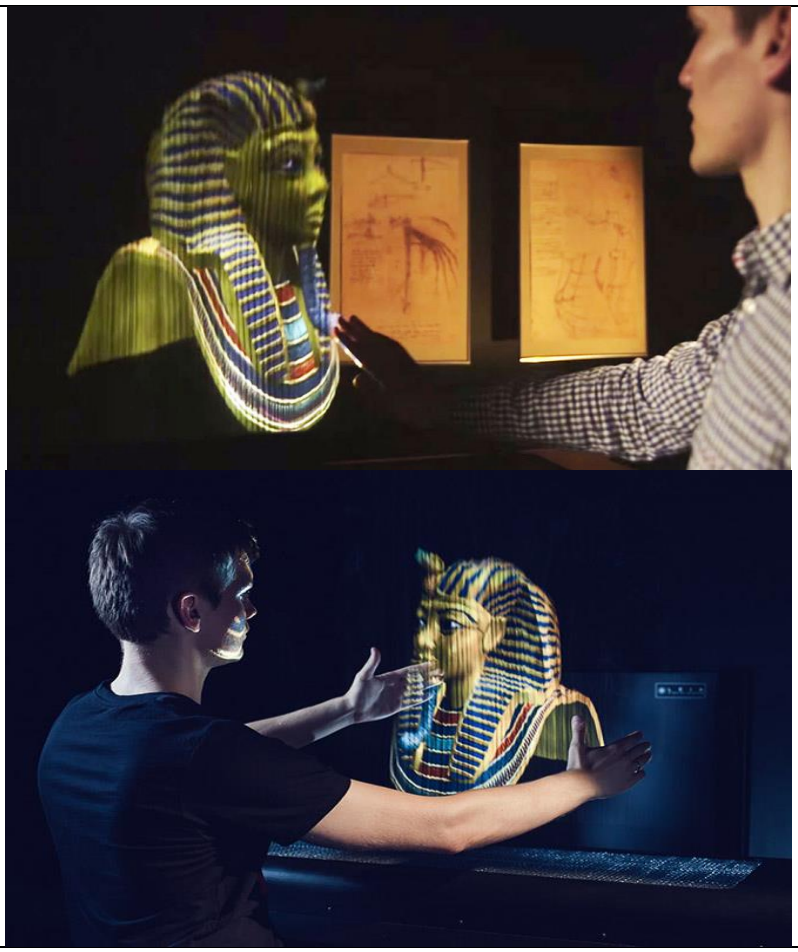

Figure 1. The Leia screen – hologram effect

This technique is the most similar to film holograms. But it is not a classic three-dimensional hologram as the technology used is based on a flat surface where an image from a projector is displayed. However, it is displayed in the air and forms an illusion of three dimensions (hologram effect). The company makes

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use of the following solutions: Microsoft Kinect, Leap Motion, and Intel + Creative. The function of tracking user profiles makes it possible to 'draw' wings or a 'fiery' circle while passing through the screen or to 'release' a bird from hand. It is also possible to interact with the objects shown on the screen, for example by opening closed doors with a touch, or call an animal's response by command. Depending on the sensitivity of sensors, a signature can be made in the air or something can be drawn on the screen (see Figure 2). Better and more accurate sensors of these types appear around the world, thus opening up new possibilities for Leia technology.

Figure 2. Interaction with the Leia screen.

Available versions of Leia Display screens are S-95 and X-300. LDS S-95 is a screen with dimensions of 95cm x 65cm mounted on a mobile base, so the picture remains at viewer's eye level. The screen blows vapor from the bottom and it is possible to display i.e. a virtual assistant, a 3D model or an interactive game. S-95 is primarily addressed to the advertising market, where innovative formulas of communication are particularly appreciated. This innovative solution perfectly complements the offer of interactive devices used at trade fairs, promotion of products or cultural events at museums. In turn, Leia X-300 generates a screen size of 3 x 2.5 m, which is suspended from the top and blows vapor downwards. This is a screen through which one can literally walk and drive out of it with a car by smashing a virtual glass pane (see Figure 3). But this is not a three-dimensional projection. LDS X-300 screens can be combined with each other using their shorter side and in practice form infinite surfaces. This allows an extensive use on event, entertainer, and theater markets and other events related to new technologies.

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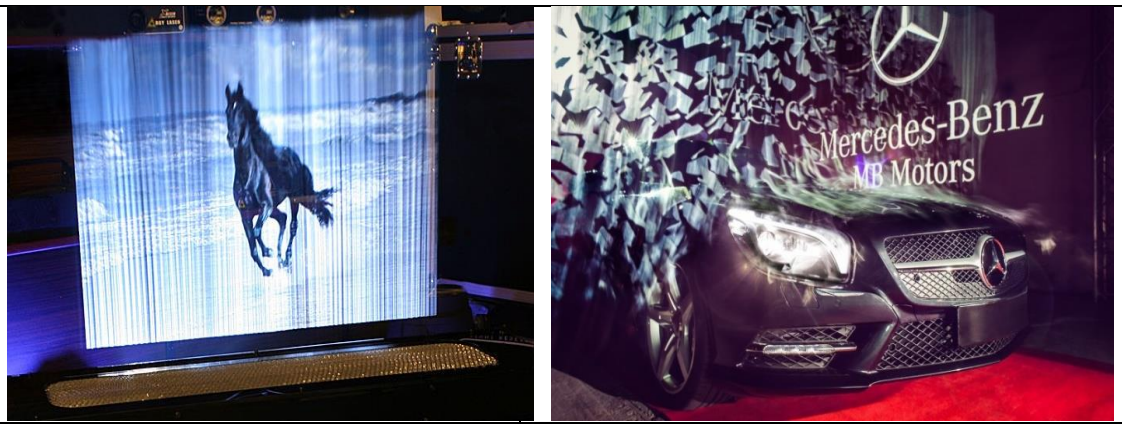

Figure 3. Leia Display S-93 and X-300.

As mentioned above, the projection surface is composed of water vapor, and demineralized water is used for its production. Leia S-95 consumes approximately 400ml of water per hour, and in the case Leia X-300, it is 4l per hour. Projection surface is protected by special curtain airbags, but it is not recommended to use the device in drafts or directly under air blowers. The image becomes visible using rear projection. There is no single recommended type of projector. Its type and capacity depends on the brightness of the place where it is to be used. The projector should be turned in the direction of the viewer. The image can be seen from both sides, but for this purpose two projectors must be used. There are some limitations resulting from the technology. The main barrier for using Leia technology is light that must be muted. Moreover, wind can interfere with the picture. The optimum operating temperature for Leia is room temperature (18-30 degrees), but the system also works at lower and higher temperature ranges.

Leia Display screens are the ideal solution wherever viewing experience counts and where businesses want to be distinguished by the originality of their media and engage their customers – at fairs, premieres, fashion shows, shopping centers and cultural and sporting events. Due to their originality and uniqueness, Leia screens allow brands to differentiate themselves in a competitive environment and among the audience build a sense of communing with the technology of the future. This technological solution can find numerous applications in the promotional activities of companies.

Conclusions and recommendations

Inventions, discoveries and new technologies – as a result of the implementation and development of the commercial market – form technological innovations that determine further development of products and processes. The application of the empirical method of a case study has made it possible to characterize the essence of born-global enterprises and illustrate the progress and development of the global technology Start-up – Leia Display System. The study has confirmed that innovation and adaptive creativity are essential to stay ahead of the competition and gain a competitive advantage in the rapidly changing global

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business environment. Entrepreneurship of young global start-ups is seen as a process of searching for global market opportunities and knowledge-based resources necessary to exploit these opportunities in order to gain results on a long term. It can be distinguished as independent risk taking ability to achieve the gains on the international market. Aiming to develop their own technological and innovative facilities, they seek access to valuable resources of knowledge. Equipment and authorial applications created by Leia support interactive and engaging business communication, creating new customer needs and setting trends in the global business environment. With their specialized products and unique technological solutions the company can fill important gaps in the value chain of other firms and exploit economies of scope. Effective teamwork implies synergism between all team members that are willing to combine and recombine their expertise, sharing knowledge, ideas and skills in order to generate creative solutions for emerging problems and new global opportunities.

Despite the fact that the research is based on a single case study, there are some interesting implications for business practice. A team of young entrepreneurs working for Leia is currently planning more innovative business solutions and applications for their devices. However, external funding is necessary for further development of the innovative technology. The company is seeking investors who are interested in the establishment of a company and in the development and the acceleration of the project. Entrepreneurs are willing to set up an R & D department in order to improve their solutions. Entrepreneurs from Leia are working to achieve the better stability of the screen, which aims to further increase the quality and detail of the image. The image has to be much more pronounced, and the screen even more unified than ever before. The development of technology for obtaining a homogeneous screen will contribute to this along with the development of small and high-performance projectors. Interaction with humans shall also be sophisticated by building advanced touch interfaces. The applications will interpret movements, voice, intentions, and not only touch.

Leia believes in the technology it has commercialized, but continues to search for new solutions by experimenting with different kinds of liquids, gases and methods of display. At the moment, however, steam works best. The second major challenge is the development of the system in the direction of three dimensions that would enable new areas of application. Engineers are working on '3D cinema without glasses' technology. This solution has numerous disadvantages, but it will display images in a way more interesting than before. Displaying in 3D requires many years of further study.

There is a need for framework conditions fostering the reasons for the emergence of Polish born-global enterprises. However, their pioneering character in terms of young age, newness of ideas and lack of established presence on the market also presents significant challenges for their capacity to survive. International entrepreneurship demands local and global externalities. The development and implementation of innovations require cooperation with

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the institutions of business environment, including those that provide funding for such projects. In this respect, technological entrepreneurship is related to the basic pillars of knowledge-based economy. A special role should be played here by business ecosystem, namely a wide range of cooperation ranging from consortia or research centers, through consultancy, organizational, funding and infrastructure services, up to relations with business environment institutions in the field of incubation. Science and technology parks, public administration and financial systems should contribute to the maturing of entrepreneurial initiatives. Furthermore, competitions and prizes for new companies that recognize the entrepreneurial spirit could be an additional source of motivation for the creation of new global initiatives. A comparatively high level of capital is needed for global start-ups to unlock and use their full potential – difficult for a company which has limited resources and which faces the reluctance of external investors to finance its untested business idea. This requires high levels of technical and managerial expertise, familiarity with procedures and markets and a high level of commitment and engagement. Consequently, innovative financing instruments acknowledging the specific characteristics of born-global enterprises, by providing them with sufficient funds without limiting their future growth, seem to be needed. Case studies in the field of global technology start-ups should develop the existing theory and provide explanations of the hitherto unrecognized phenomena. This paper may provide a starting point for an in-depth empirical research and contribution to the discussion on the methodological dilemmas associated with conducting research in this area.

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