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Lean and Global

Welcome to the May issue of the *Technology Innovation Management Review*. We welcome your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

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Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the community sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

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About TIM

The TIM Review has international contributors and readers, and it is published in association with the Technology Innovation Management program (TIM; timprogram.ca), an international graduate program at Carleton University in Ottawa, Canada.

Editorial: Lean and Global

Chris McPhee, Editor-in-Chief
Stoyan Tanev, Guest Editor

From the Editor-in-Chief

Welcome to the May 2017 issue of the *Technology Innovation Management Review*. This month's editorial theme is **Lean and Global**, and it is my pleasure to introduce our Guest Editor, **Stoyan Tanev**, Associate Professor of Technology Entrepreneurship and Innovation in the Innovation & Design Engineering Group at the University of Southern Denmark.

In June, we feature articles based on the recent ISPIM Innovation Forum, which was held in Toronto, Canada, from March 19–22, 2017. ISPIM – the International Society for Professional Innovation Management (ISPIM; ispim-innovation.com) – is a network of researchers, industrialists, consultants, and public bodies who share an interest in innovation management.

For future issues, we are accepting general submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and growing technology companies and solving practical problems in emerging domains. Please contact us (timreview.ca/contact) with potential article topics and submissions.

Chris McPhee
Editor-in-Chief

From the Guest Editor

It is a pleasure offering the reader the opportunity for a critical reflection on the potential synergy between lean startup and born-global entrepreneurial perspectives in the context of new technology firms. The articles included in this special issue acknowledge the wide application of the lean startup approach to technology entrepreneurship in the last five years. Initially driven by practitioners, it has now attracted the attention of both scholars and policy makers. The lean startup method revolutionized the world of technology startups by shifting the focus of entrepreneurs from product development to the equally important parallel process of customer development. The shift is from an obsession with great technology, product design, and functionality to a focus on discovery and learning about customers as early as possible so that problems can by fixed before the actual product launch.

The lean startup approach has granted entrepreneurs many instruments that could help them deal with uncertainty in the early stages of their businesses. However, it has remained relatively detached from another opportunity: to take into account the growing relevance of existing or emerging global markets. At the same time, many entrepreneurs see their startups as global from day one because, since the inception of their businesses, they have pursued markets outside their home country. In addition, for some of them, the pursuit of global markets is not the only way to exploit global opportunities. They have succeeded in making a difference by creating business models that explore and exploit resources in multiple countries. An increasing number of new technology businesses do not aim for, but start with, international operations. This is where the need to integrate knowledge from research on born-global firms and global startups comes in. The aim of the present special issue is to address this need in the context of new technology firms.

In the first article, I summarize insights from previous literature focusing on global startups and articulate in greater detail the benefits of considering the lean global startup as a new type of firm. The article explores some

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of the main ideas discussed in the interview with Nicole Coviello, which is also part of this special issue. The main message of the article is that the lessons learned from the emergence of lean startup entrepreneurship offer a basis for promoting a similar lean phase in technology-based global startup research and practice.

Next, **Michael Neubert**, Professor at the International School of Management in Paris, France, adopts a comparative cross-national multiple case study research approach to explore the speed of internationalization of high-tech startups operating internationally from within small and open economies. The key finding of the study is the identification of a relationship between the speed of early market internationalization and the adoption of lean market development processes. The finding offers a basis for developing propositions for further comparative studies focusing on the early and fast internationalization of high-tech startups based in emerging and developed markets.

Then, **Erik Stavnsager Rasmussen**, Associate Professor in the Department of Marketing and Management at the University of Southern Denmark in Odense, and **Nicolaj Hannesbo Petersen**, a PhD student in the same department, discuss the challenges of high-tech global startups with respect to their ability to synergize innovation and internationalization. The empirical component of the article is based on interviews with the executive managers of eight innovative international firms from a Danish Welfare Tech cluster. The study indicates the existence of a relationship between the startups' engagements with innovation and internationalization. The firms have focused on developing a platform-based core product or service offering, which became a basis for serving new customers and users in new countries. The key challenges for the firms turned around the co-evolution of the platform, products, and services, allowing them to pivot their core value propositions by adapting the platform to new international contexts.

Kaisa Still, a Senior Scientist at VTT Technical Research Centre of Finland, explores how the adoption of the lean startup paradigm has led to the emergence of a new process model that could accelerate innovation in the context of research at universities and other research organizations. The article is based on the assumption that the organizational context matters, suggesting that a deeper understanding of the research context could enable the acceleration of the corresponding innovation process. The study complements several theoretical examples with a case study from the VTT Technical Research Institute of Finland. The findings indicate that many of the lean startup concepts can also be relevant within the research context. However, in the research context, there is a weaker focus on the articulation of value propositions and the adoption of growth strategies resulting in a future scalable business.

Ferran Giones, Assistant Professor at the University of Southern Denmark in Sønderborg, and **Alexander Brem**, Professor of Technology Management at Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany, focus on defining technology entrepreneurship in the context of growing digitization and globalization. Based on current examples, they offer a description of technology entrepreneurship, digital technology entrepreneurship, and digital entrepreneurship. The suggested delineation of the terms is used as an opportunity for the articulation of a new research agenda in the field of technology entrepreneurship. It is expected to foster a discussion between researchers, entrepreneurs, and policy makers on the impact of digitization on entrepreneurship.

Finally, the special issue includes an interview with **Nicole Coviello**, Lazaridis Research Professor and Professor of Marketing at Wilfrid Laurier University in Waterloo, Canada. The interview was inspired by a recent publication by Coviello in which she emphasized the need to re-think existing research on international entrepreneurship and born-global firms by focusing on the development of a more consistent collective research identity through an ongoing process of terminological refinement and clarification. Coviello calls for a more cautious use of the term "born global" because very few firms were really born on a global scene. According to Coviello, the international entrepreneurship research community has to work harder to better integrate innovation management scholarship, business model innovation frameworks, and early internationalization theories. She encourages multi-level research and attention to the actual decision makers of global startups and, especially, to young founders who are different in terms of how they relate to technology and the world in general. For Coviello, the lean startup approach is not really new but does set the stage well for the internationalization of startups. It is also associated with business models that should be further studied in a global context.

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The overall message of the special issue emphasizes the benefits of integrating the lean startup and global startup entrepreneurial perspectives. The authors of the contributions do not suggest that every technology startup should aim to operate globally. They do, however, emphasize that startups having a global orientation since their inception could benefit from adopting a lean startup attitude towards the effectuation of their global resourcing and market reach.

Stoyan Tanev
Guest Editor

About the Editors

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. He holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa, Canada, and BScH and MSc degrees in Biology from Queen's University in Kingston, Canada. Chris has nearly 20 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

Stoyan Tanev is an Associate Professor in the Department of Technology and Innovation, Faculty of Engineering, Southern Denmark University (SDU) in Odense. Dr. Tanev is leading the Technology Entrepreneurship stream of the Master Program of Product Development and Innovation at SDU. He is also an Adjunct Research Professor in the Sprott School of Business at Carleton University in Ottawa, Canada, where he is associated with the Technology Innovation Management Program. He has a MSc and a PhD in Physics jointly from the University Pierre and Marie Curie, Paris, France, and the University of Sofia, Bulgaria, a PhD in Theology from the University of Sofia, Bulgaria, an MEng in Technology Innovation Management from Carleton University, Canada, and an MA from the University of Sherbrooke, Canada. He has multidisciplinary research interests with a focus on the fields of global technology entrepreneurship, technology innovation management, business model design, and value co-creation. Dr. Tanev is Senior IEEE member, as well as member of the editorial boards of the *Technology Innovation Management Review,* the *International Journal of Actor-Network Theory,* and *Technological Innovation.*

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Is There a Lean Future for Global Startups?

Stoyan Tanev

> *"In real life, unlike in Shakespeare, the sweetness of the rose depends upon the name it bears. Things are not only what they are. They are, in very important respects, what they seem to be."*
>
> Hubert Humphrey (1911–1978)
> 38th Vice President of the United States

This article integrates insights from the latest research on the lean startup entrepreneurial method, born-global firms, and global startups. It contributes to the clarification of terminology referring to the global aspects of startups, summarizes insights from previous literature focusing on global startups, and further substantiates the articulation of the need for considering the lean global startup as a new type of firm. The main message is that the lessons learned from the emergence of lean startup entrepreneurship offer a basis for promoting a similar lean phase in technology-based global startup research and practice. The analysis should benefit both researchers and practitioners in technology entrepreneurship, international entrepreneurship, and global innovation management.

Introduction

This article examines some of the developments following the publication of my earlier article in this journal (Tanev, 2012), in which I summarized the characteristics of born-global firms in a context relevant to new technology startups. I defined a born-global firm as a new venture that acts to satisfy a global niche from day one by searching for and accessing resources that could help its global reach. The definition focuses on new ventures that are international or global by design and not by emergence.

Since the publication of my 2012 article, there have been two major developments that could be both related to the context of born-global technology startups. The first one was the spread of the lean startup movement (Ries, 2012) as a systematic articulation of a set of entrepreneurial practices inspired by the customer development process suggested earlier by Steve Blank (2007). Blank's approach was described in greater detail in the *Startup Owner's Manual* (Blank & Dorf, 2012) as a step-by-step process for managing the search for a new business model, providing entrepreneurs with a practical path from idea to a scalable business model. It could be considered as an enhancement of Moore's (1991) technology adoption lifecycle approach, because it offers a more systematic way of dealing with the entrepreneurial challenges of "crossing the chasm" between the early adopters and the first viable market niche. Eisenmann, Ries, and Dillard (2012) defined a lean startup as a firm that follows a hypothesis-driven approach to the evaluation of an entrepreneurial opportunity and the development of a new product for a specific market niche. The lean startup approach has also attracted the attention of entrepreneurship researchers trying to position its key insights in the context of existing management and innovation theories (Frederiksen & Brem, 2017; Stolze et al., 2014).

The second development is the further maturation of international entrepreneurship research. I could refer to several recent research papers (Alcácer et al., 2016; Cavusgil & Knight, 2015; Coviello, 2015; Sarasvathy et al., 2014; Weerawardena et al., 2015; Yang & Gabrielsson, 2017) as examples of key developments in the field. The paper by Coviello (2015) is particularly relevant for the context of new technology firms because it points out the relevance of born-global startup over born-global firm definitions and highlights the research relevance of the global intentions of startups at their inception instead of the characteristics of young firms that have undergone a successful internationalization. In an interview with the author as part of the current special issue, Coviello has also provided additional comments on the international entrepreneurship research maturation process and the possibility of considering the lean global startup as a new type of firm (Coviello & Tanev, 2017).

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The remainder of this article is structured as follows. First, I discuss some of the insights by Coviello (2015) that could be highly relevant for the context of new technology firms engaged in a global business path from their inception. Next, I identify the key lessons learned from research focusing on born-global startups. Finally, I offer additional arguments that could better highlight the benefits of considering lean global startups as a new type of organization/firm.

Born-Global Firms or Global Startups?

Coviello (2015) provides an explanation of the problem of using the term "born global" in the context of startups. One of Coviello's key points is that, in order "to study a 'new' international venture, it is important to investigate (for example) their decisions or actions when they are, in fact, still new." In other words, the identification of a firm as "born global" is not a post factum conclusion that is the result of looking at how successful a firm was in its internationalization efforts. In other words, there is a difference between firms that were truly born with the intent to serve multiple foreign markets and firms that simply happen to export early. The difference in firms' growth intentions at their very founding will definitely lead to the emergence of different internationalization paths resulting in qualitatively different growth modes. Studying the different growth modes without taking into account the difference in firms' intentions at their founding will not help the proper articulation of business design principles focusing on establishing new global startups. In addition, the call for a closer attention on firms' intentions at their founding should not neglect the fact that there could have been many activities contributing to the global orientation of the firm even before its formal founding. In many cases, the founders incorporate a new firm after having worked for years on their product and partnership development.

The second important point made by Coviello is that there is a much better term referring to the globalness of startups: "global startup". This term was introduced by Oviatt and McDougall (1994) almost at the same time as the term "born global" and has a different meaning. Indeed, using the two terms interchangeably is confusing. Oviatt and McDougall have specifically discussed the characteristics of global startups, including the drivers for the emergence of such firms as a "powerful economic engine" (Oviatt et al., 1995). In their view, a global startup is just one specific type of international new venture that seeks to derive competitive advantage by coordinating many organizational activities – not just export sales – across many countries from its very inception. The other three types of international new ventures are export/import startups, multinational traders, and geographically-focused startups. They differ from global startups by serving a smaller number of international markets (export/import startups and geographically-focused startups) or coordinating a smaller range of (mostly logistical) activities across different countries (multinational trader companies). The focus on two global startup criteria – many coordinated activities across countries and many international markets – is an important point because it emphasizes a key difference with the definition of born-global firms as "entrepreneurial startups that, from or near their founding, seek to derive a substantial proportion of their revenue from the sale of products in international markets" (Knight & Cavusgil, 2004) or "young companies that derive a significant portion of their revenue from international sales" (Cavusgil & Knight, 2015). The broader focus of the international new venture definition includes the possibility for the coordination of activities other than export, such as importing, offshore R&D, joint ventures, or production subsidiaries (Coviello, 2015). The broader international new venture definition of global startups fits much better with today's context of new technology firms that could and usually benefit from upstream activities across national borders before, or in parallel to, reaching sales capacity.

An additional aspect of the above discussion is the need to account for the difference between "international" and "global". Coviello points out that "Oviatt and McDougall (1994) specifically chose to use the term 'international new venture' (encompassing four types of firms) because many of the firms they observed did not have a global focus. Rather, most competed primarily in their regional markets or in a relatively limited number of countries" (Coviello, 2015). This statement implies that the key criterion for qualifying a new firm as a global startup focuses on the quantitative measure corresponding to the multiplicity of the international markets served and not so much on the geographical and cultural distance between these multiple markets. Such implication opens two interesting questions.

The first question is whether the tangibility of this measure contradicts the intentional character of the early-stage activities of startups. On the one hand, following Coviello's advice, we should focus on the actual *intentions* of the startups to serve multiple foreign markets at their inception and, on the other hand, on the multiplicity of international markets *served* by the startups and their various activities *coordinated* across different

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countries. The problem here is in the difference between *intending to serve* and *actually serving, intending to coordinate,* and *actually coordinating.* How many startups could actually serve multiple international markets and coordinate many activities across multiple countries at their very inception?

The second interesting question is whether the meaning of "global" should be restricted to refer to the multiplicity of international markets and coordinated activities across multiple countries without any additional requirements for the geographical, psychic, and cultural distance between these countries. Should the export of a Danish firm to Germany, or a Canadian firm to the Unites States, be considered as part of their global market reach? It is not by accident that Madsen and Servais (1997) define born globals as "firms that seek to derive significant advantages from the use of resources from or the sale of outputs to multiple countries/continents right from their legal birth." The use of continents as a potential global location on an equal basis with countries indicates the tendency to associate the meaning of "global" with locations at significant geographical, psychic, and cultural distances. Another expression of this tendency is the recent definition of born-global firms suggested by Andersson, Evers, and Griot (2013): "business organizations that have a global mindset from inception and aim to derive significant competitive advantages from the use of resources and the sale of outputs in multiple countries spanning the three economic trading blocs of NAFTA, EU and Asia-Pacific." This definition refers to the initial intentions of the firms with respect to both resources and markets, and it emphasizes a multi-continent perspective on globalness that is inclusive of the context of startups.

At the end of the present section, one could reiterate the judgement by Lopez and colleagues (2009) that the born-global literature has been lacking a precise definition of what a born-global firm is, and some existing definitions are tautological. In this sense, the call for more terminological clarity and for a new more mature phase of international entrepreneurship research made by Coviello (see her interview in this special issue: Coviello & Tanev, 2017) is timely and highly relevant. One specific point could be particularly emphasized: "using the terms INV [international new venture] and BG [born global] synonymously and/or interchangeably is inaccurate, as is any reference to firms as 'INVs/BGs'" (Coviello, 2015). Rather, it is important to recognize that, by definition, these organizational forms differ. For example, a study of firms labeled as born global will examine firms that, very close to birth, actively export to global markets. If the study captures multiple and global value chain activities very close to birth, the term "global startup" from Oviatt and McDougall's (1994) typology of international new ventures is more appropriate" (Coviello, 2015). At the same time, the overall spirit of the definitions seems to predominantly reflect the context of younger small firms and not of actual startups. Actual startups deal with the challenges of maximizing the value of resources acquired ex ante from factor markets; younger small firms deal with the challenges of capturing value by competing on product markets (Schmidt & Keil, 2013). This was one of the key reasons for proposing the integration of the lean startup and the born-global or global startup paradigms. The next section will summarize some of the insights about global startups such as articulated by Oviatt, McDougall, and Loper as early as 1995, and by others after them.

The Emergence of the Global Startup Phenomenon

In their paper, Oviatt and colleagues (1995) do not seem to overemphasize their initial definition. It is in a footnote that they mention that a global startup is a type of international new venture that coordinates many organizational activities across many countries. In the main text, they add that "such firms seem to have aggressive growth objectives in that they rapidly exploit technological advantages, acquire foreign technologies, and follow clients into foreign lands" (Oviatt et al., 1995). According to them, the emerging phenomenon of rapid internationalization has become a reality due to specific technological and competitive forces. In addition, the factors enabling early internationalization have affected the formation of new ventures and made the usual slowly staged internationalization efforts risky for many firms.

Oviatt and colleagues (1995) summarized the forces that drive the emergence of new global startups by suggesting that entrepreneurs, investors, and corporate executives exploring venturing options should consider the following six conditions when determining whether a new business should be a global or a domestic startup.

1. *The best human resources are dispersed among various countries.* Certain locations in the world offer access to unique workforce skills. Global startups could profit from actual presence in such locations by procuring the best resources at lower prices.

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2. *Foreign financing could be easier or more suitable.* Startups having difficulties in raising financing could benefit from pursuing funding outside their own countries of origin. According to Oviatt and colleagues (1995) the international sourcing of funds may be one of the most important forces driving startups to internationalize because of the inherent benefits of overseas funding. "Foreign investors will want their venture to move rapidly into their own markets, and founders will certainly consider moving into a country from which they have received funding. In some cases, a prime motivation of foreign investors may be to get new technology into their own home market." (Oviatt et al., 1995).

3. *The target customers require the new venture to be international.* The increasingly global nature of demand in many markets is one of the main forces encouraging the formation of global startups.

4. *Rapid worldwide communications allow for quick competitive responses.* The pervasive availability of rapid communications and transportation capabilities worldwide has enabled almost instantaneous access to information about virtually any market. Entrepreneurs in foreign countries can learn quickly about potential business opportunities in any other country. In addition, there is a variety of unprotected market niches at different global locations. Many startups became global because quite often "the best domestic defense might be a superior international offense" (Oviatt et al., 1995).

5. *Worldwide sales are required to support the venture.* Many industries cannot afford the comfort of remaining regional or national. Worldwide sales might be needed to justify large R&D expenses and to effectively address the target market. A global startup enjoys more potential customers than a domestic venture selling the same product. Some startups could actually be forced to target foreign customers because of the insufficiency of revenue in their home countries. Oviatt and colleagues (1995) call such firms "reluctant global startups". They do not have a global strategy from the start but need to be large to be effective, and being international is a vehicle for doing that.

6. *Domestic inertia will be crippling if internationalization is postponed.* If a new venture starts out domestically, its policies and procedures are driven by the logic of the domestic market. A newly emerging international market opportunity will most likely lead to the need of disruptive operational changes that could be met with resistance by its employees. It may take great efforts and a long time to overcome such inertia. An initial international orientation facilitates the adoption of operational standards and product architectures that permit easy internationalization (Oviatt et al., 1995). In brief, a global startup benefits in the long run from being international at inception.

In addition to summarizing the key factors enabling early internationalization, Oviatt and colleagues (1995) have identified seven characteristics that are commonly associated with the survival and growth of global startups, including:

1. *Existence of a global vision from inception.* The founders must be able to compellingly communicate a global vision to everyone else associated with the venture.

2. *Founders or top managers are internationally experienced.* Understanding the logic of cross-border business conduct is absolutely necessary.

3. *The entrepreneurs have strong international business networks.* New ventures are resource poor and usually depend on a supportive network of business associates. "Having a network of international alliances to access vital resources rather than owning those resources outright is the increasingly preferred way of conducting international business." (Oviatt et al., 1995).

4. *Exploitation of preemptive technology or marketing approach.* Most successful global startups begin by selling a unique product or service in leading markets. The way for them to overcome the advantages of indigenous firms is to be first to market with a distinctively valuable product or service.

5. *Possession or privileged access to a unique intangible asset.* Marketing a distinctively valuable product is preemptive only if its distinctiveness is sustained through a competitive advantage. In most cases, the competitive advantage is some type of unique special knowledge that only the startup has. Global startups should recruit, train, and manage their human resources very effectively and use them to continuously innovate.

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6. *There is a close link between product or service extensions.* Continuous innovation ensures that a firm's advantage is a moving target that is more difficult for competitors to hit. Yet, innovations subsequent to the founding of the startup must be incremental due to the venture's limited experience and resources. Successful global startups seem to follow their initial product or service with extensions that are closely linked to the unique assets from which they derived their original competitive advantage.

7. *The organization is closely coordinated worldwide.* All the above characteristics would require a strong top management team to coordinate R&D, procurement, production, marketing, distribution, sales, and other activities in several worldwide locations that need to be closely coordinated. Such close coordination implies several things, including: i) a close interaction among top managers aligned with a strong commitment to the main goals of the new venture; ii) efficient communication of the global vision throughout the organization to ensure every employee's commitment to that vision; iii) top managers should enjoy and endure travel: international business requires face-to-face meetings to establish and nurture the network of international business associates; and iv) the technological communication infrastructure of a successful global startup must be more sophisticated than that of the usual domestic startup of equal size.

Meyer and Xia (2012) offer additional insights about global startups by focusing on the experience of British global entrepreneurs. They emphasize that the pursuit of global markets is only one way to exploit global opportunities. Many ambitious entrepreneurs, especially in high-tech ventures, push further and create business models that explore and exploit resources in multiple countries. The actuation of the opportunity behind these business models involves the need to identify, attract, transform, and apply resources in different countries, but it also requires a focus on the implementation of the business idea from day one. Meyer and Xia (2012) also provide examples of British high-tech startups that would not have existed if they did not develop business models by tapping into resources all around the world. According to them, there are three globalization trends that stand out in creating opportunities for global entrepreneurs: global value chain fine-slicing, global communities of practice, and global communications technologies.

The global value chain fine-slicing trend has emerged within the dominant practices of most multinational companies that tend to locate different tasks in different countries and selectively outsource some of these tasks. Examples of such tasks are manufacturing, back-office services, collaborative research, and acquisition of innovations from independent technology firms through licensing or specific contractual arrangements. According to Meyer and Xia (2012), the emerging granularity of the localization of these tasks creates opportunities for entrepreneurs to tap into a value chain by developing a specialized component or service targeted at major players in an industry. The emergence of such opportunities requires a certain degree of modularity within the dominant product design and architecture that would allow the pursuit of a displacement innovation (Christensen et al., 2004).Displacement is a specific type of innovation that could take place at a point of modularity by targeting the mainstream market. A new globally-minded startup could specialize by focusing on one particular component of a product or service and positioning it competitively in a global value chain by taking part of the market from well-established multinational incumbents. Such startups cannot win unless their products can interface with the established product architecture at points of well-defined modularity. This becomes possible when the interactions across the interfaces between different product components or modules are well understood and predictable. Interestingly, displacements could also enable low-end disruption by new startups that emerge by assembling value chain components in new ways to offer new customer benefits (Christensen et al., 2004). A good example of a company that was able to do that is Dell – it took advantage of the modularity of personal computers and developed its low-end disruptive business model. The example demonstrates the opportunity of articulating global startup design principles by incorporating insights based on theories of disruption (Gans, 2016).

The global communities of practice trend has emerged within many fields of specialization where close communities have evolved between experts who, despite geographic distances, meet frequently, exchange ideas and best practices, and establish informal rules of conduct in the community. For example, academic and industry-based researchers participate in conferences worldwide where they exchange ideas on new technologies and establish actual global networks. Such conferences allow researchers to create personal

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relationships with experts in multiple countries and global locations. Entrepreneurs can build on these ties when creating their own ventures, hiring, contracting, or simply accessing the best people, resources, tools, and assets across multiple geographically distant locations.

The emergence of *the global communications technologies trend* was already discussed above. The point is that many entrepreneurs have learned to employ existing communication technologies and many open source tools to combine occasional intensive face-to-face meetings with more frequent, but shorter and practically costless virtual meetings. The interaction between members of a geographically dispersed team can easily become an everyday routine.

The reason for summarizing the three trends above was to emphasize that global entrepreneurs take advantage of these opportunities and design their business models by combining and exploiting talent and resources from all around the world. The vastly reduced set-up costs of communication technology systems enables new startups to make efficient interpersonal exchanges across large distances. The access to talent and resources worldwide allows startups to become global from the start by integrating complementary technological products developed by partners from multiple global locations, coordinating resources, working with distributors, and seeking additional support from investors. Most of the entrepreneurs who have succeeded in making a global move are mature individuals who have achieved professional success before either in business or in academia. According to Meyer and Xia (2012), the commonality between them is that they share a global mindset, deep industry experience, ability to build networks by connecting with the best in their industry and technological domain around the world, persistence in pursuing global business opportunities, and readiness to adopt a lean startup-like vision of the business given that it is not always that the first attempt that is the most successful. The latest research offers even stronger arguments that the reality of the present information age suggests the adoption of a new techno-economic paradigm for the emerging structures and processes in international business in general. The reality of the new paradigm includes the changing nature of the competitive advantages of places (a new understanding of locations), the competitive advantages and strategies of firms (a new understanding of ownership), and the governance structure of international business networks (a new understanding of internationalization) (Alcácer et al., 2016). The implications of the emergence of this paradigm should be explored further in the context of new technology-based global startups.

The Emergence of the Lean Global Startup Paradigm

This section will focus on some of the issues mentioned in the introduction, and it will offer additional argumentation that could substantiate the introduction of the lean global startup as a new type of firm. It will therefore indirectly address Coviello's pessimism: "At any rate, I don't consider a lean global startup to be a new form of organization or growth mode. Lean is a way of operating. In the same way that we study organization structure, orientation etc., we should study the influence of lean (or effectual logic) as young firms internationalize" (Coviello & Tanev, 2017). It would be good to start with a reminder of the lean startup definitions as suggested by its "Godfathers": Steve Blank (2013) and Eric Ries (2011). The definitions of the lean startup emphasize several points:

- A lean startup is not a smaller version of a large company. Whereas well established companies focus on executing a business model, a startup struggles to articulate and establish one. In this sense, "a lean startup is a temporary organization designed to search for a repeatable and scalable business model" (Blank, 2013).

- A lean startup is "a human institution designed to create new products and services under conditions of extreme uncertainty" (Ries, 2012).

- Blank and Ries pioneered three key concepts to characterize the essence of lean startups: customer development, minimum viable product (MVP), and pivot. The MVP is a product consisting of a minimum set of features that is used, *first,* as a tactic to reduce wasted engineering hours and, *second,* as a way of getting the product in the hands of early and visionary customers as soon as possible. Pivot is a term used to describe a major change in direction of a startup while staying grounded in learning.

- A lean startup, as a temporary organization/institution, deals with the challenges and uncertainties of transforming the ex-ante value of resources acquired in factor markets into ex-post product market success of a newly created company. This transformation is associated with a business transition from a temporary startup mode of operation of a customer development

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team searching for a business model, to a sustaining operational mode of a newly established company based on functional departments focusing on the execution of the business model (Blank, 2013).

- In parallel to the articulation of a viable business model, a lean startup is striving to build the minimum viable ecosystem (MVE) of partners that would enable the new company to demonstrate its potential to create value on the product market. The concept of MVE was introduced by Adner (2012) as one of the principles for the construction of a successful business ecosystem. The MVP and MVE concepts fit very well together. The link between MVP and MVE could be expressed as follows: establishing a viable business means using an MVP as part of a customer development approach to transforming a lean startup into a new company with a well-configured MVE. Such an understanding of new business creation resembles the definition of creation suggested by Deleuze (1998) – the act of making configurations.

The reason to provide a more detailed definition of the lean startup was to emphasize several points, as follows. First, the lean startup is a special type of startup; it is not just the early or immature stage of any startup. There are startups that are not lean startups. If we focus on the technology business area, we could say that the other type – regular or non-lean startups – usually focuses on intensive R&D and product development until they come up with a product that is then in need of a market (i.e., technology and product development dominate over marketing). Such were most of the startups in the 1990s. Such are many of today's startups that do not really reach a viable business stage in the form of a well-established new company. The reason for Blank and Ries to introduce and insist on promoting the lean startup concept was exactly to differentiate the (lean) startup described above from the regular ones. According to their lean philosophy, "lean" is about reducing waste, and the greatest waste for a startup is to develop a product that nobody wants.

There is a danger of considering a lean startup just as an initial phase of a new startup that is preliminary to its future viable business stage. One can, of course, do that at the cost of missing the point and never reaching a viable business stage. The reason for the existence of such danger is that everything in the lean startup and in the viable business stage of the future new company is different – the type of product that is being developed, the type of customers being targeted, the type of employees that need to be hired, and the type of business goals being set. This fact was realized as early as the 1990s through the promotion of the *Crossing the Chasm* approach articulated by Geoffrey Moore (1991). There is however a key difference in the messages of the lean startup and crossing-the-chasm approaches. The main focus of the crossing-the-chasm approach was to emphasize that: i) the early customers (i.e., enthusiasts, innovators, and early adopters) are not a startup's ultimate customer target market segment: the late adopters; ii) the technological solution that impresses the early adopters is not the whole product that is going to impress the late adopters – the startup should focus on interacting with customers to help the development of the whole product; iii) the initial marketing approach to early adopters is not the way to deal with later adopters.

The lean startup approach could be seen as a valuable development of Moore's crossing-the-chasm approach. The lean startup "new development" consists of shifting the above messages into another key: i) the lean startup is not the company that the entrepreneur is trying to build; ii) the product of the lean startup is not its product but the business model; and iii) the focus of product development should be on using customer feedback to evolve the MVP into an awesome product that is going to impress the first customer target niche (i.e., product development is based on customer development). In this sense, the lean startup concept emphasizes two key differences: lean startups versus other (non-lean) startups and lean startups versus the companies that are going to be built on them. The claim that a lean startup is a temporary organization amplifies the emphasis of the second difference. According to Blank (2007), "The idea of not having a functional organization until the organization has found a proven business model is one of the hardest things for new startups to grasp" (Blank & Dorf, 2012). The current knowledge in global startup research and practice could greatly benefit from a similar enhancement based on the lean startup concept.

Second, it is clear that global startups have been studied before as a special type of international new venture and should not be considered as something new in both business practice and research. The purpose of the section of this article dedicated to global startups was to illustrate this fact. The global startup literature, however, does not seem to address the ongoing adoption, popularity, and relevance of the lean startup approach. The lean startup literature does not speak about the opportunities of a global start either. The lean

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global startup concept was introduced with the intention of linking the aspects of lean and global (Lemminger et al. 2014; Tanev et al., 2015; Rasmussen & Tanev, 2015). Almost at the same time, Steve Blank (2014) followed-up with a valuable insight: Startups have to be born global or die local because most countries do not have sufficient population to support a potential scale up with their local market (i.e., growth-oriented startups ultimately need to become global players from day one). In the definition of lean global startup, "lean" refers to global and employs a lean startup logic that is similar to the one described above. A lean global startup adopts the lean approach as part of its global move and not simply as part of its product and customer development strategies focusing on addressing a first local market niche. In a typical lean global startup, the target market niche would be at a global location and all local marketing efforts would be in parallel to the global one or for the sake of experimentation and learning. It is clear, however, that there could be global startups that are not lean startups. In this sense, it would be highly beneficial to consider the lean global startup as a unique firm type.

Third, the global startup definition suggested by Oviatt and McDougall's (1994) and Oviatt, McDougall, and Loper (1995) does not appear to be good enough to address the context of actual technology startups that have adopted a global marketing or global resourcing strategy from their inception. It misses some of the key points of the lean global startup context such as the multi-continent aspects of globalness and the evolutionary nature of a startup's transition to a newly established company. It appears to be too much attribute-based and not so much circumstance-based, to use the Christensen's (2006) terminology. More importantly, it does not seem to have taken into account the difference between the ex ante resource focus of early-stage startups and the ex post product market focus of established young companies. According to Doz and Wilson (2012), this is a typical problem for the managers of global organizations – judging the value or success of a global location by using ex post performance measurements of value. At the same time, the focus on the lean global startup context is a direct expression of Coviello's concern that international new ventures or global startups should be studied at their very early stages, when their initial intentions are most clearly articulated. In this sense, the introduction of the lean global startup concept appears to be quite useful in emphasizing the lean aspects of reaching a global presence. It is inclusive for both "finger-push" firms, with the potential to serve global markets, and for other startups that have committed to a more evolutionary lean global path from their start. Previous research offered examples of these two types of global startup scenarios and labelled them lean and global startups and lean-to-global startups (Borseman et al., 2016; Rasmussen & Tanev, 2015; Tanev et al., 2015). However, the meaning of "global" in the lean global startup definition has to be refined with respect to the global startup definition provided by Oviatt and McDougall (1994) by reducing the requirement for the quantitative intensity of the global resource coordination or market presence at the time of inception of a startup. For example, the simultaneous operation of a startup at two globally distant locations (for example, in two different continents) should be considered to be global enough for the sake of born global startup research. Establishing a new business in a foreign country enables the actualization of special innovative capabilities (Jones & Coviello, 2005; Weerawardena et al., 2015; Zijdemans & Tanev, 2014;). Once demonstrated in one specific country, these capabilities could be more easily replicated in other countries. A softer requirement for the quantitative intensity of the global upstream and downstream engagement of startups will allow the development of analytical and practical frameworks that would help globally-driven startups to pursue their global business path more systematically in the same way the lean startup approach does.

Conclusion

This article has two main contributions. The first one is taking into account some of the key insights from most recent research on born-global firms and, more specifically, the need for clarification and refinement of existing definitions by focusing on startups that have engaged into a global path from their very inception (Coveillo, 2015). On the one hand, it adopts the idea that existing born-global startup definitions provide a better fit to the startup context and summarizes some of the key lessons learned from born-global startup research (Meyer & Xia, 2012; Oviatt et al., 1995). On the other hand, it offers a critical reflection on these insights and suggests that existing definitions remain grounded in the context of younger firms and not so much on actual startups. The second contribution is the summary of the characteristics of lean startups in a way that could help further substantiate the claim about the benefits of considering lean global startups as a new type of organization/firm. The analysis suggests that the lessons learned from the emergence of lean

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startup entrepreneurship offer a basis for promoting a similar lean phase in technology-based global startup research and practice. Last but not least, international entrepreneurship research could greatly benefit from adopting a global instantiation of the lean startup paradigm in addressing the actual context of new technology firms dedicated to operating in a global context from their very inception.

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Stoyan Tanev is an Associate Professor in the Department of Technology and Innovation, Faculty of Engineering, Southern Denmark University (SDU) in Odense. Dr. Tanev is leading the Technology Entrepreneurship stream of the Master Program of Product Development and Innovation at SDU. He is also an Adjunct Research Professor in the Sprott School of Business at Carleton University in Ottawa, Canada, where he is associated with the Technology Innovation Management Program. He has a MSc and a PhD in Physics jointly from the University Pierre and Marie Curie, Paris, France, and the University of Sofia, Bulgaria, a PhD in Theology from the University of Sofia, Bulgaria, an MEng in Technology Innovation Management from Carleton University, Canada, and an MA from the University of Sherbrooke, Canada. He has multidisciplinary research interests with a focus on the fields of global technology entrepreneurship, technology innovation management, business model design, and value co-creation. Dr. Tanev is Senior IEEE member, as well as member of the editorial boards of the *Technology Innovation Management Review,* the *International Journal of Actor-Network Theory,* and *Technological Innovation.*

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Lean Internationalization: How to Globalize Early and Fast in a Small Economy

Michael Neubert

> *"The journey of a thousand miles starts from beneath your feet."*
>
> Lao-Tzu (6th–5th century BC)
> Philosopher and writer

This study examines the early market internationalization of 32 high-tech startups that operate internationally from small and open economies. It uses a comparative cross-national multiple case study research design to explore how such startups may differ in their speed of internationalization. Based on interviews with the founders, the speed of early market internationalization in these startups increases significantly due to the application of lean market development processes. The findings provide a basis for developing propositions for further comparative studies focusing on the early and fast internationalization of high-tech startups based in emerging and developed markets. The study contributes to the literature on networks, internationalization, and international entrepreneurship.

Introduction

Early and fast internationalization of high-tech startups, particularly ones that could be identified as born-global firms (Cavusgil & Knight, 2015), is a topic that has attracted growing attention in the field of international entrepreneurship, and yet, is among its least researched topics (Neubert, 2015). A born-global firm that internationalizes early and fast is often a high-tech startup with innovative products operating as pioneers in a small global market niche (Neubert, 2015). And, it has a high probability of being located in a small and open economy with a limited home market (Luostarinen & Gabrielsson, 2006).

A born-global firm from a small and open economy is generally forced to internationalize early and fast to become profitable (Neubert, 2016a). However, early and fast internationalization is very challenging for entrepreneurs because it requires specific abilities and excellent preparation including, for example, product adaptations (Neubert, 2016b). Early and fast internationalization of a born-global firm is considered entrepreneurial and risk-seeking (Oviatt & McDougall, 2005). It is often associated with high ability, experience, and willingness of the entrepreneur, who might have gone through the first phases of the Uppsala internationalization process model (Johanson & Vahlne, 2009) before founding their born-global firm.

This study follows from the author's call for research into the effect of location in a cross-national multiple case study with born-global firms from different small and open economies (Neubert, 2016b). The study asks how and why born-global firms from small and open economies differ in their speed of early market internationalization using Switzerland and Paraguay as a developed and as an emerging economy, respectively.

The article is structured as follows. First, the literature on the classification of high-tech startups and the effect of their country of origin is reviewed. Then, the research methodology of a comparative cross-national multiple case study research design is described. Next, the findings compare the commonalities and differences between the cases. Finally, the article concludes with a list of key findings and recommendations.

Literature Review and Theoretical Framework

The theoretical framework of this study is based on a review of the literature on the Uppsala internationalization process model (Johanson & Vahlne, 2009) and born-global firms (Cavusgil & Knight, 2015).

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In 1977, Johanson and Vahlne developed the Uppsala internationalization process model (Johanson & Vahlne, 2009). Their foremost finding was that firms enter new foreign markets using a so-called establishment chain. In the first step of this gradual internationalization process, firms enter geographically and culturally closer markets with low-risk market-entry modes, such as "export", "licensing" or "franchising" in collaboration with a local partner (Neubert, 2016b). With growing international success and market knowledge, they increase their investments, first establishing, for example, a wholly-owned subsidiary, and then they gradually begin to enter more distant foreign markets. Certainly, if market attractiveness decreases, the level of resources dedicated to a foreign market might also decrease, leading to outcomes such as a market exit (Neubert, 2013). According to this logic, Paraguayan firms, for example, should be expected to enter (geographically and culturally closer) foreign markets such as Bolivia and Brazil before they export to the European Union (EU), and Swiss firms should predominately export to neighbouring EU member states such as Germany, Austria, France, or Italy.

Johanson and Vahlne's second finding is related to the liability of foreignness and outsidership. Firms need a firm-specific advantage in every new foreign market in order to compensate for the liability of being a new foreign firm without a client portfolio, a support network to create market opportunities, or sufficient market knowledge. The larger the geographical, administrative, economical, and cultural distance between the home market and the foreign market, the larger the liability of foreignness and outsidership, and the larger the firm-specific advantage needs to be (Johanson & Vahlne, 2009). Local partners, such as distributors or resellers, help to bridge these differences. The speed of internationalization depends on the speed of learning (Johanson & Vahlne, 2009) about every new foreign market. This means that the firm must be able to adapt a firm-specific advantage to a sustainable and relevant competitive advantage in every new foreign market to cover the liability of foreignness and outsidership (Johanson & Vahlne, 2009).

Classification of high-tech startups

According to Johanson and Vahlne (2009), the Uppsala model can also be applied to firms that begin to internationalize soon after their founding – meaning born-global firms (Cavusgil & Knight, 2015) – because these firms select foreign markets where they can enter quickly and use low-risk and low-cost market-entry modes such as exporting. Both of these actions (selection of market and mode) might be regarded as the first step of the establishment chain of the Uppsala model (Johanson & Vahlne, 2009).

Most empirical research on early and fast internationalization focuses on high-tech startups in the sense of born-global firms (Servantie et al., 2016). A born-global firm (Cavusgil & Knight, 2015; Knight & Liesch, 2016) is a young firm that is active through early export sales. Thus, the born-global concept focuses on a market-seeking internationalization strategy that uses, for example, a global exporter internationalization model (Neubert, 2013). This is the link with the establishment chain of the Uppsala internationalization process model (Johanson & Vahlne, 2009). Both concepts focus on the market entry mode of "export" as the first step in entering a new foreign market. Further, the word "global" in "born global" should not be understood in the sense that a born-global firm exports immediately to all global markets. Often, the born-global firm starts exporting to a limited number of the most attractive markets or to a particular region such as a free-trade area (Coviello, 2015).

A born-global firm needs to be distinguished from an international new venture. The concept of an international new venture (Oviatt & McDougall, 2005) analyses all international value chain activities of a young firm including not only exporting but also offshoring, outsourcing, R&D, production, and sourcing. Thus, the terms born-global firm and international new venture cannot be used synonymously (Coviello, 2015). The high-tech startups analyzed in this article focus (in their current development phase) on market-seeking internationalization activities using the market entry strategy "export" in combination with local distributors to create market opportunities and to acquire clients. Thus, they are classified as born-global firms.

Rasmussen and Tanev (2015) introduced the lean global startup as a new type of firm. In comparison to a born-global firm, a lean global startup is a high-tech startup that creates a new market niche with an innovative technology using a new business model. The internationalization strategy is developed in advance and is part of the initial business plan. Lean global startups implement their business plan using of Blank's (2013) lean startup model. In incremental and iterative product development cycles, lean global startups develop minimum viable products and test them in the market (Blank, 2013). Because of the immediacy of the feedback, products and services can be quickly adapted to market needs. Rasmussen and Tanev (2015) and

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Tanev and colleagues (2015) make a clear distinction between access to upstream and downstream global resources, both of which must be taken into account when studying lean global startups. The reason for the emphasis on this distinction could be that many high-tech startups having a global orientation from their inception may start their global operations through upstream activities (e.g., R&D and co-innovation with global partners) before they engage into downstream activities (e.g., market development and export). In this sense, lean global startups seem to fit better the definition of international new ventures instead of born-global firms. However, the high-tech startups in this study might also be classified as lean global startups if they were to use a lean startup methodology for their market internationalization.

Effect of location on early and fast internationalization

The effect of location on early and fast internationalization has gained increasing attention among researchers (Knight & Liesch, 2016; Hitt et al., 2016), because findings from studies that analyze the fast and early internationalization of high-tech firms from developed economies are not necessarily applicable to emerging economies (Zander et al., 2015). To date, there is little research on born-global from emerging economies (Gonzalez-Perez et al., 2016). A study by Ciravegna, Lopez, and Kundu (2014) emphasizes the importance of social networks – particularly, the networking ability of an entrepreneur as a driver of the speed of internationalization. Hitt, Li, and Xu (2016) and Zucchella, Hagen, Denicolai, and Masucci (2016) reported that the reputation of the home country and the quality of institutions in that country also influence early and fast internationalization.

Small and open economies tend to have a significantly higher rate of born-global firms (Cavusgil & Knight, 2015) due to the small size of their home market. Therefore, high-tech startups from small and open economies have to internationalize early after their incorporation (Luostarinen & Gabrielsson, 2006) and will include it in their business plans (Neubert, 2015). Small and open economies have networks of free-trade agreements, which allow high-tech startups to freely move capital, human resources, goods, and services. This aspect is crucial, because high-tech startups need access to resources and clients, which are often not available in their home markets. For the purposes of this study, the two countries of Switzerland and Paraguay are classified as small and open economies.

Research Methodology

The purpose of this study is to answer the following question: How and why do born-global firms from small and open economies differ in their speed of internationalization? To allow comparisons between developed and emerging countries, cases of high-tech startups were drawn from two small and open economies: Switzerland, representing a developed economy, and Paraguay, representing an emerging economy.

This study uses a comparative cross-national multiple case study research design to answer the explanatory research questions (Yin, 2015). In contrast to an experimental design or a survey, a multiple case study has more flexibility, allows an in-depth analysis of a complex research problem (Yin, 2015) within a highly contextualized environment, and also allows for a comparison between different cases and countries. This research design also allows the use of the replication logic as a way to obtain external and internal validity as well analyzing pattern-matching properties between theories and cases (Yin, 2015).

This study used different sources of evidence to obtain robust conclusions and to achieve construct validity. Therefore, the triangulation concept is applied to the data collection phase to guarantee that different sources of evidence were used to collect data from each case. The primary source for data collection comprised qualitative, semi-structured, in-depth, individual face-to-face interviews with subject-matter experts who were the founders, managers, and shareholders of high-tech startups. Other sources of evidence were the corporate websites, product and firm brochures, internal documents provided by the firms, and other secondary data.

The data analysis followed a logical sequence, starting with an individual case analysis, followed by a cross comparison to identify similarities and differences, and finally a literal and theoretical replication using a pattern-matching approach. The goal of this approach is to increase the likelihood of transferring and generalizing the findings to other contexts.

The choice of the sampling strategy is based on the purpose of this study. A random sample from a database of Swiss and Paraguayan high-tech startups was taken until data saturation was achieved after 20 Swiss and 12 Paraguayan interviews. According to Yin (2015), if at

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least 6 to 10 cases are selected, this sampling strategy produces a statistically representative sample. The interview subjects are all founders, managers, and shareholders of their high-tech startups and mainly hold postgraduate degrees. Evidence of activity in foreign markets was found in 91% of the sampled high-tech startups.

Findings

The analysis of the collected data revealed insights into what influences the speed of internationalization of high-tech startups. Primarily, the analysis of the similarities revealed that the Uppsala model might be applied to both countries (Johanson & Vahlne, 2009; Neubert, 2015). However, although the high-tech startups in each country used an establishment chain, they took different approaches to identify attractive foreign markets. The Paraguayan high-tech startups tended to focus on neighbouring markets, where their liability of foreignness is lower; the Swiss high-tech startups tended to focus on their network, thereby reducing their liability of outsidership. In both cases, the startups focused on developing a firm-specific advantage for local competition and entry into new foreign markets. Indeed, unique, innovative, and high-quality niche market products and local distributors with an existing client network are a precondition for the attractiveness of every new foreign market entry because they compensate for the liability of outsidership and foreignness and ultimately increase the speed of internationalization (Neubert, 2016a).

The second finding is that all the case study firms can indeed be considered born-global firms (Cavusgil & Knight, 2015; Knight & Liesch, 2016). These young firms are active through early export sales as their main form of market entry (Coviello, 2015) with strong attention paid to a market-seeking internationalization strategy using, for example, a global exporter internationalization model (Neubert, 2013a). The Swiss high-tech startups can be considered traditional born-global firms seeking market opportunities wherever they are located (Cavusgil & Knight, 2015). In contrast, the Paraguayan high-tech startups could be classified a "born regionals" (Cavusgil & Knight, 2015) because they focus on neighbouring markets at the beginning of their internationalization process. Thus, the Uppsala model might be better suited to the Paraguayan high-tech startups, because they select new foreign markets primarily based on the cultural, geographical and economic proximity to their home market, and only to a lesser extent on their attractiveness in the sense of potential for market growth and market size.

Networking and learning ability were identified as the key abilities of the entrepreneurs (Ciravegna et al., 2014; Coviello, 2015; Neubert, 2016b) and the main drivers of the speed of internationalization. Several interviewees mentioned that their whole network has changed since the foundation of their high-tech startups. Thus, they consider the ability to create new contacts in new foreign markets as crucial. Others underlined the qualitative aspect: they believe that the ability to develop business opportunities from their network is even more important with respect to learning with whom you can do business and with whom you cannot. The founders, managers, and shareholders with an educational background in higher education, especially at international institutions, also showed a higher probability and speed of internationalization (Amorós et al., 2016). Networking in the sense of foreign markets is defined as the ability to create market opportunities to acquire new clients and distribution partners with local networks. Thus, the speed of internationalization depends on the ability of a high-tech startup to acquire new clients in foreign markets. Most of the interviewees were involved in foreign business development activities, even though they might have little or no prior experience in international business development, mostly due to their technical background (Neubert, 2016b).

Although all of the interviewees understand the significance of early and fast internationalization (Neubert, 2016a), almost all of the high-tech startups in this study faced significant delays in their internationalization projects even though they have an international strategy and often institutional support (e.g., coaches). Thus, the main challenge lies in the execution, because the business plan is often more a hypothesis (Rasmussen & Tanev, 2015) than a realistic and proven business model. For example, some of the interviewees complained about their difficulties in finding experienced sales managers with strong international networks and expertise in their small market niche. Even board members often lacked the network to develop realistic business opportunities. Foreign markets are rather selected based on a single business opportunity than the strategic attractiveness of the market. Several parallel foreign market entries lead to an overexpansion of the existing resources without the implementation of efficient market development processes. The founders, managers, and shareholders interviewed in this study generally perceived that this learning experience was necessary to succeed but they admitted that their learning curve might not have been so steep if they had applied tools such as Blank's (2013) lean startup' model or a lean market development process (Neubert, 2013,

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2011). Both approaches are supported by the notion that the speed of learning in small, iterative steps defines the speed of early internationalization.

Both, Swiss and Paraguayan high-tech startups understand the importance of early, fast, and lean internationalization. However, they faced significant delays in the execution of their international market-development activities in comparison to the time estimated in their business plans. Most of the interviewees indicated that the reason was a disorganized internationalization behaviour. They are willing and planning to implement efficient and successful foreign market development processes such as the example depicted in Figure 1 (Neubert, 2011, 2013), which shows the degree of structured and disciplined approach that is necessary to manage a global sales organization successfully in contrast to the often creative and unstructured internationalization behaviour of many high-tech startups. As one put it, "the ability to develop new foreign markets should become one of our core competences". Due to this intention, they might be classified as lean global startups (Rasmussen & Tanev, 2015).

Conclusions

This study provides some new insights on the factors affecting the speed of internationalization of high-tech startups from emerging and developed small and open economies. It is based on the theoretical framework of the Uppsala model and the born-global firm, and it examines how and why born-global firms differ in their speed of internationalization.

Key findings include:

1. Successful high-tech startups from small and open economies understand the importance of early and fast internationalization.

2. They consider the ability to internationalize successfully and efficiently as one of their core competences.

3. The main tool to execute their internationalization strategy is a lean market development process. As a pioneer in a small global market niche, high-tech startups need to penetrate global markets as fast and as long as they can maintain their competitive advantage.

4. The entrepreneurial team needs the ability to network, to create promising business opportunities, to acquire new business in foreign markets, and to develop a global marketing and sales team, or else their firm will suffer significant delays in their business plans.

In spite of the differences that distinguish both countries of origin, the majority of both Swiss and Paraguayan high-tech startups in this study consider early and fast internationalization important for their enduring survival. The case study firms can be considered as born-global firms, and they follow the establishment chain of the Uppsala model. Thus, one of the contributions of this study is the application of the Uppsala model on high-tech firms from small and open economies that focus on early export.

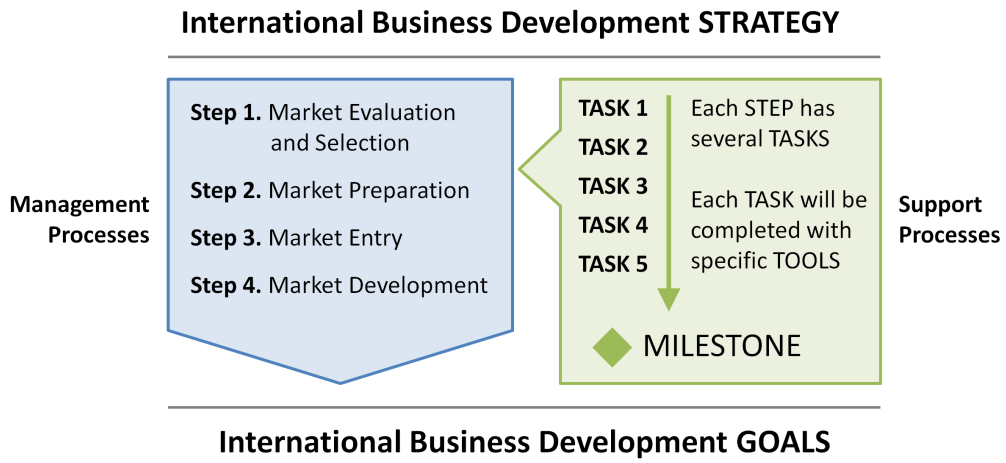

Figure 1. The market development process (Neubert, 2011, 2013)

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Despite the stated importance of early and fast internationalization, high-tech startups faced significant delays in the execution of their international market-development activities in comparison to the time estimated in their business plans, and this was often due to a disorganized internationalization behaviour. High-tech startups often chase international business opportunities based on their networks or follow existing clients instead of analyzing the attractiveness of foreign markets or following a pre-defined market-development process. Thus, another contribution of this study is that high-tech startups should apply a lean approach to enable an efficient and structured internationalization process. It may help them to close the gap between the aspirations of their strategies and business plans and the hard facts in their balance sheets.

Most of the interviewees understood that this approach reduces the speed of internationalization. They acknowledged the importance of a market-development process that begins with a detailed evaluation and selection of foreign markets before a company actually enters them. Although the Paraguayan high-tech startups initiated their internationalization primarily in neighbouring countries, the Swiss high-tech startups demonstrated a global approach that depends on the attractiveness of each market. All the firms understood that the role and the capabilities of the entrepreneur are crucial for the international success of their high-tech startups. The faster the entrepreneur (Paraguay) and the management team (Switzerland) learn techniques for acquiring clients in foreign markets, the higher the speed of internationalization. Obviously, this includes an intercultural sensitivity to differentiate promising from less promising business opportunities.

The findings of this qualitative multiple case study research project contribute to the research field of international entrepreneurship through better understanding of how and why high-tech startups from small and open economies differ in their speed of internationalization. Furthermore, the findings also add to managerial practice because they will help managers increase the efficiency of international market development. Lastly, policy makers might also benefit from the findings in developing improved public support programmes for high-tech startups.

This comparative cross-national multiple case study research design has several limitations in size and scope that offer new ideas for future research. Future cross-national studies can focus on the differences between other emerging and developed small and open economies. Future scholarly work might also include quantitative assessments of founder and managerial perceptions combined with qualitative data to provide greater clarification of the statistical significance of the variables of this study. Finally, it would be valuable to include correlational studies to analyze the relationships between variable pairs, for example the networking ability of the entrepreneur and the speed of internationalization.

About the Author

Michael Neubert is a Professor at the International School of Management in Paris, France, where he obtained his PhD and is now also Chair of the Strategic Management Committee. He is also a Visiting Professor at the Universidad Paraguayo Alemana in Asunción, Paraguay. He teaches international business, strategic management, doing business in foreign markets, and international finance. His research interests concern the internationalization of high-tech startups from small and open economies. Michael is member of the Academy of International Business, and he is a partner of a private equity firm that invests in high-tech startups and supports them in the development of new foreign markets. Michael is also the CEO of C2NM, a Swiss consulting firm specializing in the field of international and intercultural management.

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Platforms for Innovation and Internationalization

Erik Stavnsager Rasmussen and Nicolaj Hannesbo Petersen

> *"We developed a platform solution. This means that we can work in many different areas where we can use the same platform. Whether it is diabetes, lung disease, cancer, obesity in teenagers, and so on, we can use the same 'engine'. We can even personalize it directly for each patient, and over time it's automatically adjusted to each person. On a technical level, you can use the solution on all devices – smartphone, tablet, computer, and the web – you name it."*
>
> CEO of firm that produces health apps
> and an interview subject in this study

The high-tech global startup has many challenges related to both innovation and internationalization. From a Danish cluster of Welfare Tech firms, eight innovative and international firms were selected and interviewed. Such firms typically have to be agile and operate in virtual networks in almost all parts of their value chains. This article contributes to the understanding of how innovation and internationalization to a great extent are interlinked. The firms have developed a core product or service offering, which the firms often describe as "a platform". Around the platform, they develop their products and services for new customers and users in new countries. The firms have to sustain a strong focus on the platform while at the same time developing their platform solution for new products, new customers, and new markets. This pivoting makes it possible to use the platform in a new context but is highly demanding for the firms. They need to be extremely agile and fast-moving but at the same time still to have a focus on the core of the firm: the platform.

Introduction

Successful innovation progresses from an initial creative act, taking place in what is often called "the fuzzy front end" (Jørgensen et al., 2011; Reid & de Brentani, 2004), to the act of commercialization (execution), and then beyond that to sustainability and the evolution of the innovation (Wooder & Baker, 2012). Typically, this is seen as a one-way process of creating, delivering, and capturing value to defend and sustain value, but it can instead be seen as a process that circles a core idea or platform, as in the lean perspective (Blank, 2013; Tanev et al., 2015). However, the term "platform" can be used in many ways and settings.

In this article, we have chosen the concept of a platform primarily due to our respondents' use of it. In their book about platforms, Meyer and Lehnerd (1997) described a product platform as "a set of individual products that share common technology and address a related set of market application", such as how Black & Decker created a cordless power tool portfolio that shares a common battery format. They try to expand this view of platforms to include services and other types of value-chain activities beyond product development. In general, they define a platform as "a network of interdependent components that work together to try to accomplish the aim of the system". We thus link the use of the platform concept to the ecosystem of innovations and networks of firms. Platforms are more than just a technology; they must be seen as assets in a structure upon which companies can develop new products and services and then market them. This structure can be inside one firm but will often take place in an ecosystem of several firms and other actors, as seen in the cases in this article.

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In the same vein as product and service development, internationalization is often seen as a one-way development to increasingly international firms. Instead, the process can be seen as a constant process of internationalization and de-inter¬natio¬na¬lization in a setting of inward and outward international relations (Freeman et al., 2013). This process involves strategic and operations decisions regarding markets, suppliers, and partners and value-chain activities.

Innovation can be viewed as a small or large number of products and services pivoting around a core idea or platform. Internationalization of the firm (both inward and outward) can also be seen as pivoting around the sale of a platform and sourcing for this platform through internationalizing and de-internationalizing. We intend to show in this article how these processes are linked together in a complex pattern of strategic and operational choices. The theoretical points from the literature review will be supported by short case examples from Danish firms in a welfare technology cluster. What is new in this article compared to previous research on platforms is the empirical observation that innovation and internationalization go through some of the same processes in these firms and that this must have theoretical consequences, too. The article is a follow-up to research on the concept of lean global startups (cf. Rasmussen & Tanev, 2015; Tanev, 2012; Tanev & Frederiksen, 2014; Tanev et al., 2015; Zijdemans & Tanev, 2014) but with a focus on the platforms around which the firms are pivoting their innovation and internationalization.

Literature Review

The newly started high-tech global firm has many challenges, and often it has to be agile and operate in virtual networks in almost all parts of its value chain. We intend to discuss how this is possible from both theoretical and empirical points of view through a small number of case studies. Almor (2011) described these firms as "dancing as fast as they can" and suggested that their ultimate success will come from their flexibility and from a focused strategy aimed at tailoring products and services to a globalization that demands innovation solutions in both sale, sourcing, and other value chain activities. The technology-based international firms will typically grow along one of the axes of customer scope, country scope, or product scope (Almor, 2011), but in the cases that are in this paper, they will often have to grow along two axes or all three at the same time. This growth is made possible through the extensive use of local and global networks for both innovation and internationalization.

The ecosystem and network concepts

Valkokari and colleagues (2017) argue that the innovative capacity of firms depends on their ability to manage dynamic strategic interactions among actors in an ecosystem – it is a competency that enables them to ensure the future vitality of the ecosystem and their own business. This perspective can be extended to encompass not just the innovative capacity of the firm but to its internationalization capacity, too. An ecosystem typically has a large number of actors – both on firm and personal levels. The ecosystem is normally governed through informal arrangements and not contracts (Koskela-Huotari et al., 2016., Lusch et al., 2016; Pellikka & Ali-Vehmas, 2016; Stam, 2015; Viitanen, 2016). The ecosystem concept is thus an extension of the network concept. Based on technological revolutions and increasing globalization, the business landscape is changing the demands for innovation and strategic actions on a global competitive level (Hitt et al., 1998). In attempts to grow and prosper in the global business landscape, the ability to leverage social and business networks has become vital (Eberhard & Craig, 2013; Jones et al., 2011; Vasilchenko, 2011). Thus, networks are reshaping the global marketplace (Parkhe et al., 2006).

According to Bergenholtz and Waldstrøm (2011), the most cited network definition of inter-organizational social network analysis is Laumann (1978): "a set of nodes (e.g., persons, organizations) linked by a set of social relationships (e.g., friendships, transfer of funds, overlapping membership) of a specified type". Furthermore, Bergenholtz and Waldstrøm (2011) argue that the definition unites scholars towards explicitness about both the type and number of actors and form and content of the ties, which sets it apart from more abstract and soft concepts of networks such as connectedness, interdependence, or embeddedness. Mattsson (1987) argue that all business strategies involve a degree of network position change, such as developing new technologies and introducing new ways of organizing collaboration between network actors. As a consequence, the ecological characteristics of complexity, novelty, dynamics, and (network) embeddedness are influencing the perceptions of management with regards to their firm's innovative capacity and internationalization opportunities (Möller, 2010).

Inter-organizational network studies have expanded rapidly since 2000 (Borgatti & Halgin, 2011). The development shows a shift from individualistic and atomistic views of organizing towards a more relational, contextual, and systemic approach (Borgatti & Foster, 2003;

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Ford & Håkansson, 2006). Network perspectives use relationships among actors as explanations of actor and (network) outcomes standing in opposition to individualistic examinations that centre on attributes of actors. From a network perspective, different dimensions of embeddedness deliver substance for business-to-business interactions, which in the end affects business networks (Ford et al., 2008). Halinen and Törnroos (1998) distinguish between vertical (across levels) and horizontal embeddedness (within the same level) to address representational roles and positions of actors within the embedded networks.

The lean startup approach

In the 2000s, the lean startup approach emerged with Steve Blank and Eric Ries claiming that it can reduce the risk of launching new products. In publishing *The Lean Startup*, Ries (2011) contributed to the establishment of a lean startup terminology, including the terms "minimum viable product", "pivoting", and "build-measure-learn". The term "lean" is drawn from lean manufacturing to emphasize the core idea behind the methodology – eliminating waste. The core principle is to reduce waste by not using resources on hypotheses about the product or marketplace that the customer has not validated or do not create value (Ries, 2011). It is thus important to learn from the potential customers early in the process and thereby produce a solution based on customer needs and wants. Entrepreneurs too often "fall in love" with their product or technology from the start only to ignore negative feedback from customers and spend years building a product based on a vision that no one else shares (Furr & Ahlstrom, 2011). To avoid this pitfall, the lean startup approach calls for an iterative process where the problem, products, and customer hypotheses are developed and validated by the customers.

Eisenmann, Ries, and Dillard (2012) defined a lean startup as a firm that follows a hypothesis-driven approach to the evaluation of an entrepreneurial opportunity and the development of a new product for a specific market niche. The lean startup methodology focuses on translating a specific entrepreneurial vision into falsifiable hypotheses regarding a new product together with an associated emerging business model. The hypotheses are then tested using a series of well-thought prototypes and minimum viable products that are designed to validate specific product features or business model specifications rigorously. In this context, the entrepreneurial opportunity is based on shaping the new solution in a way that could solve a specific customer problem.

Other prominent contributors to the lean startup approach are Nathan Furr and Paul Ahlstrom with their book *Nail It then Scale It* (Furr & Ahlstrom, 2011). They suggested a three-step process through which the entrepreneur starts with a hypothesis about the customer pain and then tests it. Once the customer pain has been identified and validated, a hypothesis is made regarding the minimum feature set that will be necessary to drive a customer purchase. Next, a series of gradually more advanced prototypes should be built. Discussion and validation with customers occur throughout each of the steps. Eventually, the customer solution will be "nailed", and the startup can focus on developing a go-to-market strategy and scaling the business.

According to Blank (2013), a startup is "a temporary organization designed to search for a repeatable and scalable business model." Ries (2011) adds that a startup is "a human institution designed to create new products and services under conditions of extreme uncertainty". Both authors advocate experimentation as a source of customer knowledge, which is associated with the concept of a minimum viable product (MVP). The minimum viable product is a product or a service consisting of a minimum set of features that is used as a tactic to reduce wasted engineering hours and financial resources. Furthermore, it is a specific commercialization strategy for putting the product into the hands of early and visionary customers as soon as possible. It is also a specific approach to co-developing a product with customers by looking for quick adjustments of the initial product features. The approach seeks to validate as many assumptions as possible about the viability of the final product before using extensive financial resources. Also, the new venture may adjust its course in a way that may involve "pivoting" from the original agenda. Ries (2011) describes the pivot as "a structured course correction designed to test a new fundamental hypothesis about the product, strategy, and engine of growth".

The minimum viable products a startup builds can be seen as experiments to learn about how to create a sustainable business. It is necessary to reframe the purpose of the startup to "learn what the customer wants" rather than to prove that any original business plan was correct. Ries (2011) suggest a tool to facilitate this learning process: the build-measure-learn feedback loop. Through this process of testing initial minimum viable products with a customer, their feedback results in changes that steer the startup in the right direction (Blank & Dorf, 2012). By continuously going through

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the loop and iterating rapidly, the startup is making incremental progress in their business model to accurately target customers and thereby increases the odds of success. Along the way, the entrepreneur faces a difficult question: Do we change the original strategy or stick with it? With the lean startup approach, the answer to this question depends on a pivot strategy where products and services are turned around the original idea.

Method: Linking Innovation and Internationalization in a Platform

The context of this study is Welfare Tech (welfaretech.dk), a publicly funded Danish cluster established in 2010 to ease and foster innovation and business development in healthcare, homecare, and social services. In 2010, it was regionally based in one of five regions in Denmark, but in 2013, it became a nation membership organization. The members include public organizations, research institutions, educational institutions, and other associations, but the majority is from private industry. Among the cluster's 202 members in 2016, 135 were private firms, most of which are characterized as small and medium-sized businesses. The cluster has 15 employees to facilitate the cluster's membership and to sustain the network development nationally and internationally. The purpose of the cluster is to develop new ideas and insights into demands and requirements, from hospitals and municipalities for example, and to provide a rich, diverse, and dynamic business network development while addressing global societal needs and challenges associated with an aging demographic. The key value the cluster delivers to its membership is a network for product and service innovation and internationalization. As expressed by the manager of the cluster, "We build the pipelines, but the firms have to decide what should be running in the pipes".

The methodological design of the research is a longitudinal processual case study approach (Halinen & Törnroos, 2005), which takes into consideration the network's actors and how the network changes and transforms relationships between them. A systematic combination of empirical exploration, application of the theoretical framework, and in-depth case analysis is used, and the research objective is to discover new insights for developing theories (Dubois & Gadde, 2002, 2014). These insights come from a combination of longitudinal retrospective and real-time processual case research with a mixed method of qualitative and quantitative data (Bizzi & Langley, 2012). Specifically, the public funded cluster is studied in a timeframe of 3 years: 2014 to 2016.

Table 1 presents the eight cases, which were selected from a survey based on social network analysis and from secondary data obtained from public databases. In cases 1 and 7, the new owner of the firm was interviewed, and in the other cases, the owner/founder/CEO

Table 1. Overview of the selected cases from the Welfare Tech cluster

Case	Number of Employees	Year of Foundation	Type of Business
1	5–9	1973	Welfare technology (mobility solutions)
2	20	2006	Software development for automated logistical solutions
3	8	2009	IT solutions for overview, planning, and communication in healthcare
4	13	2013	Health IT (healthcare software)
5	10–19	2006	Healthcare technology (telemedicine solutions)
6	20–49	2010	Healthcare technology (touchscreens with customized apps)
7	20–49	1985	Healthcare technology (patient turning system)
8	20–49	2005	Mobile apps and web solutions for healthcare

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was interviewed. All interviews were based on an interview guide with a focus on the firm's relation to the cluster in relation to innovation and internationalization. Furthermore, a number of questions were asked related to the history of the firm and the type of products/services they deliver. The length of the interviews was between 1.5 and 2 hours, and all interviews were transcribed and analyzed with the Nvivo tool. All quotes have been selected from this analysis and afterwards translated into English.

Cases

From the study of the Welfare Tech cluster, the researchers have selected eight firms that all are characterized by being innovative and international at the same time. Innovation does not necessarily mean that the firms are developing high-technology with patents, but that they have a focus on developing their solutions on an ongoing basis, often through close relationships with research institutions in Denmark and abroad. Internationalization is evaluated from the number of value chain activities the companies have outside Denmark and the size of these activities (e.g., export compared to total sale).

Results

For the case firms, innovation and internationalization are associated with finding customers outside Denmark, as this typical quotation shows:

> *"Early on, in a market outside Denmark, you have to show your partners that there is a market for your solution. You must be able to demonstrate that it can sell and that it could be interesting for a partner. They need 'meat on the table', so to say."* (Case 6)

The market, in this case, is outside Denmark, and the partners are both for international innovation and sales. The product or service is presented to potential partners, changed a bit, and presented again. Finding the right partners for both innovation and internationalization is crucial, and the firms and their managers use many resources to find and evaluate them. The partners will typically be placed horizontally and vertically at the same time (Halinen & Törnroos, 1998).

> *"You have to evaluate all the contacts you get – check them, find references, learn what they are doing, see if it could be interesting to us, and so on. This is an intentional process where you meet people and have a dialogue, and maybe they will refer to you. You get wiser, collect data and information, and talk about yourself. There are many ways to enter a market, but it is important to find out what's happening regarding technology, products, and the firms. All this is about establishing a network and sharing it with your partners."* (Case 7)

For many of these small firms in the network, the question is: Why go international? For most of them, the answer is quite simple: Because the Danish market is too small.

> *"Denmark is not large enough, not if we are going to make a living out of our products. Not with the price we have to charge. You must use the contacts you have, grab the network, and implement your solution on an international scale. If the next customer is in Portugal, then go to Portugal and find somebody that can help you."* (Case 4)

For several of the firms, the international strategy has been to establish local firms (typically joint ventures with foreign and Danish partners) in each foreign market.

> *"We set up cooperation agreements in each country – typically with local partners. The customers will then be in contact with, for example, a German company in Germany. But, behind this, we are in control together with our partners."* (Case 3)

Often, the establishment abroad is done through one partner in the network in Denmark. This contact has typically been established through the network or by some of the organizations involved.

> *"We have* one *contact in London that we found through our network. This is a potential customer that agreed to present us to other firms in his network. The important thing is to get a lead to the next customer and then refer to the first contact. It is crucial that we have the reference to this contact and the Danish organizations. People don't ask the same questions when we have these relationships. Otherwise, we would just be another small firm trying to enter the market."* (Case 4)

Internationalization is often done with a few partners (typically larger firms) that can use the solutions the firms provide and provide access to customers and new partners abroad.

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> *"We started in Denmark, and then we had a project in the US, and then an EU project with six countries. Then, we went to Sweden and Norway and Greenland. One project in Australia and one in Dubai and other projects, for example in Spain… We work on a global scale with 11 to 14 countries that are comparable to the 20 employees we have… We have distribution partners in Germany, France, the Middle East, and in the US. They function as our local 'man on the ground', so to say. They sell our platform solution, and we then develop it. Our solutions have to fit their business model before they can be valuable partners. They must be in the market and not have to build from scratch."* (Case 8)

For the firms in the network, it is extremely important to have the opportunity from the network to relate to larger firms and organizations that can help them with the internationalization. One of the key challenges for the Welfare Tech cluster has thus been to establish networks and relationships, especially with partners and customers abroad. These network activities involve building trust between the firms and organizations in the cluster as the first step, and then to build trust with actors outside Denmark as the second step.

> *"They* <the Welfare Tech cluster> *have given me a place where I can come and form a network… We have found a new partner – a new firm – and we will sell our products together at the export markets in the UK and France."* (Case 1)

Several of the firms need access to highly specialized industries such as hospitals, which are quite critical for new firms, especially small firms from abroad.

> *"We started with Q* <a large Danish firm that is well established in the market> *and asked them if it was the right way to enter the hospital market abroad. Together, we found some partners and one especially large partner who is the Rolls Royce of this industry. Together we can now grow our firms."* (Case 2)

Partners such as universities can be a great help for the firms, too. Often they are used as hubs to create contacts to new partners and customers. One of the lessons learned during the development of the cluster was that these hubs have to be nurtured and developed but that the time horizon is extremely long, especially if you are new, small firm.

> *"We have been in dialogue with K* <a university> *for a long time. They were leaders of a project, and we were partners in the project. What we do is so specific that there is no competition. The import thing for us is not 'canvas' sale but to create new relationships with firms that can integrate our solution into their solution. Alternatively, maybe we can integrate their solution into ours."* (Case 5)

To create solutions that can fit into other firms' products and services is thus extremely important for the case firms. To develop a platform that at the same time can be protected and fit into the partners' products is of course not easy. One solution is to "slice" the platform "cake" into smaller pieces that each can be used in a project without giving away all the firm's innovative secrets.

Discussion and Conclusion

A young innovative firm with international ambitions will meet many obstacles. Often, the founding period has been used to develop one unique product or service. For the firms in this research, the core product or service is typically seen as a platform for further expansion – innovations and internationalization. The respondents in the interviews were asked to present the company's main idea – product or service. This presentation was often drawn as a platform and the products and services coming from this platform as concentric circles with the core product or platform in the centre. The quotation at the beginning of this article tells precisely how the case firms see their solutions:

"We developed a platform solution. This means that we can work in many different areas where we can use the same platform. Whether it is diabetes, lung disease, cancer, obesity in teenagers, and so on, we can use the same 'engine'. We can even personalize it directly for each patient, and over time it's automatically adjusted to each person. On a technical level, you can use the solution on all devices – smartphone, tablet, computer, and the web – you name it."

In the middle is the platform, and around it are different types of applications built on the platform. Further out is the adjustments made for each customer, and in the last circle, the personalized product or service for each user is found. In each circle – except the inner circle – partners are taking care of innovation and sales outside Denmark. Further circles can be added to describe the different communication solutions – mobile phones, computer programs, the web, and so on. All the circles can be turned around the platform in the middle and, in this way, firms adjust the solution to each customer.

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From a theoretical point of view, platforms are not new but have been described in the literature for many years (Meyer & DeTore, 2001; Meyer & Lehnerd, 1997). Our novel contribution to the traditional platform literature is to recognize platforms as potential starting points for the internationalization of firms.

Pivoting, as in the lean startup literature, is thus not just a question about innovation but also about finding the right solution for each customer, often with the help of a partner. As described above, the pivoting often implies giving away a small slice of the platform cake instead of all the innovations. In a small country such as Denmark, this use of the platform has to be done on an international scale because the Danish market is much too small for the niche products and services developed by the case firms. Innovation and internationalization are thus part of the same process as seen from the firms' point of view. From the analysis of the interviews, it is clear that innovation and internationalization are not two separate processes in many of the firms. The processes could be called "innovative globalization", and the firms are "dancing as fast as they can", as described by (Almor, 2011), with growth along the axes of the customer, country, and product scope at the same time.

To find new customers in new country markets and to develop new products and services is for these small, innovative firms thus a question of adjusting the initial platform a bit and pivot around it. It is necessary for the firms to keep a strong focus on the platform because they do not have the resources to develop a new platform. At the same time, they have to adjust the offerings coming from the platform to new customers and markets on a global scale. To "pivot", from the lean startup literature, has thus a new meaning when looking at firms that have to be highly international, too. Pivoting – or turning around the initial idea – has to be done in relation to products and services, customers and users, and new country markets. Being able to do this with an extreme focus on the core platform and at the same with a high degree of agility in the product and market development is the essential part of what could be a new type of firm: the lean and global startup.

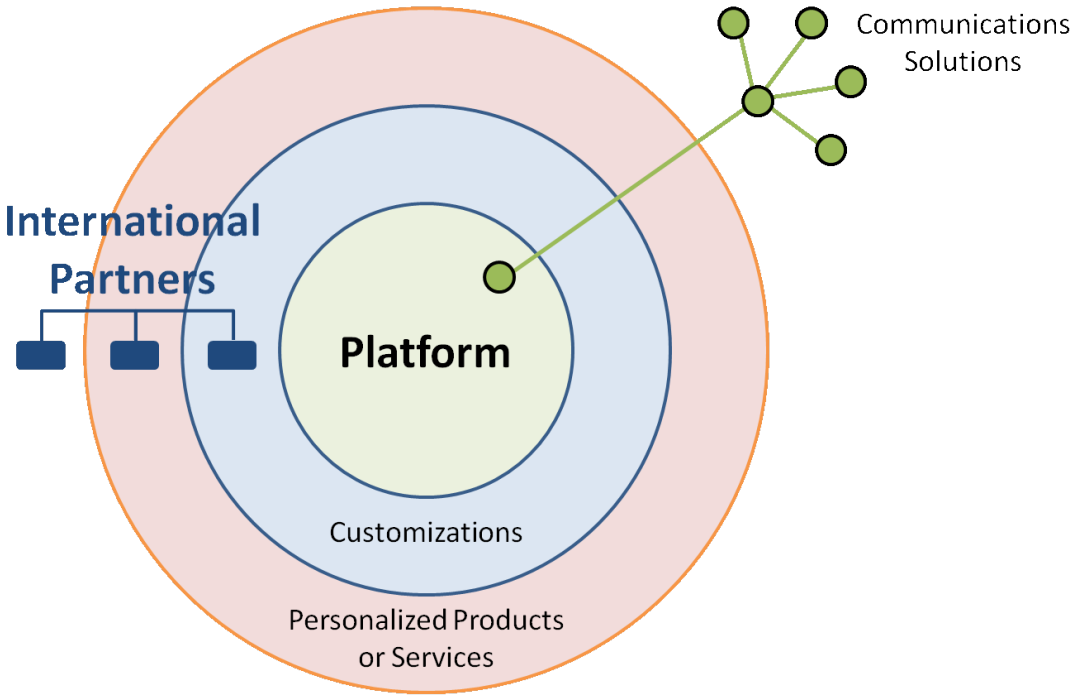

Figure 1. A typical conceptualization of a firm's view of their platform and partner interactions

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Erik S. Rasmussen is an Associate Professor in the Department of Marketing and Management at the University of Southern Denmark in Odense. He received his PhD in 2001 from the University of Southern Denmark, focusing on fast-internationalizing small and medium-sized firms. His research focuses especially on international entrepreneurship and born-global firms. In recent years, he has particularly focused on studying international entrepreneurs that can avoid domestic path dependence by establishing ventures that, from the beginning, develop routines for a multi-cultural workforce, coordinate resources across nations, and target customers in several geographic places simultaneously. Furthermore, he has published a number of articles about lean and global startups combining the lean startup and born-global theories.

Nicolaj Hannesbo Petersen is a PhD student in the Department of Marketing and Management at the University of Southern Denmark in Odense. A particular focus of the project is on innovation and internationalization processes anchored in the structure of relationships among SMEs. The network perspective is concentrated on a Danish publicly funded welfare/health technology cluster. Central aspects of the work include how and why embedded opportunities and constraints evolve and are made sense of through the network for economic action. Nicolaj's work experience was gained from practice through innovation consultancy in the venture capitalist industry.

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Accelerating Research Innovation by Adopting the Lean Startup Paradigm

Kaisa Still

> *"It is the unlikely partnership between academia, the public sector and private enterprise that allow us to navigate the path from discovery, to innovation, to transformation. The process, however, is often unwieldy, taking decades to go from primary discovery to a measurable impact on society."*
>
> Greg Satell
> Innovation advisor and author
> In *Forbes,* Dec. 18, 2015

Converting scientific expertise into marketable products and services is playing an increasingly important role in the launching of new ventures, the growth of existing firms, and the creation of new jobs. In this article, we explore how the lean startup paradigm, which validates the market for a product with a business model that can sustain subsequent scaling, has led to a new process model to accelerate innovation. We then apply this paradigm to the context of research at universities and other research organizations. The article is based on the assumption that the organizational context matters, and it shows how a deeper understanding of the research context could enable an acceleration of the innovation process. We complement theoretical examples with a case example from VTT Technical Research Institute of Finland. Our findings show that many of the concepts from early-acceleration phases – and the lean startup paradigm – can also be relevant in innovation discussions within the research context. However, the phase of value-proposition discovery is less adequately addressed, and that of growth discovery, with its emphasis on building on a scalable, sustainable business does not seem to be addressed with the presented innovation approaches from the research context. Hence, the entrepreneurial activities at the research context differ from those in startups and internal startups in established organizations.

Introduction

Today, commercialization, or "going to market" (Friedman, 2002), is particularly challenging, especially given the pressure to do it quickly. Indeed, it has been claimed that the need for speed in development and speed in going to market have a tremendous impact on the dynamics of technology transfer and is the most important driver of change, which means that a firm's ability to develop and market products and technologies quickly is crucial (Amesse & Cohendet, 2001).

However, the context of this study is the research world, which is not oftentimes characterized as a dynamic environment with a high clock-speed, though it has been stated that "in the long run, only dynamic and innovative research environments survive" (Graversen, 2007). For example, some years ago, it was estimated that it takes three to six months to put a research team together; hence, this long-term perspective that is needed for several design iterations can only be achieved by government funding (Nunamaker, cited in Winter, 2010). A bit more than a third of all R&D activities in Europe continue to be funded by government (Eurostat, 2016). Reaping the benefits of product and service innovation – in a timely, successful manner, continues to be a challenge. In Europe, a so-called European paradox has been acknowledged, referring to the perceived failure of European countries to translate scientific advances into marketable innovations (European Commission, 1995). Furthermore, the European Commission has placed renewed emphasis on the conversion of Europe's scientific expertise into marketable products and services by seeking to use

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public sector intervention to stimulate the private sector and to remove bottlenecks that stop such ideas reaching the market (Eurostat, 2016).

Technology transfer – simply defined as "the movement of know-how, technical knowledge, or technology from one organizational setting to another" (Roessner, 2000) – from universities and other public research organizations is increasingly seen to play a significant role in contributing to new venture creation, the growth of existing firms, and new job creation. This role is oftentimes addressed under the umbrella concept of innovation, which for about 20 years has been viewed as a complex, interactive process that is essentially systemic in character (Autio, 1997), with technology transfer activities loosely regarded as "boundary spanners" or "brokers" between academia and industry (O'Kane et al., 2015).

In this article, we seek to transfer a technology innovation methodology from industry to academia. By applying the "lean startup" paradigm to research activities of universities (and other public research institutions), we seek to accelerate innovation in a research context. The article is structured as follows. First, we briefly examine the lean startup paradigm and share insights about innovation in the research context. Then, we introduce a new model of innovation acceleration developed specifically to address the European paradox of commercialization failure. Next, we align our innovation acceleration model with theories and methods from the research context and share practical insights from a case from VTT Technical Research Centre of Finland. We then discuss the findings, and we conclude by highlighting the implications for researchers, managers, and policy makers.

Lean Startup Paradigm

The lean startup paradigm envisions a new company arising based on a new product or service that will be embraced by a particular market (Maurya, 2012; Ries, 2011) because it solves the customer's urgent problem (Moogk, 2012). Simply put, the paramount goal of the startup management team is to find product/market fit with a business model that can scale before they run out of cash (Blank 2014). It has been stated that the uniqueness of this lean startup methodology consists of its ability to explicitly take into account the numerous uncertainties regarding the sustainability and suitability of a given solution towards a specific customer problem (Rasmussen & Tanev, 2015).

The ideas behind the lean startup were launched by the introduction of the customer development process by Steve Blank (2007). Subsequently, it has been refined by Blank to emphasize experimentation (Blank, 2013), with the focus on the adaptiveness and effectiveness of new startups in dealing with the scarcity of resources in their go-to-market efforts (Maurya, 2012). Around the same time, Erik Ries (2011) tied the lean startup concept to lean manufacturing and lean thinking by applying them to the context of entrepreneurship. He wrote the game-changing book *The Lean Startup: How Constant Innovation Creates Radically Successful Businesses,* which is based on five principles that guide the translation of a specific entrepreneurial vision into new products and solutions:

1. Entrepreneurs are everywhere.

2. Entrepreneurship is management.

3. Learning should be validated.

4. Follow a build-measure-learn approach.

5. Apply innovation accounting: a qualitative approach that allows entrepreneurs to see whether the innovation engine is working.

In the lean startup, the first part of the innovation process is to determine whether the product vision can be matched with a problem worth solving using a combination of qualitative customer observation and interviewing techniques (Maurya, 2012). If the product vision is validated with customer data (i.e., if there is a problem/solution fit), the startup rapidly builds prototypes or initial versions of its product that are complete enough to demonstrate the value it brings to the users. This is known as a minimum viable product (MVP) (Moogk, 2012). Once the problem is found and the MVP is built, the goal of a startup is to validate that there is an attractive enough market for the solution. In effect, the startup is looking for a viable business model. Throughout this process, learning can take place, supporting the question whether to pivot the original strategy or persevere (Ries, 2011).

Ries (2011) further states that the lean startup must avoid doctrines and rigid ideology. Some have labelled lean startup "a movement" (Rasmussen & Tanev, 2015) as well as "a collection of tools and techniques that can be employed by entrepreneurs to build their ventures faster and at lower cost" (Harms, 2015), both emphasiz-

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ing that it tends to be viewed more as a practice-based methodology than a theory for innovation. However, Harms (2015) points out that innovation and technology management scholars may know the lean startup approach under the names of "disciplined entrepreneurship", "hypothesis-driven entrepreneurship", or "probe and learn".

Innovation in a Research Context

The importance of context

In a special issue focusing on the importance of context in entrepreneurial innovation, Autio and colleagues (2014) state: "All human action occurs in contexts: it is the context that regulates what individuals and teams get to see, what choices they are likely to make, what the outcomes of those choices are likely to be. For this reason, context must play a central role in our understanding of the origins, forms, micro-processes, functioning, and diverse outcomes of entrepreneurial activities." They go on to acknowledge and emphasize the tendency in the entrepreneurship literature to focus on the individual, the team, and the resulting venture while neglecting the context.

Still, earlier research has emphasized that the environment in which an individual works is likely to have a great influence on that individual's behaviour, with the main environmental factors being culture, policies, and routines (Kalar & Antoncic, 2015). The research streams that have concentrated on contexts explaining entrepreneurial innovation have explored nations, regions, and industries – and, according to these scholars, context matters because it shapes not only the opportunities that are available but also the dynamics that unfold (Garud et al., 2014). Hence, the research context as such has not been a dominant research stream, though universities and public research organizations have been presented as key players in knowledge ecosystems, advancing technological innovation within the system (Clarysse et al., 2014).

The boundaries between science and business are blurring (O'Kane et al., 2015), as evidenced by the introduction of concepts such as "academic capitalism", the "triple-helix", and the evolving entrepreneurial university. By extending the role of universities beyond simply producing new knowledge, but also disseminating this knowledge to industry and society, the entrepreneurial university is expected to provide a culture and suitable atmosphere for encouraging academics through activities that are more entrepreneurial in nature (Kalar & Antoncic, 2015). Still, the contrast is clearly acknowledged: the startup culture "encourages individual initiative and autonomy, and creates a shared esprit de corps that results in the passionate and relentless pursuit of opportunity. This is the antithesis of the process, procedures and rules that make up large companies" (Blank, 2014).

In his seminal work focusing on university-directed commercialization and entrepreneurial innovation at Stanford University, Nelson (2014) showed how the organizational context not only shaped the decision to engage in entrepreneurship but also the specific approach taken to the commercialization process. In Nelson's work, interviewees argued that the availability of specific funding sources influenced the specific commercialization focus and urgency. Furthermore, he finds it doubtful that individual initiatives such as faculty workshops on entrepreneurship, access to technical equipment, or a seed grant in the tens of thousands of dollars (all common approaches taken by universities in their attempts to spur entrepreneurship) would have changed the fundamental commercialization process and its impact.

Nelson (2014) hence suggested that understanding entrepreneurial behaviours may demand attention not only to individual-level characteristics but also to contextually-informed approaches to action. In addition, he advises that it might be good to embrace those aspects of the university context that mark it as distinct from the firm – for it might be these very features that plant and nurture the research that leads to future marketable technologies.

Understanding innovation in a research context

In the 1980s and 1990s, the focus of technology transfer was on competiveness and was based on a rather simple logic: universities and government labs make, industry takes (Bozeman, 2000). In introducing the concept of design science for the research context of information systems, the purpose was to produce systems that do not yet exist, to achieve better results, with an engineering emphasis (Nunamaker et al., 1991). The concept of "the last mile" was introduced to identify where the value to society is created: the last mile is where you make the lasting difference (Nunamaker et al., 2015; Winter, 2010). This is seen to proceed in three stages: i) proof-of-concept research to demonstrate the functional feasibility of a solution; ii) proof-of-value research to investigate whether a solution can create value across a variety of conditions; and iii) proof-of-use research to address complex issues of operational feasibility. This means that the solution is not really un-

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derstood and cannot really be evaluated before it is actually implemented, and researchers cannot predict the impact of their research when only sitting at their desks (Nunamaker et al., 2015).

In the late 1990s, Autio (1997) discussed new technology-based firms emerging as spinoffs from universities and public research organizations. He saw some key differences between science-based firms (firms developing applications concerning physical phenomena or theoretical constructs) and engineering-based firms (firms expanding the scope of use of these applications), arguing that the dominant focus of science-based firms was on a technology-push mode of technology transfer, whereas the emphasis of engineering-based firms appeared to be on a market-pull mode. However, according to Autio, ultimately the most important economic impact of these spinoffs may well be as a catalyst delivered through technology interactions between the firms and their operating environment.

In the 2000s, the research context was addressed by introducing the term "public research institutions". In 2007, a paper suggested two modes of innovation: the science, technology, and innovation (STI) mode, which is based on the production and use of codified scientific and technical knowledge, and the doing, using, interacting (DUI) mode, which relies on informal processes of learning and experience-based know-how (Jensen et al., 2007). It also argued – just like Autio did 10 years earlier – that, in most areas, the results of scientific research are not directly useful for technological advances. Rather, they are more about providing guidance and clues for further development. Furthermore, it suggested that firms with an exclusive focus on developing their science and technology base could benefit from adopting practices and measures designed to promote informal learning by DUI. For public research institutions and universities, it was pointed out that, if they cannot foster sufficient commercialization and entrepreneurial skills among their academics and technology transfer officers, it may be appropriate to place more emphasis on licensing inventions. Hence, in technology transfer, patenting and subsequent licensing were still heavily favoured.

In the 2010s, the linkages between science, technology, and university spinoffs and universities were increasingly emphasized. In explaining their multi-stage, holistic model for creating university spinoffs, Pattnaik and Pandey (2014) argued that universities are moving from their traditional roles of research, teaching, and knowledge dissemination into a more advanced role of creating spinoffs and promoting academic entrepreneurship, with significant impact on regional development and economic growth. They highlighted the role of spinoffs as significant engines toward the commercialization of the technologies that were previously developed, but they also noted that university researchers tend to be more focused in technology development than in other equally important aspects of business. Pattnaik and Pandey's (2014) model consisted of four steps: i) competences and funding; ii) test and confirmation of results; iii) invention disclosure and patenting; and iv) creating spinoffs, leasing technology, and focusing on general economic and social value. More recently, Boh and colleagues (2016) stated that faculty and students are most heavily involved in the earliest phases of the technology commercialization process of the university spin-offs. These authors also identified six stages in the early technology commercialization process: i) idea generation; ii) the commercializing decision; iii) prototype generation and establishment of commercial and technical viability; iv) founding team formation; v) strategy and commercialization process determination; and vi) fundraising to sustain activities, with the aim of convincing investors that the new technology has commercial and technical viability (Boh et al., 2016).

On the research organization side – now addressed as public research organizations – Steinmo and Rasmussen (2016) concluded that they play a crucial role in R&D and innovation across a wide range of industries. On one hand, public research organizations are seen as valuable collaboration partners; firms that collaborate with public research organizations are more likely to develop innovations than other firms. On the other hand, most firms find it difficult to collaborate with public research organizations. Business organizations and public research organizations are seen to pursue different goals. They are therefore structurally different from each other in many ways such as, for example, in their incentive structures and management styles (Steinmo & Rasmussen, 2016). These differences often prevent firms from using public research organizations as sources of external information, and firms generally rate them very lowly as information sources and potential partners.

An Innovation Acceleration Model Inspired by Lean Startup

In many public research organizations, research projects have been undertaken to address the European paradox. Indeed, this has also been a starting point for

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the Accelerate project (www.accelerateproject.eu), which is part of the second instalment of the ITEA programme (itea3.org) to support innovative, industry-driven, pre-competitive R&D projects in the area of software-intensive systems and services. Overall, the project is focused on enabling: i) the commercialization of better products and services, ii) while being faster to the market, and iii) with sustainable business models. During the project, a new model of innovation acceleration has been developed to overcome some of the key limitations of current models of innovation. Most existing models represent some variations on the familiar pipeline-process architecture: they are not embedded in the strategy issues of company boards, and hence there is misalignment between the newly emerging theoretical models of innovation and innovation in practice (Berkhout et al., 2010).

Inspiration for the model of innovation acceleration has been found from the new kind of innovation thinking that has emerged from within the startup world. The principles of lean startup entrepreneurship have been extended beyond the startup context as the early-stage entrepreneurial challenges have been found to exist beyond the context encountered by typical high-technology ventures (Lockett et al., 2005). The "internal startup" concept, in which a company launches a separate (semi-)independent initiative to pursue a new innovation or idea (Mäkijärvi et al., 2016), has even been claimed so successful that "an internal startup is an ideal environment to nurture innovation and entrepreneurship in large companies" (Edison et al., 2016).

The resulting innovation acceleration model has been defined with four phases (customer discovery, solution discovery, value proposition discovery, and growth discovery), moving from the initial idea to the scalable, fast-growing, and sustainable business (Figure 1). The customer discovery phase aims at producing an initial concept: a vision for a new business with committed people. The solution discovery phase aims at a high-value concept with user acceptance and resources to move forward. In the value proposition discovery phase, a validated and desired solution is produced

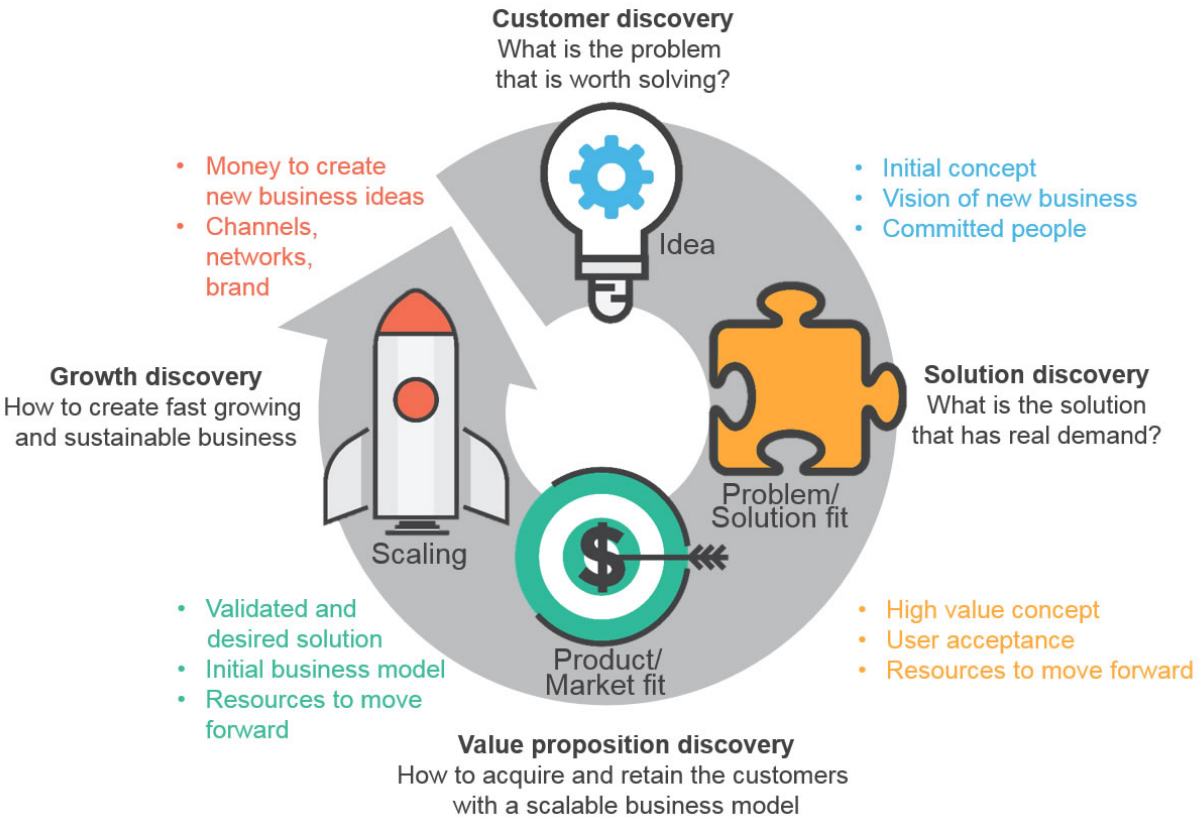

Figure 1. The innovation acceleration model

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with an initial business model and resources to move forward. The growth discovery phase is about scaling and creating a sustainable business, which then is expected to result in money to create new business ideas, as well as channels, networks, and brand. Hence, it is a model of continuous refinement, in which especially the two last phases are go-to-market activities as the entity is operating in the market with its value proposition, going toward scaling.

The new process model has been validated by working with Finnish startups that could easily place themselves within the continuum of the process elements (Wallin et al., 2015). It has been successfully used by some of startups and internal startups of the Accelerate project. It has been also used in European startup masterclasses (Mohout, 2014).

Applying the Innovation Acceleration Model to the Research Context

This article is based on the premise that, in today's fast-paced world faced with global competition, it is imperative for many stakeholders to explore the opportunities for accelerating innovation in the research context. Hence, we set out to answer the following research question: *How can the innovation acceleration model be applied in the context of research?*

As described above, it is well known that the research context (referring to universities and research organizations, especially public research organizations) differs from the context of business. Overall, it has been stated that traditional research projects focus on exploration while startups focus on exploitation (Nelson, 2014). Furthermore, in academia, it has been stated that ideas are generated for their own sake, and their implementation is considered less important or even irrelevant (Winter, 2010). For the purpose of this article, we have selected and presented some perspectives that would be relevant in highlighting the differences in innovation acceleration. Still, in this so-called non-commercial environment, speed has been proven to matter (Lockett et al., 2005).

Our research is less about the entrepreneurial individuals – although we understand that innovation in all of its phases is done by individuals – and more about the organizational context. We agree, therefore, with the hypothesis that organizational context plays a role in shaping how participants approach technology commercialization (Autio et al., 2014; Nelson, 2014). We seek to explore the extension of the possibilities of innovation acceleration beyond standalone startups and internal startups.

To explore the importance of context for innovation, and innovation acceleration in particular, we analyzed a selection of different approaches. These approaches, representing more than 20 years of innovation research in a research context, were categorized and mapped onto the schematic representation of the innovation acceleration methodology, which, as already presented, is very much based on the lean startup paradigm.

Context of a case study

After aligning our innovation acceleration framework with theories and methods from the research context, we sought to derive complementary practical insights by applying it within VTT Technical Research Centre of Finland Ltd (vttresearch.com). VTT is a leading research and technology company in the Nordic countries, and it offers research and innovation services to both private and public partners. In 2015, it had a net turnover of 185M€, received 48 new patent applications, and created 21 spinoffs.

Recently, VTT has been re-focusing its strategy by focusing on growth: with scientific and operational excellence, it wants to bring its own innovations to the market, simultaneously supporting Finnish companies and society on the whole. The new strategy journey supports the analysis of the existing innovation and technology transfer processes such as the one made for the purposes of this article. There are a number of improvement projects under way, for example related to intellectual property rights, sales and spinoffs, service model development, as well as a wider implementation of the lean startup methodology. It should be noted that spinoffs are not new to VTT: Autio's (1997) early research into technology-based new business creation included 29 VTT spinoffs.

As just one example of VTT's innovation activities, the Innovative Business from Emerging Technologies (iBet) program encourages internal startups and internal entrepreneurship within VTT. It explores future opportunities, concentrating on renewing the technology basis and leading to societal, industrial, and technological impacts. VTT is looking for great ideas that can be incubated, refined, and transformed into inventions, further developing them into innovations aiming at marketable products, solutions, and services. The iBet programme proceeds as follows:

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1. For selected ideas, team members are invited to spend 3–5 days to prepare a pitch.

2. Teams with successful pitches are given one month for further development.

3. Approved plans are given funding for one year, with an option for further continuation.

From 2016 to 2017, 168 ideas were submitted to the iBet process. Of these, 20 ideas were selected, 13 of which were granted funding for one year.

Findings

With the aim of understanding the applicability and use of the lean startup paradigm within the research context, the research question was explored using both the theoretical approaches as well as one concrete case. The findings are presented in Table 1, which shows how the four phases of the innovation acceleration model are addressed.

The major finding of the analysis is that the front-end of the model is addressed by all of the approaches. However, the "go-to-market" elements corresponding to the two last phases of the innovation model are not widely addressed. The value proposition discovery phase was oftentimes presented as something that another entity than the university or research organization, such as a spinoff, would take care of. The phase of growth discovery, with its emphasis on building on scalable, sustainable business does not seem to be addressed with the presented innovation approaches from the research context.

The first phase of customer discovery encourages entrepreneurs (or entrepreneurial teams) to create an initial concept and vision of new business with selected committed people. This phase responds to the tensions of market pull versus technology push with developing applications and technology interactions (Autio, 1997) and the doing-using-interacting model (Jensen et al., 2007). This phase also emphasizes the competences and funding from the creating of spinoff model (Pattnaik & Pandey, 2014) as well as idea generation, the commercialization decision, and founding team formation of the early technology commercialization process at universities (Boh et al., 2016).

The second phase is about solution discovery, when the goal is to create a high-value concept, with user acceptance and resources to move forward. The proof-of-concept and proof-of value (Nunamaker et al., 1991) and the continuation of doing-using-interacting (Jensen et al., 2007) can be placed into this phase. Also, the test and confirmation (Pattnaik & Pandey, 2014), and the prototype generation and establishment of commercial and technical viability as well as invention disclosure and patenting (Boh et al., 2016) correspond to this phase.

In the third phase of value proposition discovery, developing a validated and desired solution is key, with corresponding efforts to create the initial business model, and again, with resources to move on. The proof-of use (Nunamaker et al., 1991) correlates to the validated solution. Whether to move on with a spinoff or with leasing technology (Pattnaik & Pandey, 2014) can be seen as creating an initial business model – however, again, taking the innovation process outside of the university or research organization setting, and hence forcing the innovation acceleration cycle to start from the beginning. The strategy and determination of the commercialization process as well as fundraising to sustain activities (Boh et al., 2016) also can be seen to be part of this third phase. However, whether all of these activities create a high-value concept is to be determined, as many of the research context approaches do not mention user acceptance or real contact and feedback from customers, which is imperative in the lean startup paradigm.

The fourth phase, growth discovery, aims at creating scalable, sustainable businesses. Other than with the hint that spinoffs or licensing agreements are the tools for taking the innovation to the market, it does not seem to be addressed with the innovation approaches discussed in the research context. Channels, networks, and brands are not mentioned in the descriptions of these approaches, nor is the business sustainability focusing on securing the money to create a new business.

VTT's approach to supporting entrepreneurship with the iBet program also reflects the phases of the acceleration methodology, and shows how the lean startup paradigm is increasingly being applied to the research context. Idea selection corresponds to the idea phase, development of plans corresponds to the problem/solution fit, and continued funding allows for exploring toward the product/market fit. Again, the words "scaling", "brand", and "growth" are note mentioned in the iBet program, and hence the growth discovery phase does not appear to be addressed.

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Table 1. Mapping the innovation in research context to the model for innovation acceleration

Innovation in Research Context	Innovation Acceleration Model			
	Customer Discovery *What is the problem that is worth solving?*	**Solution Discovery** *What is the solution that has real demand?*	**Value Proposition Discovery** *How to acquire and retain the customers with a scalable business model*	**Growth Discovery** *How to create fast growing and sustainable business*
Nunamaker et al. (1991) Nunamaker et al. (2015)	–	• Proof-of-concept • Proof-of-value	• Proof-of-use	–
Autio et al. (1997)	• Developing applications • Market pull • Technology interactions		–	–
Jensen et al. (2007)	• Doing-Using-Interacting (DUI model)		–	–
Pattnaik & Pandey (2014)	• Competences and funding	• Testing and confirmation of results • Invention disclosure and patenting	• Creating spinoffs • Leasing technology	
Boh et al. (2016)	• Idea generation • Commercializatio n decision • Founding team formation	• Prototype generation and establishment of commercial and technical viability • Strategy and commercialization process determination	• Fundraising to sustain activities, with the aim of convincing investors	–
VTT Case: iBET	• Idea selection	• Development of selected plans	• Continued funding for selected plans	–

Discussion

Universities and research organizations, identified as non-commercial environments, oftentimes with commercialization and go-to-market activities going through technology transfer offices, have been described with their specific innovation activities, characteristics, and processes, hence separating them from companies and businesses. For example, new technology-based firms have been described as growth oriented, taking risks to pursue growth, growing or perishing with their technology (Autio, 1997), and none of those descriptions were found in the research innovation literature.

Still, it can be concluded that many of the innovation-related concepts derived from the research context can be fitted into the acceleration methodology. However,

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it is also evident that the context does make a difference, and that the research context has been approaching innovation from a different perspective. The descriptive exploration of more than 20 years of innovation activities within a research environment indicated the impact of context on entrepreneurial activities (Autio et al., 2014; Clarysse et al., 2014; Garud et al., 2014; Nelson, 2014). Hence, our results from analyzing innovation approaches from a research context with the model for innovation acceleration bring evidence to the notion that entrepreneurial innovation is profoundly affected by its context (Autio et al., 2014).

Some of the principles of the lean startup approach (Ries, 2011) could be found in the analyzed innovation approaches. For example, the doing, using, interacting (DUI) model as well as informal learning (Jensen et al., 2007) correspond very well to the overall idea of validated learning. The research context is seen to be moving from exploration to exploitation (Nelson, 2014) – hence, going toward the goal of a successful business, which is at the core of the lean startup paradigm, and indeed, Pattnaik and Pandey (2014) already mention spinoffs as the means for that. However, with this creation of spinoffs as well as with leasing technology, Pattnaik and Pandey (2014) move the innovation process away from the university or research organization setting. Hence, research organizations are seen to be valuable partners in innovation (Steinmo & Rasmussen, 2016), perhaps with the implicit connotation that they are not actual innovators and entrepreneurs, which conflicts with the first lean startup principle: "entrepreneurs are everywhere" (Ries, 2011). In addition, the emphasis on the user (or market) is not dominant in the research context approaches. For example, the multi-stage, holistic model of creating university spinoffs (Pattnaik & Pandey, 2014) does not seem to focus on user needs. Also, discussions of management or innovation accounting were not directly addressed in the selected approaches.

The practical example from VTT, the iBet program, can be seen as one way of going beyond the traditional innovation process of a research organization. Although it also showed that the growth discovery phase was notably not included, it did include some emphasis on go-to-market activities. Furthermore, the fact that this entrepreneurship focused program was attractive to the personnel at VTT is interesting and encouraging: with the total number of VTT researchers at about 1450, this translates to submission from more than 11 percent of them (assuming that each researcher only submitted one idea). This finding reflects that the research context (at least in Finland) is changing, and entrepreneurship is increasingly seen to be part of it.

Limitations of the study

Innovation continues to be a multi-disciplinary topic with a large amount of literature related to its processes, characteristics, impact, etc. This article does not pretend to be comprehensive in its quest to analyze how the lean startup paradigm explicitly presented with an innovation acceleration methodology can be applied in the context of research. Rather, the article is intended as more of an exploratory discussion that starts from an existing model for innovation acceleration, and its applicability and validity in the research context. Hence, the number of research approaches analyzed was limited, and the approach was aligned with a single case example from VTT. In particular, the major finding of the "go to market" elements corresponding to the two last phases of the innovation model but especially on the growth discovery/scaling being largely absent from the research context could be explored further, with more examples as well and on the basis of a more thorough theoretical review.

Managerial implications

There are many different actors in the research context who are involved in the innovation process. Beyond research personnel, new business development people, intellectual property specialists, and early sales professionals, accelerating innovation is important to all. All of us must know the terminology and the process steps that are generally used to describe innovation within our specific contexts. However, we should not feel limited by the semantic framework, especially if the organization wants to go beyond traditional plans and development activities, and really starts "doing, using, and interacting".

As the early phases of innovation are increasingly emphasized in research contexts, research organizations should start addressing this gap by adopting lean startup practices. The adaptation of competence development, hiring practices, and strategic partnering are also possible methods in developing go-to-market capabilities by taking into account the different early stages of the research process context. With the new capabilities, the issue of speed can also be addressed.

Looking into the demand side of technology and innovation is also encouraged. Going beyond the traditional technology transfer is emphasized by Blank (2014), who states that companies manage innovation by building innovation internally, buying it, or partnering with re-

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sources outside of the company. It should be noted that he heavily emphasizes the acquisition of startups as the corporate innovation strategy, which is also supported by the evidence of growth strategies of companies such as Google. A question worth exploring in more detail hence becomes: will startups become the de-facto standard for technology transfer from research to the corporate world?

Policy implications

Innovation policy has not been immune to the paradigm shift the lean startup: it sees the promise of successful businesses that will contribute to wealth, competitiveness, and quality of life. Not only are the results of lean startups on the wish list, but so are the ingredients. For example, Finland wants to become an international leader in experimental culture, at both national and regional levels as well as in organizations (kokeilevasuomi.fi/en/frontpage). Accordingly, the Finnish government has continued to develop research funding programs that focus on and support experimentation.

This article highlights the interdependencies of the research context's innovation process with the surrounding innovation ecosystem, and the impacts created by such activities. This aspect was also emphasized by Autio and colleagues (2014): "the connections and ties across these specific contexts are crucial for entrepreneurial innovation and future policy development deeds to recognize these inter-dependencies and the possible synergies and conflicts between them." For example, the innovation policy has direct links to customer needs; the speed of knowledge transfer is partly controlled by the scientific publishing processes.

At the same time, the impact of context on an individual's innovation activities is emphasized. For example, to put it bluntly, it may be detrimental to expect the same kind of entrepreneurship from scientists at research organizations as from individuals working at startups.

Overall, there is a clear call for clarity of roles and responsibilities of various ecosystem players and for addressing the dynamics of such systems. Also, the value of having these players coming from various contexts and still co-creating together should be further studied.

Conclusion

In this article, we conducted a limited literature review to highlight that the research context was seen to have its own innovation characteristics and processes for technology transfer. We then explored how the lean startup paradigm explicitly presented as an innovation acceleration model matched the special context of research. The concepts from research innovation were complemented with a practical example: the iBet case at VTT Technical Research Institute of Finland.

The findings show that many of the concepts of the early acceleration phases can also be found in the innovation discussions within the research context. The phases for going-to-market receive less attention: i) the value proposition discovery phase was addressed sometimes, and even then, it was oftentimes presented that another entity than the university or research organization such as a spinoff would take care of it; and ii) the phase of growth discovery, with its emphasis on building on scalable, sustainable business does not seem to be addressed with the presented innovation approaches from the research context.

Hence, the entrepreneurial activities at the research context differ from those in startups and internal startups, which supports the impact of context presented, for example, by Nelson (2014) and Autio and colleagues (2014). This gap should be discussed and addressed at research organizations, for example with practical tools for competence development, hiring, and the selection of strategic partners. Furthermore, when looking into the demand-side of the technologies and innovation, there seems to be an inclination to emphasize startups as means of technology transfer. If this continues, it challenges not only the culture and processes but also the outputs of the research context. In addition, policy makers should take this into account when clarifying the roles, responsibilities, value-creation activities, and dynamics within the innovation ecosystem.

About the Author

Kaisa Still is a Senior Scientist at VTT Technical Research Centre of Finland. She has extensive experience of innovation management gained within a research organization and a university, in a startup and in growth companies, as well as in a business incubator. Supporting collaboration, co-creation and innovation with technology continues to be at the core of her interests. Her current work concentrates on platforms and innovation ecosystems, accelerating innovation activities, and digital opportunities. Combined with the policy perspective, her work extends to private and public organizations, in regional and global contexts.

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Digital Technology Entrepreneurship: A Definition and Research Agenda

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"*Entrepreneurship is the key to emerging technologies.*"

James H. Clark
Entrepreneur and computer scientist

Technology entrepreneurship is an established concept in academia. However, recent developments in the context of digital entrepreneurship call for revision and advancement. The multiple possible combinations of technology and entrepreneurship have resulted in a diversity of phenomena with significantly different characteristics and socio-economic impact. This article is focused on the identification and description of technology entrepreneurship in times of digitization. Based on current examples, we identify and describe characterizations of technology entrepreneurship, digital technology entrepreneurship, and digital entrepreneurship. With this new delineation of terms, we would like to foster discussion between researchers, entrepreneurs, and policy makers on the impact of digitization on entrepreneurship, and set a future research agenda.

Introduction

Do we need another definition in entrepreneurship research? We argue that at least technology entrepreneurship deserves a revision. Indeed, Mosey, Guerrero, and Greenman (2017) have stated that, after two decades of interest and research contributions in the field, we all can now take stock of what has been achieved, what needs to be revisited, and what is still missing. We have reached a consolidation stage in technology entrepreneurship research.

A seminal contribution to the definition of technology entrepreneurship as a field was made by Tony Bailetti. His definition highlights 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" (Bailetti, 2012). Around the time when Bailetti's article was published, the largest ever initial public offering (IPO) from a technology company took place: Facebook raised over $16 billion USD upon becoming listed in the stock market (Rusli & Eavis, 2012). In subsequent five years after Facebook became a public company, we have witnessed a mobile and social media revolution (Hanna et al., 2011). This revolution has not only changed how organizations connect with customers, but it has also transformed the meaning of technology entrepreneurship.

To make sense of how much digitization has changed technology entrepreneurship, we propose to examine the topic from three different angles: the underlying technological opportunity, the entrepreneurship process, and the resource acquisition. Prior research has highlighted the entrepreneur–opportunity nexus, suggesting that the type and nature of a technology opportunity can be a determining factor in the activation of the entrepreneurial process (Davidsson, 2015; Gruber et al., 2012). Similarly, the entrepreneurial activities and their sequence (Brush et al., 2008; Lichtenstein, 2015) or the acquisition and timing of resources affect survival and the likelihood of growth (Bhawe et al., 2016; Klyver & Schenkel, 2013). These complementary perspectives allow us to identify and describe entrepreneurship cases where we can observe how digitization has permeated technology entrepreneurship.

We follow the approach of MacInnis (2011) to identify and describe characterizations of the concept, and then determine and differentiate the theoretical and practical implications. First, we describe the different types of technology entrepreneurship and their characteristics. Based on that, we propose and discuss a conceptual differentiation. Finally, we identify the implications for researchers, entrepreneurs, or other actors active in the promotion of technology entrepreneurship.

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New Forms of Technology Entrepreneurship

The absence of a detailed characterization of technology entrepreneurship makes it difficult to determine whether we are still inside the original concept boundaries. In their recent systematic literature review, Ferreira and colleagues (2016) opt for a broad conceptualization of technology entrepreneurship, suggesting that it is a combination of entrepreneurship and technology-based innovation. Similarly, Beckman and colleagues (2012) wrote in their special issue on technology entrepreneurship that it is a type of entrepreneurship that aims to exploit opportunities related to advances in science and engineering. Both conceptualizations are broad and are rather consistent with Bailetti's (2012) approach.

An unexpected challenge to this conceptualization has evolved through the meaning of "technology". Although most of technology entrepreneurship research started by studying new entrants in high-tech industries (Gans & Stern, 2003), much attention has been given to the technology commercialization efforts of new firms such as academic spin-offs (Fryges & Wright, 2014; Mosey et al., 2017; Wright et al., 2007). As a result, the phenomenon under study was usually characterized as a technology-push situation (Brem & Voigt, 2009), where the entrepreneur had the mission to find an application and create a market for a new and complex technology (Giones et al., 2013). But how much does this perspective fit with entrepreneurial activity using digital technologies? As recently discussed by Nambisan (2016), the digitization of the "technology" not only changes its properties but also impacts the overall technology entrepreneurship process. Apparently, this has also major impacts on entrepreneurial processes in general.

To explore the potential differences between alternative characterizations, we first present potentially different, but related forms, of technology entrepreneurship, as shown in Table 1.

Instead of looking for an exhaustive characterization, Table 1 offers a first impression of the diversity of forms that technology entrepreneurship can take. Even in the extreme case of pure digital entrepreneurship, it can be argued that it rarely fits within a technology-push perspective, being instead much closer to concepts such as recombinant innovation or demand-driven approaches to technological innovation in the understanding of market-pull (Brem & Voigt, 2009; Priem et al., 2011). From a research perspective, digital entrepreneurship is much closer to the information systems' concepts of artefacts, platforms, and information infrastructure

Table 1. Alternative forms of technology and digital entrepreneurship

Typology	Technology Behind the Opportunity	Key Activities in the Process	Access to Resources and Funding
Technology Entrepreneurship	New products based on breakthroughs in research; science-based advances through specific knowledge in an academic field Example: Graphene	Technology proof of concept: first customer validation; activate a global but niche market (Clarysse et al., 2011)	Public research grants and other soft money sources Venture capital attracted by promising intellectual property (Audretsch et al., 2012; Giones & Miralles, 2015)
Digital Technology Entrepreneurship	New products based on ICT technologies only; making smart devices using the possibilities of Internet of Things Example: Smartphone	Use of existing technologies: market validation, traction, and growth, scalability	Business angels; seed and venture capital; stock market Crowdfunding: reward and equity (Gedda et al., 2016)
Digital Entrepreneurship	New products and services based on the Internet. Services running only in the cloud; using big data or artificial intelligence. Example: Snapchat	Technology as an input factor: high growth ambitions (Wallin et al., 2016); stay ahead of competitors; be the dominant player in the category	Business angels; seed and venture capital; stock market Equity crowdfunding (Tomczak & Brem, 2013)

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(Nambisan, 2016). Digital entrepreneurs often do not really care about the specific technology behind their business idea, they simply focus on the service that is based on it. Hence, technology here is an input factor only. Digital technology entrepreneurship refers to the technology: its products are technological.

To further clarify this potential divide, in Table 2 we present some examples of entrepreneurial firms that could help reveal the existing differences across the types of technology entrepreneurship.

As the examples in Table 2 illustrate, the type of technology that triggers the entrepreneurship story behind the cases is different. It is not only a discussion about whether we are talking about software or hardware firms, or whether these entrepreneurs aim to only offer services or combine products and services. The typologies we propose aim to connect the traditional science-based technology entrepreneurship coming from university intellectual property (Hartmann, 2014) to the new and rapidly evolving Internet-based digital startups (Drori et al., 2009).

Table 2. Examples of different types of technology and digital entrepreneurship

Typology	Example	
Technology Entrepreneurship	Fractus (www.fractus.com)	Started as an academic spin-off, Fractus was a pioneer in the development of internal antennas for smartphones. They first attempted to commercialize their new antenna designs as a finished product, but then realized that it made more sense to just focus on R&D, patenting, and licensing their technology to manufacturers and OEMs such as Nokia, Samsung, or Motorola.
	Oryzon Genomics (www.oryzon.com)	Founded by bio-pharmaceutical researchers, Oryzon's first decade of operations was focused in offering genomics diagnostics. The company took-off in 2008 when it shifted its focus on developing proprietary drug candidates and licensing to large pharmaceutical companies such as Roche.
	Rust Patrol (www.rustpatrol.com)	The technology was invented by a chemistry professor, and it offered a potential alternative solution to address metal corrosion. A decade later, in 2014, two students joined the researcher to successfully start commercializing anti-corrosion products for industrial and consumer needs.
Digital Technology Entrepreneurship	Go Pro (www.gopro.com)	Founded by a surfer frustrated with the limited options he had to take nice action shots, Go Pro became a manufacturer of action cameras and created a new category in the market. It is a good example of user entrepreneurship (Shah & Tripsas, 2007).
	Fitbit (www.fitbit.com)	Started by a team of IT professionals that identified the untapped potential of sensors and wireless technologies, it transformed from being a consumer electronics to a digital healthcare company. Created and dominated the wearable tech category in the market.
	Tesla (www.tesla.com)	First a hobby electric car, it was one of the rare successful attempts to build an electric sports car from scratch. In a few decades, it has become a disruptor in the automotive industry, challenging the innovation pace and accelerating the technological development of electric vehicles.
Digital Entrepreneurship	AirBnb (www.airbnb.com)	What started as an idea to make a bit of money by renting space in an apartment, quickly became a popular site for people to share and find accommodation. After failing to attract business angels, it was only after being part of an acceleration program in 2009 that it started to gain traction as an accommodation-sharing platform.
	Just Eat (www.just-eat.com)	An attempt to make takeaway ordering an option for all types of restaurants in 2001 was the birth of one of the largest networks of international restaurants that offers online ordering in an increasing number of countries around the world.
	Dropbox (www.dropbox.com)	The idea of having a user's files synchronize in the cloud was behind the digital storage company that has successfully competed with the largest software firms. Since 2009, when the competitive threat of the iCloud arose, they have managed to keep growing what was once a feature into a full product line for consumers and businesses.

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The typologies and examples in Tables 1 and 2 are provided to group together similar evolution paths and growth trajectories. This comes as a response to the diversity of technology origins and outcomes that make it unfeasible to extract homogeneous insights from them if treated as a sole category. We argue instead that it might be a much more fruitful avenue to explore how some of these organizations have benefited from lean startup approaches (Frederiksen & Brem, 2017) or how they have activated a global niche for their products (Tanev, 2012).

Furthermore, each of these types of firms might respond to specific entrepreneurial motivations in their founders. Some might be driven by the idea to address a social problem, whereas others might be excited by the ambition to build a firm that makes an economic impact and becomes a respected institution. These motivations can reflect a combination of multiple entrepreneurial identities or a specific dominant identity (Fauchart & Gruber, 2011). The social identity of the entrepreneur behind each of these firms has implications for the goals they set, as well as for the exit routes that they might be able to define (Dehlen et al., 2014). However, digital entrepreneurs expect to be able to sell their firms to a larger player, resulting in the effective transfer of their user base to a new firm. Pure technology or digital technology entrepreneurs carry with them technology assets that can either be the focus of interest of the acquirer or a costly asset that makes the acquisition price unattractive.

In the following section, we aim to suggest promising directions to further explore technology entrepreneurship considering the different shapes and forms that digital technologies have triggered.

Implications for Digital Technology Entrepreneurship Theory and Practice

The digital transformation of most of the input technologies that entrepreneurs use to propose their new innovative ventures has extended the types of technology entrepreneurs we can observe. Instead of proposing a clear-cut conceptualization between digital and technology entrepreneurship, we propose to describe the change in meaning of "technology" as a continuum between the extremes represented by the commercialization of the latest scientific breakthroughs (e.g., a new material like graphene) and the latest application for smartphones (e.g., a new food delivery app). Figure 1 shows the overlap between these concepts.

As a result, the concept of digital technology entrepreneurship necessarily combines elements of technology and digital entrepreneurship. Thus, we propose to enrich Bailetti's (2012) definition of technology entrepreneurship to include specific aspects related to this specific form of entrepreneurship: digital technology entrepreneurship is focused on the identification and exploitation of opportunities based on scientific or technological knowledge through the creation of digital artefacts. Digital technology entrepreneurs build firms based on technologies on the one hand, and on services on the other hand.

The extension of the definition implies that this profile of entrepreneurs do not only experience the challenges of engineering or scientific development, but also the complex dynamics of digital platforms and infrastructures (Nambisan, 2016). Digital technology entrepreneurs do not only rely on an innovation ecosystem as digital entrepreneurs do. They strategically combine technological product knowledge ("technology push") with consumer know-how ("market pull"). But why introduce these terms – are there not already enough definitions in the area of entrepreneurship, as mentioned earlier? From an academic perspective, researchers could use the different classifications of entrepreneurship to learn more about the personal motivations of entrepreneurs and their founding behaviours, financing preferences, etc. One may further argue that such labels might not be relevant to the entrepreneurs themselves. However, we believe that, when it comes to entrepreneurs aspiring to start a business, it might help them to make a conscious decision on what type of technology entrepreneur they want to be.

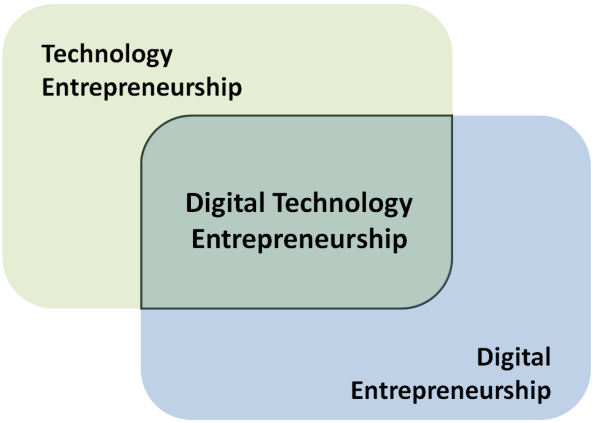

Figure 1. Conceptual representation of a new type of technology entrepreneurship: digital technology entrepreneurship

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Indeed, the introduction of digital technologies as an input for entrepreneurship opens further opportunities for researchers, entrepreneurs, and policy makers. Below, we discuss the implications of our new characterizations of technology entrepreneurship, digital technology entrepreneurship, and digital entrepreneurship for each of these groups.

Researchers

In traditional forms of technology entrepreneurship, the key decision of the entrepreneur was to select whether to aim for licensing their technology or engage in the full commercialization of their product (Gans & Stern, 2003). In contrast, digital technology entrepreneurs are embedded in an interconnected system when they aim to commercialize their solutions; it is a context where platforms and network effects matter (Kyprianou, 2016; Srinivasan et al., 2004) and standards or dominant designs (Brem et al., 2016) can define the boundaries and scalability of products. As a result, there are opportunities to update what we know about growth patterns in technology entrepreneurship (Hesse & Sternberg, 2016) to include digital technology entrepreneurs. Related research questions include:

- What are the implications of building a new venture on a digital artefact? What is different in resource acquisition, team dynamics, or funding strategies?

- What are the implications of growth in digital technology entrepreneurship? How is it different from technology entrepreneurship or digital entrepreneurship? When does growth stop being a desirable outcome for entrepreneurs? How do valuation, user, and revenue growth translate into different entrepreneurship processes and perceptions of success?

Further research could also study the co-evolution between digital technology entrepreneurship and the digital platforms or infrastructure governance (Wareham et al., 2014), as well as the impact of regulation (Gurses & Ozcan, 2015) to explore when this enables or constrains entrepreneurial activity. Related research questions include:

- How do platform dynamics impact entrepreneurial activity in emerging ecosystems? When does too much dynamism reduce the ecosystem attractiveness to new potential entrants? When does entrepreneurial activity generate new innovations, and when does it not?

- When do entrepreneurs engage in transforming the digital platforms where they operate? How does regulation by code and by law explain the different evolutionary paths in different markets?

- What strategies do entrepreneurs use to protect their positions in unstructured ecosystems? What is different in digital infrastructures? When do digital entrepreneurs use regulation to their advantage?

To explore this and related research questions, researchers might take advantage of methods and theoretical perspectives from information systems' research, where we have seen similar research fields' interconnections in the last years between innovation and information systems (Majchrzak & Malhotra, 2013). Promising approaches include:

- Introducing heuristics theorizing to build design theories in entrepreneurship research (Gregory & Muntermann, 2014).

- Bringing multilevel perspectives (Shepherd, 2010) that capture the complexity of digital technology entrepreneurship, or different angles such as real options to understand how stakeholders see and make decisions in technology entrepreneurship (Rasmussen & Mathisen, 2016).

Entrepreneurs

The introduction of digital elements in the technology entrepreneurship process also reveals a bright side for entrepreneurs. For example, the digital aspects of the technology favour the adoption of born-global approaches (Kraus et al., 2017; Tanev, 2012). These firms can quickly scale up their products and aim for a global audience. Furthermore, the digitization of the production processes makes it possible to be both a lean and global company at the same time (Frederiksen & Brem, 2017; Rasmussen & Tanev, 2015), blurring the traditional boundaries of technology entrepreneurship. Activities in the entrepreneurship process, such as resource acquisition, are also changing; digital technologies offer the possibility to bring forth early working prototypes that can be used in reward crowdfunding campaigns, completely changing the technology innovation management process in the new firm (Giones & Oo, 2017). With so many possible futures, the ability to design and innovate the business model makes a difference (Doganova & Eyquem-Renault, 2009; Westerlund et al., 2014).

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There is also a dark side to the digital potential of technology entrepreneurship. Fast growth and forward leaps often mean higher failure risks for the ambitious digital entrepreneurs stepping into emerging ecosystems, where the role of each of the players is still unclear and the technology base is still evolving. Westerlund, Leminen, and Rajahonka (2014) describe the example of new entrants in the Internet of Things (IoT) ecosystem, where the lack of structure and solid standards (Brem et al., 2016) in the ecosystem increase the complexity of entrepreneurs' decisions.

To sum up, the digital artefact at the core of the entrepreneurship process might require or call for additional information management capabilities in the entrepreneurial team, but it also opens new doors to accelerate learning and growth in the new venture.

Policy makers

The consequence of digitization goes beyond the dynamics of the entrepreneurship process. An example of how digital technology entrepreneurship is also activating new policy and support mechanisms is the successful I-Corps program (http://www.nsf.gov/i-corps) run by the National Science Foundation in the United States. The digital core of new technologies makes it possible to run accelerated approaches to market validation and early-stage growth.

As a result, the model of the university incubator for technology entrepreneurship (Amezcua et al., 2013; Gerlach & Brem, 2015) no longer fits with the characteristics of digital technology entrepreneurship. Instead, we observe how an increasing number of research centres and universities are starting to partially or fully introduce entrepreneurship-supported models that follow the accelerator program design (Pauwels et al., 2016). The transition from incubation to acceleration models requires specific knowledge, dynamic markets, and an investor ecosystem; done in isolation, it is likely to end up in the black-box of failed policies (Brown & Mason, 2014).

Conclusion

The unprecedented digital revolution has transformed the meaning and forms of entrepreneurship across the globe. The emerging field of technology entrepreneurship research has not been able to keep pace with the fast changes in the digitization of our society and economy. In this article, we aim to help entrepreneurs and researchers interested in further exploring the possibilities that new technologies and entrepreneurship generate. We propose a conceptualization and characterization of three different phenomena: technology entrepreneurship, digital technology entrepreneurship, and digital entrepreneurship. Each of them has a different origin and different emergence dynamics, and in most cases, they generate rather different trajectories for growth and technology evolution. The uniqueness and novelty of the phenomena also open multiple research opportunities. We have proposed a research agenda that hopefully motivates further research and provides valuable insights to entrepreneurs and policy makers alike.

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Ferran Giones is an Assistant Professor at the University of Southern Denmark in Sønderborg. He received his PhD from La Salle – Ramon Llull University in Barcelona, Spain. His research field is technology entrepreneurship, where he explores how and when technological progress transforms into entrepreneurial activity, and how this entrepreneurial activity results in sustainable organizations and innovative ecosystems.

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Initiating a New Research Phase in the Field of International Entrepreneurship: An Interview with Professor Nicole Coviello

Nicole Coviello and Stoyan Tanev

> *"International entrepreneurship research seems to be at the cusp of moving from… a 'poorly understood emergence phase' of identity development to one that is better understood."*
>
> Nicole Coviello (2015)
> Professor of Marketing, International Business, and Entrepreneurship

Introduction by Stoyan Tanev

The internationalization of businesses has become a pervasive phenomenon worldwide. In the international business literature, firms that internationalize early in their life cycle are referred to as "born globals" (Rennie, 1993), "international new ventures" (Oviatt & McDougall, 1994), "global startups" (Oviatt & McDougall, 1995), or "instant internationals" (Fillis, 2001). The term born global, however, has acquired a dominant position despite being defined in different ways by different scholars. Although many firms target global niches and develop a global presence from or within one or two years of their founding, they may not fit any of the existing definitions of "born global". One of the reasons for the variety of perspectives could be that research on born-global firms and international new ventures has necessarily brought together two different research domains – international business and entrepreneurship – and, accordingly, there has been the quick emergence of the international entrepreneurship research field.

In addition, research on born-global firms and international new ventures has become highly relevant in the context of technology entrepreneurship and has attracted the attention of scholars and practitioners in this area. Today, many new technology firms are in a better position to target competitive positions in international markets by working with global partners to innovate and pilot new disruptive technologies. The latest research suggests that the information age has enabled the adoption of a new techno-economic vision for the emerging structures and processes in international business in general. The reality of the newly emerging paradigm includes the changing nature of the competitive advantages of places, the competitive advantages and strategies of firms, and the governance structure of international business networks (Alcácer et al., 2016). Unfortunately, the terminological inconsistency in international business and international entrepreneurship research does not help practitioners to develop design principles for the creation and launching of new, globally competitive high-tech startups.

In a recent publication, Nicole Coviello (2015) emphasized the need to re-think existing research on international entrepreneurship and, more specifically, research on born-global firms. She pointed out that the main value of a critical review lies in initiating a new research phase focusing on the development of a more consistent collective research identity for international entrepreneurship through an ongoing process of terminological refinement and clarification. Here, I present my recent interview with Nicole Coviello, which was inspired by her recent publication. It focuses on issues that could be of relevance for new technology firms aiming at an international or global engagement from their very inception.

Interview with Nicole Coviello

Tanev: *Prof. Coviello, your call for a terminological refinement suggests our first question: What is your definition of a born-global firm? How does it compare to other such definitions and what is the key difference that you would like to emphasize?*

Coviello: I think the point might be more about clarification than refinement. I have long resisted using the term "born global" for two reasons. First, it was pre-

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ceded in academic literature by the "international new venture typology from Tricia McDougall and Ben Oviatt: a typology that identified four different forms of international new venture. To me, that typology was a clear signal that multiple organizational forms are relevant in international research and labelling all international new ventures as "born globals" misses that point. Second, the term "born global" presumes the firm is founded on the global stage. However, although research has been talking about born globals since 1996, I believe it is only now that digital technology truly facilitates "born global-ness". I'd argue that most of our past research in international entrepreneurship has *not* been about born globals but rather, born internationals or born regionals (and even those labels imply the firms were founded with the intent to pursue international or regional expansion). The term "born global" has been over-used and mis-used because it's a catchy phrase.

My opinion (and practice) is that if one wants to study a born-global firm, then that firm should have been founded with the intent to serve global markets and then done so. Of note – this means being able to understand intent at founding: was globalization part of the founding intent or did the firm just happen to get pulled into international markets? The distinction is important because the behaviours of a proactive versus reactive firm are quite different. Furthermore, I believe it's important to clarify where the firm is relative to founding. For example, data collected on a 2–3 year-old firm is very different from that collected from a 10 year-old firm, even if you make the argument they are both "born global". The latter have survived early internationalization (that may or may not have been rapid). The former may still be in the process of internationalizing. They are not equivalent.

In a nutshell, the label "born global" was a lot more brandable than "international new venture". There are other differences too but, if I could, I would wave a magic wand so that every study in international entrepreneurship clearly described their firms and founding intent *without* using the born-global label.

Tanev: *My interest in the field of international entrepreneurship turns around new technology-based firms that engaged into a global path from their very inception. The logic behind this interest is the following: If technology firms that are born global are more successful than firms that are not born global, we should focus on defining and implementing design principles that incorporate key attributes of born-global firms and use these principles to launch and grow new companies. Our logic is based on the assumption that born-global technology startups are expected to be more successful than technology firms that did not engage into a global path from the very beginning. What does international entrepreneurship research say about that – how solid is the empirical evidence suggesting a basis for such assumption?*

Coviello: Before I answer your question, I want to make a few clarifying points. First, until recently, very few firms truly had the possibility of engaging on a global path. Global means global. International is not quite as broad in scope. Regional is closer to home. Only now, with the emergence of what I call finger-push firms, do we have a wide range of companies with the potential to serve global markets. That's because their offer is fully digitized, and all that is required for them to reach/communicate with/serve markets around the global is the push of a button on a computer. With 3D printing, even the sourcing of product becomes obsolete. Second, another point to keep in mind when conceptually discussing a born-global firm pertains to international expansion speed. Speed is another term that has been used too casually. Most speed research isn't about speed at all but rather it is about timing. My opinion is that, to study speed, you need to consider whether you are interested in: i) timing (e.g., time to first foreign market entry); ii) pace of ongoing internationalization, or iii) the rhythm of internationalization over time. Those are three very different concepts.

So where does success come in? I have two thoughts. First, no, I don't think that we have sufficient evidence in international entrepreneurship research to suggest that born globals are more successful. We assume they are. We also assume that internationalization speed is beneficial. But true born globals and speed need more attention in research. Second, we are only now able to compare born globals and non-born-globals because we can compare, for example, software-as-a-service (SaaS) firms with software developers. Both fall into the "software" sector but only one (SaaS) has the potential to be born global; the other is much more likely to be born regional or born international. Again, we don't yet have sufficient empirical evidence on firms that are truly born global versus masquerading as such (because of how authors have labelled the firms they study).

Tanev: *If you were to distill the practical implications of a decade's work on born globals and your re-thinking of the concept, what are the key points the individual entrepreneur should take away and apply in starting a new global business today?*

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Coviello: Get into SaaS if you want to be "global". If you are in technology manufacturing, exploring the Internet of Things or artificial intelligence, or developing software, know there is a global market *but* your business is likely to be strongest by serving select markets and customers carefully and well. You don't need to be global to be successful.

Tanev: *Recently, you have also pointed out that, for scholars working at the interface of international business and entrepreneurship, an understanding of entrepreneurial business models is essential (Coviello, 2016). Where do you see the potential and challenges of integrating research into business models, born globals, and international new ventures?*

Coviello: It's important to remember that international entrepreneurship research and practice sit at the intersection of international business and entrepreneurship. The relevance of the business model literature comes from entrepreneurship and while we have happily adopted concepts like entrepreneurial orientation into the international entrepreneurship literature, we've been slow to recognize how international entrepreneurship parallels entrepreneurship arguments regarding business models. Your work is one of the very few exceptions (Rasmussen & Tanev, 2015).

Tanev: *In your discussion of the global entrepreneurial potential of business model research, you have also referred to the growing interest in the lean startup entrepreneurial approach and the possibility of considering lean global startups as a new type of organization/firm (Rasmussen & Tanev, 2015). By "lean startup approach", we mean the specific hypothesis-driven entrepreneurial approach that "favors experimentation over elaborate planning, customer feedback over intuition, and iterative design over traditional 'big design up front' development" (Blank, 2013), which is based on several concepts such as minimum viable product and pivoting. Do you personally see a reason for the adoption of the lean startup approach within the context of born-global firms? Does integrating lean startup and born global research allow for the identification of a new type of firm, or at least a unique growth mode, that deserves to be considered separately from others?*

Coviello: From a practical perspective, it is good news that the lean startup approach has been widely popularized. Practitioners like it and lean captures all the advantages of being nimble and with little to unlearn. Steve Blank has done a great job of popularizing concepts that have been core to entrepreneurship theory for some time (e.g., arguments from Howard Stevenson or Saras Sarasvathy). That is, "lean" isn't really new – it's just that Blank makes the ideas digestible and, I think, more tangible for practitioners. It does, however, set the stage well for internationalization. At any rate, I don't consider a lean global startup to be a new form of organization or growth mode. Lean is a way of operating. In the same way that we study organization structure, orientation, etc., we should study the influence of lean (or effectual logic) as young firms internationalize.

Tanev: *There seems to be an ongoing tendency to consider the field of innovation management in the broader context of business model innovation. We believe that there is a point in such claim, given that an innovation usually affects all the components of a business model. Your call for integrating international entrepreneurship and business model research should therefore inspire more research focusing on innovation management in a global entrepreneurial context. But why is there so little international entrepreneurship research focusing on innovation management? The few articles in this area do not seem to have a major impact. What are the challenges, theoretical or conceptual, the addressing of which would help in integrating early internationalization and innovation research with a focus on new entrepreneurial firms?*

Coviello: I think one of the challenges comes from the heritage of international entrepreneurship. Most researchers have come from an international-business-related area or from entrepreneurship whereas innovation is a distinct third discipline. Marian Jones and I tried to bring innovation into the international entrepreneurship discussion with our paper in the *Journal of International Business Studies* (Jones & Coviello, 2005), but you are right, there is more to be done.

Tanev: *Please tell us more about your understanding of the priorities of the new international entrepreneurship research phase you are calling for. In your recent paper, you refer to the need for more international entrepreneurship and international business research at the level of the individual entrepreneur and especially in the context of the next generation of young founders emerging from our entrepreneurship programs. But where do you see other similar needs, what type of future research is needed, and are there other research themes that have become urgent and need to be addressed?*

Coviello: My interest in the "people of international entrepreneurship" comes from arguments that any decision or action at the firm level stems from an

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individual or team. As a result, I encourage multi-level research and attention to decision makers in the firm. In terms of young founders, I think they are different in terms of how they relate to technology and the world; these differences need to be understood. They don't see the technological, cultural, or national barriers that previous generations did, and I suspect this will influence how they lead their firms. Returning to the concept of a true born global (i.e., a finger-push firm that can instantly set up a global operation), they might turn all our traditionally accepted wisdom on its head. We need to study these firms.

Tanev: *Finally, do you see any undergoing changes in the global business environment? What changes or trends in the business environment may need to be addressed in our future research? Where do you think international entrepreneurship research will be 10 years from now?*

Coviello: I think my previous answer leads into this one. Understanding, for example, ownership, locational, or internalization advantage was essential when firms expanded by geographic footprint. Things change when expansion is by "finger-push". Our new research needs to recognize that major global players are likely to be located in one region (e.g., main technology centres) and serve the world from either that location or perhaps with small groups of employees working remotely. I hope that 10 years from now, international entrepreneurship research will be a richer blend of international business, entrepreneurship, plus innovation and technology management research.

Tanev: *Thank you very much, Prof. Coviello. We greatly appreciate your time and insights for TIM Review readers worldwide.*

Summary by Stoyan Tanev

There are several points in the above interview to be highlighted in the context of the present special issue:

1. Using the term "born global" is not recommended because of the improper semantic implications generated by the term "born." Very few firms were really "born" on a global scene and, as a result, most of international entrepreneurship research so far has not been really studying born globals but rather, born internationals or born regionals. In this sense, the global startup terminology is more appropriate.

2. According to Coviello, it is only now that digital technology truly facilitates "born global-ness". An example of true born global is a finger-push firm that can instantly set up a global operation. Such firms might disrupt our traditionally accepted wisdom. International entrepreneurship research needs to focus on studying these firms.

3. If you want to be "global", get into SaaS. If you are in technology manufacturing, exploring the Internet of Things or artificial intelligence, or developing software, know there is a global market but remember that you do not need to be global in order to be successful.

4. International entrepreneurship research needs to embrace business model frameworks that could enhance the conceptualization of all business aspects in an international/global context.

5. The lean startup approach is not really new but it made entrepreneurial ideas more digestible, more tangible, and more actionable for practitioners, setting the stage well for early internationalization. In this sense, a lean global startup does not seem to be a new form of organization or special type of growth mode: it is more like a specific way of operating. For a more detailed discussion of this point, please see my article in this special issue: "Is there a Lean Future for Global Startups?" (Tanev, 2017).

6. The challenges of managing innovation in a global context come from the fact that most international entrepreneurship researchers have come from an international business related area or from entrepreneurship whereas innovation is a distinct third discipline. The international entrepreneurship research community has to work on further integrating innovation management scholarship in parallel to business model design and innovation frameworks and theories.

7. Multi-level research and attention to the actual decision makers of global startups should be strongly encouraged. Young founders are different in terms of how they relate to technology and the world. They deserve a special attention and need to be further studied.

8. In the near future, international entrepreneurship research will be a richer blend of international business, entrepreneurship, innovation, and technology management research.

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An Interview with Professor Nicole Coviello

Nicole Coviello is the Lazaridis Research Professor and Professor of Marketing at Wilfrid Laurier University in Waterloo, Canada. She received her PhD in Marketing and International Business from the University of Auckland, New Zealand, in 1994. She also holds an MSc (Technology Management) and BComm Hons (Marketing) from the University of Saskatchewan in Saskatoon, Canada. Dr. Coviello began her career at the University of Waikato, New Zealand, and has since held positions at the University of Calgary, Canada, and the University of Auckland. In 2010, she received an Honorary Doctorate from the Turku School of Economics in Finland. Dr. Coviello has published in the top journals across three disciplines – marketing, international business, and entrepreneurship. In 2014, she was ranked as one of the top scholars in International Marketing and among the top 20 International Business scholars. She is Field Editor for both marketing and international entrepreneurship at the *Journal of Business Venturing.*

Stoyan Tanev is an Associate Professor in the Department of Technology and Innovation, Faculty of Engineering, Southern Denmark University (SDU) in Odense. Dr. Tanev is leading the Technology Entrepreneurship stream of the Master Program of Product Development and Innovation at SDU. He is also an Adjunct Research Professor in the Sprott School of Business at Carleton University in Ottawa, Canada, where he is associated with the Technology Innovation Management Program. He has a MSc and a PhD in Physics jointly from the University Pierre and Marie Curie, Paris, France, and the University of Sofia, Bulgaria, a PhD in Theology from the University of Sofia, Bulgaria, an MEng in Technology Innovation Management from Carleton University, Canada, and an MA from the University of Sherbrooke, Canada. He has multidisciplinary research interests with a focus on the fields of global technology entrepreneurship, technology innovation management, business model design, and value co-creation. Dr. Tanev is Senior IEEE member, as well as member of the editorial boards of the *Technology Innovation Management Review,* the *International Journal of Actor-Network Theory,* and *Technological Innovation.*

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