Technology Innovation Management Review

September 2018
Volume 8 Issue 9
http://doi.org/10.22215/timreview/1180

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Insights

Welcome to the September 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.

Carleton UNIVERSITY

www.timreview.ca

Technology Innovation Management Review

September 2018
Volume 8 Issue 9

Publisher

The *Technology Innovation Management Review* is a monthly publication of the Talent First Network.

ISSN

1927-0321

www.timreview.ca

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.

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

Contribute

Contribute to the TIM Review in the following ways:

- Read and comment on articles.
- Review the upcoming themes and tell us what topics you would like to see covered.
- Write an article for a future issue; see the author guidelines and editorial process for details.
- Recommend colleagues as authors or guest editors.
- Give feedback on the website or any other aspect of this publication.
- Sponsor or advertise in the TIM Review.
- Tell a friend or colleague about the TIM Review.

Please contact the Editor if you have any questions or comments: timreview.ca/contact

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: Insights

Chris McPhee, Editor-in-Chief

Welcome to the September 2018 issue of the *Technology Innovation Management Review*. The authors in this issue share insights on repairing trust in R&D partnerships, the relationship between marketing needs and actions in entrepreneurial marketing, defining transnational entrepreneurship, assessing the impact of business intelligence on export performance, and applying the lean startup methodology to the commercialization process.

In the first article, **Anna Brattström** from Lund University in Sweden provides an actionable framework for dealing with trust violations in R&D partnerships. Based on a review of relevant literature and real-life examples illustrating how trust can be rebuilt in partnerships, the author provides a framework and checklists to help firms deal with trust violations when they occur and choose a strategy to rebuild trust over time.

Next, **Mika Westerlund** from Carleton University in Ottawa, Canada, and **Seppo Leminen** from Pellervo Economic Research and Aalto University in Helsinki, Finland, investigate the relationship between marketing needs and actions in entrepreneurial marketing. Their study showed that entrepreneurial interpretation of the environment is important as it results in various marketing actions. However, the authors also argue that both the research and practice of entrepreneurial marketing should put more emphasis on monitoring and understanding changes and opportunities in a competitive situation.

In the third article, **Eduardo Bailetti** from Carleton University's Technology Innovation Management program identifies the distinctive features of transnational entrepreneurship and offers a new definition to help companies grow at an early stage. The author developed this new definition and identified the distinctive features by examining existing definitions of transnational entrepreneurship and using topic modelling to discover themes in the relevant literature.

Then, **Michael Neubert** from the International School of Management in Paris, France, and **Augustinus Van der Krogt** from Universidad Paraguayo Alemana in San Lorenzo, Paraguay, study the use and impact of business intelligence on the ability of software firms from emerging economies to globalize successfully. Through their analysis of in-depth interviews with founders, shareholders, and CEOs of Paraguayan software firms – and using the Uppsala internationalization process model as a theoretical framework – the authors share insights about the impact of business intelligence on the export performance of firms attempting to globalize from within an emerging economy.

Finally, **Saheed Gbadegeshin** from the Turku School of Economics in Finland presents a new framework for commercializing high technologies that draws upon the lean startup methodology. This framework, called "lean commercialization", was developed from a case study of technology-based companies and by interviewing commercialization experts. The article outlines the benefits of the framework and provides a procedure for its application in practice.

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, and proposals for future special issues.

Chris McPhee
Editor-in-Chief

About the Editor

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. Chris 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. He 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.

Citation: McPhee, C. 2018. Editorial: Insights. *Technology Innovation Management Review*, 8(9): 3–3. http://doi.org/10.22215/timreview/1181

Keywords: trust, partnerships, entrepreneurial marketing, transnational entrepreneurship, globalization, export, emerging economies, lean, commercialization

How to Deal With and Repair Broken Trust in an R&D Partnership

Anna Brattström

> *"Rebuilding trust when it's been broken is not dependent only on the person who has broken it, or how many times they can prove they are honest. It depends on the person who has decided not to trust anymore. Though they may be totally justified in their decision not to trust, as long as they choose not to, the relationship has no hope of survival and should be ended. If or when they decide to trust again, there is hope reborn."*
>
> Doe Zantamata
> Author of *Happiness in Your Life*

This article offers an actionable framework for dealing with trust violations in R&D partnerships: it explains how to turn around a conflicted R&D partnership, repair trust, and learn from the experience. As innovation becomes more open, firms increasingly find themselves involved in R&D collaborations with suppliers, customers or even competitors. Trust plays a fundamental role in such partnerships to work. Yet, trust cannot be taken for granted. In fact, trust in R&D partnerships is often violated – and without executive intervention, trust violations can soon turn even the most promising partnership into a value-destroying predicament. Although much has been written about trust formation in R&D partnerships, this article focuses instead on what to do when trust has been broken. The analysis is based on a review of academic research and is illustrated with real-life examples of trust repair processes.

Introduction

R&D partnerships are vital sources of innovation and competitive advantage for firms across many industries. As products become increasingly complex and technology becomes increasingly advanced, R&D partnerships are formed between service firms and manufacturers, between hardware and software developers, between OEMs and their suppliers – even between competitors. The upside is enormous. By sharing knowledge and pooling resources, partnering firms are able to develop cutting-edge technology across a range of areas that no firm could have covered on its own.

Trust is a core currency in such partnerships. Trust facilitates learning and knowledge exchange. Trust allows firms to collaborate under uncertain conditions when it is impossible to write a full contract. In short, the research evidence is clear: there is a strong and significant correlation between trust and collaborative performance in R&D partnerships (Gulati & Nickerson, 2008; Krishnan et al., 2006; Poppo et al., 2016). Yet, seasoned executives know all too well that, although trust takes a long time to build, it can only take a minute to destroy. In particular, when costs increase more than expected and project delays strain patience (which is, after all, the rule more than the exception in a context of innovation), collaborating partners may turn out to be more opportunistic than initially expected. They might shirk, leak information, try to push costs onto one another, or behave in a way that causes the initial trust to disappear and distrust to emerge. Such loss of trust is a real problem. Once trust disappears, R&D partnerships are likely to descend a slippery slope of increasingly harsh interactions and an atmosphere of wariness, watchfulness, and vigilance (Ariño & de la Torre, 1998; Doz, 1996), often leading to expensive divorces (Gulati et al., 2008). In this situation, a core question becomes: *how can firms deal with trust violations when they occur and how can trust be rebuilt over time?*

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In this article, I address that core question. Actionable advice already exists about how to assess initial trust (e.g., Kunttu, 2017; Moraes, 2010) build trust (e.g., Arino et al., 2001), or exit R&D partnerships once trust is broken (e.g., Gulati et al., 2008). My analysis complements this prior work by developing a framework that addresses how to deal with trust violations when they occur, then repair trust, learn from the experience, and continue to reap the benefits of collaboration. For managers, this knowledge is important. Because there is no such thing as a perfect partnership, learning how to work together – instead of splitting up – can become a valuable source competitive advantage in the longer run. For scholars interested in inter-organizational trust repair (e.g., Bachmann et al., 2015; Brattström et al., 2018; Doz, 1996; Faems et al., 2008), the framework that I develop in this article offers an integrative perspective of how different trust repair tactics work in conjunction.

Method

The framework in this article is based on a thorough review of current research on how to build, maintain, and repair trust in R&D partnerships. I searched for the words "trust", "trust repair", "relationship repair", and "transgression" in major European and North American journals. This allowed me to identify a rich body of research that addresses this particular phenomenon. I used this literature in two specific ways.

First, I leveraged conceptual work that discusses the dynamics of trust, distrust, and trust repair (Bachmann et al., 2015; Dirks et al., 2009; Gillespie & Dietz, 2009; Lewicki & Brinsfield, 2017; Lewicki et al., 1998; Lewicki & Wiethoff, 2000). This conceptual work offers rich insights into the dynamics of trust repair processes, including how they differ from processes of trust building. Moving beyond these prior conceptual studies, my analysis focused specifically on the context of R&D partnerships and the particular opportunities and challenges of repairing trust in this context. Here, the results of my analysis are written with a practitioner audience in mind.

Second, I drew on empirical research on inter-organizational trust breakdown and repair. In particular, I leveraged the richness of longitudinal, qualitative studies that have been published on this topic, where authors have provided rich insights into different trust breakdown repair processes between organizations (e.g., Ariño & de la Torre, 1998; Brattström et al., 2018; Doz, 1996; Faems et al., 2008). Each of these studies explores a particular facet of inter-organizational trust repair, such as the role of contracts (Faems et al., 2008) or shielding off (Brattström et al., 2018). The purpose of my analysis, in contrast, is to provide an integrative perspective: to identify the strength and weaknesses of different trust repair strategies and to discuss how they can be used in conjunction. To support my conclusions and recommendations, I provide detailed references to the original sources.

Why Trust Is Needed in R&D Partnerships

An R&D partnership is "the specific set of different modes of inter-firm collaboration where two or more firms, that remain independent economic agents and organizations, share some of their R&D activities" (Hagedoorn, 2002). An R&D partnership is a leap into the unknown. Because it is inherently about *innovation,* partners cannot fully predict the outcome, the duration, the cost, nor the benefits of collaboration. They can only hope that both partners will do what it takes to succeed. Trust enables such hope. To trust is to take a leap of faith – to put your destiny in another's hands.

When a firm is in control of its partner, trust is desirable but not essential (Brattström & Bachmann, 2018). In most cases, however, firms find themselves in R&D partnerships where they are not in full control but are nevertheless dependent on the actions of a partner. In these cases, trust is more than "nice to have" because it allows partners to interact without being paralyzed by fear of loss. For example, trust enables the exchange of sensitive information or complex knowledge. Trust promotes constructive dialogue, stimulates creativity, and thereby leads to productive progress in work tasks. In fact, trust is much more than a "feel good" factor: there is a clear and powerful link between trust and performance in R&D partnerships (Gulati & Nickerson, 2008; Krishnan et al., 2006; Poppo et al., 2016).

Trust is built incrementally as partners interact with each other over time (Zaheer et al., 1998). Usually, this starts with personal relationships, which are gradually extended so that there is not only trust between individuals, but a more generalized and institutionalized trust between the collaboration organizations. In such cases, the relationship becomes characterized by hope, faith, confidence, and assurance (Mayer et al., 1995).

If trust is violated, this positive spiral of incremental trust-building is broken. Negative stories start to spread, leading to a polarization between the two firms and a decline in trust in the R&D partnership. Since

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trust violations often provoke a desire for retaliation, this initiates an escalating, negative spiral: trust violations become increasingly frequent, leading to further deterioration of trust and additional trust violations (Lewicki et al., 1998). Eventually, distrust becomes ingrained into the R&D partnership (Kroeger, 2012), representing confident negative expectations about each partner's future conduct (Lewicki et al., 1998). Depending on the nature of the violation, this distrust can imply expectations about the partner being honest but incompetent, dishonest but competent, or the twofold setback of being both dishonest *and* incompetent. When this happens, collaboration suffers. Information does not flow as easily, learning is hampered, attention and efforts are spent on fighting instead of collaboration, deteriorating motivation and draining the partnership from energy. The research evidence is clear: if collaborating partners fail to deal with this negative spiral, chances are that the R&D partnership ends up in a costly divorce (Ariño & de la Torre, 1998).

What to Do When Trust Is Violated: Exit, Buy, or Repair?

After a trust violation, it is easy to get carried away as the conflict escalates. The intuitive reaction is to call in the lawyers and ask them: "How soon can we get out of this R&D partnership?" This, however, is the wrong question. Executives need to keep a cool head and instead ask themselves: "How dependent are we on this partner?"

Below is a one-minute checklist that can be used to assess the degree of interdependence in a specific R&D partnership. It shows that there are many different reasons why dependence occurs. Dependence is stronger when investments are made within the R&D partnership that have little value outside it (Pfeffer & Salancik, 1978). Dependence also increases when a partner has made long-term investments that will not return a profit if that partner pulls out of the R&D partnership too early. It may also be that the technical design of a co-created product or the working practices of the firms are so deeply intertwined that tearing them up and starting over with a new partner is both expensive and risky. Moreover, in many industries, there are not that many alternative partners to turn to, which further increases dependence.

Exit is a preferable option under weak-to-moderate dependence. Negative trust spirals are, after all, difficult to turn around. If dependence on the partner is low, it

How dependent is our firm on this partner?

Check all that apply:

- ☐ We have invested in equipment, know-how, or staff that are of little use outside of this partnership.
- ☐ The technical designs of our respective products are deeply integrated.
- ☐ We have developed shared routines, a common terminology, or a shared database with our partner.
- ☐ There are few alternative partners that can do the same work, and we cannot do it in-house.

If trust is broken, do we exit, buy, or repair?

Score +1 for each box checked and compare the total:

0: Dependence seems low: consider **exit** before throwing more good money after bad.

1–2: Dependence seems moderate: consider **trust repair** as a good alternative.

3–4: Dependence seems high: consider **trust repair** or **acquisition**.

Figure 1. Checklist for assessing partner dependence following a violation of trust in an R&D partnership

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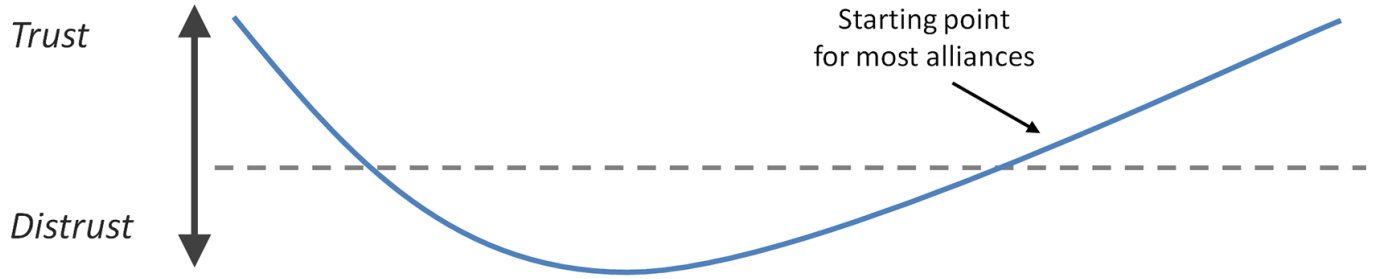
is better to leave too soon than too late. *Acquisition,* on the other hand, is preferable under moderate-to-strong dependence. Through acquisition, joint work is continued, but the majority owner gets to call the shots, need not worry about information leakage, and enjoys all the profit in the end.

Both exit and acquisition, however, come with substantial risks. Because firms benefit most from R&D partnerships when they intend to continue collaborating for a long time (Gulati & Nickerson, 2008), being too eager to exit can undermine the R&D partnership from the start. Acquisition is not easy either. By growing in size and complexity, the acquiring firm becomes less agile. Instead of sharing the risks associated with the joint task with a partner, the acquiring firm takes them all on itself. Moreover, acquisitions surprisingly often prove to be value-destroying rather than value-creating when partners struggle to integrate two different firms (Cartwright & Cooper, 1993). When both exit and acquisition are difficult or too drastic, repairing trust can become an alternative. In the following section, I discuss this alternative, presenting executive tactics for repairing trust.

Trust Repair: A Long-Term Alternative to Exit or Acquisition

Building initial trust requires a step-by-step process during which partners slowly but steadily learn about each other. In contrast, repairing trust requires drastic action. Once the level of trust has dropped below zero, incremental trust-building activities – such as showing commitment, consistency, and honesty – are simply too vague and weak to turn round the negative spiral. Figure 2 provides one way to think about the difference between incremental trust-building and trust repair.

As illustrated in Figure 2, trust repair starts from a negative state that is characterized by watchfulness, wariness, fear, and skepticism (Lewicki et al., 1998). To repair trust, partners must first overcome this negativity. They must break away from the tit-for-tat retaliation that follows from violations and that escalate distrust. And, they must put a stop to the negative gossip, stories, and rumours that often spread following a trust violation, and that lead to the diffusion of distrust within the firm. On this point, repairing trust between two organizations is different from repairing trust



Phase	Trust Breakdown	Trust Repair		
		Step 1. Stop escalation	Step 2. Build a platform	Step 3. Build trust incrementally
Critical activities during this phase	Distrust escalates since trust violations provoke retaliations and negative stories spread within the organization.	One or both partners put a stop to escalation by refusing "tit for tat" retaliations and hindering negative gossip.	Partners substantially change their way of working in order to collaborate even though distrust is still present.	Trust is incrementally built as partners show commitment, consistency, and honesty.
Relationship characteristics	Watchfulness, wariness, fear, and skepticism.	The relationship is cooled down, but distrust persists.	There is an expectation that joint work can be continued, even through distrust is still present.	Hope, faith, confidence, and assurance.

Figure 2. Critical steps during a process of trust repair

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between individuals. Whereas interpersonal trust repair only requires that one person change their view of another, inter-organizational trust repair requires that multiple individuals change their views – and also that this change of attitude is reflected in the organization's routines.

As illustrated in Figure 2, the first step of trust repair therefore comprises actions to stop the escalation of distrust. This enables partners to continue the collaboration, even though distrust is still present. The second step comprises actions to establish a platform for repairing trust. The main outcome of this step is an expectation that trust violations that happened in the past are less likely to recur. Thereby, the second step creates sufficient conditions for trust to grow, without being subsumed by the distrust present in the R&D partnership. The third step comprises actions to fully repair trust.

Next, I discuss three specific approaches for stopping escalation, building a platform, and repairing trust – as summarized in Table 1. The first approach is based on *apologies,* the second is based on *control,* and the third is based on *shielding off.* The insights presented are derived from evidence generated through more than a decade of academic research on trust repair (for excellent reviews of the emergent literature on trust repair, see Bachmann et al., 2015; Dirks et al., 2009; Lewicki & Brinsfield, 2017).

Repair Trust by Making Apologies

Step 1: Make a clear and credible apology
An apology is formally defined as a statement that acknowledges responsibility and regret for a trust violation (Kim et al., 2009). Making an apology signals that whatever deceitful behaviour took place was an exception to standard behaviour. Apologies – if accepted – are

Table 1. An overview of the three approaches to repairing trust in an R&D partnership

		Key Activities			
Factor	**How It Works**	**Step 1. Stop the escalation of distrust**	**Step 2. Establish a platform**	**Step 3. Repair trust step-by-step**	**Why It Can Backfire**
Apology	The guilty par(ties) express regret and earn forgiveness by making apologies and amends.	Make a clear and credible apology.	Commit to a full investigation and increase self-monitoring and control.	Be clear about expectations and deal with sources of conflict before they escalate.	• Can be followed by claims for compensation • Investigation can uncover unpleasant facts • It can be more difficult when both partners have violated trust
Control	Stability and predictability are increased by the implementation of a more detailed control and coordination structure.	Increase monitoring and control in the R&D partnership.	Improve coordination of joint activities.	Gradually decrease monitoring to demonstrate trust and trustworthiness.	• Monitoring and control can be interpreted as a sign of distrust, thereby fuelling escalation of distrust
Shielding Off	The relationship is cooled down as less combative groups are separated from the core of the conflict and trust is repaired locally among these groups.	Shield off less combative groups from the core of the conflict.	Repair trust locally by focusing on solving problems "here and now".	Increase interaction between groups in order to allow locally repaired trust to diffuse.	• Shielding off less combative groups hampers coordination • Increasing interaction between groups can also trigger diffusion of distrust

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effective means by which the escalation of a negative spiral can be slowed down. Basically, there are two ways to apologize (Kim et al., 2009). One is to say, "I did it, I accept full responsibility, and I am sorry." The other is to say, "I did it and I am sorry – but I really couldn't help it, since my hands were tied," [or] "...I didn't know it was wrong." Researchers (Harmon et al., 2015; Kim et al., 2006) have shown that, when the transgression relates to lack of honesty, then an apology is more effective if external circumstances can be blamed. This is because accepting full responsibility confirms that the violator was indeed untrustworthy, which can escalate distrust rather than repair trust. If, on the other hand, the transgression relates to lack of competence, then the apology is more credible if the transgressor assumes full responsibility for their wrongdoings.

Step 2: Commit to a full investigation
Apologies can stop the escalation of distrust but they are not a sufficient platform for subsequently building trust, because "talk is cheap" (Bottom et al., 2002). To be credible, apologies must be followed by action. One such action is to commit to a full investigation of what was done wrong and why (Gillespie & Dietz, 2009). Rather than identifying scapegoats, this investigation must take a system-wide perspective, reprimanding individuals where necessary and attending to the culture, management practice, and structures that enabled the trust violation to take place.

To further substantiate the apology and build a platform for trust, the investigation should lead to heightened self-monitoring and control. For example, the wrongdoer can open its books to the R&D partnership partner, allowing full disclosure. This is a way both to signal commitment to the R&D partnership and to prevent future transgressions. To add further weight to their apology, the transgressor can also institute a self-punishment (Nakayachi & Watabe, 2005). This could take the form of an upfront monetary compensation to the other party or a new routine that ensures that the adverse consequences of any further wrongdoings will fall on the wrongdoer themselves. Through such actions, the firm responsible for the trust violation shows that it is serious about reforming its behaviour.

Step 3: Be clear about expectations
Once a negative spiral has been halted and a platform for trust-building established, it is time to engage in an incremental step-by-step process of trust-building. These activities include being very clear about one's own expectations, aiming to understand the partner's expectations and learning from experience by recognizing potential sources of conflict and dealing with them before they escalate into negative spirals.

How apologies can backfire
Apologies can be used as long as one partner is willing to accept responsibility for a trust violation. In many R&D partnerships, however, there are two trust violators, not one, and it can be difficult to sort out who should accept responsibility, and for what. Apologies may also be followed by claims for compensation. If so, denial might be the better strategy. Moreover, any firm that assents to a full investigation of its conduct must be confident that the partner will not find anything that confirms distrust and triggers renewed escalation of conflict. Finally, any firm that invites its partner to monitor its activities must also be confident that the partner will not abuse the information they gain in the process. Since distrust typically goes both ways, such confidence is often lacking. If done wrong, apologies can lead to claims for compensation and even trigger new perceptions of trust violations. The difficult choice that executives need to make is whether they are willing to take *all* the consequences of accepting responsibility for a trust violation.

Repair Trust by Increasing Control

Step 1: Increase monitoring and control
Consider the following example:

> On January 1, 1992, the Open Skies Treaty came into force, a treaty currently signed by 34 state parties. This treaty enables all participating nations to fly over areas of concern to them and collect information about military forces and activities. Since the treaty was signed, the participating nations have conducted more than 800 such flights over each other's territory, contributing to peace by creating transparency between nations.

The Open Skies Treaty is a good example of how fragile relationships can be stabilized by implementing a control structure that improves monitoring. The equivalent to an Open Skies treaty in the context of R&D partnerships could be to grant access for mutual crosschecking of information. It could also imply mutual monitoring to make sure that behaviour and outputs were as expected. This type of control structure creates stability by safeguarding against potential opportunism. Thereby, it can stop the escalation of distrust after a trust violation and help to preserve an R&D partnership.

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Step 2: Improve coordination
Even though control and monitoring provide a safeguard, they are not the same thing as trust. In order to build a platform for trust repair, it is important to combine monitoring (which creates assurance against trust violations) with coordination (which helps to align tasks and joint activities) (Brattström & Bachmann, 2018; Brattström & Richtnér, 2014). Consider the following example (described by Faems et al., 2008):

> At the end of the 1990s, Graph and Jet (pseudonyms), two companies in the image printing industry, initiated an explorative R&D collaboration. Unfortunately, the R&D partnership soon ran into unanticipated problems that the partners found it difficult to sort out constructively and collaboratively. After about two years of conflict, the situation became unsustainable and the collaboration was terminated. Whereas this could have been the end of the relationship, the partners instead chose to initiate a second collaboration, despite prevailing mistrust among managers. Jet was low on cash and needed financial support from Graph, while Graph needed access to Jet's advanced technologies (i.e., there were strong interdependencies). Graph and Jet jointly realized the need for a better control structure. They specified in a contract that both companies would conduct similar technological tests and hold joint meetings in which they would share information; they also made it clear what technological activities each expected from the other. In short, they drastically increased the transparency of joint operations in order to facilitate a constructive approach to problem-solving. This new control structure improved the relational climate and eventually contributed to the repair of trust.

Graph and Jet managed to repair trust without either party making an apology. Instead, they implemented a contract that clearly stipulated information exchange and joint problem-solving. Such improvement of coordination is important because there is often a strong, positive link between the successful alignment of activities and trust (Brattström & Bachmann, 2018). A breakdown in task alignment can raise suspicions that the failure was intentional and deceitful. On the other hand, when the alignment of tasks succeeds and the partner delivers as expected, it is easier to think that the partner is trustworthy. Control structures that facilitate communication, contribute to a shared culture and a shared "language", and they create a joint understanding of the task at hand, which makes it easier to overcome the challenges that emerge during collaborative projects. In this way, coordinative control creates a platform for building trust.

Step 3: Gradually relax monitoring
The last step is a gradual reduction of monitoring. This enables partners both to demonstrate their own trustworthiness and to signal their trust in each other. In addition, it is important to consider more general trust-building activities, such as clarifying expectations and dealing with conflict before it escalates.

How control can backfire
Control is an important aspect of all R&D partnerships, but it can be counterproductive. Instead of inducing stability and predictability in the R&D partnership, control can be interpreted as a signal of distrust, fueling a negative spiral instead of calming it.

For control to work, partners need a shared understanding of what control is needed and why. In the Open Skies Treaty, all the signatory nations have a common interest in peace and stability, and all agree that aerial surveillance increases the chances of achieving this outcome. In an R&D partnership between two firms, partners may disagree about who is guilty and in need of control, or what type of control is necessary. If the breach of trust is the result of a series of mutual and escalating transgressions, increased control is particularly likely to be interpreted as an escalation of conflict. To address this, executives must be certain that they and their partner have a clear shared understanding of what control is needed, as well as aligned expectations on where increased control will lead.

Repair Trust by Shielding Off

Apologies and controls are examples of how a trust violation can be dealt with by directly attacking the root-cause of the problems. By making an apology, the guilty party demonstrates that it is aware of the problem and intends to solve it. By implementing a control structure, the wronged party seeks a constructive way to prevent future transgressions. In comparison, the third approach – shielding off – implies an implicit workaround of the problem at hand. Rather than *addressing* the cause of the breakdown in trust, this approach is predicated on shielding-off less combative groups from the source of conflict, allowing them to repair trust locally by *ignoring* the cause of the breakdown.

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Step 1: Shield off less combative groups from the source of conflict

Consider the following example (described by Brattström et al., 2018):

> In 2006, Machine, a global manufacturer of construction equipment, and Cooler Systems, one of its key suppliers, were running a joint development project that was facing serious delays and unforeseen costs. As a result, the collaboration between the two firms became antagonistic at the top management level. Operational engineers, however, had a more constructive dialogue, since they could interact via fact-based reasoning around the technical details of the component being developed. In order to sustain progress in operational tasks, it was therefore decided that communication between engineers and managers would be very restricted, and that engineers would focus on solving practical problems "here and now", disregarding the conflicted past as well as any complicated and uncertain discussions about the future. As it happened, these actions provided the peace and quiet required to soothe the relationship between operational engineers. Later on, a new control structure was implemented in this R&D partnership, which enabled managers to continue with their hands-off approach and engineers to maintain their focus on daily problem-solving. Eventually, trust became established at the operational level and this trust contributed to a corresponding relational turnaround between managers.

Isolating less combative groups from interaction with more combative groups stops the escalation of conflict within the firm. Escalation across groups is otherwise a common pattern in conflicts (Collins, 2008). Groups that are in conflict often seek "allies", meaning other groups with which they can share gossip and stories, thereby increasing polarization between the conflicting parties. In contrast, shielding off less combative groups helps to damp down the flames of escalation.

Step 2: Let the shielded group focus on practical problem-solving

Once escalation of distrust has been slowed down, the focus shifts to establishing a platform for trust repair. This is done by stimulating local repair of trust among less combative groups, even though other groups within the R&D partnership may still exhibit distrust. In the R&D partnership between Machine and Cooler, local trust repair was enabled by allowing engineers to focus on solving practical tasks here and now. As engineers began to reason, "we are all engineers", this created a sense of mutual understanding and limited polarization. Over time, sentiments of trust and friendship emerged among engineers, even though distrust remained among corporate managers.

Step 3: Gradually diffuse local trust

Local trust repair can subsequently function as a platform for repair of trust in more combative groups. An important activity in the final step, therefore, is to increase interaction between groups once more. This allows for a positive trust spiral to take effect as local trust diffuses to other groups. In the R&D partnership between Machine and Cooler, this took place when one engineer was promoted to the management level. Since he had a more positive attitude towards Cooler, he was able to positively influence trust perceptions among the corporate group.

How shielding-off can backfire

Like apologies and control, local trust repair also brings disadvantages. First, the approach is only applicable if one group is less combative than the other(s). In many R&D partnerships, distrust permeates all groups that interact with the partner, from corporate managers to operational staff. Another disadvantage is that shielding off can hamper coordination. In the R&D partnership between Machinery and Cooler, contact between corporate managers and operational engineers was suspended. In this case, this turned out to have a positive effect on trust. However, limiting interaction between managers and operational staff also decreases managers' influence over the firm that they are supposed to be managing and increases the risk that operational staff will engage in behaviour that is not in line with corporate policy.

Finally, the point at which interaction is increased between less and more combative groups is a pivotal moment. While the preferred outcome of this final stage is a diffusion of trust, the actual result could be the spread of d*is*trust, pitching the R&D partnership partners back into a negative spiral. Before engaging in local trust repair, executives need to make a difficult call: whether they can risk losing control over their internal operations by allowing less combative groups to form local trust with an antagonistic partner, and how they can create the conditions necessary for trust to grow during the final stage.

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Discussion

The analysis presented in this article offers core implications both for managers of R&D alliances and scholars interested in processes of inter-organizational trust repair.

Implications for managers

1. *Exit, acquisition or trust repair are different ways to deal with trust violations.* The most important task for executives faced with trust violations is to make sure that the actions they are contemplating will have the results they hope for. Exit should be decisive and constructive – not dragged out over time, leading to excessive losses. Acquisitions should realize synergies – not sweep problems under the carpet or create new ones. When repairing trust, apologies, control, and local trust repair must ensure that trust is strengthened, not weakened even further. Which of these approaches is the most viable requires a careful assessment of the situation in the specific R&D partnership.

2. *You can assess the chances of successfully repairing trust.* Not all relationships and trust violations are suitable for apologies, control, or shielding-off. Figure 3 provides checklists that can be used as a basis for reflecting on the chances of successfully repairing trust. The questions raised in the checklist are important because the answers will determine the appropriate way to deal with a specific trust violation. At the same time, these questions are tricky, because they do not have black-or-white answers.

3. *Effective trust repair can require a bundle of different approaches.* Seasoned executives know that every strategy has the risk of backfiring. What may be most appropriate when seeking to repair trust is to bundle together two or more of these different strategies together. R&D partnerships are complex and multi-faceted affairs, but they are here to stay. Although it is crucial for their functioning, trust is not a tangible object that can be managed in a transparent and predictable way.

Implications for research

Dealing with trust violations is an important but challenging task. The emerging literature on trust repair between individuals and organizations offers important insights into this process. Prior work has highlighted two different "tactics" for repairing trust: one based on apologies, the other based on control (Dirks et al., 2009). Whereas the control perspective has been discussed extensively in the context of inter-organizational relationships, the apology perspective has mainly been analyzed in the context of interpersonal relationships. I add to this literature in three specific ways. First, by relating the apology perspective on trust repair to the particular conditions that face managers of inter-organizational relationships. Second, by developing local trust as an alternative strategy for repairing trust, which is different from both the apology and control perspective. I do so by synthesizing prior work (Brattström et al., 2018) and relating it to the specific phenomena of trust repair. Finally, my analysis answers calls that have been made for integrative perspectives on trust repair (Bachmann et al., 2015; Dirks et al., 2009; Lewicki & Brinsfield, 2017). By relating different tactics, such as apologies, control, and shielding-off to a three-step framework (see Figure 3), my analysis allows for a comparison of these different trust repair tactics.

Conclusion

Even though trust is desirable in R&D partnerships, it is frequently violated. Dealing with trust violations is therefore a critical part of an executive's job. In this article, I provide an overview of three different options after trust has been violated – exit, acquisition, and trust repair – and outline the pros and cons of each. Addressing the need for managerial advice on how to repair trust, this article provides an actionable framework of trust repair encompassing three critical steps: stopping escalation, building a platform, and repairing trust step by step.

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How likely is it that our firm can repair trust with this partner?

1. How severe was the trust violation?

Check all that apply:

- ☐ One or both of us has violated written agreements.
- ☐ One or both of us has violated unwritten, tacit, or implicit agreements.
- ☐ One or both of us has taken advantage of the other.
- ☐ One or both of us has a feeling that the other has not been totally honest.

Score +1 for each box checked and compare the total:

0: This seems to be a trustful alliance.

1-2: We and/or our partner seem to have violated trust, but trust repair is possible.

3-4: We and/or our partner have clearly violated trust: we should consider exit, acquisition, or a combination of trust-repair approaches.

2. Can we afford an apology?

Check all that apply:

- ☐ If we accept responsibility for violation(s), our partner will raise claims for compensation that we are not willing to meet.
- ☐ An investigation of our firm will reveal things that we would prefer to keep secret
- ☐ Our partner will take advantage of the information unearthed by an investigation.
- ☐ We're not willing to apologize (before our partner does).

Score +1 for each box checked and compare the total:

0: It seems that an apology is appropriate here and will help to repair trust.

1-2: We should think twice before accepting responsibility, and combine an apology with control or local trust repair.

3-4: There is a risk that an apology will backfire. We should consider whether we can pursue control or local trust repair – or reconsider exit or acquisition.

3. Do we have an aligned understanding of what went wrong and what can be corrected?

Check all that apply:

- ☐ We have different views about which of us violated trust, or whether we both did.
- ☐ We have different views about how trust was violated, and whether it was a matter of competence or integrity.
- ☐ We have different views about the need for more monitoring in this alliance.
- ☐ We have different views of how we can improve coordination of joint tasks.

Score +1 for each box checked and compare the total:

0: We seem to have a clear and aligned understanding of what went wrong. Monitoring and control can help us repair trust this time.

1-2: We should consider whether we need to combine control with apologies and/or local trust repair.

3-4: There is a clear risk that monitoring will backfire. We should consider whether we can pursue apologies or local trust repair – or reconsider exit or acquisition.

4. Is there a less combative group present, and can we afford to shield this group off?

Check all that apply:

- ☐ All groups (e.g., engineers and managers) are equally involved in the conflict.
- ☐ All tasks (e.g., development, production, writing contracts) are equally conflict-laden.
- ☐ Our partner will take advantage if we give less conflict-laden groups more autonomy.
- ☐ Providing less conflict-laden groups autonomy will severely hamper coordination.

Score +1 for each box checked and compare the total:

0: We seem to have a good chance of succeeding with local trust repair.

1-2: We should consider whether you need to combine local trust repair with apologies and/or control.

3-4: There is a risk that local trust repair will backfire. We should consider whether you can pursue apologies or control – or reconsider exit or acquisition.

Figure 3. Checklist for assessing the chances of successfully repairing trust in an R&D partnership

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About the Author

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Citation: Brattström, A. 2018. How to Deal With and Repair Broken Trust in an R&D Partnership. Technology Innovation Management Review, 8(9): 4–15. http://doi.org/10.22215/timreview/1182

Keywords: open innovation, R&D partnerships, trust, conflict, trust repair

Does Entrepreneurial Marketing Underrate Competition?

Mika Westerlund and Seppo Leminen

> *"You don't know what you don't know."*
>
> Jason Hall
> Founder and CEO of FiveChannels

This study aims to investigate the relationship between marketing needs and actions in entrepreneurial marketing. So doing, it explores how the entrepreneur's interpretation of the needs that arise from the changes and opportunities in the business environment affects their actions in entrepreneurial marketing. We establish and test a set of hypotheses over a sample of 3,097 entrepreneur-led small firms from Finland. The results show that entrepreneurial perception of environmental pressure in terms of partners, customers, and competitors is linked to the marketing practices of small firms in terms of developing business relations, publicity, and offerings. That is, actions in entrepreneurial marketing depend on the entrepreneur's ability to interpret needs based on the signals in the business environment. However, the study confirms that entrepreneurs pay less attention to competition, which affects their marketing actions, and it suggests that both research and practice of entrepreneurial marketing should pay more regard to competition.

Introduction

Marketing is a key concern of entrepreneurship research, although entrepreneurs are not typically marketing experts (Jones, 2010; Martin, 2009). According to Collinson and Shaw (2001), entrepreneurship can look to marketing as the key function within the firm, which can encompass innovation and creativity. Since the 1980s, a stream of research has examined the marketing–entrepreneurship interface in small firms, and much of that work has concentrated on issues surrounding the implementation of marketing in entrepreneurial firms (Hill & Wright, 2000). The term "entrepreneurial marketing" has come to describe the marketing activities of small ventures (Kraus et al., 2010). We share the definition that entrepreneurial marketing is "proactive identification and exploitation of opportunities for acquiring and retaining profitable customers through innovative approaches to risk management, resource leveraging and value creation" (Morris et al., 2002). Distinctions between traditional marketing and entrepreneurial marketing are derived based on discussions of the concepts of size, speed, market, opportunity, risk, and uncertainty (Whalen et al., 2016).

Entrepreneurial marketing represents an exploration of ways in which entrepreneurial attitudes and behaviours can be applied to the development of marketing strategy and tactics (Kurgun et al., 2011). Nonetheless, Hills and Hultman (2011a) argue that, whereas many questions related to entrepreneurial marketing still exist, there is a particular need for more research on the relationship between the interpretation of the business environment and actions in entrepreneurial marketing. Understanding the link is relevant because environmental conditions moderate the entrepreneurial marketing process from opportunity recognition to entrepreneurial actions and competitive advantage (Whalen et al., 2016). Further, Miles and colleagues (2015) call for more research on how the entrepreneurial marketing literature can help scholars understand and predict the marketing actions of firms. Of note, there are differences in the interpretation of the environment and actions taken in entrepreneur-led versus manager-led firms (Zhang & Bruning, 2011). Entrepreneurial marketing is, ultimately, an individual style of doing business shaped by the situation-specific worldview of the entrepreneur (Fillis, 2010).

Understanding and responding to competition is a specific problem related to the entrepreneurial interpretation of the environment. Small firms are innovative and customer-oriented, but they have been found to show remarkably lower levels of competitor orientation than

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large firms, although competitor orientation is related to firm's performance (Marjanova et al., 2015; O'Dwyer & Gilmore, forthcoming). On the other hand, the concept of entrepreneurial marketing does not address competition. It refers to a small firm being able to cope with fewer resources, and it emphasizes the need for proactive, growth-oriented, risk-taking, innovative, and opportunity-oriented decision making (Hills & Hultman, 2011a). That said, research on market orientation uniformly argues that market intelligence needs to encompass three factors: customers, competition, and inter-functional coordination (Zhang & Bruning, 2011). In small firms, inter-functional coordination refers to interacting with partner networks (Larson, 1991).

The aim of this research is to investigate needs and actions as they relate to entrepreneurial marketing in Finnish entrepreneur-led small firms. We seek to identify the relationship between the entrepreneur's interpretation of the business environment and their marketing actions. Specifically, we are interested in how the interpretation of competition shows up in entrepreneur-led firms and their actions in entrepreneurial marketing. Entrepreneurs make an interesting context, because their cognitive categorization and assessment of business situations are different from salaried managers, and because it is the entrepreneur's perception of the environment that matters (Becherer & Maurer, 1997). In summary, we seek to identify the links between the entrepreneur's interpretation of the business environment and the resulting marketing actions, and among these links, explore how the entrepreneurial interpretation of competition shows up in entrepreneur-led small firms and their actions in entrepreneurial marketing. Our results suggest that the entrepreneurial interpretation of needs related to partners, customers, and competitors are linked with the company's actions in entrepreneurial marketing, but the role of competition is undervalued.

The remainder of this article is organized as follows. After this introduction, we provide a literature review of entrepreneurial marketing and its underlying elements. We also present our hypotheses on the links between perceived needs and actions taken in the company as they relate to entrepreneurial marketing. Thereafter, we explain our data collected from Finnish entrepreneur-led small firms, as well as our research methodology, and we present the results of the quantitative empirical analysis. Finally, we conclude by discussing our findings and their implications, as well as avenues for future research.

Literature Review

Foundations of entrepreneurial marketing

Marketing and entrepreneurship influence the fate of small firms around the world – their success, their growth, and their profitability (Hills & Hultman, 2011b). Moreover, Hultman and Hills (2011) argue that there are many links between the two concepts. Both are driven and affected by environmental turbulence and both have a behavioural orientation (Hisrich, 1992). Marketing within the small firm can often be viewed as an integral part of managing entrepreneurial activities (Chaston, 1997) and the sum of marketing plus entrepreneurship is greater than their individual component parts (Jones, 2010). According to Gilmore (2011), the term "entrepreneurial" refers to the overall activities and behaviour of entrepreneurs, which includes behaviour that is competitive and drives the marketing process. Subsequently, entrepreneurial marketing describes the marketing adopted by firms that pursue opportunities and seek value in turbulent and unstructured market conditions (Simba & Ndlovu, 2015).

Nonetheless, entrepreneurial marketing is a concept that is hard to grasp (Kurgun et al., 2011). According to Bjerke and Hultman (2002), entrepreneurial marketing is "the marketing of small businesses growing through entrepreneurship." Its practice has been especially common in small firms and, for many entrepreneur-led companies, it is something that is "second nature" (Collinson & Shaw, 2001). Entrepreneurial marketing addresses the challenge of making entrepreneurial decisions under the constraints of limited resources, expertise, impact, and size – and it is subject to external change factors (Gilmore, 2011). On the other hand, entrepreneurial marketing is driven by specific outcome goals and needs (Becherer et al., 2012). According to Hills and Hultman (2011a), entrepreneurial marketing is the result of three elements: entrepreneurial interpretation of information, decision making, and marketing actions. Of these, decision making is widely studied (e.g. Yang & Gabrielsson, 2017). Whereas entrepreneurial marketing is proactive by nature (Morris et al., 2002), in small firms, marketing often is informal and reactive to market opportunities and the entrepreneur has an influence on the decision-making process (Franco et al., 2014).

The commonly addressed characteristics of entrepreneurial marketing – being proactive, growth-oriented, risk-taking, innovative, and opportunity-oriented – are predominantly related to entrepreneurial decision making (cf. Hills & Hultman, 2011a). However, we focus on the

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link between the other two elements, namely entrepreneurial interpretation of the business environment and the firm's actions in entrepreneurial marketing. In other words, we are interested in the relationship between entrepreneurial marketing's contextual antecedents and operational practices (Sashittal & Jassawalla, 2001). From the perspective of entrepreneurial marketing, new opportunities come from an understanding of the marketplace itself (i.e., customers, competitors, and partners), together with the business environment in which that market operates (Miles et al., 2015). Companies need different marketing strategies depending on various internal and external factors (Stokes, 2000), and the entrepreneur needs to be able to recognize and anticipate the pressures for change both inside and outside the enterprise – and to plan for them (Scott & Bruce, 1987). Specifically, entrepreneurs need to examine internal and external factors related to marketing and their effects in turbulent business environments (Al-Askari, 2011).

We anticipate that an entrepreneur's interpretation of the business environment (i.e., their marketing needs) affect the entrepreneur-led company's marketing actions. The better the entrepreneurial interpretation of the environment, the more relevant actions in entrepreneurial marketing the small business echoes. We consider marketing needs as arising from the contextual pressure in competition, customer demand, and network relations (Dilts & Hanlon, 2002; Hill & Wright, 2000; Hills et al., 2008; Whalen et al., 2016). These needs also refer to the discovery of opportunities that may originate through some form of environmental change, for example advances in technology, or by exploiting changes in the marketplace, for example the exit of a competitor (Miles et al., 2015). Consequently, we view that actions in entrepreneurial marketing comprise developing business network relations, ensuring publicity through various channels, and creating innovative offerings (Chaston, 1998; Hills et al., 2008; Lin & Smyrnios, 2007; Lodish et al., 2001; Whalen et al., 2016). In the following sections, we establish our research hypotheses. We start by exploring actions in entrepreneurial marketing and then we discuss the interpretation of the business environment that can lead to those actions.

Marketing actions – operational practices in entrepreneurial marketing

An entrepreneurial mindset is almost synonymous with innovative practices (Morrish, 2011), and the actions of a firm mirror the orientation of its entrepreneur (Miles et al., 2015). Actions in entrepreneurial marketing refer to the application of marketing practices that help the company succeed and create value (Mort et al., 2012). To survive in competitive, rapidly changing markets, organizations must focus on building long-lasting customer relationships (Webster, 1982). On the other hand, entrepreneurial marketing is based on networking not only with customers but also partners to build and support marketing activity (Gilmore, 2011; Franco et al., 2014). Furthermore, the development and launch of new offerings to attract new customers and to permit new market entry are essential (Chaston, 1998). Dilts and Hanlon (2002) argue that marketing pursues differentiation of products and services from those of competitors through distinctive competence and public relations that focuses on establishing and maintaining a favourable corporate image. Hence, we anticipate that actions in entrepreneurial marketing address relations, publicity, and the development of offerings.

1. ***Relations.*** Relationships with customers and other stakeholders are at the foundation of entrepreneurial marketing (Hills et al., 2008). Chaston (1998) found that the highest growth rate is achieved by entrepreneurial firms performing relationship marketing. Small firms tend to carry out the most fundamental of relationship marketing activities through personal networking and face-to-face interactions (Miles et al., 2015). Relationship marketing refers to all marketing practices directed toward establishing, developing, and maintaining successful relational exchanges (Morgan & Hunt, 1994). According to Chaston (1997), it shows that companies move closer to their customers. However, relationship marketing is not only about customers; it is also about partners. Chorev and Anderson (2006) argue that creating alliances with partners is often required to penetrate new markets and to provide a desirable complete solution. Partners contribute to the product, pricing, and promotional decisions of entrepreneurs (Collinson & Shaw, 2001). Marketing strategies emphasizing relationships with partners are associated with operating under greater environmental uncertainty (Dilts & Hanlon, 2002).

2. ***Publicity.*** Martin (2009) stresses the importance of communication, as well as the role of promotions and public relations. Marketing activities need to be complemented with appropriate promotional marketing suited to customers (Lin & Smyrnios, 2007) through, for example, exhibitions or participation in a fair (Bettiol et al., 2012). The Internet has changed

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the way in which small businesses manage and build business relationships, gain publicity, and conduct public relations. E-technology is a useful way for firms to expand their marketing activities, because it is a cost-effective option to communicate information about their products and services, and it allows small firms to reach a wider or specific target market (Gilmore, 2011; Miles et al., 2015). Small businesses are effective in adopting Internet tools and social media to improve their reputation, strengthen their brand, and pre-empt or respond to feedback from customers, suppliers, or other stakeholders (Jones, 2010; Miles et al., 2015). Also, firms can enhance their creditability by creating a professional corporate image with an efficient website (Gilmore, 2011).

3. ***Offerings.*** Entrepreneurial marketing is characterized by responsiveness to the marketplace and an ability to anticipate changes in customer demands (Collinson & Shaw, 2001). New and improved offerings are developed by working in close partnerships with customers (Chaston, 1997; Mort et al., 2012). Development of an offering can be facilitated by such partnerships, whether they are in consumer or business-to-business markets (Whalen et al., 2016). Al-Askari (2011) argues that entrepreneurs tend to stress the product/customer focus and create new markets, products, and services. Further, entrepreneurial firms survive by offering a different range of offerings than the competitors (Knight, 2000). Even the packaging of the product is important from the differentiation point of view (Gilmore, 2011). Knight (2000) also argues that small firms may benefit by differentiating their offerings through product specialization. Successful entrepreneurs are those who create a very specific, unique offering (Gilmore, 2011).

Marketing needs – entrepreneurial interpretation of the environment

Marketing and entrepreneurship are interrelated responses to the environment in which a company is operating (Hill & Wright, 2000). Entrepreneurs are increasingly faced with rapidly changing environments, involving changes in competition, customer demand, and technology (Dilts & Hanlon, 2002). According to Fillis (2010), today's market conditions are shaped by chaos, fragmentation, uncertainty, complexity, and ambiguity. Environmental uncertainty concerns attributes upon which an entrepreneur's attention may be selectively focused, such as customers, competitors, suppliers, regulatory agents, partners, and other actors (Dilts & Hanlon, 2002). Consequently, marketing decisions in entrepreneur-led firms are based on daily contacts and networks while value is created through effective relationships, partnerships, and alliances (Jones & Rowley, 2009). Entrepreneurial marketing is a combination of innovative, proactive, and risk-taking activities that create, communicate, and deliver value to and by customers, entrepreneurs, partners, and society at large (Whalen et al., 2016). Hence, key marketing needs arising from the interpretation of the environment relate to partners, customers, and competitors (Miles et al., 2015).

1. ***Partners.*** Hill and Wright (2000) pinpoint understanding markets, customers, and competition among the central aspects of the marketing–entrepreneurship interface. Moreover, they emphasize selling, sourcing, and buying relationships, suggesting that partners are essential. Chorev and Anderson (2006) found that networking with partners can be very useful for a small business by assisting in expanding its own limited resources and capabilities. As small companies typically lack knowledge and market information, they can access new resources and save time through the partner networks (Collinson & Shaw, 2001). They should leverage the strengths of others by seeking cooperation with both customers and major companies to overcome their deficiencies and lack of resources and to improve their access to markets (Chorev & Anderson, 2006). Partners can also be suppliers or distributors in the supply chain, and understanding their needs is as crucial as understanding those of the customers. Marketing leadership is characterized by innovative marketing techniques and careful control of distribution channels (Knight, 2000). Chorev and Anderson (2006) argue that, for supply and distribution partners, environmental uncertainty exists because of a lack of experience in selling, delivering, and supporting products on a new market.

Hypotheses 1, 2, & 3: *The entrepreneurial need to develop partnerships has a positive effect on* ***(H1)*** *developing network relationships,* ***(H2)*** *ensuring publicity on the market, and* ***(H3)*** *creating new products and services.*

2. ***Customers.*** The marketing literature suggests that a company should focus on its customers and the "customer-first" philosophy is a predominant one in a successful business (Hill & Wright, 2000). A firm is always more or less able to generate market intelligence pertaining to current customer needs and to respond to it in an organization-wide manner (Duus, 1997). While it may be able to focus on processing market knowledge and responding to customer

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needs, it may neglect opportunities for breakthrough products that customers cannot express or identify a need for (Ahmadi & O'Cass, 2016). Thus, Mohr (2001) stresses the importance of identifying the customer's new and changing needs that the company should meet in the future. Understanding customers' needs and implementing their feedback is the only way to achieve a sellable product (Chorev & Anderson, 2006). The pressure for entrepreneurial marketing includes the search for unusual, new, and creative promotion methods to attract customers (Al-Askari, 2011). Moreover, Chaston (1997) notes that with companies driven by entrepreneurial marketing, the pressure for change, which can come from customers, is in the area of increasing the effectiveness of the new product development process.

Hypotheses 4, 5, & 6: *The entrepreneurial need to understand customers has a positive effect on* ***(H4)*** *developing business relationships,* ***(H5)*** *ensuring publicity on the market, and* ***(H6)*** *creating new products and services.*

3. ***Competitors.*** The literature about the marketing in small firms concentrates on the difficulties that companies experience and encounter in their practice of marketing (Hill & Wright, 2000). Al-Askari (2011) suggests that the practice of entrepreneurial marketing depends on competitive trends in addition to customers' expectations. This view is supported by Hills and colleagues (2008), who suggest that marketing competencies in entrepreneurial firms are typically driven by a superior understanding of market positioning. This highlights the need to understand markets in terms of competition. Recognizing current and future competition is among the key drivers of marketing practice (Miles et al., 2015; Mohr, 2001). That said, small firms tend to show remarkably lower levels of competitor orientation than large firms (Marjanova et al., 2015; O'Dwyer & Gilmore, forthcoming). Then again, the entrepreneur has an important role in understanding competition, because it helps in identifying opportunities in a changing environment (Collinson & Shaw, 2001). Atuahene-Gima and Ko (2001) point to the intensity of market competition by tapping the perceived similarity of competitor offerings, price competition, and aggressiveness of the competitor's behaviour.

Hypotheses 7, 8, & 9: *The entrepreneurial need to address competition has a positive effect on* ***(H7)*** *developing network relationships,* ***(H8)*** *ensuring publicity on the market, and* ***(H9)*** *creating new products and services.*

Methodology

Our focus is on two key elements of entrepreneurial marketing: interpretation of the business environment and marketing actions. In order to analyze the links between the two, we used data from the semi-annual 2007 small business survey in Finland for our empirical analysis. The fall 2007 survey was conducted by a Finnish research company Taloustutkimus on behalf of the Federation of Finnish Entrepreneurs (cf. Westerlund et al., 2016), but we were able to include a set of questions on small firms' marketing activities into the survey. We developed the scales for the needs and marketing actions based on a literature review, and all questions utilized a (binary coded) dichotomous scale. The study relies merely on the respondents' perceptions because objective measures were not available from other sources.

The survey yielded a total of 3,823 usable responses for the analysis. However, to focus on entrepreneurial marketing in entrepreneur-led small firms, we only included responses from entrepreneurs and excluded those from salaried managers. The choice was justified by findings in previous research on entrepreneurship (e.g., Becherer & Maurer, 1997), which have suggested that the cognitive categorization and assessment of business situations of entrepreneurs are different from salaried managers. Thus, our final sample consisted of survey responses from 3,097 entrepreneurs. According to the demographics analysis, 25% of these respondents comprised one-person firms with the entrepreneur as the sole employee. As expected, the firms in the data were small; 97% had fewer than 50 employees and only 3% had more than 50 employees.

Scale validity and reliability

We performed an empirical analysis using the SmartPLS 3.2 by Ringle and colleagues (2015). Partial Least Squares (PLS) path modelling is a component-based multiple regression approach that does not require multivariate normal data and places minimum requirements on measurement levels (Tenenhaus et al., 2005). The advantages of PLS include the ability to model multiple constructs, the ability to handle multicollinearity among the independents, robustness in the face of missing data, and the creation of independent latents directly on the basis of cross-products involving the response variables (Chin et al., 2003). PLS can analyze different types of data, including binary coded data (Falk & Miller, 1992), like in our data set. Moreover, PLS helps to avoid biased and inconsistent parameter estimates

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for equations, because it considers all path coefficients simultaneously and estimates multiple individual item loadings in the context of a theoretically specified model rather than in isolation. It is appropriate when the research model is in an early stage of development and has not been tested extensively (Teo et al., 2003).

Table 1 lists measurement items. In order to estimate parameters, we applied Wold's (1982) PLS method. First, we used Harman's single factor test to address common method bias (CMB), which can be a problem when both dependent and independent variables are measured in the same survey. To do this, we constrained the number of factors to be just one and examined the unrotated solution. If CMB was an issue, a single factor would account for the majority of the variance in the model (Podsakoff & Organ, 1986). The first factor only explained 16.8% of variance in the model. Thus, CMB was not a concern with the data.

Table 1. List of measurement items

Entrepreneurial Marketing	Construct	Items
Needs	Partners	• Find new partners for collaboration • Develop the supply/distribution chain
	Customers	• Recognize our customer needs and wants • Develop our extant customer relationships
	Competitors	• Respond to the increased price competition • Know the competitors in our market domain
Actions	Relations	• Personal selling through close relationships • Networking with partners and customers
	Publicity	• Participation in fairs and exhibitions • Sustaining a corporate website
	Offerings	• Differentiation of products and services • Developing and launching new offering ideas

Note: *The response options ranged from 0 = "not significant" to 1 = "significant"*

Second, we examined composite reliability values (CR) and average variance extracted values (AVE) for each construct to assess the reliability and convergent validity of the constructs. All CR values exceeded the recommended minimum levels of .70 (Fornell & Larcker, 1981) and .50 for AVE (Diamantopoulos & Siguaw, 2000). To assess discriminant validity, we examined the correlation matrix of the constructs. Construct correlations were minimal, suggesting the constructs actually measure different things. Further, according to Fornell and Larcker (1981), satisfactory discriminant validity among constructs is obtained when the square root of the AVE is greater than corresponding construct correlations, as is in our data (Table 2).

Results

Our empirical analysis reveals that the results support all of our hypotheses. The need for developing partnerships, as perceived by the entrepreneur based on their interpretation of the business environment is positively associated with the company's taken actions in entrepreneurial marketing, namely developing network relationships (H1: ß=.15, p<.001), ensuring publicity on the market (H2: ß=.22, p<.001), and creating new product and service offerings (H3: ß=.20, p<.001). Similarly, the need for understanding customers is positively linked with developing network relationships (H4: ß=.14, p<.001), ensuring publicity on the market (H5: ß=.05, p<.01), and creating new product and service offerings (H6: ß=.15, p<.001). Finally, the need for addressing competition on the market is positively linked with developing network relationships (H7: ß=.08, p<.001), ensuring publicity on the market (H8: ß=.09, p<.001), and creating new product and service offerings (H9: ß=.06, p<.01).

Table 3 summarizes the results. Of note, although all relationships were statistically significant, results for hypotheses H5, H7, H8, and H9 showed small construct co-efficient values, ranging from .05 through .09. Further, although the purpose of the analysis was merely to confirm the existence of links between perceived needs that arise from the entrepreneur's interpretation of the business environment and marketing actions taken by the company, rather than create an all-encompassing model, R^2 values for the dependent constructs remained small, ranging from 5.3 to 7.2 percent. These values, as well as implications of the results, are discussed in the following section.

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Table 2. Construct correlations and descriptive statistics of measures

Construct		CR	AVE	1	2	3	4	5	6
1	Competitors	.73	.58	(.76)					
2	Customers	.73	.57	.12	(.76)				
3	Offerings	.79	.65	.10	.16	(.81)			
4	Partners	.74	.59	.10	.01	.21	(.77)		
5	Publicity	.77	.63	.12	.07	.21	.23	(.79)	
6	Relations	.70	.54	.11	.15	.16	.16	.09	(.74)

Note: *square root of AVE on diagonal (in parentheses)*

Table 3. Results from hypothesis testing

H#	Relationship	Coefficient	*t*-value	*p*-value	Support
H1	Partners → Relations	.15	8.72	<.001	Yes
H2	Partners → Publicity	.22	10.64	<.001	Yes
H3	Partners → Offerings	.20	9.26	<.001	Yes
H4	Customers → Relations	.14	7.43	<.001	Yes
H5	Customers → Publicity	.05	2.85	<.01	Yes
H6	Customers → Offerings	.15	9.05	<.001	Yes
H7	Competitors → Relations	.08	4.18	<.001	Yes
H8	Competitors → Publicity	.09	4.80	<.001	Yes
H9	Competitors → Offerings	.06	2.82	<.01	Yes

Note: *N=3097; bootstrap samples=1000*

Discussion

The aim of this research was to investigate the link between needs and actions in entrepreneurial marketing in entrepreneur-led companies. We considered marketing needs as arising from the entrepreneur's interpretation of the pressure from the business environment in terms of partners, customers, and competitors. Moreover, we discussed the company's actions in entrepreneurial marketing in terms of relations, publicity, and offerings development. In particular, we were interested in how needs related to competition show up because previous literature (e.g., Marjanova et al., 2015) has shown that small firms exhibit significantly lower levels of competitor orientation than large firms.

Our empirical analysis of 3,097 entrepreneur-led firms from Finland showed that entrepreneurial interpretation of the changes in a firm's business environment is connected with its marketing actions. Entrepreneurial decision making in small firms is strongly dependent on the entrepreneur's ability to interpret signals in the business environment. In particular, these signals include the needs and wants of a firm's customers and partners, as well as the competitive trends and competitor's actions on the market. Understanding these contextual factors define whether and how an entrepreneur-led company can respond to the market turbulence. Marketing can take many forms and includes investing in customer and partner relations, ensuring publicity, and new product and service development.

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That said, the study showed that entrepreneurial interpretation of competition has a weaker connection with marketing actions. In other words, an entrepreneur's perception of the competitive situation on the market does not result in the development of business relationships, publicity, and offerings to the same degree as perceived marketing needs related to partners and customers. This result was expected based on the literature review (e.g., Marjanova et al., 2015; O'Dwyer & Gilmore, forthcoming), and it supports the notion that entrepreneur-led small firms show significantly lower levels of competitor orientation despite its importance to firm's performance.

On the other hand, the weak link between market needs related to customers and publicity was unexpected. We cannot fully explain this result, but anticipate that, although marketing needs related to customers were measured more as a need to understand customers and their needs, the resulting marketing actions were measured more as promotional activities. Yet again, although exhibitions and fairs may be mainly promotional events, they also offer opportunities for the entrepreneurs to talk with current and future customers and, in that way, sense market needs.

Implications

The results of this study have implications to theory and practice. Although the concept of entrepreneurial marketing has been hard to grasp, our results give empirical support to the notion put forth by Kurgun and colleagues (2011), who suggest that entrepreneurial marketing represents an exploration of ways in which entrepreneurial attitudes and behaviours can be applied to the development of marketing strategy and tactics. Our study shows that the entrepreneurs' interpretation of the pressure from the business environment in terms of marketing needs is linked with the forms of marketing actions they take. Hills and Hultman (2011a) argue that entrepreneurial marketing focuses on the behaviour of an innovative entrepreneur who continuously strives for growth. Our study suggests that such ways include the development of business relations, corporate publicity, and offerings, and these actions are driven by the entrepreneur's perception of changes and discovery of opportunities on the market in terms of partnerships, customer needs, and competition. In this way, our study responds to the call by Hills and Hultman (2011a), who proposed that research on entrepreneurial marketing should focus on understanding the link between the entrepreneurial interpretation of the environment and marketing actions.

Further, we agree with Marjanova and co-authors (2015) and O'Dwyer and Gilmore (forthcoming), who argue that small firms should pay closer attention to direct and indirect competitors in order to identify opportunities and build sustainable competitive businesses, and to achieve higher financial and innovation performance. Our empirical findings provide further evidence for the notion that small firms exhibit lower levels of competitor orientation (e.g., Marjanova et al., 2015), and they contribute to the literature by showing that paying less attention to understanding the competitive situation on the market also has a weaker link to market actions taken by the company in terms of network relations development, publicity, and new offering development. This suggests that entrepreneurs make decisions related to marketing actions based on incomplete information, which may potentially lead to harmful and wrong decisions or missed opportunities. On the other hand, the concept of entrepreneurial marketing does not specifically address competition, but rather refers to a small firm being able to cope with fewer resources, and it emphasizes the need for proactive, growth-oriented, risk-taking, innovative, and opportunity-oriented decision making (Hills & Hultman, 2011a). Based on our results, we feel that the literature and practice of entrepreneurial marketing have underrated the role of competition.

Therefore, in addition to providing evidence for the link between the entrepreneurial interpretation of the business environment and the firm's marketing actions, we contribute to the literature by arguing that research on entrepreneurial marketing should further emphasize the role of understanding competition rather than taking an inward-looking view on the business. Previous literature often associates the need for entrepreneurial marketing with survival of the small firm (e.g., Becherer et al., 2012; Buskirk & Lavik, 2004; Ionita, 2012; Kraus et al., 2010; Stokes, 2000; Whalen et al., 2016). Although our study confirms that small firms show lower levels of addressing competitors, we feel that the recent advancements in entrepreneurship education have unfortunately not been supportive to improve the issue. For instance, the business model canvas (cf. Osterwalder & Pigneur, 2010) and its derivatives have become a key tool in entrepreneurial education and strategy development. That said, the canvas puts emphasis on customers, value proposition (offering), as well as partners and key resources. Conversely, it does not address competition. We further argue that conceptual strategy tools for small businesses should include the competition element by default.

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Business practitioners can benefit from our results in at least two ways. First, they can learn which aspects to focus on when seeking to filter and understand turbulent business environments that are characterized by rich information and emergent changes and opportunities from the marketing point of view. Our study suggests that firms need to consider not only customer needs and competition, but partners as well. In particular, although competitor orientation in small firms seems to be at a significantly lower level compared to large companies, entrepreneurs should focus more on understanding the competitive situation on the market. Second, practitioners can understand that entrepreneurial marketing is a feature for entrepreneurial companies at any point of maturity, and that they need to be alert of the situation in the business environment in order to provide a multitude of marketing actions as a response to changes and opportunities. These marketing actions include the development of business relationships with customers, partners, and other stakeholders; ensuring publicity in both online and offline work; and creating novel product and service offerings to differentiate themselves from the competition and provide value.

Limitations and Future Research

Although we were able show the link between the entrepreneurial interpretation of the business environment and the company's marketing actions as intended, the R^2 values of dependent variables in our model were small, indicating that a lot of variability in the data remained unexplained. This suggests that the model would benefit from having a mediator between the entrepreneurs' interpretation of the environment and their marketing actions. That said, it should be the entrepreneurial marketing process as explained by Hills and Hultman (2011a) who argued that entrepreneurial marketing is a combination of environmental interpretation, entrepreneurial decision making, and marketing actions. Thus, future research on entrepreneurial marketing should include the decision-making process for entrepreneurial marketing along with its characteristics such as innovativeness and risk propensity.

Further, although entrepreneurial marketing ultimately stems from the entrepreneur, future research should address the role of the entrepreneur's personal traits, competences, and motivations in the interpretation of the environment and actions in entrepreneurial marketing. Moreover, future studies should examine how interpretation and marketing actions differ between fast-growth firms and those that reflect little growth, as well as take into account the type of the business and the stage of the company. Companies focusing on products rather than services or business customers rather than consumers may interpret the market conditions differently and decide on marketing actions in a different manner. Similarly, a new venture or an early-stage firm may perceive different marketing priorities than an established or a later-stage firm (e.g., reaching investors versus customers).

Conclusion

This study examined the link between the entrepreneurial interpretation of the business environment and the small entrepreneur-led firm's marketing actions. Although the study showed that entrepreneurial interpretation of the environment is important as it results in various marketing actions, both research and practice of entrepreneurial marketing should put more emphasis on monitoring and understanding changes and opportunities in a competitive situation.

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Keywords: entrepreneurial, marketing, environment, orientation, competition

Transnational Entrepreneurship: Distinctive Features and a New Definition

Eduardo Bailetti

> *"Creating a structure for mutual prosperity requires lowering regional and transnational barriers to facilitate the flow of goods and promote people-to-people interactions."*
>
> Moon Jae-in
> Current President of South Korea

Definitions of transnational entrepreneurship are too general making it difficult to understand what distinguishes transnational entrepreneurship from other forms of entrepreneurship. In addition, these definitions identify the "immigrant", "ethnic", or "migrant" entrepreneur as the focal actor rather than the company. This makes it difficult to align transnational entrepreneurship with the theory of the firm and provide practical insights to practitioners. This article examines 11 definitions of transnational entrepreneurship, discovers the groups of words that best represent the information in a corpus comprised of 44 journal articles, identifies the key features that distinguish transnational entrepreneurship from other forms of entrepreneurship, and advances a new definition of transnational entrepreneurship. The results indicate that transnational entrepreneurship has two key distinctive features: cross-border investment logic and institutional distance – the difference in institutional context between countries. Accordingly, transnational entrepreneurship may be usefully defined as "a cross-border investment to acquire, combine, and recombine specialized individuals and heterogeneous assets to create and capture value for the company under conditions of institutional distance and uncertainty". This proposed definition builds on the features that make transnational entrepreneurship distinctive, is consistent with the theory of the firm, and carries implications for how to grow companies at an early stage.

Introduction

Insights into how and why a new entrepreneurial company can establish itself as a transnational company have not yet been provided by the developing field of transnational entrepreneurship. Given that new companies that grow their operations globally are worth more, grow quicker, and are more capable at adapting to uncertain environments (Bailetti & Zijdemans, 2014), this is an important hurdle to overcome.

In this article, a review of the transnational entrepreneurship literature reveals three contributing factors that may be holding the field back from providing practical guidance on how to establish transnational business activities: i) varied and general definitions, ii) an absence of identified distinctive features, and iii) the presence of the entrepreneur rather than the firm as the focal actor.

Definitions of transnational entrepreneurship can be too general, and the perspectives used to define transnational entrepreneurship vary widely. This makes it difficult to understand what makes transnational entrepreneurship different from other fields. For example, transnational entrepreneurship is said to be about regular cross-border operations (Brzozowski et al., 2017). However, many operations that are carried out across borders have little to do with transnational companies (e.g., remittances, travel). Similarly, defining transnational entrepreneurship as the use of resources from two different fields to create competitive advantage (Patel & Conklin, 2009) could apply to many scenarios, not just transnational entrepreneurship. It is hard to argue that an entrepreneur who uses resources from industry and academia – two different fields – to develop a new product is engaged in transnational entrepreneurship.

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In addition, it is observed that several definitions of transnational entrepreneurship identify the immigrant entrepreneur (Chen & Tan, 2009; Sequeira et al., 2009; Brzozowski et al., 2014), the ethnic entrepreneur (Brzozowski, Cucculelli & Surdej, 2017), or the migrant entrepreneur (Santamaria-Alvarez et al., 2018) as the focal actor rather than the company. Given that much of the attention on transnational entrepreneurship is from social science-related researchers (Drori et al., 2009), it is understandable that the individual entrepreneur is identified as the focal actor. However, the value the entrepreneur (and the team) creates and captures is embodied in the company, not the individual entrepreneur (Foss et al., 2011; Klein, 2016). Thus, wealth-creating entrepreneurial action is better understood when viewed from a perspective that is aligned with the theory of the firm and places the company as the focal actor.

Transnational entrepreneurship would therefore benefit from a new focused definition that highlights the field's distinctive features and is aligned with the theory of the firm. The new definition should contribute directly to practical insights that managers can employ.

Proposing a new definition can help update a field to recognize new developments, such as the case of Oviatt and McDougall's (2005) definition of international entrepreneurship, or it can leverage previous work in an emerging field to provide a clearer working definition, as in the case of Bailetti's (2012) definition of technology entrepreneurship. The author follows Bailetti's approach to proposing a definition of technology entrepreneurship (2012) in that it examines the literature's existing definitions to identify the distinctive features and proposes a new definition drawn upon them.

Thus, the objectives of this article are to identify what distinguishes transnational entrepreneurship from other forms of entrepreneurship and to offer a new definition that is useful to practitioners and researchers.

In the next section, a review of the definitions identified in the academic literature is presented and analyzed. Then, the results of using topic modelling to discover topics in a corpus comprised of journal articles are provided and discussed. The distinctive features of transnational entrepreneurship are identified using the results of these analyses, a new definition is proposed, and a comparison highlighting the advantages of the new definition is outlined. To conclude, the managerial implications for new companies are discussed, the contributions of the research are highlighted, and avenues for future research are suggested.

A Review of Existing Definitions

Table 1 provides 11 definitions of transnational entrepreneurship. The definitions were extracted from literature found using search terms "transnational entrepreneurship" and "transnational ventures". For inclusion, definitions required direct reference to transnational entrepreneurship followed by a direct definition or an explanation or description that resembled a definition. Definitions that described the transnational entrepreneur rather than the field were rejected. When a definition offered was a direct quotation from a prior article, the original source of the definition was used. The definition recorded for Patel and Conklin (2009) includes two separate passages where transnational entrepreneurship was defined: the first focused on transnational entrepreneurship as a process and the second focused on its outcome.

None of these definitions explicitly identify the company as the focal actor. Six of these definitions identify the immigrant, migrant, or ethnic entrepreneur as the focal actor (Brzozowski et al., 2014, 2017; Chen & Tan, 2009; Lin, 2010; Santamaria-Alvarez et al., 2018; Sequeira, Carr & Rasheed, 2009), three identify actors that are embedded in two or more social and economic arenas (Drori et al., 2009; Poblete, 2018; Prashantham et al., 2018), and three definitions do not identify the focal actor (Patel & Conklin, 2009, p.1047 & p.1050; Patel & Terjesen, 2011). Viewing transnational entrepreneurship from the perspective of the entrepreneur has great descriptive qualities but lacks prescriptive power for aspiring entrepreneurs seeking to grow new companies internationally. Without detailed discussion on what the company must do to achieve a transnational presence, there will be a shortage of practical managerial insights for future entrepreneurial action.

Table 1 suggests that transnational entrepreneurship has been defined using various perspectives, such as:

- To discover and enact cross-national opportunities (Chen & Tan, 2009; Prashantham et al., 2018)
- As a process to establish social fields (Sequeira et al., 2009)
- As a process to adapt to change (Patel & Conklin, 2009)
- To explain the use of resources and social networks (Lin, 2010; Patel & Conklin, 2009; Patel & Terjesen, 2011)

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Table 1. Definitions of transnational entrepreneurship in the literature

Definition	*Transnational entrepreneurship...*	**Source**
1.	...is a multi-faceted process, in which immigrant entrepreneurs discover and enact business opportunities across national borders.	Chen & Tan (2009, p.1080)
2.	...represents a form of economic transnationalism that immigrants engage in for different purposes.	Sequeira et al. (2009, p.1026)
3.	...is a process of economic adaptation based on mobilization of social networks across borders... ...to leverage resources from two different social fields to create competitive advantage.	Patel & Conklin (2009, p.1047 & p.1050)
4.	...involves entrepreneurial activities that are carried out in a cross-national context and initiated by actors who are embedded in at least two different social and economic arenas.	Drori et al. (2009, p.1001)
5.	...[occurs when] immigrants simultaneously engage in two or more socially embedded environments and maximize their resource base by doing so.	Lin (2010, p.127)
6.	...is the ability to mobilize social networks in dual institutional settings.	Patel & Terjesen (2011, p.64)
7.	...implies immigrant business engagement not only in the host country, but also in the country of origin.	Brzozowski et al. (2014, p.551)
8.	...encompasses immigrant and (although on a smaller scale) ethnic entrepreneurs who maintain regular cross-border operations, marking their economic presence (at least) in two countries: the host and home economy.	Brzozowski et al. (2017, p.107)
9.	...[is] the process of transnational entrepreneurship involves entrepreneurial activities that are carried out in a cross-national context and initiated by actors who are embedded in at least two different social and economic arenas.	Poblete (2018, p.278)
10.	...[is] the pursuit of entrepreneurial cross-national opportunities by actors embedded in different socio-economic arenas.	Prashantham et al. (2018, p.4)
11.	...[features] individuals who migrate to another country while maintaining business linkages with both the country of origin and the country of destination.	Santamaria-Alvarez et al. (2018, p.246)

- For conducting business in a cross-national context (Brzozowski et al., 2014; Drori et al., Honig & Wright, 2009; Poblete, 2018; Santamaria-Alvarez et al., 2018).

The author also examined the definitions in Table 1 by considering how the objects (focal actors, inputs, or outputs) are embedded in two or more settings (i.e., the surroundings where a phenomenon is positioned or where it takes place). This examination revealed that the definitions in this analysis can be grouped into three different viewpoints:

1. Where the *individual* is placed in the setting (Brzozowski et al., 2017; Drori et al., 2009; Lin, 2010; Patel & Terjesen, 2011; Poblete, 2018; Prashantham et al., 2018; Santamaria-Alvarez et al., 2018)

2. Where the *input* is placed in the setting (Patel & Conklin, 2009; Patel & Terjesen, 2011)

3. Where the *outcome* is placed in the setting (Chen & Tan, 2009; Sequeira et al., 2009)

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These findings demonstrate a lack of consensus within the field, which makes it difficult for focused, prescriptive insights to be provided to practitioners.

Discovering Topics

A corpus of recent, relevant, peer-reviewed journal articles related to transnational entrepreneurship was collected to discover the topics that best represent the field. The articles were selected along four criteria:

1. Search terms: "transnational entrepreneurship" and "transnational ventures"

2. Publication date: between January 1, 2007, and July 1, 2018

3. Publishing journal's ranking: A*, A, or B according to the Master Journal List of the Australian Business Deans Council (updated April 30, 2018)

4. Relevance: the focus of the article must be on conducting business in two or more countries

The initial search resulted in 32 qualified articles. A brief search for additional articles which cite qualified articles produced an additional 12 articles. Appendix A lists the 44 articles used in the analysis.

To reveal the themes that exist within the 44 journal articles, the text of those articles was processed using a topic modelling visualization tool called the J-tool (jtool.cugcr.ca). Topic modelling is a machine learning method of analysis that enables the researcher to "analyze the words of the original texts to discover the themes that run through them" (Blei, 2012). Effectively, topic modelling clusters copious amounts of written material into related groups called "topics". All the articles within a topic share a common set of words, the meaning of which must be interpreted by the analyst who develops the topic model.

The J-tool uses an open-source statistical package called MALLET (mallet.cs.umass.edu/about.php), which is based on the Latent Dirichlet Allocation (LDA) topic modelling algorithm. For a high-level description of LDA and topic modelling please see Blei (2012), and for a deeper discussion of probabilistic modelling, refer to Blei and colleagues (2003) and Blei and Lafferty (2009).

To determine the appropriate number of topics to use for the topic model, the results of multiple topic models were compared, and the one interpreted as having the best "fit" was chosen for analysis. To determine fit, the author used a combination of parameters such as the level of data loss resulting from the topic model, the way the articles distributed between the topics, whether the number of articles at 70 threshold was above 7 for all topics, the presence (or absence) of exclusive words, and the strength of the scores assigned to the articles most associated to each topic.

The author also explored the results of the drill-down function of the J-tool when a single topic had 20 or more articles associated with it. A drill down is when the J-tool uses the articles associated with one topic as the input for a new topic model. The same fit parameters were used to determine if the drill-down fit well enough to include in the topic model. What this means in practical terms is that the one topic can be divided into two sub-topics.

The articles within a topic are clustered together by J-tool because they are calculated to be related to each other in some way. To give that relationship meaning, a theme name may be interpreted and applied by the analyst based on the model results, which include the words most exclusive to the topic, the most common words, the words that tend to appear together, and the titles of the articles most associated to the topic in order of strength.

A close examination of the J-tool results allows a researcher to describe the underlying theme of each topic. In this study, the descriptions of the different themes found in the 44 selected articles enabled the identification of the distinctive features of the transnational entrepreneurship literature.

Findings

A topic model of two topics was determined to be the best fit for the corpus, followed by a drill-down of Topic 2 into two subtopics. Thus, three topics (Topic 1, Subtopic 1, and Subtopic 2) were analyzed, as illustrated in Figure 1, which shows the structure of the topics (and subtopics) in addition to the number of articles and the three most common words in each topic.

Theme names were determined subjectively after an examination of the J-tool output for each of the three topics. The resulting theme names assigned to the topics are "Enter Foreign Markets", "Leverage Ethnic Enclave", and "Bridge the Divide".

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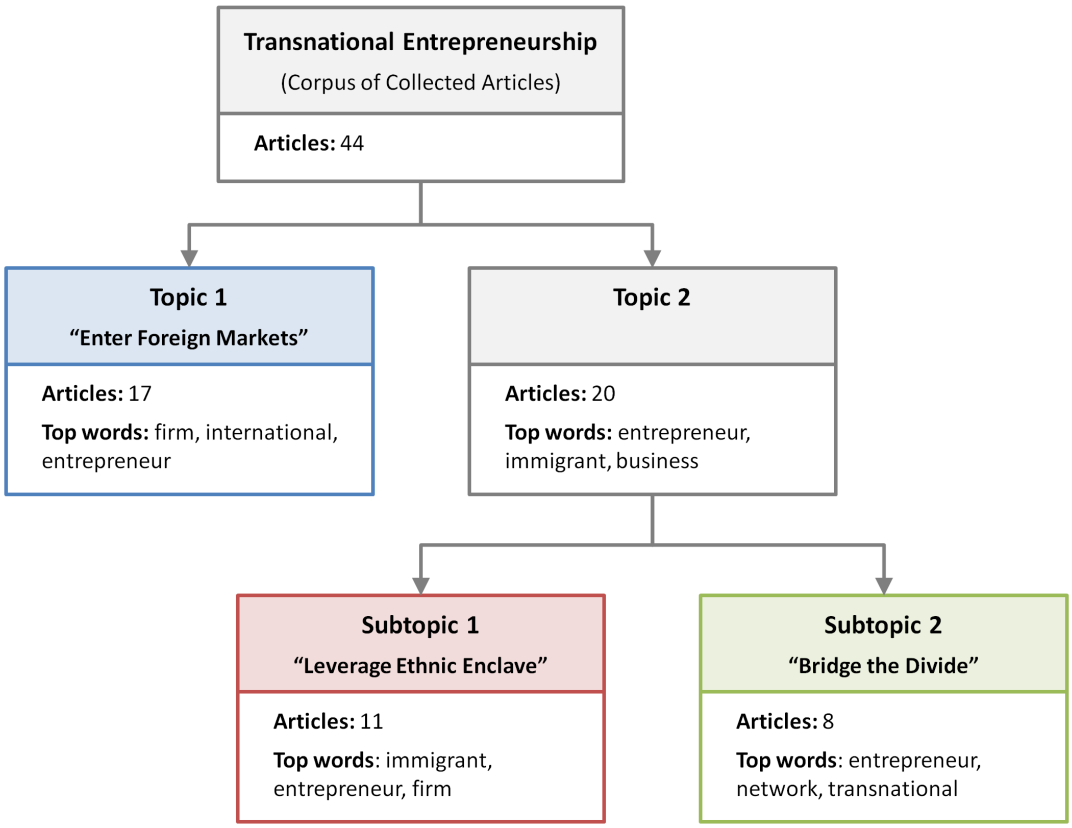

Figure 1. Topics and subtopics of the transnational entrepreneurship topic model

Topic 1 focuses on describing the characteristics of the new company that is seeking to grow in foreign markets. The topic modelling clustered articles that discussed the internationalization of companies mostly in the context of exporting. This did not appear to contribute to the distinctiveness of transnational entrepreneurship as other fields cover this type of internationalization pathway. The name for Topic 1 was concluded to be "Enter Foreign Markets".

The theme of Subtopic 1 was described as "Leverage Ethnic Enclave". The focus of the topic was on the actions of a new company that contribute to performance-based outcomes of growth, survival, and economic development. The new company leverages the networks within the ethnic enclaves of different regions to establish a working relationship with actors within or associated with the enclave. The networking activities of the ethnic enclave are determined by its entrepreneurial orientation. The unique characteristic of Subtopic 1 was noted as the new company's action of leveraging the power of an ethnic enclave to access additional resources, information, and social capital.

The theme of Subtopic 2 was described as "Bridge the Divide", and it depicts the new company internationalizing through business relationships with actors in two distinct economic regions. The new company bridges the divide between the two geographically separated regions and balances the networks it has on both sides. Although the new company's pursuit of internationalization is common between Subtopic 2 and Topic 1, it is the bridging of the divide and balancing of networks between the different regions that are the unique characteristics of Subtopic 2.

Distinctiveness

The results indicate that there are two key features that distinguish transnational entrepreneurship from other research fields: a cross-border investment and institutional distance. This assertion is based on the findings from Table 1 and the topic modelling. By forming relationships in two or more countries, a company can access a greater variety of opportunities and information on assets, customers, suppliers, and partners than by operating in only one country.

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To form relationships with actors in foreign countries, the company makes a cross-border investment (e.g., foreign direct investment, portfolio equity securities, debt securities, and loans). Each investment has a logic that is dependent on the investment instrument used and the institutional distance between the distinctive settings. For instance, foreign direct investment is more sensitive to information flows than equity and debt securities due to ownership implications requiring deep market knowledge and more frequent interactions (Daude & Fratzscher, 2008). Institutional distance has three dimensions: normative, cognitive, and regulatory (Eden & Miller, 2004), and it is deemed critical to the logic used by companies that span national boundaries (Bae & Solomom, 2010; Krammer, 2018). Institutional distance has been identified in the transnational entrepreneurship literature as the "cultural, economic, and institutional gap" (Li et al., 2017) and the "geographic, cultural, and psychological distance" (Terjesen & Elam, 2009), but its strategic significance had not yet been identified to the best of the researcher's knowledge. This article uses institutional distance as a catch-all for the differences that exist between two countries that would affect business.

The formal logic used to make the cross-border investment follows an accountable process that influences the balance between investing in the country of residence and investing in foreign countries. For example, a company that wishes to respond to local adjustments in every country in which it operates will make different cross-border investments than a company that wishes to maximize production efficiency (Edwards et al., 2014).

As illustrated in the topic modelling analysis, the literature connected with Subtopic 2 highlights the need for a company to bridge the divide that exists between itself and foreign actors. When a company makes a cross-border investment, it forms relationships with one or more actors in a foreign country. This foreign actor is within a setting that is part of a foreign country. Similarly, the company that makes the cross-border investment is within a setting that is part of the country of residence. To benefit from a cross-border investment, the company needs to exploit the differences that exist between the company's setting and the foreign actor's setting.

Figure 2 illustrates the aspects that distinguish transnational entrepreneurship from other fields: specifically, the cross-border investment logic and the institutional distance between two countries (setting A and setting B). The figure shows that a company will operate in two countries when it expects the return on its cross-border investment to be higher than the expected return from operating in one country (i.e., Scenario 1 < Scenario 2).

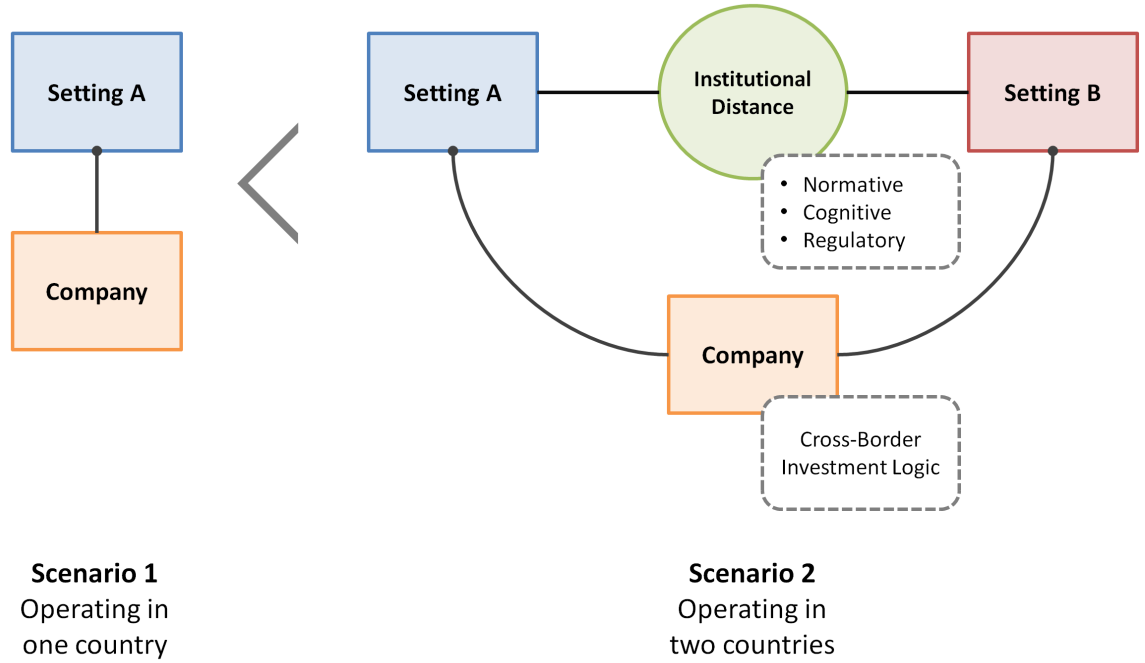

Figure 2. Two scenarios illustrating the distinctive aspects of transnational entrepreneurship

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A New Definition of Transnational Entrepreneurship

Based on the results of the analysis described above, this study proposes that transnational entrepreneurship should be defined as:

> *a cross-border investment to acquire, combine, and recombine specialized individuals and heterogeneous assets to create and capture value for the company under conditions of institutional distance and uncertainty.*

The proposed definition of transnational entrepreneurship is based on the four elements in the definition of technology entrepreneurship provided by Bailetti (2012):

1. **Ultimate outcomes:** Value creation and capture are identified as the two outcomes of transnational entrepreneurship.

2. **Target of the ultimate outcomes:** The company is identified as the target organization for which transnational entrepreneurship creates and captures value.

3. **Mechanism used to deliver the ultimate outcomes:** The cross-border investment in a project is the mechanism that mobilizes resources used to create and capture value across two or more countries. A project is the deployment of a stock of resources (i.e., specialized individuals and heterogeneous assets) committed to delivering the two ultimate outcome types for a period.

4. **Interdependence of this mechanism with countries involved:** The resources involved in a project influence, and are influenced by, changes in the countries which they are assembled from.

When compared to the definitions identified in Table 1, the proposed transnational entrepreneurship definition:

1. Emphasizes that transnational entrepreneurship is about creating and capturing value for the company. Value capture is evidenced through the growth metrics of the company, not through describing the entrepreneur.

2. Specifies that the cross-border investment acts as the mechanism to assemble and deploy specialists and assets. Without an investment in the foreign country, the assembly of specialists and assets would not be possible, and the company could not become embedded in that country.

3. Identifies institutional distance as a key condition in which the cross-border investment logic is made. The greater the distance, the greater the opportunity (Krammer, 2018).

4. Transcends the limiting notion that transnational entrepreneurship is about the ethnicity or immigration status of the founding entrepreneur. The foreign experience of the founder or the team employed with the company will influence the company's ability to engage actors in foreign settings, but this is not viewed as a defining characteristic of transnational entrepreneurship.

5. Highlights that specialists and assets, and the advantages available through the combinations of them, are intricately linked to changes in the countries from which they are accessed. If the company is invested in a country and the structure of that country changes due to socio-political or economic factors, then the company will be affected because of its interconnectedness.

6. Allows for more rigorous and practical assessment. The component parts of the definition – i) value creation and capture as the ultimate outcomes, ii) the company as the target, iii) the cross-border investment as the mechanism, iv) the interdependencies between company and state, and v) the institutional distance between settings – can each be explored independently or in conjunction.

Managerial Implications for New Companies

There are at least four implications for managers of new companies. First, the greater the institutional distance, the greater the opportunity. New company managers can view institutional distance as a positive rather than a negative when it comes to the exploration and discovery of new opportunities. A new company wishing to increase expected outcomes by embedding in a foreign country should look to countries with high degrees of institutional distance relative to their current country of operation. There will be exceptions. For example, a democratic company embedding in a communist country will have a tough time extracting the value captured in that country to invest somewhere else, so managers must use judgement to find the best case.

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The second managerial implication is that managers must balance the investment in the country of residence and foreign countries. Equally, managers must use a balanced strategy when structuring their cross-border investments. Each setting invested in by the transnational company is important and cannot be traded-off because the company needs both to achieve its comparative advantage. Investments within each setting must also follow a balancing strategy between efficiency and adjustment because it is the only way a young company can survive. For instance, if a new company invests in a country to access customers, its offer can have core and customizable elements to meet demands for efficiency and adjustment. Similarly, if the investment is to access specialized individuals, managers can find a balance locally with workflow processes and technology that are standardized for efficiency and use motivation and reward mechanisms adjusted to the local cultural context.

Greater understanding of the reasons why a new company becomes a transnational is the third managerial implication. A new growth-oriented company must gain from expanding its operations from a single country to two or more countries. Managers pursuing transnational entrepreneurship should seriously consider establishing operations in a second country, which will provide access to people and assets that will increase the new company's capacity to create and capture value.

The fourth managerial implication is that new companies should pursue transnational entrepreneurship regardless of ethnicity, migrancy, or immigration. The core of transnational entrepreneurship is separate from the ethnicity, migrancy, or immigration status of the company's founders and team. For example, managers interested in engaging in transnational entrepreneurship may or may not engage with an ethnic enclave of the foreign country in which they intend to establish operations.

Conclusion

This article contributes a definition of transnational entrepreneurship where the company is the focal actor, a cross-border investment in specialized individuals and heterogeneous assets is the mechanism the company uses to create and capture value, and the investment is made under conditions of institutional distance between distinct settings.

The author asserts that two features distinguish transnational entrepreneurship from other forms of entrepreneurship: cross-border investment logic and institutional distance. A cross-border investment should be made to capture more value for the company than if it were to operate only in the country of residence.

The proposed new definition asserts that the investment is interdependent with changes in the settings in which the company is embedded. The company's value capture abilities are subject to the risk and reward of structural changes in the foreign setting being invested in. This implies exposure to, and interest in, changes in the foreign country's setting due to resulting effects on the company's profitability.

Ethnicity has been dropped from the definition because it is not core to the observed distinctiveness of the field. Instead, this definition allows the field to move forward with a focus on the value creation and capture activities of the company as the definition is independent of the stage of the company, applying equally well to a new company and a mature company, and it is free of the limiting component of the ethnicity of the founder. This makes the definition highly relevant for startups given that most existing definitions seem to reflect the context of larger and more mature firms (Tanev, 2017).

The article identifies the practical value of identifying the distinctiveness of transnational entrepreneurship from the managerial perspective. It also compares the new definition with previous definitions of transnational entrepreneurship. The value of the component parts of the definition provides a framework that future researchers can use to conduct a deeper examination of the field.

The new definition allows researchers to connect transnational entrepreneurship to other streams of research, particularly entrepreneurship, international business, institutional theory, knowledge spillover, glocalization, and regional economic development. The assertion for regional economic development is that, if an investment is being made by the company into a new country, the investment will be so that new value can be created in that market and the company can capture a portion of it. The value that is not captured by the company will be captured by local suppliers, partners, and customers, thus contributing to the economic development of the region.

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The author hopes that this article and the new definition of transnational entrepreneurship inspires researchers from an array of fields to contribute to the understanding of transnational entrepreneurship and to connect it to other streams of research. Further exploration of the distinctive characteristics of the cross-border investment, the investment logic, and the institutional distance would be valuable contributions to further understanding of transnational entrepreneurship. The relationship between the company, the state, and the changing environment in which the company is embedded is also an interesting direction that could be fruitful.

About the Author

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Citation: Bailetti, E. 2018. Transnational Entrepreneurship: Distinctive Features and a New Definition. *Technology Innovation Management Review,* 8(9): 28–38. http://doi.org/10.22215/timreview/1184

Keywords: transnational, cross-border, entrepreneurship, definition, features, topic modelling

Impact of Business Intelligence Solutions on Export Performance of Software Firms in Emerging Economies

Michael Neubert and Augustinus Van der Krogt

> *"We should keep on going along the path of globalization. Globalization is good... when trade stops, war comes."*
>
> Jack Ma
> Business magnate, investor, and philanthropist
> Co-Founder of the Alibaba Group

The article is written with the aim of understanding how well software firms in emerging economies perform when exporting their goods. Focusing on Paraguay as a representative context, a multiple-case-study research design was adopted using different sources of evidence, including 15 in-depth interviews with founders, shareholders, and CEOs. The data were analyzed using grounded theory in order to develop patterns and categories, and to understand differences and regularities. The revised Uppsala internationalization process model was used as a theoretical framework. This article highlights the experts' views of the impact of business intelligence on the export performance of software firms in Paraguay. Although only a few of the interviewees currently use business intelligence solutions to support international strategic decision-making processes, most of them reveal a desire to use them because they expect it will have a positive impact on export performance and international competitiveness. The main factors for selecting a business intelligence solution are transparency of cost and benefits, excellent client service, and an attractive pricing model. The study results apply to all stakeholders who support the impact of business intelligence systems on the export performance of software firms in emerging economies. The article fulfils an identified need and call for research to study the use and impact of business intelligence on the way an emerging country's exportation of goods actually performs, and the ability of its software firms to globalize successfully.

Introduction

Companies seeking to internationalize use business intelligence to create strategies and technologies for collecting and analyzing foreign market data and to predict the future attractiveness of new foreign markets (Dedić & Stanier, 2016). Business intelligence helps to increase the speed of internationalization (Manyika et al., 2016) by gaining knowledge and creating networks in new foreign markets with limited resources, increasing efficient decision-making during market evaluation and finally, it helps to select the most attractive foreign markets (Autio & Zander, 2016). More applications such as international pricing decisions (Neubert, 2017b) or acquiring domestic distributors might benefit from the use of business-intelligence systems.

In Paraguayan software businesses, as in other locales and industries, there is a great need to understand the extent to which business intelligence impacts the performance of their exports. Paraguay's open economy is home to innovative software firms (Neubert & Van Der Krogt, 2017), and they need speed to aim their new products toward international markets, for example, to refinance their research and development cost (Neubert, 2016b). Thus, the Paraguayan software sector might enable future competitiveness by using business intelligence to develop international markets.

The goal of this study is to understand the use and impact expected by business intelligence on Paraguayan software exports and internationalization activities of firms. It follows on from research by Coviello, Kano,

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and Liesch (2017), Manyika and co-authors (2016), and Vahlne and Johanson (2017), and continues the research of Neubert and Van Der Krogt (2017, 2018). Their papers demonstrate a need for further research about the impact of business intelligence on internationalization. Vahlne and Johanson (2017) suggested that this need should be addressed through qualitative research methods such as multiple case studies. Due to the importance of early and fast internationalization (Neubert & Van Der Krogt, 2017), the expected impact of business intelligence might be important for Paraguayan software firms as an example for high-tech firms from emerging markets (Neubert & Van Der Krogt, 2017), which is the main motivation for this study. Our goal is to develop a market evaluation framework, and we outline the importance of business intelligence in the whole market development process including broader aspects in addition to those found in that of international entrepreneurship and business intelligence.

After the introduction, this article continues with a review of the existing and current literature about the Uppsala internationalization process model, which is the theoretical framework selected for this study (Vahlne & Johanson, 2017). Then, it presents the research methodology including the sampling strategy and the research questions. Next, the research questions are answered based on the findings of this multiple-case study. Then, the results are discussed and compared with research results from other studies. Finally, the article concludes with a list of key findings, an analysis of the impact of the research results, and recommendations for further research.

Literature Review and Theoretical Framework

For 40 years, the Uppsala internationalization process model has been an important and heavily discussed theoretical framework (Håkanson & Kappen, 2017) that describes the initial stages of internationalization (Neubert, 2015; Santangelo & Meyer, 2017). During this time, Johanson and Vahlne have regularly adapted their theoretical framework to a changing international business environment and progress in research about internationalization (Johanson & Vahlne, 2009; Vahlne & Johanson, 2013, 2017). In this context, Coviello and colleagues (2017) called for further research to understand the impact of macro-level influences, including digitalization, on the Uppsala internationalization process model (Figure 1).

The Uppsala internationalization process model, as updated in 2017, consists of two change variables and two state variables (Figure 1) (Vahlne & Johanson, 2017). The state variables are "capabilities" and "commitments/performance" (Vahlne & Johanson, 2017). The change variables are "knowledge development processes" and "commitment processes" (Vahlne & Johanson, 2017). The arrows show the relationship between change and state variables, for example, the dedication of additional resources to a foreign market or the acquisition of additional knowledge influences the firms' performance and its capabilities.

The framework of the "entrepreneurial knowledge development process" is used in this study because the

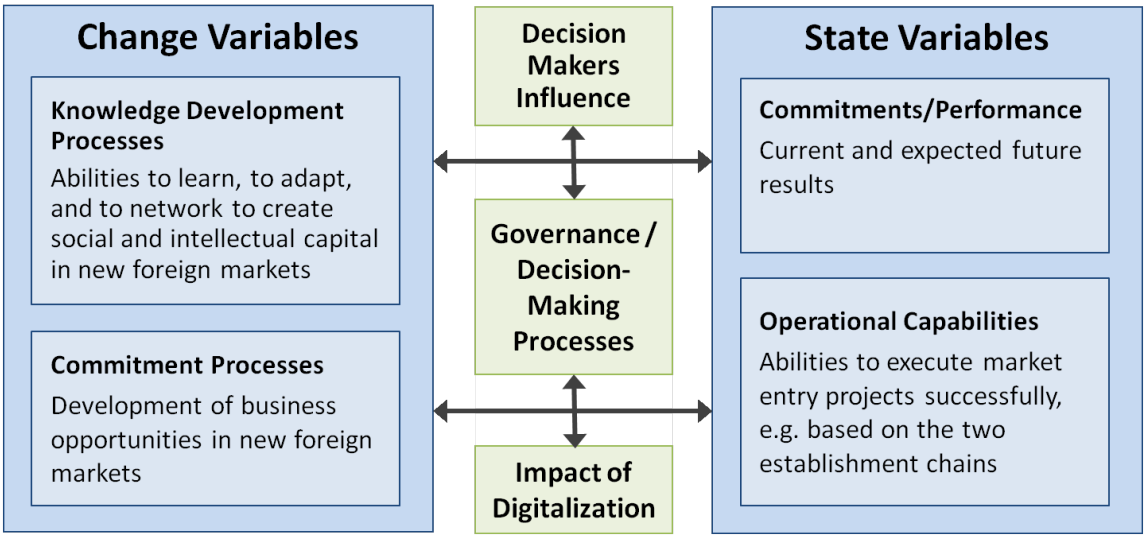

Figure 1. Theoretical framework based on the Uppsala internationalization process model (Vahlne & Johanson, 2017; Coviello et al., 2017)

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Paraguayan software firms in this sample are entrepreneurial firms managed by their owners or founders. This process consists of three elements: 1) "relationship building" (e.g., creating business opportunities and building trust with new clients and distributors), 2) "strategic flexibility", and 3) "adaptability to the task environment" (Vahlne & Johanson, 2017). The abilities to learn, to adapt (i.e., to create intellectual capital), and to network (i.e., to create social capital) support the development of market- and firm-specific advantages, which make market entries successful. The second change variable of the Uppsala internationalization process model is "commitment processes", which can also be defined as "opportunity development" (Vahlne & Johanson, 2017) in foreign markets. This variable describes the identification, acquisition, and the development of business opportunities in new foreign markets.

Under the headline "operational capabilities", Vahlne and Johanson (2017) describe one of the most import elements of the Uppsala internationalization process model: "establishment chains" (Figure 2). High-tech firms, such as the software firms in our sample, use establishment chains to enter new foreign markets. As the first step in this internationalization process, Paraguayan software firms enter culturally and geographically closer markets such as Brazil, Bolivia, or Argentina with low-risk and low resource-consuming market-entry modes, such as "service export" or "software licensing", mostly in collaboration with domestic distributors (Neubert & Van Der Krogt, 2017; Neubert, 2017a). This process is called the market *distance* establishment chain (Figure 2).

With growing success, Paraguayan software firms might increase their presence in these markets, by establishing a wholly owned subsidiary, for example, or by acquiring their domestic distributor (Neubert, 2013b). This process is called the market *commitment* establishment chain (Figure 2). In parallel, such firms also might begin to enter more distant foreign markets such as Chile and Mexico, or they might follow their existing key account clients to even more distant markets. The attractiveness of foreign markets is often volatile. It might change quickly due to the acquisition of a new client or the loss of an established sales channel, also leading to outcomes such as a decreasing market commitment (Clarke & Liesch, 2017) or even a market exit (Neubert, 2011, 2013a; Sapouna et al., 2018).

Other elements of Johanson and Vahlne's Uppsala internationalization process model are the liabilities of foreignness and outsidership (Vahlne & Johanson, 2017). Paraguayan software firms, for example, need a bundle of sufficiently strong market- and firm-specific advantages to compensate for the liabilities of foreignness and outsidership (Vahlne & Johanson, 2017). Among the main market- and firm-specific advantages of Paraguayan software firms are lower cost than American competitors and being in a similar time zone as

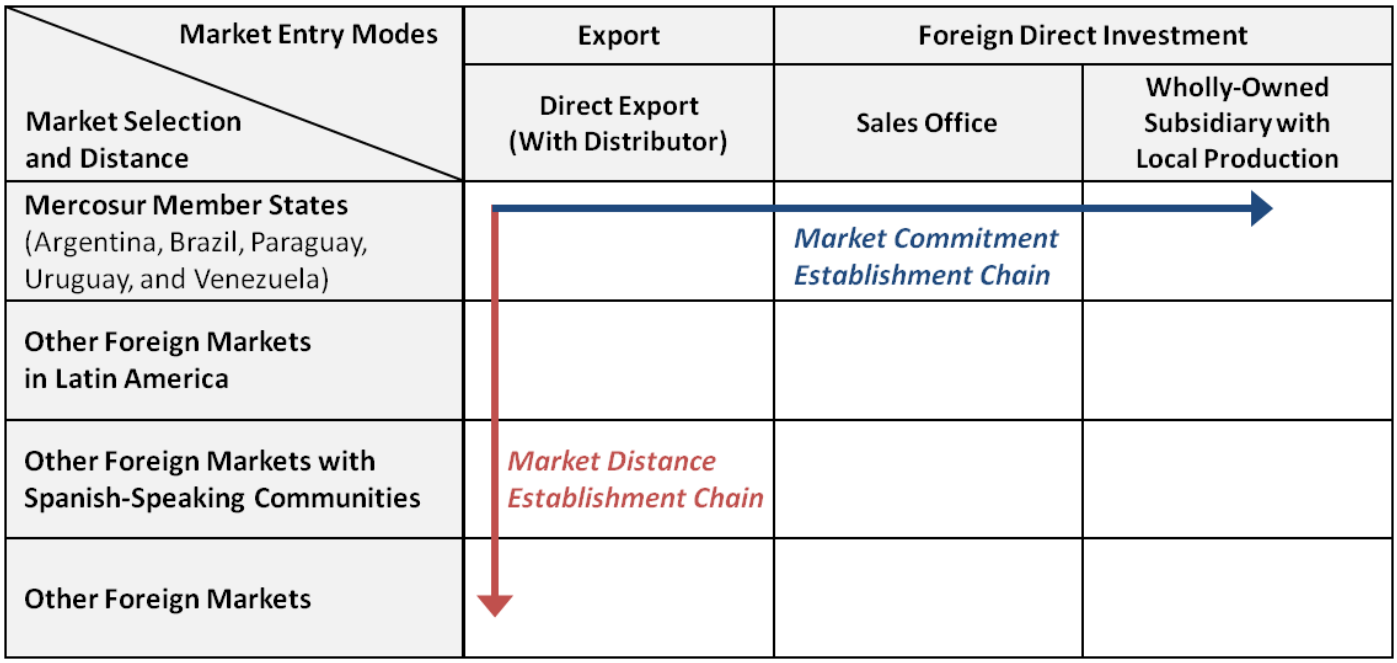

Figure 2. Market distance and market commitment establishment chain

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American clients, relative to competitors from other low-cost countries such as India. In particular, the advantage of being able to communicate with clients in the United States during normal office hours and in the same language and similar culture should not be underestimated, because it is greatly appreciated by American clients.

The larger the economic, linguistic, geographical, administrative, and cultural distances (Ghemawat, 2007) between the foreign target market and the home market, the larger the liabilities of outsidership and foreignness, and the larger the need for firm-specific competitive advantages (Vahlne & Johanson, 2017). All software firms and their employees have something like a global industry culture because they share the same technical language, tools (e.g., software), and methodologies (e.g., agile programming). This familiarity with the same technologies, methodologies, and language reduces the liabilities of foreignness and outsidership.

Domestic distributors help Paraguayan software firms to bridge these distances. They might help them to adapt their product features, pricing, marketing communication, or terms of doing business (e.g., payment conditions and warranties) (Deresky, 2017; Hollensen, 2017). In addition, they might offer services related to importing, legal and compliance advice, logistics (including storage), client acquisition and service, and accounts receivable management (Neubert, 2016a, 2017a). Distributors provide market knowledge and access to domestic client networks immediately, which increases the speed of market entry in comparison to a hierarchical mode of market entry. Thus, the speed of internationalization depends on the speed of knowledge and network creation (Vahlne & Johanson, 2017; Neubert, 2017a; 2016b) in each new foreign market, preferably with the support of a local partner. Despite all the services distributors provide, digitalization might lead to disintermediation using online marketing or distribution channels such as social media.

The Uppsala internationalization process model was also chosen as the theoretical framework of this study because it has already been adopted by many Paraguayan software firms in this sample to develop neighbouring foreign markets (Neubert & Van Der Krogt, 2017). Although the export volume of Paraguayan software firms is still very low (Trade Map, 2018), they consider speedy internationalization as important for the long-term survival of their firms due to the limited size of their domestic home market (Neubert & Van Der Krogt, 2017). However, they often are confronted with significant delays in the execution of their international market development activities in comparison to the time planned in their business plans (Neubert & Van Der Krogt, 2017). The main reason is an often unplanned and unstructured internationalization behaviour (Neubert & Van Der Krogt, 2017). Paraguayan software firms often enter new foreign markets based on their existing networks and clients by using market opportunities, or by following existing clients without analyzing the appeal of new foreign markets in detail (Neubert & Van Der Krogt, 2017). Founders, shareholders, and CEOs understand that this reduces the speed of international market development. Previously, we have seen that they acknowledge the importance of a structured market-development process (Figure 3) starting from a detailed evaluation and selection of foreign markets before they actually enter them (Neubert & Van Der Krogt, 2017). Founders, shareholders, and CEOs recognize that their capabilities and their firms' capabilities are crucial for their international success. The faster they learn how to do business and to acquire customers in new foreign markets, the higher the speed of internationalization (Neubert & Van Der Krogt, 2017; Vahlne & Johanson, 2017). However, this learning is especially challenging for Paraguayan software firms, because they internationalize from an emerging to a generally higher developed market (Buckley et al., 2017).

This multiple-case study uses Gartner's (2018) definition of digitalization, which is "the use of digital technologies to change a business model" or business processes. The aim of digitalization is the integration of digital technologies (Gray & Rumpe, 2015; Khan, 2016) into core processes such as the foreign market development process of Neubert (2011, 2013b). Due to the digitalization of foreign market evaluation and selection processes (Figure 3), Paraguayan software firms might collect, store, and analyze social data (market networks)

Figure 3. Foreign market development process (Adapted from Neubert, 2017a)

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and intellectual data (market knowledge) about foreign markets faster than with other methods (Coviello et al., 2017; Vahlne & Johanson, 2017).

Digitalization improves decision-making processes and the ability of decision makers to decide effectively (Clark et al., 2018; Neubert, 2018). Decisions relating to market-entry strategies or market-entry modes can be particularly challenging (Ahi et al., 2017): their preparation requires significant resources to analyze data, to predict outcomes, and to develop alternative solutions. Therefore, digitalization increases the effectiveness and reduces the manual work of these decision-support processes (Holsapple et al., 2014; Merkert et al., 2015).

Traditional data-driven and fact-based decision-making processes increase the productivity and profitability of companies by five to six per cent compared to their competitors (Bohanec et al., 2017; Neubert, 2018). Companies using prescriptive, analytics-based, machine-learning (ML) algorithms, for example, to compute the future attractiveness of international markets or to identify new business opportunities (Dedić & Stanier, 2016; Neubert, 2017a; Witten et al., 2016) increase their revenues by more than 15% (Kawas et al., 2013). However, such gains are only possible if international managers understand and are able to leverage the benefits of digitalization (Ransbotham et al., 2015).

Methodology and Research Questions

The purpose of this study has brought up the following three research questions:

1. Are Paraguayan software firms using business intelligence solutions to support international strategic decision-making processes?

2. What is the perceived impact of business intelligence solutions on export performance and internationalization?

3. What factors determine the use and the selection of business intelligence services?

This study uses a multiple-case-study research design to provide answers to these descriptive and explanatory research questions (Yin, 2017). In contrast to an experimental design or a survey, a multiple-case-study method is more flexible, and it allows for an in-depth analysis of this research problem (Yin, 2017) within a highly-contextualized environment (e.g., export) also allowing for a comparison between the different cases presented. This research design helps answer the research questions because it allows the use of the replication logic so as to receive external and internal validities and analyze pattern-matching properties between theories and cases (Yin, 2017).

We used the triangulation concept during the data collection phase of this study to ensure that different sources of evidence were used to collect data from each case, the reason being that this study used various sources of evidence to derive sound conclusions and to achieve construct validity. The primary source for data collection comprised qualitative, semi-structured, in-depth, individual face-to-face interviews with subject-matter experts who were all founders, shareholders, or CEOs of Paraguayan software firms with significant international management experience and higher education. Only one person per case study firm was interviewed. The software firms focus on the development of products and services for niche markets, which can compete at a domestic and foreign market level (Neubert & Van Der Krogt, 2017). Other sources used were: firm and product flyers and brochures, corporate websites, and internal documents provided by the interviewees and other secondary data, which were collected in October and November 2017. The reliability criteria were met by using the same questionnaire, study protocol, and data structure in the data collection phase. The questionnaire consisted of nine explorative, open-ended questions, which were found to be easy to understand and to digest with no further need for clarification. The average duration of the interviews was 90 minutes.

The data analysis followed a logical sequence, starting with an individual analysis of each interview, which in turn was followed by a cross-comparison of the results to identify differences and similarities between the answers of the different interviewees, a theoretical and literal replication using a pattern-matching approach, and finally a comparison with the research findings similar studies (Neubert, 2018). The main goal of this approach is to increase the possibility to transfer and generalize the findings to other contexts (Yin, 2017).

The sampling was based on a purposive case-selection strategy. After drawing a random sample from a database of 60 Paraguayan firms, which are active in the software services sector (Fernandez & van der Krogt, 2015), 15 typical cases of the sample exporting software products were selected. According to Yin (2017), if at

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least six to ten cases are selected, this sampling strategy produces a statistically representative sample. Data saturation was achieved with 15 interviews due to repetitive answers. This sample size is higher than required, which allows for a better triangulation of data and helps to strengthen the results of the whole study (Yin, 2017).

Research Findings

The analysis of the data collected from the in-depth, semi-structured, qualitative, face-to-face interviews with founders, shareholders, and CEOs of Paraguayan software firms revealed themes that answer each of the three research questions, as described in the subsections below.

1. Are Paraguayan software firms using business intelligence solutions to support international strategic decision-making processes?

Theme 1: Paraguayan founders, shareholders, and CEOs and their software firms currently do not use business intelligence solutions, in terms of big data and predictive analytics, to support international strategic decision-making processes.

Only one (7%) of the interviewees is using theories of internationalization, country market data, and analytics in the form of predictions, which appear as market studies to evaluate the attractiveness of foreign markets. According to the interviewees, the limited use of big data and this type of analytics in strategic decision-making can be explained during the initial stages of business intelligence in Paraguay as an emerging economy. At this moment, business intelligence strategies are still confined to the few larger – multinational – companies in the telecommunications and financial sector. Moreover, although macroeconomic data are mostly available, there are very limited sector-specific data in industry and services sectors in Paraguay, and this is a topic brought up by most of the interviewees. The perception of the interviewees about limited sector-specific data in Paraguay and in foreign markets should rather be interpreted in the sense that Paraguayan founders, shareholders, or CEOs currently have no access to this data for various reasons. The majority of the interviewees mentioned that this is further complicated by a lack of data analysis knowledge and experience in their interpretation. Business intelligence and especially big data analytics is therefore still at a premature stage and is difficult to use to support business objectives in Paraguay.

Theme 2: Paraguayan founders, shareholders, and CEOs generally do not use business intelligence solutions to analyze the attractiveness of new markets due to insufficient experience and knowledge.

Despite the more advanced availability of macro-economic and sector-specific data in other countries such as Brazil and Mexico as well as developed countries, the situation in Paraguay affects the knowledge, experience, and expectations of data usage for internationalization in industry and services. In the specific case of the software sector, the study shows us that less than half the companies have sufficient knowledge (40%) and experience (35%) to make effective use of business intelligence in general, and predictive data in particular. At this point, among the Paraguayan software firms, only one company is using predictive data to identify foreign market opportunities, including the prediction of market appeal or client development. Other companies indicate that the limited use of data is partially explained by a lack of time to study and apply it. Therefore, effective use of predictive data would require companies to grant more time and training resources.

The main finding of the first research question is that only a minority of founders, shareholders, or CEOs and their software firms use business intelligence solutions at the moment, in terms of big data and predictive analytics, to support international strategic decision-making processes such as foreign market evaluation and selection or the acquisition of new clients due to a missing experience and knowledge about these tools. These findings support the results of Neubert (2018).

2. What is the perceived impact of business intelligence solutions on export performance and internationalization?

Theme 3: The majority of Paraguayan founders, shareholders, and CEOs are interested in using business intelligence solutions, in terms of big data and predictive analytics, to support international strategic decision-making processes.

Despite what is currently known and experienced, nine (70%) of the interviewees are interested in using business intelligence when dealing with big data and predictive analytics to support their internationalization strategy in the short term. Eleven (85%) of the interviewees can see themselves using business intelligence in terms of big data and predictive analytics in the long term because they are in the process of identifying new

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foreign market opportunities, and they want better insights into the market potential. However, it is important to observe that the interviews also reveal that actually acquiring and using predictive data may be rather difficult due to time constraints and little willingness to pay for data services, which is also combined with high expectations of data sets being flexible and integral to their needs.

Theme 4: The majority of Paraguayan founders, shareholders, and CEOs are interested in using business intelligence solutions, in terms of big data and predictive analytics, to support international strategic decision-making processes due to their expected positive impacts.

The research provides some hints about the perceived short-term impact of business intelligence in terms of big data and predictive analytics on sales. In the short term, the interviewees indicate that predictive data can assist mainly in identifying new markets, market segments, leads, and clients. It can also help in better and faster planning, better-informed decision-making, and greater control of sales. To a lesser extent, the data are thought to be useful to the founders, shareholders, or CEOs choosing sales channels and optimizing their sales funnel as well as in terms of big data and predictive analytics, which in any case are less effective when it comes to increasing loyalty and sales volume of the existing clients.

The interviewees expect an even stronger long-term impact on productivity and profitability of international operations. About 77% can foresee more than a six per cent increase in profitability and growth and 54% of the interviewees indicate more than a six per cent increase in productivity. As much as 85% expect these improvements because of a more optimistic forecast concerning the service needs of existing clients. A large majority of the participating companies also indicate the potential of contribution by clearer calculations of the attractiveness of foreign markets, predictions of market developments in specific subsectors, and the reduction of risks in the market. The companies have lower expectations with regards to the contribution to cost reductions, forecasting of revenues, price developments, and competition. A majority (62%) of the interviewees expected an improved sales process in terms of improved efficiency during sales negotiations, faster and better decision making, and a reduction of sales risks. Almost half of the interviewees can imagine that business intelligence in terms of big data and predictive analytics will contribute to an increased turnover per client, an improved relationship with clients, and more motivated salespeople.

The main finding relating to the second research question is that the majority of founders, shareholders, and CEOs want to use business intelligence in terms of big data and predictive analytics as they believe that their export performance and on their competitiveness in international market development is impacted positively. This belief of the interviewees is supported by the current literature. According to Bohanec colleagues (2017) and Kawas and colleagues (2013), the use of business intelligence positively influences revenues, productivity, and profitability.

3. What factors determine the use and the selection of business intelligence services?

Theme 5: The main factors that determine the use and the selection of business intelligence services in terms of big data and predictive analytics are transparency of cost and benefits and an excellent after-sales service.

When considering the use of a business-intelligence service in terms of big data and predictive analytics, the founders, shareholders, and CEOs are restrained in making their decision by a variety of assumptions. The interviewees expressed concern about a lack of support in the make-up of data as well as its unclear selection, processing, and evaluation (i.e., the "black box effect") and they further assume that the cost of data services is inflated in relation to the small size of their business. The interviewees also consider the benefits of the software solution to be unclear and have a lack of comprehension as to its specific relevance. Furthermore, they perceive a lack of motivation of the clients and distributors to collaborate in the use of predictive data. This call for transparency mainly shows that Paraguayan founders, shareholders, and CEOs have limited experience and knowledge with big data and predictive analytics software to support strategic decision making because they are unsure about trusting and basing their decisions on the results presented. Contrary to what could be expected, few founders, shareholders, and CEOs are worried about the management of the software and training of employees.

To select a business-intelligence platform to support internationalization, the founders, shareholders, and CEOs will mainly consider a business-intelligence solution that responds to the expected problems mentioned

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earlier. Over 85% of the interviewees would choose based on an excellent after-sales client service that accompanies the company in the use of the service. The interviewees will instead consider recommendations and references by existing clients. They further expect a low price that reflects the relatively small size of their own business, along with a high level of flexibility and integrality. Few interviewees are concerned about the size and reputation of the provider that offers additional services, such as supplying them with professional training and consulting.

The main finding of the third research question is that the leading factors that determine the use and the selection of business intelligence services are transparency of cost and benefits. Further, founders, shareholders, and CEOs expect an excellent client service and an attractive pricing model.

Discussion

This is based on a call for research made by Coviello and colleagues (2017) and Vahlne and Johanson (2017), and it continues the research of Neubert and Van Der Krogt (2017, 2018) and Neubert (2018) about the impact of digitalization in the sense of business intelligence solutions on internationalization. Therefore we discuss the findings of this multiple-case study in comparison to the findings of the existing relevant literature. The main motivation and assumption of this study is that business intelligence might increase the efficiency of internationalization. The findings are discussed along the three dimensions: knowledge and experience, decision-making criteria, and expected impact on performance (Figure 4).

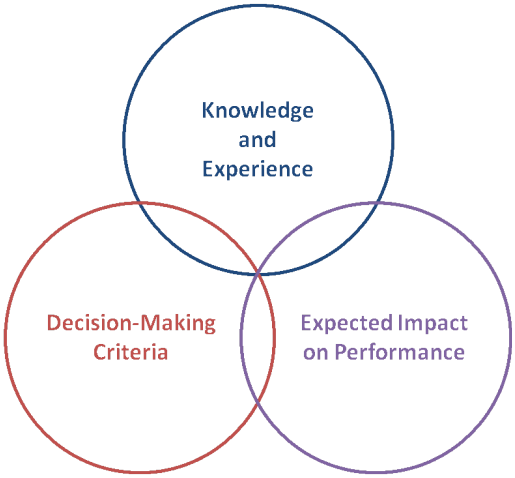

Figure 4. The three dimensions of the discussion framework

The goal of the first research question is to understand the perceptions of founders, shareholders, and CEOs of software firms about the use of business intelligence. The findings suggest that the interviewees and their software firms still lack knowledge and experience about the application of business intelligence solutions to support international decision-making processes. The study of Neubert (2018) produced similar results. Although both studies are qualitative and therefore hardly generalizable, the findings of both of them suggest that there is probably a substantial need for training and consulting. Founders, shareholders, and CEOs need specific use cases about the evaluation and selection of new foreign markets to understand the benefits of digitalization. This happens in this fast-changing environment with huge amounts of data as well as significant risks and long-term financial commitments. It is the almost perfect environment for business intelligence solutions in terms of big data and predictive analytics to support international strategic decision-making processes of entrepreneurs with limited resources.

The goal of the second research question is to understand the opinions of subject-matter experts regarding the expected impact of business intelligence on export performance and internationalization. The findings suggest that the majority of the interviewees want to use business intelligence solutions due to its perceived positive impact on performance. The lack of data and the missing experience and knowledge about business intelligence solutions are the barriers to usage. This belief of the interviewees is supported by the current literature. According to various authors (Bohanec et al., 2017; Kawas et al., 2013); Müller et al., 2018; Neubert, 2018), the use of business intelligence solutions that leverage artificial intelligence provides a significant impact of around 15% on revenues, productivity, and profitability, especially due to a higher efficiency of international learning (Stoian et al., 2017) and networking activities (Coviello et al., 2017; Vahlne & Johanson, 2017). According to Neubert (2018), the most important needs for digitalization are lead generation, client acquisition, and client retention.

The goal of the third research question is to understand the views of founders, shareholders, and CEOs about the factors that determine the use and the selection of business intelligence solutions. The suggested findings demonstrate that transparency of cost and benefits, as well as good client service and attractive prices are the main factors that determine the use and the selection of business intelligence. The findings of Neubert (2018)

confirm the criteria transparency of cost, benefits, and attractive price-performance ratios in addition to the following factors: transparency about data protection (including collection and analysis) and the ability to integrate the business intelligence solution into existing enterprise resource planning (ERP) systems. Finally, founders, shareholders, and CEOs want to avoid the "black box effect", meaning they want to understand the algorithms to the extent that they can put trust in the results.

The discussion of the findings and their comparison with the existent literature shows that there is high interest as well as high expectations but relatively low experience and knowledge among the interviewees concerning the impact of business intelligence solutions, in the sense of big data and predictive analytics, on export performance of Paraguayan software firms.

Conclusions

This article fulfils a need that has been observed for research to study the use and the expected impact of business intelligence solutions on export performance and international competitiveness of software firms, especially those in emerging economies. The findings bring to light additional insights about the impact of business intelligence on the export performance of Paraguayan software firms using the Uppsala internationalization process model as a theoretical framework.

The first finding of this study is that only a few of the Paraguayan software firms in this sample currently use business intelligence solutions in terms of big data and predictive analytics to support their international strategic decision-making processes, such as the evaluation and selection of foreign markets, due to a lack of data as well as insufficient experience and knowledge.

The second finding of this study is that the majority of founders, shareholders, and CEOs would like to use business intelligence solutions in terms of big data and predictive analytics because they expect a significant positive impact on export performance and on their competitiveness in international market development.

The third finding of this study is that the principal factors that determine the use and the selection of business intelligence services are transparency of cost and benefits. Further, founders, shareholders, and CEOs expect excellent client service and an appealing pricing model. The call for more transparency is mainly based on the interviewees doubting whether they can trust the results and whether it makes sense to base their decisions on them in addition to (or perhaps in opposition to) their own experience and intuition.

The results are relevant for many people dealing with internationalization, including export promotion agencies, researchers in international entrepreneurship, and developers of predictive analytics software, who support the kind of activities that promote engaging with the development, training, and application of business intelligence systems or in general digitalization for international decision making. The reason for this is better understanding of the impact of business intelligence on the export performance and internationalization, especially among software firms in emerging economies. The results are particularly relevant for the future competitiveness of the entire Paraguayan software sector and should motivate all stakeholders to monitor and continue this research stream.

The qualitative multiple-case-study research design limits the generalizability of the findings but suggests areas for additional research. Qualitative research is based more on the perceptions, views, and opinions of subject-matter experts rather than the actual measurement of results. Thus, qualitative studies are unique and therefore difficult to replicate. Therefore, future scholarly work should include quantitative assessments and data of the perceptions of subject-matter experts in Paraguay and elsewhere to come to solid conclusions and to provide greater clarification as to the statistical significance of the variables presented in this study, so as to manage to replicate the results of other software firms from different emerging or developed country markets.

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Citation: Neubert, M., & Van der Krogt, A. 2018. Impact of Business Intelligence Solutions on Export Performance of Software Firms in Emerging Economies. *Technology Innovation Management Review,* 8(9): 39–49. http://doi.org/10.22215/timreview/1185

Keywords: international business, international management, international entrepreneurship, global marketing, emerging markets, business intelligence, machine learning, artificial intelligence, Paraguay, software industry

Lean Commercialization: A New Framework for Commercializing High Technologies

Saheed A. Gbadegeshin

> *"After filing a patent, your job is only quarter done. And, to achieve patent commercialization success, every inventor must think like a business man."*
>
> Kalyan C. Kankanala
> Author and Intellectual Property Attorney

Commercializing high technologies is expensive, tedious, and resource intensive. Meanwhile, there is a need for quick diffusion of innovations due to economic pressures for companies and research institutes. Therefore, this article proposes a new framework: lean commercialization. The framework represents a transformation of new technology and knowledge to products and services through the application of the lean/agile methodology. This methodology focuses on how resources can be minimized during the development, manufacturing, and marketing of new products and services, while still being accepted by customers. The lean commercialization framework was developed from a case study of high-technology companies and by interviewing commercialization experts. This article contributes to the theory and practice of commercialization of high technologies and provides a procedure for the practical application of the lean commercialization framework.

Introduction

Commercialization is series of activities that transform an innovation to a final product or service from which economic benefit can be derived (Meyers, 2009; Perkmann et al., 2013; Rosa & Rose, 2007; Speser, 2008). Presently, there is pressure on research institutes and their scientists to commercialize innovations due to limited funding for basic research. Therefore, searching for new means of commercialization is essential (Gbadegeshin, 2017a; Still, 2017). Here, we examine on such means, which is the application of the lean/agile methodology to commercialization activities (Apilo et al., 2015; Gbadegeshin, 2017a; Kruuti, 2016). Lean is an effort to eliminate waste while developing high-quality products and services. This principle relies on improvements in production, administration, and strategies of organization (Kilpatrick, 2003).

One of well-known lean/agile approaches is the lean startup methodology. It was propounded by Ries (2011) and it has been applied by scholars in various contexts, such as healthcare (e.g., Gaffney et al., 2014; Silva et al., 2013), biotechnology (e.g., Shimasaki, 2018; Kruuti, 2016; Grohn et al., 2015), education (e.g., Tran, 2015; Youtie & Shapira, 2017), research (e.g., Still, 2017), technology-based ventures (e.g., Harms et al., 2015), and information and communication technology (e.g., Gbadegeshin & Heinonen, 2016; Ibba et al., 2018; Miski, 2014).

In applying the lean startup methodology to commercialization, a new term is proposed: "lean commercialization". Lean commercialization applies the lean startup methodology to the commercialization process, with the primary goals of eliminating waste and minimizing resource expenditures on technology development, manufacturing, and marketing of new products and services. This new approach also aims to create sustainable businesses around new technologies.

The lean commercialization framework proposed in this article is based on empirical studies on commercialization activities of technology-based companies, their technologies after commercialization, and the experience of business advisors. A case study approach was employed by interviewing the founders of the companies and observing their high technologies, and by interviewing business advistors. Two serial entrepreneurs were interviewed in 2012, their commercialized technologies were monitored from 2012 to 2016, and four commercialization experts were interviewed in 2017.

Lean Commercialization: A New Framework for Commercializing High Technologies

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This study makes a theoretical contribution by proposing a new commercialization logic. It also makes a theoretical contribution by providing a framework which can be used by the technology entrepreneurs and technology-based enterprises. The study makes a practical contribution through its framework, which assists technologists and scientists in their commercialization adventures.

Theoretical Background

The lean startup methodology

Entrepreneurs, scholars and companies are interested in lean startup methodology because of its role in innovation and the development of new products and services (Blank, 2013; Blank et al., 2013; Gaffney et al., 2014; Moogk, 2012). Hence, since 2008, it has been the subject of many scholarly articles, books, and blog posts (Gaffney et al., 2014). The method was initially developed for the entrepreneurs and startups, but due to its broader applicability and potential benefits, larger and more mature companies are now also employing it (Apilo et al., 2015; Blank, 2013; Gaffney et al., 2014; Hakin, 2014). Likewise, tertiary institutions are inculcating it into their curricula (Wright et al., 2017; Youtie & Shapira, 2017).

The primary underpinnings of the lean startup methodology are to ensure efficiency and effectiveness, minimize wastes, and produce acceptable products and services. The method employs a build–measure–learn feedback loop that enables an individual person or company to build and verify an idea or innovation. It also enables them to learn from test results. The lean startup methodology encourages validated learning and experimentation (Blank, 2013; Ries, 2011). Similarly, the method assists enterprises to arrive at viable business models using minimal resources (Furr et al., 2014; Gaffney et al., 2014).

The lean startup methodology has five key principles that are both simple and straightforward: entrepreneurs are everywhere, entrepreneurship is management, validated learning, innovation accounting, and build–measure–learn (Ries, 2011). The first principle, "entrepreneurs are everywhere", denotes that those who see and utilize an opportunity can be found at any place, including large enterprises. The second principle, "entrepreneurship is management", means that the process of utilizing opportunities need to be well planned and executed, which will lead to lessons learned. In turn, these lessons account for the third principle, which is "validated learning". The fourth and fifth principles, "innovation accounting" and "build–measure–learn" are more practical, and they constitute the application aspect of the lean startup methodology (Gaffney et al., 2014). Put another way, the salient features of the lean startup methodology are the development of a minimum viable product, market testing of the minimum viable product, collecting and analyzing market test data, and learning from the test results (Donelan, 2013).

Therefore, the application of lean startup methodology is an iterative execution of the build–measure–learn loop. It is a development of a prototype (in the case of a physical product) or a service sample (in the case of a non-physical product) followed by testing and redesign based on the test results. The iteration makes the entrepreneurs and companies understand needs, wants, and preferences of their customers (Hart, 2012; Järvinen et al., 2014; Ries, 2011).

Applying a lean methodology ensures better and faster development of successful products and services (Apilo et al., 2015; Hemilä & Jaring, 2018; Maurya, 2012). The benefits of the method include:

- reduction of the lifecycle of new product development
- minimization of resource wastes (Furr et al., 2014; Moogk, 2012; Ries, 2011)
- more efficient and effective new product or service development (Blank, 2013; Gaffney et al., 2014; Ries, 2011)
- facilitation of customer acceptable products or services (Gaffney et al., 2014; Järvinen et al., 2014)
- usefulness in extreme uncertainty conditions (Blank, 2013; Järvinen et al., 2014; Ries, 2011)
- facilitation of commercialization processes of startups, small companies, and multinational companies (Gbadegeshin & Heinonen, 2016; Harms et al., 2015; Kruuti, 2016; Moogk, 2012).

Notably, the lean startup methodology is different from a traditional business development approach. Blank (2013) and Järvinen and colleagues (2014) elucidate that the lean startup methodology can be distinguished from the traditional approaches in relation to strategy, new product development, organization structure, and

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operational perspectives. First, the strategy of the lean startup methodology results in the development of a suitable business model, whereas the traditional approach is an execution of a business plan. Second, the lean startup methodology focuses on the development of customers and a market, whereas the traditional method concentrates on product development. Third, the organizational structure of the lean startup methodology consists of customer and agile development teams, which are not present in the traditional method. Last, the lean startup methodology makes use of metrics, accepts failure, and appreciates customer feedback; these features are lacking in the traditional approach.

Case studies: Applying the lean startup methodology in commercialization

Common features of high technologies are novelty, complexity, resource intensity, and high levels of R&D (Schrier & Hallin, 2017; Steenhuis & de Bruijn, 2006). These features make high technologies full of risks and create uncertainty for their commercialization (Furr et al., 2014). However, several case studies have shown that these high-technologies could be commercialized with the lean startup methodology. For example, Shimasaki (2018) affirms that the methodology enabled a biotechnology company to commercialize its product through validated learning and iterations. The author concludes that:

"For those contemplating starting a biotechnology company, or those in a development stage company, making use of capital efficiency and lean startup, open-innovation frameworks can leverage the capital raised, and greatly improve your likelihood of success."

In a similar example, Kruuti (2016) found in his case study that the application of the lean startup methodology assisted a multinational company in understanding its unfamiliar market and in establishing relationships with its new consumers. He argued that this methodology made the company and its commercialization team develop their new technology in accordance with the needs and wants of the consumers. Looking into another high-tech industry, Harms and colleagues (2015) emphasized that the lean startup methodology reduces market uncertainty for the material sciences industry. These scholars stated that the methodology promotes a technology commercialization process in relation to their case studies. In a digitalization context, Ibba and colleagues (2018) confirmed that the lean startup methodology played an important role in solving crucial challenges facing the commercialization of digitalized technologies and products. These scholars found that their case study companies employed pivoting, validated learning, testing, and feedback to overcome their commercialization bottlenecks. All these scholars stated that, to accelerate and scale commercialization activities, the application of the lean startup methodology would be beneficial.

Current frameworks for the application of the lean startup methodology

Considering the lean startup methodology, its logic, and its benefits, many frameworks have been developed by scholars. Most of the frameworks are based on the work of theorists, such as Ries (2011) and his associates such as Blank (2013) and Furr and colleagues (2014). Likewise, many frameworks have been developed in further applications of the main theory (e.g., Gbadegeshin & Heinonen, 2016; Järvinen et al., 2014; Lalic et al., 2012; Munch et al., 2013).

Due to the nature of high-technologies and their industries, the need for rapid commercialization, the need for skillful personnel to manage business operations, the importance of customer satisfaction, and the emergence of the digitalization phenomenon (Hemilä & Vanhanen, 2016), the lean startup methodology is linked to the term "acceleration" (Hemilä & Jaring, 2018). Acceleration refers to methods, tools, and processes that entrepreneurs and companies employ to make their new offers available in the market (Apilo et al., 2015). The acceleration framework is quite similar to the lean startup methodology, and it was developed from the lean startup methodology and other agile methods, such as effectuation, creation theory, business modelling, and experimentation. The framework consists of four stages: idea, high-value concept, validated minimum viable solution, and scale solution (Apilo et al., 2015). These stages mean that a need or problem has to be discovered; then, possible solutions need to be identified and tested. When these activities are achieved, there should be a focus on the scalability of the solution in order to make business sustainable (Hemilä & Jaring, 2018).

Furthermore, Furr and colleagues (2014) extend the lean startup methodology by inculcating the business model to the framework, which they describe as the "innovator's method". Their framework consists of four stages: insight, problem definition, solution prototyping, and business model creation. Moreover, they extended the concept of the minimum viable product, even going so far as to label it the "minimum awesome

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product" (Erickson, 2015). All of the above frameworks contain prototyping or a minimum viable product, testing or experimentation, results analysis, and validated lessons. Thus, these are key activities of the lean startup methodology.

A recent framework for the application of lean startup to the commercialization of innovations

The author and a co-author (Gbadegeshin & Henionen, 2016) recently proposed a framework for the application of the lean startup methodology to the commercialization process, as depicted in Figure 1. We developed this framework from a study on the commercialization of business ideas and innovations. The framework describes six stages in the application of the lean startup methodology in commercialization. The stages are: Googling the idea or new technology, developing uniqueness, conceptualizing the new technology, developing prototypes, testing prototypes, and analyzing test data. Following testing, if the results are positive, the commercialization team can make a "preserve" decision by engaging in mass production and marketing of the new technology. If the test result is neutral, the commercialization team can "pivot". However, if the result is negative, the commercialization team could restart their commercialization process.

Before applying the framework, the commercialization team needs to consider the following factors:

- The team must have adequate knowledge about the lean startup methodology.
- There must be a clear expectation that challenges will occur in the early stages of applying the lean startup methodology for the first time. Examples of these challenges are an inability to develop a minimum viable product in a short timeframe, disappointments from subcontractors, and an unwillingness of potential customer to try prototypes.
- Potential customers (i.e., the testers) must be made aware that a minimum viable product is not a final product.
- There must be a plan for expansion in case the test is successful, and it must consider the nature and type of offer (product or service), the commercialization phase, and the required team.

Methodology

This study employed a qualitative research method using a case study approach. This method is useful when an issue is being studied in its natural environment. It allows researchers to understand the issue deeply by making use of real-life conditions. Thus, the method also assists the researchers in interpreting their findings as well replicating their study (Denzin & Lincoln, 2000). The method is highly relevant for empirical studies and for theory building (Creswell, 2009; Eriksson & Kovalainen, 2008). One of the strengths of this method is making use of many pieces of evidence such as documents, observations, interviews, and artifacts (Yin, 2003). However, a systematic procedure must be used when applying the method (Creswell, 2009) so that trustworthiness can be demonstrated, which is crucial for the validity and reliability of a study (Eriksson & Kovalainen, 2008; Morse et al., 2002). The following subsections detail the exact methodological process used in this study.

Study participants

The empirical part of this study has three phases: initial interviews (2012), observation of technology commercialization (2013–2016), and retrospective interviews

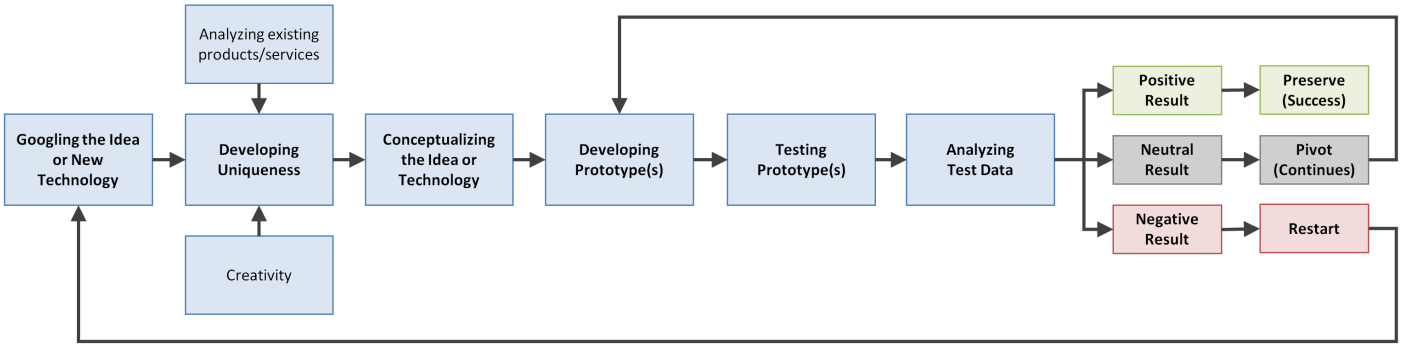

Figure 1. Application of the lean startup to the commercialization of technologies (Adapted from Gbadegeshin & Heinonen, 2016)

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(2017). The study participants in the first phase were selected based on their experience as successful serial technology entrepreneurs in Finland. The participants were expected to be a serial entrepreneur with more than 20 years' experience in commercialization of high-technologies. Although many Finnish technology entrepreneurs were contacted, very few showed interest and two ultimately agreed to participate. However, the two participants offered the opportunity for an in-depth analysis of their commercialization experiences and technologies. The primary aim of this phase was to understand their logic in commercializing high-technologies. After their interviews, these participants gave permission to observe their technologies (products, services, and solutions). This observation period corresponds to the second phase of this study.

Only the high-technologies developed by the participants were considered, and they were selected based on these criteria: the technology must be developed from a basic research or have high-level of R&D activities; it must have process and product complexities; it must employ state-of-the-art or cutting-edge know-how; and it must be associated with advanced economic growth and technological development. These criteria align with recommendations by Wong (1990), Steenhuis and de Bruijn (2006), and Schrier and Hallin (2017). The observed technologies came from various sectors – electronics, cleantech, healthcare, chemical production, and information technology – which were categorized as high-tech industries according to Eurostat (2016).

In the third phase of the study, participants were selected based on their expertise as a government official business advisors with more than 20 years' experience. Among the many business advisors contacted in Finland, four were able to participate in face-to-face interviews for this study. Table 1 describes the study participants interviewed in the first and third phases of the study.

Data collection and analysis

The data were collected through interviews during the first and third phases. These interviews were conducted face-to-face, recorded, and later transcribed. Data collection during the second phase focused on observing the commercialization activities of the companies, but it was supplemented with information from public and government databases.

The collected data were analyzed with a content analysis tool that enabled the reduction of bulk qualitative data through codification, theme development, and result reporting (Creswell, 2009; Miles & Huberman, 1994). Next, the collected data were first read by the author of this article several times, who made notes. The notes from each phase were later combined to develop different codes. Thereafter, codes were collated by naming each phase. The first phase was named "commercialization activities", the second phase was named "technology progress", and the last phase was named "expert validation". Then, the codes from each phase were summarized and themes were assigned to the codes. Finally, the themes were summarized to produce the final results of the study.

Table 1. Overview of the participants interviewed in this study

Phase	Interviewee	Background
Phase 1 (2012)	1	PhD, founded 5 companies, and presently works as a Chief Engineer in one of the companies.
	2	PhD, co-founded 6 companies, and presently works as CEO of two co-founded companies.
Phase 3 (2017)	3	MSc, previously worked as an R&D Manager, and presently works as a Senior Business Advisor for new high-tech companies.
	4	PhD, founded 3 companies, and presently works as a Senior Business Advisor for new high-tech companies.
	5	PhD, previously worked as an R&D manager and a Business Development Manager, and presently works as a Senior Business Advisor for new high-tech companies.
	6	PhD, previously worked as an Innovation Manager and an Entrepreneurship Manager, and presently works as a CEO/Business Advisor of a venture capital company for new high-tech companies.

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The entire research methodology is summarized in Figure 2, which also reflects the structure of this article.

Results and Discussion

Application of the lean startup methodology to the commercialization process

The first empirical phase revealed that the serial technology entrepreneurs employed lean startup logic, though these entrepreneurs did not know about the lean startup methodology. These serial technology entrepreneurs applied the logic by focusing on better utilization of their available resources, minimization of waste, and maximization of business opportunities associated with their new technologies. These entrepreneurs believed that little or small resources needed to be invested in initial commercialization activities, while hoping for the best. They made it known that more investment could be added when the new technology started to generate some income. This result aligns with the claims of several authors about the benefits of the lean startup methodology (Gaffney et al., 2014; Gbadegeshin & Heinonen, 2016; Ibba et al., 2018; Järvinen et al., 2014; Kruuti, 2016; Moogk, 2012; Shimasaki, 2018).

Furthermore, these serial technology entrepreneurs believed in the simultaneous development of customer and market. To do so, they preferred to have direct contact with end users of their new technologies and to acquire as much market information as possible. They also ensured that they piloted their technologies before full commercialization. This belief and their effort correspond to descriptions of several authors with regards to the application of the lean startup methodology (e.g., Blank, 2013; Blank et al., 2013; Furr et al., 2014; Harms et al., 2015; Kruuti, 2016).

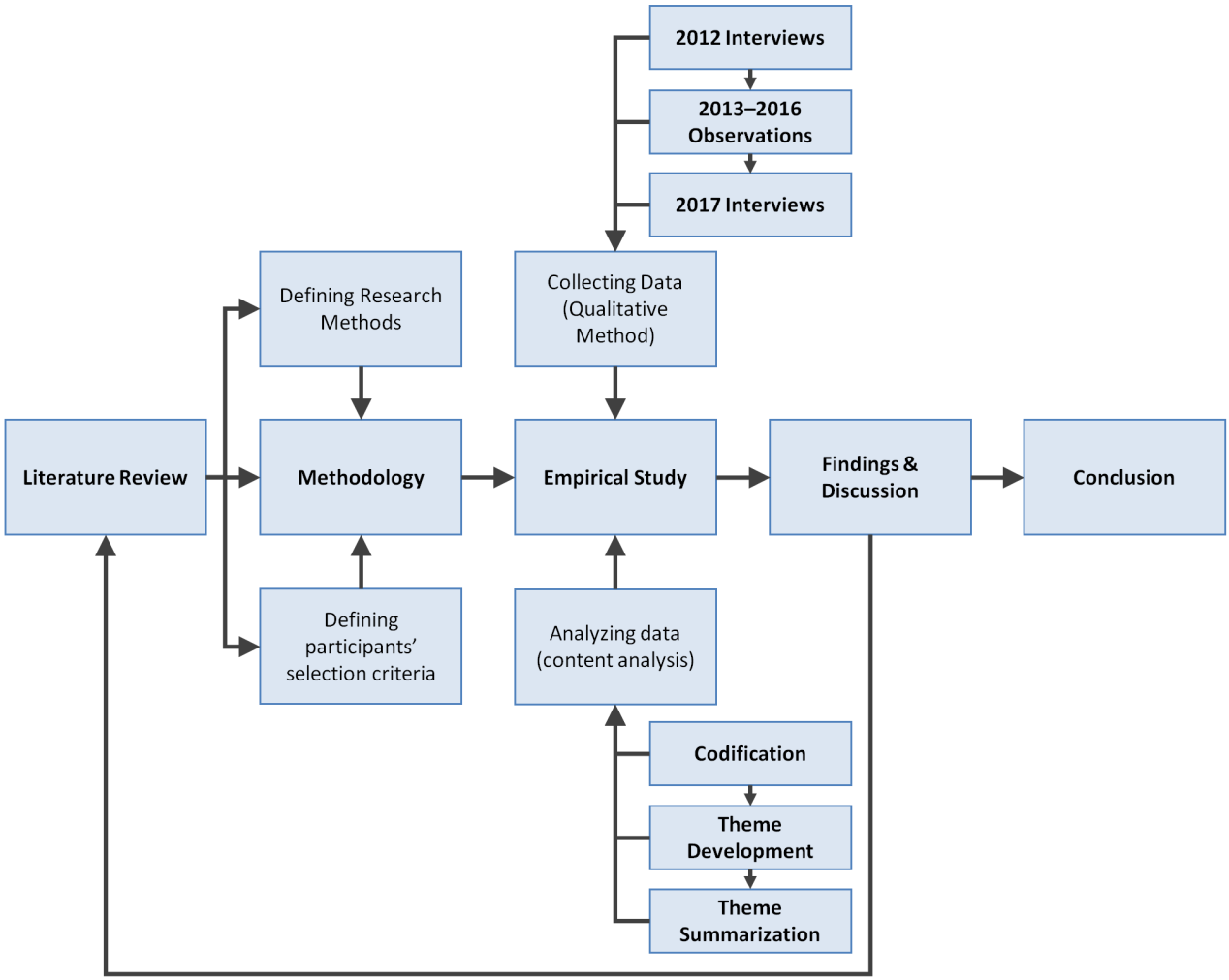

Figure 2. Overview of the methodology followed in this study

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Moreover, it was noted that their commercialization process consisted of four stages – pre-commercialization, actual commercialization, new-pre commercialization, and post-commercialization – as found previously by this author Gbadegeshin (2017, 2018a). Figure 3 shows the author's interpretation of the commercialization process described by the study participants, including the different activities undertaken in each phase.

Figure 3 has similarities with the initial lean startup methodology framework, based on the work of Ries (2011) and others (e.g., Apilo et al., 2015; Blank, 2013; Furr et al., 2014; Hemilä & Jaring, 2018). The commercialization stages of Figure 3, and their various activities, appeared similar in all observed high-technologies in this study, despite being sold in different industrial sectors. The commercialization process also seemed to follow lean the startup methodology pattern as explained in the literature (Blank, 2013; Gaffney et al., 2014; Järvinen et al., 2014; Lalic et al., 2012; Munch et al., 2013; Ries, 2011).

Similarly, the four business advisors interviewed in phase 3 confirmed that firms are following the process described above while explaining that commercialization activities have changed over the last two decades. These experts observed that, two decades ago, technology entrepreneurs focused on functionality, efficiency, and high quality, instead of problem solving and customer acceptance. Their affirmation corresponds to the focus of recent frameworks of the lean startup methodology (Apilo et al., 2015; Furr et al., 2014; Gbadegeshin & Heinonen, 2016; Hemilä & Jaring, 2018). The experts also made it known that startup phenomenon, digitalization influences, and "money making" pressures are compelling entrepreneurs to apply lean startup logic as some authors have also noted (e.g., Apilo et al., 2015; Ibba et al., 2018; Kruuti, 2016; Shimasaki, 2018). Thus, the experts emphasized that, in the last five years, lean startup logic has been spreading among technology entrepreneurs, though they also acknowledged that it can be difficult to use. This result confirmed the claim of Gbadegeshin and

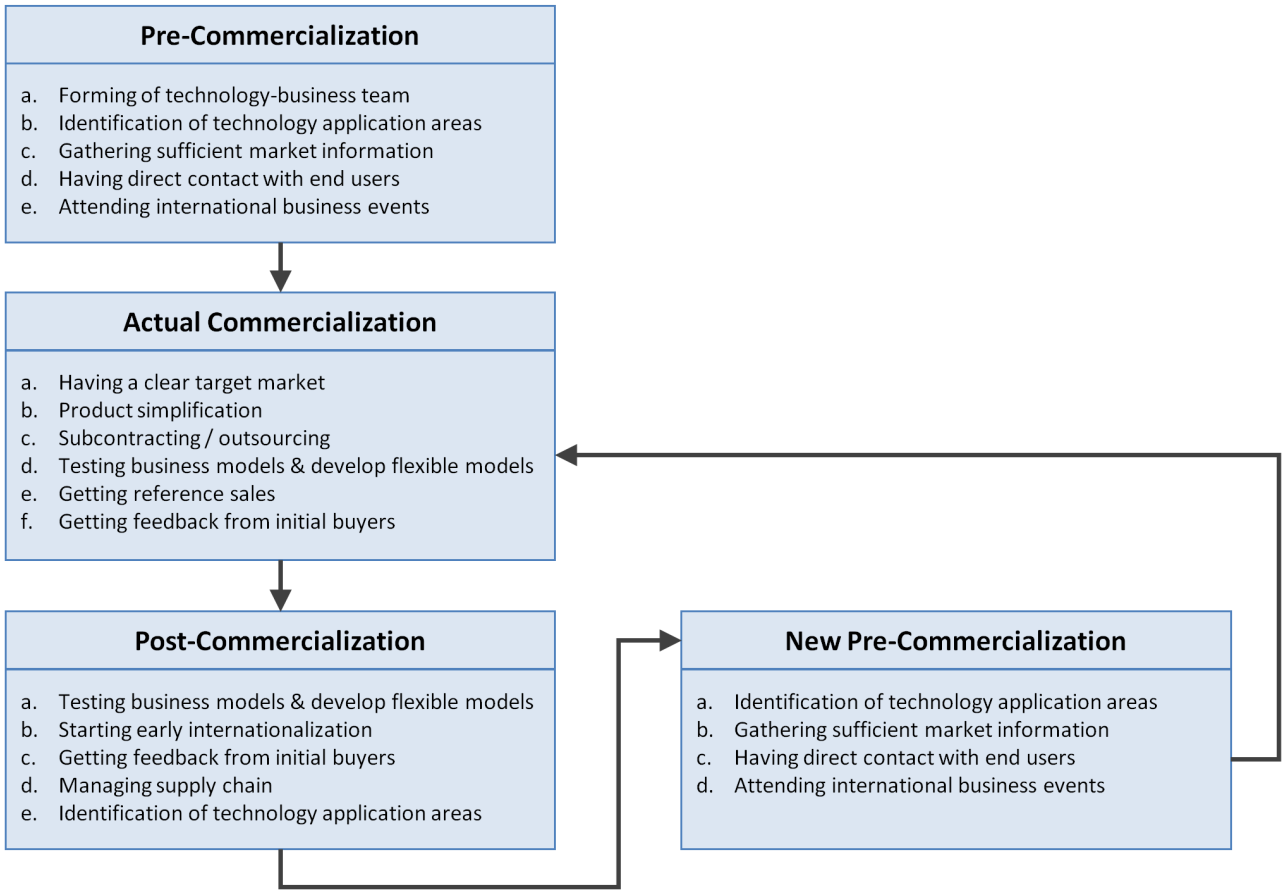

Figure 3. The commercialization process of high technologies

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Heinonen (2016) that the application of lean startup methodology might be problematic for the entrepreneurs due to its initial challenges, such as the development of a minimum viable product in a short timeframe and the need to convince potential customers to try prototypes.

In addition, the experts enumerated that insufficient knowledge about the lean startup methodology, belief that the lean startup methodology is for "ICT people", and following of personal preference or intuition are reasons many technology entrepreneurs choose not to apply the lean startup methodology, as some scholars have also noted (e.g., Apilo et al., 2015; Hemilä & Jaring, 2018; Shimasaki, 2018). Meanwhile, the experts noted that young entrepreneurs seemed to use the lean startup methodology more than older entrepreneurs; likewise, experienced or serial entrepreneurs also use the lean startup methodology. This preference among younger entrepreneurs was noted by Wright and colleagues (2017) when explaining ecosystems of student entrepreneurship. Additionally, the experts regarded the lean startup methodology as a tool, which can be replaced or changed.

In summary, the interviews with the study participants confirmed that the lean startup methodology could be applied in commercializing high-technologies, even without the active awareness of the logic among those undertaking the commercialization activities. However, the participants also agreed that limited knowledge of the lean startup methodology could be an obstacle to the successful application of the logic. In view of these findings, there is indeed a need for a framework to enlighten and guide technology entrepreneurs in applying lean startup methodology in their commercialization adventures.

Development of the lean commercialization framework

In responding to this need for knowledge and guidance, a new framework titled "lean commercialization" was developed, as shown in Figure 4. The framework is an application of the lean startup logic to the commercialization process, and it serves as a guide for high-tech entrepreneurs.

Lean commercialization starts with "Evaluating new technology", which is common to most commercialization processes (for examples, see: Abd Rahim et al.,

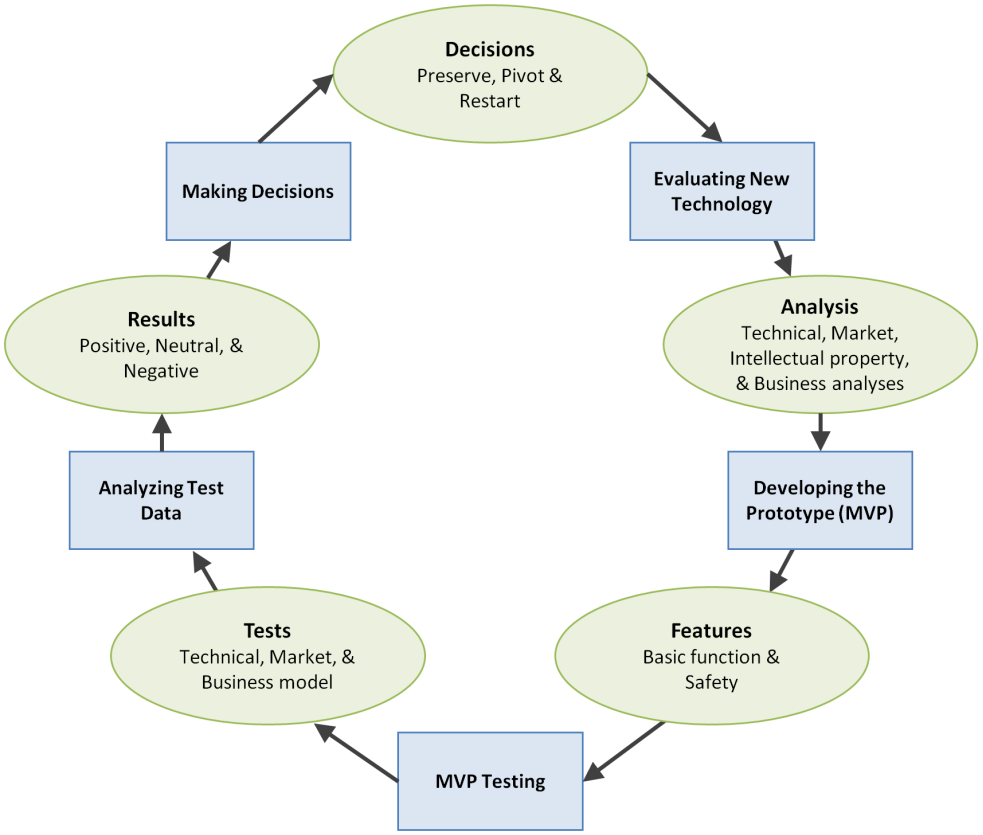

Figure 4. The lean commercialization framework

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2015; Al Natsheh et al., 2014; Amadi-Echendu & John, 2008; Amadi-Echendu & Rasetlola, 2011; Bradley et al., 2013; Eldred & McGrath, 1997; Maine & Garnsey, 2007). This activity is expected to consist of an analysis of technical and market issues and intellectual property. These analyses are essential for commercialization and building a technology-based company (Al Natsheh et al., 2013). However, this activity is not limited to these analyses. Other analyses related to human resources, material acquisition and supply chains, factory siting and manufacturing processes, and any other business development related issues can be done at this stage.

The second stage of lean commercialization is "Developing the prototype". This stage is also common to many commercialization frameworks, though under different names. For example, Maine and Garnsey (2007) called it "customization of R&D", Pietzsch and colleagues (2009) name it "design and development", and Gbadegeshin (2017b) termed it "prototyping and development". Meanwhile, the lean startup methodology called it "minimum viable product", which simply means a working prototype that can be put in front of customers (Furr et al., 2014; Gbadegeshin & Heinonen, 2016; Ries, 2011). Thus, this stage of lean commercialization is expected to result in the development of a workable prototype with basic functions and safety features. The main aim of a minimum viable product is to examine the workability of a new idea with potential customers (Blank, 2013; Furr et al., 2014; Ries, 2011). Likewise, lean commercialization aims to have a working prototype with the main functions and safety so that it can be tested by consumers. Functional features ensure that the technology achieves its purpose, while safety features protect the users. In lean commercialization, this form of prototype enables a firm to validate the conceptualization of the new technology, as others have noted (Apilo et al., 2015; Gbadegeshin, 2017b; Hemilä & Jaring, 2018; Shimasaki, 2018).

The third stage is "Minimum viable product testing", or "MVP testing". Testing is an important phase of any commercialization process. Some commercialization scholars, (e.g., Maine & Garnsey, 2007; Pietzsch et al., 2009) found that testing enabled commercialization teams to validate their new technologies. Similarly, scholars examining the lean startup methodology argue that testing reveals the "practicality" or "reality" of the new technology (e.g., Apilo et al., 2015; Gbadegeshin & Heinonen, 2016; Ibba et al., 2018; Järvinen et al., 2014; Kruuti, 2016; Moogk, 2012; Shimasaki, 2018; Tran, 2015). Thus, this stage in lean commercialization process examines the functionality of the technology while also validating its business potential. Testing is expected to include (but is not limited to) market, technical, and business model tests. In all cases, the testing must be documented to inform the next stage.

The fourth stage is "Analyzing test data". This stage is not commonly pronounced in many commercialization frameworks. However, this stage is an integral part of the lean startup methodology. Therefore, with lean commercialization, users employ analysis tools to synthesize any collected data. In contrast to the lean startup methodology, which emphasizes analytics (i.e., quantitative analysis) (Blank, 2013; Maurya, 2012; Ries, 2011), any form of data analysis can be used with lean commercialization, whether based on qualitative or quantitative data. For example, some empirical studies (e.g., Gbadegeshin & Heinonen, 2016; Ibba et al., 2018; Järvinen et al., 2014) have shown that different types of information are often collected during minimum viable product tests. Thus, it is recommended that, for lean commercialization, users of the methodology should be open-minded in collecting and analyzing their data. Such an attitude would enable the users to deduce insights from their tests, as explained by Erickson (2015), Furr and colleagues (2014), and Hemilä and Jaring (2018). Additionally, the tests can be done in different market segments and geographical locations so that mutual understanding of market and customers can be attained.

Test results can be positive, neutral, and negative. A test result is positive if the collected data showed that the new technology fulfils its primary purpose, potential customers are satisfied with it, or a business model is able to be achieved. This kind of result is often difficult with the first minimum viable product test, but it is possible. In contrast, a test result is negative when the aforementioned conditions are not met. For example, if the technology had a functional problem, if potential consumers did not have a good experience, or if a good business model could not be developed. A test result is neutral when the results are mixed or insufficient to draw conclusions.

The last stage of lean commercialization stage is "Making decisions". Ries (2011) advocates failing quickly, learning lessons, and thinking about the way forward. Lean commercialization shares this view, at least partially, by encouraging commercialization teams to make a decision about whether to continue or restart their new high-tech commercialization process in this

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final stage. A positive result should encourage teams to continue with full commercialization, but a neutral result suggests that the opportunity should be pivoted. Pivoting means that problems discovered in the minimum viable product test are addressed and re-tested, the minimum viable product is introduced to a new market, or the new technology is repurposed. However, pivoting does not mean that the new technology needs to start again from stage one. According to Gbadegeshin and Heinonen (2016), pivoting can start from the prototype development stage. Similarly, the empirical cases in this study confirmed that pivoting could start from this stage. Additionally, developing a new prototype might not be necessary in some cases; thus, lean commercialization users are advised to examine the test result critically before pivoting, because high technology is expensive, tedious, and resource-intensive to develop (Gbadegeshin, 2018a). Lastly, commercialization activities should be restarted if the minimum viable product test is negative. This means that lean commercialization users need to start the whole process afresh.

In summing up, lean commercialization is designed to reduce waste, minimize resource use, improve the utilization of a business opportunity, and create a sustainable business or help grow an existing business. Users of the framework must consider the nature of the new high technology and its related services and solutions, the formation of a commercialization team, and the nature of the target market. The nature of new technology determines the stages and sub-activities of lean commercialization. Similarly, the composition of the commercialization team helps or hinders the commercialization process (Gbadegeshin, 2017b). Most importantly, targeting a market determines what different factors and actors need to be considered in the commercialization process (Al Natsheh et al., 2015); hence, this consideration is essential in the application of the lean commercialization framework.

Conclusion

Commercializing scientific expertise that has been developed over a period of time is for developing and sustaining new and old businesses (Still, 2017). Similarly, transforming new technologies that have been developed from series of research and development investments is an important source of income for companies and government (Cornford, 2002; Gibson & Naquin, 2011; Hindle & Yencken, 2004). Hence, converting inventions or innovations into consumable products and services is part of the third mission of universities, after teaching and research (Clark, 1998; Etzkowitz et al., 2008; Foss & Gibson, 2015; Guerrero et al., 2016). Making new technologies available and acceptable in marketplaces (Tanev & Frederiksen, 2014) requires the creation of new businesses, the revamping of existing enterprises, and the employment of people (Gbadegeshin, 2017a, b; Still, 2017). Therefore, the commercialization of high-technologies is crucial for economic development (Banerjee & Cole, 2011; Baptista & Preto, 2011).

Naturally, high-technologies are expensive to commercialize. For example, Al Natsheh and co-authors (2015) pinpoint that, for commercializing Quantum Key Distribution technology (a high-technology for cybersecurity), various issues need to be addressed, including technical development, technology validation/certification, technology infrastructure, scattered and small markets, supply chain, after-sales services, and customer orientation/awareness. These issues make the commercialization of that high-technology challenging. Moreover, high-technologies are made more complicated by the advent of digitalization (Gbadegeshin, 2018b). In fact, more new high-technologies are expected to emerge as digitalization continues to evolve (Gbadegeshin, 2018b; Parviainen et al., 2017). With all these factors, employing a new logic or improving an old logic is necessary. This is the main motivation for proposing lean commercialization, which is developed from studying different high-technologies from different industries.

Lean commercialization, as its name implies, is a combination of lean/agile and commercialization knowledge. Its primary aim is to assist technology entrepreneurs and technology-based companies to commercialize their new high-technologies, without investing a huge amount of money and other resources. It helps users to validate their high-technologies and business models quickly. It also helps users to learn from their trials and simultaneously develop market and customers for their technologies. It aims to motivate potential entrepreneurs, scientists, and engineers to move forward with their innovations and acquire knowledge even if resources are scarce.

Although lean commercialization has its roots in the lean startup methodology, it has connections with other theories/frameworks such as bricolage and effectuation (Apilo et al., 2015). Briefly, bricolage originates from work of Lévi-Strauss (1966) and involves simply

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"making do" with current resources. It also refers to the creation of something new from little available resources or by combining various limited resources (Baker & Nelson, 2005; Fisher, 2012; Gbadegeshin, 2018b). Similarly, effectuation, as propounded by Sarasvathy (2001), is a process of identifying and exploiting a business opportunity with limited available resources, and by employing affordable loss logic. This theory deals with business opportunities with a high level of uncertainty (Fisher, 2012).

Therefore, lean commercialization contributes to the theory of commercialization and entrepreneurship. Its framework is simple and easy-to-understand. It can be used for training scientists and engineers. Thus, the lean commercialization framework is useful for teaching technology entrepreneurship. Similarly, the lean commercialization framework can be used by practitioners, especially commercialization teams and commercialization project staff. Thus, lean commercialization makes a contribution to the practice of commercialization.

Lean commercialization is promising but it does have some limitations. First, lean commercialization was developed from a case study research methodology. This method is usually constrained in terms of the ability to generalize the results (Creswell, 2009; Eriksson & Kovalainen, 2008; Yin, 2003). This constraint limits the logic to high-technologies in similar case contexts as studied here. However, lean commercialization can be applied to any high-technologies, or even "medium" or "low" technologies, depending on the user, because this methodological limit does not affect the quality of the framework. Second, lean commercialization was developed in the context of Finland, which is one of the most technologically advanced countries in the world (Kärki et al., 2017; Statistics Finland, 2018; World Economic Forum, 2018). This means that certain factors might have facilitated or hindered commercialization activities in the case studies, and these factors might be not present in the countries of other potential users of the lean commercialization framework. Thus, country-specific factors, such as R&D funding system, entrepreneurship policy, and ICT infrastructure, might create a limitation in applying the framework, but these factors do not undermine lean commercialization logic. Nonetheless, these limitations call for testing of lean commercialization in other contexts so that the framework can be validated.

Acknowledgements

The author would like to thank the Finnish Cultural Foundation, the Foundation for Economic Education in Finland (Liikesivistysrahasto), the Turku University Foundation, Turun Kauppaseura Foundation, Turku TOP-Säätiö, and the Turku School of Economics Support Foundation (Matti Koivurinnan säätiö) for their financial support. The author would also like to thank his supervisors: Professor Jarna Heinonen and Professor Anne Kovalainen. He also thanks his colleague, Mr. Ezak Ofem, for his feedback on the manuscript.

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Citation: Gbadegeshin, S. A. 2018. Lean Commercialization: A New Framework for Commercializing High Technologies. *Technology Innovation Management Review,* 8(9): 50–63. http://doi.org/10.22215/timreview/1186

Keywords: lean commercialization, high technologies, lean startup, technology-based companies, Finland

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Academic Affiliations and Funding Acknowledgements

The Federal Economic Development Agency for Southern Ontario (FedDev Ontario; feddevontario.gc.ca) is part of the Innovation, Science and Economic Development portfolio and one of six regional development agencies, each of which helps to address key economic challenges by providing regionally-tailored programs, services, knowledge and expertise.

- *The TIM Review receives partial funding from FedDev Ontario's Investing in Regional Diversification initiative.*

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- *The TIM Review is published in association with and receives partial funding from the TIM program.*