



Lean Internal Startups for Software Product Innovation in Large Companies: Enablers and Inhibitors



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ABSTRACT

Context: Startups are disrupting traditional markets and replacing well-established actors with their innovative products. To compete in this age of disruption, large and established companies cannot rely on traditional ways of advancement, which focus on cost efficiency, lead time reduction and quality improvement. Corporate management is now looking for possibilities to innovate like startups. Along with it, the awareness and the use of the Lean startup approach have grown rapidly amongst the software startup community and large companies in recent years.

Objective: The aim of this study is to investigate how Lean internal startup facilitates software product innovation in large companies. This study also identifies the enablers and inhibitors for Lean internal startups.

Method: A multiple case study approach is followed in the investigation. Two software product innovation projects from two different large companies are examined, using a conceptual framework that is based on the method-in-action framework and extended with the previously developed Lean-Internal Corporate Venture model. Seven face-to-face in-depth interviews of the employees with different roles and responsibilities are conducted. The collected data is analysed through a careful coding process. Within-case analysis and cross-case comparison are applied to draw the findings from the two cases.

Results: A generic process flow summarises the common key processes of Lean internal startups in the context of large companies. The findings suggest that an internal startup can be initiated top-down by management, or bottom-up by employees, which faces different challenges. A list of enablers and inhibitors of applying Lean startup in large companies are identified, including top management support and cross-functional team as key enablers. Both cases face different inhibitors due to the different process of inception, objective of the team and type of the product.

Conclusions: The contribution of this study for research is threefold. First, this study is one of the first attempt to investigate the use of Lean startup approach in the context of large companies empirically. Second, the study shows the potential of the method-in-action framework to investigate the Lean startup approach in non-startup context. The third contribution is a general process of Lean internal startup and the evidence of the enablers and inhibitors of implementing it, which are both theory-informed and empirically grounded. Future studies could extend our study by addressing the limitations of the research approach undertaken in this study.

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1. Introduction

Today, software startups have become one of the key drivers of economy and innovation. In 2016, 550,000 new businesses or startups have been established each month in the US only

(Fairlie et al., 2016). Even though they are inexperienced, young and immature (Sutton, 2000), their products are disrupting traditional markets and are putting well-established actors under pressure. Uber, Spotify, and Airbnb, to name just a few, are examples of software startups that have grown rapidly. Startups offer new product, new business model, and new business value at high speed, and with cutting edge technology. They continuously talk to their potential customers to discover gaps in the existing offers,

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iterate, and conduct experiments to find repeatable and scalable business models. They are willing to pivot immediately if the opportunity does not prove viable.

To compete in this age of disruption, large and established companies cannot rely on traditional ways of advancement, which focus on cost efficiency, lead time reduction or quality improvement (Rejeb et al., 2008). Corporate management is now looking for new ways to keep their leading positions in a fast moving market, and to innovate like startups. With greater resource in-house, they hope that they can bring innovative products with new customer values to market as startups do.

Along with it, the awareness and use of the Lean startup approach have grown rapidly amongst the software startup community in recent years. Similar to many precedent methods, the development and promotion of Lean startup have been almost entirely driven by practitioners and consultants, with little participation from the research community during the early stage of its evolution. However now it is the focus of more and more research efforts (Unterkalmsteiner et al., 2016).

Even though the Lean startup approach is originated in software startups, it has also gained interest from large companies as General Electric, 3M, Intuit, etc. A recent survey on 170 corporate executives reveals that 82% of them are using some elements of Lean startup in their context (Kirsner, 2016). Marijarvi et al. (2016) report on the experience of large Finnish large companies in developing new software through internal startups. More and more large companies adopted the Lean startup approach, hoping that it will help them to generate successful software product innovation.

Ries (2011) argues that the core ideas behind Lean startup can offer benefits for large companies as well. If the obstacles can be minimised, the opportunities can be very beneficial to support software product innovation. Hence, evidence for understanding the enablers and inhibitors for Lean internal startups in large companies needs to be gathered. However, scientific and empirical studies regarding the leverage of the Lean startup approach for software product innovation in large software organisations are rare. Based on this observation, the main research question investigated in this study is: *How could large companies run effectively Lean internal startups for their software product innovation projects?*

To answer the main research question, we divided it into two sub-questions as follows:

- RQ1: How are Lean internal startups run in large companies for their software product innovation projects?
- RQ2: What are the enablers and inhibitors of running Lean internal startups in large companies?

The remainder of this paper is structured as follows. Section 2 discusses the background and related work. Section 3 presents the theoretical frameworks used in this study, whilst Section 4 describes the research methodology employed. The key processes of Lean internal startups are reported in Section 5. Section 6 presents the enablers and inhibitors for Lean internal startups in the context of large companies, which are further discussed in Section 7. The conclusions and future work are covered in Section 8.

2. Background and Related Work

2.1. Software Product Innovation

Software product innovation is the creation and introduction of a new software product to an existing or new market (Lippoldt and Stryszowski, 2009). The new product is developed to respond to either a technology or market opportunity (Krishnan and Ulrich, 2001). Newer technology is used to improve the current or to offer completely new functionalities, for example, the use of cloud computing as the online storage or the implementation of

new electronic payment method. New products may be triggered by the unmet customer needs from current solutions or to address newly revealed customer needs.

In software industry, the majority of innovation could be either process or product (Simonetti et al., 1995). Software process innovation refers to the implementation of new processes, tools or methods to develop software, e.g., object-oriented development (Fichman and Kemerer, 1993), CASE (Computer-Aided Software Engineering) tools (Orlikowski, 1993), open source software (Feller and Fitzgerald, 2000), and software process improvement initiatives (Bygstad and Fagerstrom, 2005). However, the use of innovative tools or processes does not necessary lead to innovative products (Carlo et al., 2011).

Highsmith and Cockburn (2001) claim that agile development support software process innovation by focusing on people and team. Agile seems able to prescribe on how to develop a working software faster, but is still unable to give answer what product should be developed (Bosch et al., 2013). Although agile also advocates to build the software iteratively, it only works when the problem is known to the stakeholders. This is not the case in product innovation, where the problem and solution are unknown.

Product innovation in software industry which is influenced either by new hardware or software development raises strategic challenges for software companies (Kalternecker et al., 2015). The shift from mainframe to personal computers created new market for standalone operating system. Microsoft, a new startup at that time, emerged and offered new operating system called DOS. For over a decade, the popularity of mobile devices has attracted new startups to develop various mobile apps, including new mobile operating systems, e.g., Android, iOS, etc.. Another example is the shift from proprietary software to open source software (Bonaccorsi et al., 2006), which allows new startups to enter a market and challenge market leaders, e.g., Linux vs. Microsoft Windows or Mozilla vs. Internet Explorer.

In large and high-tech companies, innovative activities are performed by a specialised and dedicated entity, typically R&D department. In R&D, most innovations are scientific and/or technological based. The involvement of companies in R&D activities are driven by the need to improve current process or products, researching new process or technology or specific user need. When the technology becomes more advanced and complex, R&D are demanded to bring more innovative products. However, not all technologies produced by R&D are inline with and directly support the business goal. These technologies are called misfit technologies (Anokhin et al., 2011). When this happens, the company has three options: keep scientific research, sell the technologies outside or introduce spin-off (Abetti, 2002; Anokhin et al., 2011).

Our previous work shows that the current research on software product innovation is scattered in different areas: early user integration, continuous experimentation, and open innovation (Edison et al., 2016). Research on early user integration focuses on capturing new ideas from outside companies, i.e. users, customers, competitors etc., and turn them into real products (Bailey and Horvitz, 2010; Blohm et al., 2011; Kauppinen et al., 2007; Gassmann et al., 2006). Rather than developing new products internally, research on open innovation suggests to collaborate with external entities, e.g., through living lab.

An emergent research area in software product innovation is startup experimentation approach, which is inspired by the Lean startup approach (Fagerholm et al., 2014; Lindgren and Münch, 2015). In this approach, software is developed and validated through experiments with all stakeholders. Bosch (2012) proposes an innovation experimentation system to minimise research and development (R&D) investment and increase customer satisfaction. In this system, R&D runs a 2–4 week sprint based on customer feedback. However, the method is limited to SaaS (Software-

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