



**Nova School of Business and Economics
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**THREE ESSAYS ON ENTREPRENEURSHIP AND INNOVATION:
THE ROLE OF LATE ADOPTERS**

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*To my mom.
For always giving me wings to fly and for catching me whenever I fall.*

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Thesis abstract

This dissertation presents novel topics in entrepreneurship and innovation. In today's markets, companies, especially those competing in red oceans, should look for new opportunities to remain competitive. To explore such opportunities, they need to come up with breakthrough ideas, which provide them with new market spaces and allow them to surpass competitors. One way of creating blue oceans is to explore what the competitors are ignoring. One rich source of novel ideas, which has been ignored by both researchers and practitioners, is late adopters. Late adopters are the last group of users who adopt a new product, service or technology. In this thesis, we explore this category of users and examine their potential as a source of innovative ideas and entrepreneurial opportunities. Chapter 1 of this thesis provides a brief introduction to the topics of entrepreneurship and diffusion of innovation. In chapter 2, we conduct an exploratory study in the entrepreneurial eco system of Cambridge. We aim at understanding the choices entrepreneurs make while making decisions, such as listening to early vs late adopters. In the third chapter, we present a measurement scale to assess characteristics of late adopters, which facilitates the process of identifying them. Once we identify them, we need a customized new product development method to involve this category of users in idea generation. In chapter 4, we present the Lag-User Method. Through this method, we can benefit from the insights of late adopters. Among others, our studies reveal that late adopters can be among any demographic or social group. Their needs are different from those of other user categories. We find that unlike lead-user, late adopters do not create prototypes and need coaching to come up with incremental, really new or radical innovations. Insights from late adopters and laggards can help firms explore weaknesses of their products/services and target common needs across different markets, (e.g. the need for sophisticated technology that is simple to use). This will enable firms to cut costs and benefit from economies of scale while satisfying local needs and thereby increase their performance.

Keywords: Entrepreneurship, Paradox, Diffusion of Innovations, Late Adoption, New Product and Service Development

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Chapter 1 **Introduction**

1.1. Background

Innovation and entrepreneurship go hand in hand, since entrepreneurial opportunities are normally fuelled by ideas and/or innovations. Despite growing interest in both topics, several questions of innovation and entrepreneurship domains remain unexplored. This dissertation addresses questions in diffusion of innovations and entrepreneurship, offering implications for theory and practice and thus advancing our knowledge and understanding of both domains.

1.2. Entrepreneurship

1.2.1. Entrepreneurship as a field of study

Entrepreneurship is recognised as being fundamentally important for societies and economies. (Gans & Stern, 2003). Although a relatively young field, researchers have explored various streams about this phenomenon. Theoretical definitions of an entrepreneur go back to the 18th century, when the foundation for today's studies was laid. As a pioneer of the field, Cantillon (1931) defines an entrepreneur as “someone who assumes the risk and may legitimately appropriate any profits”. Schumpeter (1947) believes that “the entrepreneur performs the function of innovation that enables the liberal system to persist by going beyond its contradictions” (Bruyat & Julien, 2000, p. 167). Drucker (1985) followed by recent studies (Baumol & Strom, 2007; Minniti & Levesque, 2010) refers to entrepreneurship as a means to achieve growth.

Various elements of entrepreneurship come to attention. For instance, Stevenson and Jarillo (1990) identify three main streams of research in studies of entrepreneurship: “what happens when entrepreneurs act, why they act, how they act” (p. 18). The first question, “what happens when entrepreneurs act?” is mainly of interest to economists (Stevenson & Jarillo, 1990; Schumpeter, 1934, 1947; Kirzner, 1979, 2015; Casson, 1982). “Why entrepreneurs act” is based on psychological/sociological elements, founded by McClelland (1961) and Collins and Moore

(1964). This stream of research focuses on the entrepreneur as an individual, with specific characteristics, experiences, motivations and perspectives. Finally, studying “how entrepreneurs act” provides evidence about how entrepreneurs pursue their goals and are able to perform (Stevenson and Jarillo, 1990).

1.2.2. Theories of Entrepreneurship

Cantillon (1881, 1931) one of the pioneers of the theories of entrepreneurship, presents entrepreneurs as economic agents, who produce new products and connect producers and customers. Say (1851) proposes that one of entrepreneurs’ major roles is to create teams in order to achieve productivity.

Some of these theories, which have been used to explain the concept of entrepreneurship, include Risk Bearing Theory (Knight, 1921), and Innovation Theory (Schumpeter, 1947).

Introducing the Risk Bearing Theory, Knight (1921) claims that risk taking is a key aspect of any entrepreneurial activity. His perspective views risk taking as a factor of production in that the key role of an entrepreneur was to act in expectation of particular future occurrences. Thus taking risks would result in entrepreneurial performance and success. The theory supports that without the capacity to make risk an individual would not be able to engage in business activities that would risk his investment. Hence, for entrepreneurship to occur, an individual must have the capacity to take risks with a positive bias towards making profits.

Schumpeter (1947) views the phenomenon of entrepreneurship through the lens of his Innovation Theory. He believes that certain characteristics are essential for an individual

to be considered an entrepreneur. These characteristics include being innovative, having foresight and being creative. Thus according to this theory, entrepreneurship occurs where an individual introduces a new product, finds an alternative raw material, and discovers a new market or even a new way of doing things (McDaniel, 2005). Schumpeter's theory has however been criticized as it disregards risk taking and managerial skills placing emphasis only on innovation (Cheah, 1990). This theory would hence apply mainly to large businesses since small business would find it cheaper and easier to copy others rather than innovate.

McClelland's (1961) argues that entrepreneurs are individuals with the ability to perform better at certain tasks and make good decisions when faced with uncertainties. Thus an individual's vision of success becomes stronger than any monetary or other external risks that are involved (Kuratko and Audretsch, 2009).

These and other works have attempted to explain the concept of entrepreneurship. However, other external factors play a significant role in entrepreneurial activities as well. Factors such as technology, market, environment or type of customers, the attitude of the entrepreneur toward various factors, such as risk taking (Forlani & Mullins, 2000; Norton & Moore, 2002), improvisation (Hmieleski & Corbett, 2006, 2008) or his/her passion toward creating a new venture (Cardon et al., 2005, 2009) all play important roles in a new venture's creation, survival and success.

Behind every firm's creation, there is one or more individuals facing decisions and making choices. The act of decision making will follow founders throughout the process of venture creation. Various studies have looked at various aspects of entrepreneurial decision making (McCarthy & Schooman, 1993; Shepherd et al., 2015; Townsend & al.,

2010). However, to our knowledge, no study has yet look at various perspectives entrepreneurs could take while making decisions. Chapter two of this dissertation explores a trade-off versus a paradox approach in an entrepreneurial decision making context. The phenomenon of entrepreneurship is closely bound to innovation. For any venture to come to life, an innovation must diffuse in the market. In the next section, we introduce major topics of diffusion and adoption of Innovations.

1.3. Diffusion of Innovation

New firms occurs, when an individual introduces a product, service or market innovation (Schumpeter, 1947; McDaniel, 2005). For the new firm to succeed, entrepreneur's innovative ideas must find acceptance in the market place. Understanding the phenomenon of diffusion is essential for entrepreneurs in order to understand how different categories of users perceive innovations. This will allow them to define the right product and select an appropriate market (Gans & Stern, 2003).

The study of diffusion of innovations goes back to early 20th century. Tarde (1903) observes diffusion of innovations through conscious or unconscious imitations. Almost half a century later, a study by Ryan and Gross (1943) presents the results of the diffusion of hybrid-corn farmers in Iowa. Wejnert (2002) presents examples of diverse early studies of diffusion, which have followed Ryan and Gross (1934). These studies focus on various topics such as agricultural practices (Fliegel, 1993; Griliches, 1957), technologies (Burt, 1987; Coleman et al., 1966; Palmer et al., 1993), fertility-control methods (Rogers & Kincaid, 1981; Rosero-Bixby & Casterline, 1994), policy innovations (Berry & Berry, 1992; Boli-Bennett & Ramirez, 1987; Valente, 1995), and political reforms (Meyer, 1987; Starr, 1991).

Rogers (1962) is considered to be the inventor of the Diffusion of Innovations (DOI) theory. DOI refers to the spread of an innovation within a social system and to the process of

acceptance of that innovation over time by the members of the social system (Rogers, 2010). Numerous studies have reviewed the literature, which followed Rogers' DOI theory, such as diffusion of innovations in healthcare service industry (Greenhalgh et al., 2004), diffusion in organization studies (Adams et al., 2006) or diffusion of innovations in the food domain (Ronteltap et al., 2007). Légaré et al. (2008) explore barriers and facilitators of adoption of innovations in clinical practice, whereas Keupp et al. (2011) focus on innovation management. Kapoor et al. (2014) provide a longitudinal study across each of Rogers' innovation attributes, i.e. across Rogers' Five Factors..

1.3.1. Rogers' Five Factors

Rogers presents five attributes of innovations, known as Rogers' Five Factors: relative advantage, compatibility, complexity, trialability and observability. He defends that users' attitude toward these factors affect an innovation's rate of adoption.

Relative advantage is "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2013, p. 229). The characteristics of the innovation as well as that of the adopters determine the type and the importance of relative advantage. Literature refers to various types of relative advantage. Economic factors, e.g. the initial cost of an innovation, affect the rate of adoption. For example, when a technology enters the market initially, it is normally offered at a higher price and so it diffuses at a slow rate. Over time the price of that technology declines, the economic relative advantage increases and so does the rate of adoption.

For certain classes of innovation, social status - as another type of relative advantage - can be the main reason for adoption. Certain groups of users are more likely to adopt innovations with desire to get social status. Status aspects of innovations seem to be more important to users who adopt earlier than those who adopt later. Rogers (2013) concludes these arguments by stating, "the relative advantage of an innovation as perceived by the members of a social system, is

positively related to its rate of adoption” (Rogers, 2013, p. 233). A study by Lee and Kim (2007) confirms this conclusion, by showing that staffs’ understanding of the relative advantage of a new system has a direct impact on the acceptance and implementation of that system.

Despite the above-mentioned points, the relative advantage of an innovation is not always clear. An innovation diffuses slower when individuals have difficulties in perceiving its relative advantage. This is the case for preventive innovations. Individuals adopt preventive innovations not because they realize its relative advantage, but rather to avoid some undesired future events. Many preventive measures can be considered preventive innovations, for instance wearing seatbelts or adopting a new diet or health plan. Both these measures will prevent users from unwanted future events, although those events would not have necessarily occurred. Considering the uncertain and complex nature of the relative advantage of preventive innovations, it is easy to understand why they have a low rate of adoption (Rogers, 2013).

Compatibility is “the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (Rogers, 2013, p. 240). The more compatible an innovation is, the less uncertain it appears to the potential adopters. The lower the uncertainty, the higher the rate of adoption. An innovation’s compatibility with socio-cultural values of the market, where it is introduced, can result in higher rate of adoption. While some innovations diffuse widely in a certain market, socio-cultural factors might block its adoption in other markets. Moreover, compatibility with previously introduced innovations can affect new ideas’ rate of adoption. Users assess innovations based on old ideas, i.e. they give meaning to innovations based on what they are familiar with. Additionally, a negative experience with an old idea can reduce the rate of adoption of a new idea. Another aspect of compatibility of an innovation is the degree to which it meets users’ unfulfilled needs. When users feel that an innovation is compatible to their unfulfilled needs, they feel less uncertain towards it and adopt it faster. The degree of compatibility perceived by users can increase through measures such as product packages, naming or positioning of an innovation. Thus, “the compatibility of an

innovation as perceived by members of a social system is positively related to its rate of adoption (Rogers, 2013, p. 249). For example, a study by Huh et al. (2009) concludes that compatibility is a predictor of acceptance of hotel information systems.

Complexity is “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers, 2013, p. 257). The evolution and adoption of home computers is a good example, where the more simple home computers became over years, the faster they were adopted. So Rogers (2013, p. 257) concludes, “the complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption”. However, some companies use complexity as a means to surpass competitors (Chang et al., 2010).

Trialability is “the degree to which an innovation may be experienced with on a limited basis”. It is one way of creating meaning for an innovation and examining how it works. Not all innovations can be tried out prior to purchase. So, Rogers (2013) proposes that the trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. Two studies of computer applications support Rogers’ theory, that lack of compatibility results in lack of uptake (Teo & Lim, 1996; Turner & Turner, 2002).

Observability is “the degree to which the results of an innovation are visible to others” (Rogers, 2013, p. 258). The more easily an innovation can be observed and explained to others, the higher will be its rate of adoption. The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.

1.3.2. Adopter categories

As part of his research on Diffusion of Innovations, Rogers also introduces the diffusion of innovation curve. Arguing that adoption of an innovation over time normally follows a bell curve, he specifies five categories of adopters based on innovativeness: innovators, early

adopters, early majority, late majority and laggards. Moore (2014) also presents characteristics of various adopter categories. Below we present an overview of these five categories.

1.3.3. Innovators

Innovators are the first group of users to adopt a product. They are venturesome, passionate about innovations and are willing to accept high levels of uncertainty regarding new products. They are part of more cosmopolitan networks and have access to substantial financial resources. They possess sufficient knowledge about complex technologies and act as “gate keepers” in the flow of new ideas into markets (Rogers, 2013). Similarly, Moore (2014) defines innovators as technology enthusiasts, the ones who appreciate the architecture of new products, try a product until it works and are willing to accept problems and mistakes. They are the ones pointing out the flaws and provide firms with feedback in an early stage of product launch.

1.3.3.1. Early Adopters

Rogers (2013) refers to early adopters as the ones respected by their peers. While innovators are too advanced for the mainstream users, early adopters are more integrated in their social system. They have a high level of opinion leadership among their peers and are referred to as “individual to check with” when it comes to adoption of new ideas. Their role is to decrease the uncertainty of innovations for other adopter categories and give new ideas their approval stamp. Moore (2014) refers to early adopters as the visionaries, capable of matching an innovation with a strategic opportunity. They tend to communicate horizontally, i.e. across industry boundaries, see a high potential for technology and therefore less price sensitive than the following adopter categories. Having influence on their peers, they have the capability of altering their community to adopt advances in technology.

1.3.3.2. Early Majority

Early majority adopt an innovation right before the average member of a social system. They think some time before adopting an innovation and so they do not possess any opinion leadership. Although they are a large portion of the adopters (34%), they are followers with a relatively long innovation adoption process (Rogers, 2013). Literature also refers the early majority as the pragmatists, who communicate more vertically, i.e. more with others like themselves. They care more about references and relationships and are mainly interested in established firms. They like to wait and see what competition has to offer partly to see prices decline or to have a safe alternative in case things go wrong with the first option. They are fairly price sensitive, yet willing to pay for good quality and service (Moore, 2014).

1.3.3.3. Late Majority

According to Rogers (2010), similar to early majority, late majority make up approximately one third of all the member of the system. Late majority adopts an innovation only after the average user has already adopted it. Their decision could be based on necessity or peer pressure. They approach innovations with a sceptical and cautious air. Their financial resources are rather scarce and they need to see low uncertainty regarding an innovation before they adopt (Rogers, 2013). Others refer to late majority as conservatives, who are against discontinuous innovations. They are rather in favour of tradition than progress. They fear high-tech a bit and can be stubborn in resistance to change (Moore, 2014).

1.3.3.4. Laggards

Laggards are the last group of users to adopt an innovation. Their innovation decision process is rather long. They are the most traditional category of users and refer to the past as their point of

reference. They are suspicious of innovations and agents of change and interact mainly with those individuals who also have traditional values. They are extremely price sensitive and must be sure that an innovation will not fail before they adopt (Rogers, 2013). Laggards are also referred to as sceptics. They often feel that delivered products do not deliver the functions promised at the point of sale. Since they are very critical about innovations, they can teach firms a lot about what they are doing wrong (Moore, 2014). However, their role in the diffusion has been underestimated by both theory and practice. The last scientific paper published in a top journal in this topic goes back to 1970 in the Journal of Marketing Research (Uhl et al., 1970).

1.3.4. Adopter Categories and Rogers' Five Factors

Different adopter categories have different attributes and characteristics, which determine their needs and preferences. Similarly, Rogers' five attributes of innovations weigh differently for different users. While complexity might be appealing to innovators or early adopters, it is the opposite for late majority and laggards (from now on late adopters). Since late adopters prefer simple products, complexity leads into their lower rate of adoption (Jahanmir & Lages, 2015a, 2016). As confirmed by a study by Jahanmir & Lages (2015b), late adopters tend to recognize the relative advantage of a product only after they start using it .. While trialability is an important factor for early adopters, late adopters rely on the opinion of their peers who have already adopted an innovation.

1.3.5. Models of diffusion

Following Rogers' Diffusion of Innovation theory, researchers have explored the topic of diffusion and adoption in various forms. Diffusion models have been traditionally used to project adoption of an innovation. Such models show how members of a social system will

adopt an innovation over time. Bass (1969) and TAM (1989) models are among the most notable models of diffusion.

1.3.5.1. Bass Model

Bass Diffusion Model is considered the pioneering diffusion model. It describes the process of how a population adopts a new product. Bass (1969) presents a growth model for the timing of initial purchase of a new product, based on an assumption that “the probability of purchase at any time is related linearly to the number of previous buyers” (Bass, 1969, p. 13). He argues that except for innovators, social system pressures as well as the pressure of earlier adopters influence later adopters. Thus, he divides adopters in two groups: innovators and imitators (imitators being a group composed by early adopters, early majority, late adopters and laggards). Both innovators and imitators, he claims, make the initial purchase but with a major distinction: buying influence. Innovators are not influenced in the time of adoption, whereas a number of previous buyers influence imitators. Bass also points out that “the importance of innovators will be greater at first, but will diminish monotonically with time” (Bass, 1969, p. 4)

Following the Bass Model, Kempe et al. (2003) propose that in order to ensure that a large fraction of the market adopts a product in a short period, firms should initially target a few “influencers”, who in turn will recommend the product to the members of their network. The question they pose is how we should choose those few influencers for this process. However, considering product generations, the Bass model does not differentiate between consumers who have already adopted the previous generation and those who have not and are only adopting the new generation (Jiang & Jain, 2012).

Ratcliff and Doshi (2016) use the Bass Model to analyse diffusion of innovation at the base of the pyramid. They demonstrate that the Bass Model has the potential to identify different

conflicting factors, which influence consumer adoption. This allows companies to compare the strength of these factors and determine the diffusion and adoption of their product.

1.3.5.2. Technology Acceptance Model (TAM)

Davis (1989) proposes the Technology Acceptance Model (TAM) and explores the mediating role of perceived ease of use and perceived usefulness in their relation between innovations' characteristics and innovations' diffusion and adoption. Further studies based on TAM examine the reasons behind users' acceptance or rejection of an innovation (Davis, 1989; Davis, 1993; Davis et al., 1989). The initial version of TAM (Davis, 1989) is based on Fishbein and Ajzen's (1977) Theory of Reasoned Action (TRA), which proposes that stronger intention lead to higher effort to perform the behaviour. Both TAM and TRA propose an indirect intervention of external factors, such as perceived ease of use and perceived usefulness (in the case of TAM) or attitude and subjective norms (in case of TRA). Having evolved over time, TAM has been empirically tested in various studies and has proven to be a useful tool in understanding the adoption of innovations (Legris et al., 2003).

1.4. Users as Creative consumers

Over years, companies have shifted from manufacturer-led innovation to user-led innovation. Smith (1776,1976) presents one of the first examples of innovations by users in the case of a fire engine, modified by a user whose aim was to reduce his own labour. Following this early study, a new stream of research has explored users as sources of innovation. Initial studies in the field mainly presented evidence, that users can provide companies with useful input about how to better meet the needs of the consumers (e.g. Myers & Marquis, 1969; Rothwell, 1977).

About a decade later, researchers went on to claim that users can be actual sources of innovations in scientific instruments (von Hippel, 1976, 1986, 1988). Recent studies of user innovations focus on consumer goods, such as sports equipment, automobile or banking (e.g. Franz, 2005; Lüthje et al, 2005; Tietz et al., 2005). These studies suggest that a significant portion of innovations in these sectors come from users. There are several reasons why users innovate. Marcel et al. (2010) conduct a review, which names the two main reasons of user innovation as a) innovation-related costs and b) benefits for the users. Users' expertise and knowledge allows them to create a solution customized to their own needs and at a low cost (Franke & Shah, 2003; Lüthje, 2004).

1.5. About This Dissertation

In this dissertation, we present three essays which explore novel topics in innovation and entrepreneurship. Essay 1 examines two approaches, which entrepreneurs take while making decisions: trade-off (either/or) and paradox (both/and). Four dimensions emerge: technology, market, team and customer. Results about the fourth dimension, customer, show that at an early stage of venture creation, entrepreneurs consider a trade-off approach regarding inputs from early versus late adopters. This shows a gap in theory and practice of entrepreneurship and innovation literature: the role of late adopters in idea generation and new product development (NPD).

In order to explore the role of late adopters in innovation and entrepreneurship, the first essential step is to identify them. Essay 2 presents a measurement scale, through which we can identify late adopters. The scale presents three dimensions of late adopters' characteristics: slowness of adoption, resistance to innovation and scepticism.

After identifying late adopters, firms need to get access to their input. Unlike other user categories, late adopters believe that they cannot innovate. Thus, they need a customized NPD

method, in order to be able to generate new ideas. Essay 3 presents the Lag-User Method. Inspired by the Lead-User Method, the Lag-User Method is an innovative NPD method, which is customized to late adopters' needs and characteristics. It allows companies to involve late adopters in the idea generation and NPD processes and so get access to an untapped source of novel ideas.

Chapter 2 Essay 1 - Paradoxes or trade-offs of entrepreneurship: Exploratory insights from the Cambridge eco-system

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Abstract

The literature in business and management studies presents trade-offs (either/or) and paradoxes (both/and) as two different approaches of making choices. However, research in entrepreneurship has not analyzed entrepreneurial decisions through a paradox and a trade-off approach. Using insights from unstructured interviews with founders of start-ups in health care and medical devices industry in Cambridge (MA, USA), this study explores two approaches entrepreneurs follow while making decisions, a trade-off versus a paradox approach. Four dimensions emerge from the analysis: technology, market, customer, and team. Results show that within each dimension, in some cases successful entrepreneurs consider a trade-off approach (e.g. technology push over market pull, simplicity over complexity, or breakthrough over incremental). In other cases, they take a paradoxical approach (e.g. passion versus preparedness, improvisation versus planning, exploitative versus explorative innovations, a reactive versus a pro-active approach). Occasionally founders consider a trade-off approach in an early stage and move to paradox later (e.g. when deciding about listening to early versus late adopters or when selecting a single versus multiple market applications). Because of high certainty, a paradoxical approach occurs more often at a later stage of venture creation.

2.1. Introduction

Entrepreneurial challenges are important concerns for researchers and practitioners. Over a decade ago, Shane and Venkataraman (2000) argue that entrepreneurship is a field worth studying and offer a conceptual framework. They argue that looking at an entrepreneur as a person is not sufficient and that the phenomenon of entrepreneurship consists of two different aspects: the entrepreneur and entrepreneurial opportunities.

Translating promising technologies into economic returns is one of the main challenges of every start-up (Gans & Stern, 2003). A compelling technology is also a key element for investors, because such technology might lead to exploring attractive markets and having a larger customer base (Cusumano, 2013). However, an attractive market and evidence of customer interest are not sufficient for a start-up's success. A strong team is another critical factor. Scholars analyze the effect of the founding team's capabilities on venture's performance (e.g. Zhao et al., 2012) and on venture capitalists' evaluation of venture proposals (Franke et al., 2008). Teams' involvement and heterogeneity (Vanaelst et al., 2006), and team composition and tacit knowledge transfer (Forbes et al., 2006; Knockaert et al., 2010) also affect start-ups' success and survival. Finally, studies posit that the right eco-system and environmental settings affect entrepreneurs' motivation (Dubini, 1989) and venture creation (Edelman et al., 2010; Feldman, 2001).

Within this context, decision making is a major element of entrepreneurship. Entrepreneurs are constantly facing choices and have to make decisions with the best outcomes for their venture (e.g. Holland & Shepherd, 2011; Townsend et al., 2010). Despite the increasing scholarship on entrepreneurial choices and decision making factors, the literature seemingly ignores the approaches which entrepreneurs, namely in healthcare, could take while facing challenges and tensions.

Strategic agility enables entrepreneurs to respond effectively and flexibly to the tensions of their environment and involves being alert and capable of identifying and integrating new challenges and opportunities, while facing tensions resulting from those challenges or opportunities (Lewis et al, 2014). Trade-off and paradox are different types of responses to those challenges. When facing a tension between competing options A and B, a trade-off approach looks at advantages and disadvantages of each option, providing an either/or approach. Here the goal is to identify the option with the highest advantage and lowest disadvantage. On the other hand, a paradoxical approach aims at choosing options A and B simultaneously. Although the options might seem contradictory, their interrelations often allow their coexistence. Thus, the goal of a paradoxical approach is to present a both/and solution, emphasizing common grounds and contrasts of the opposing elements (Lewis et al, 2014).

Scholars in leadership and organizational behavior study these approaches in various contexts, such as organizational environments, survival, or strategic agility (e.g. Doz & Kosonen, 2008). Others look at paradoxes in management studies (da Cunha et al., 2002) and propose that a positive perspective towards the co-presence of opposing elements can increase the potential relationship between the two (Clegg et al., 2002). For example, Chen et al. (2009) study passion versus preparedness and the effects of each element on venture capitalists' decisions. However, research in the field of entrepreneurship has seemingly overlooked paradoxical approaches in the case of entrepreneurial decisions in healthcare. When thinking about his management experience, the founder of a technological company recalls the paradoxical approach he took to solve the tensions between passion and preparedness: "A lot of entrepreneurs get started, because they are very passionate. That was certainly my case. But getting a business to work mechanically is also about being prepared. You can't do with one or the other. You need to have both".

This study works on a sample of entrepreneurs in the field of healthcare and medical devices. Founders in this rich field share similar complexities. In the medical field, defining the customer

is often difficult: patients receive the technology, doctors use or prescribe the technology, hospitals need to approve the technology, and insurance companies are the ones paying for the technology. Market in this field is not as straightforward and simple as in most fields. Thus, this exploratory study aims to understand better the nature of entrepreneurial decisions in the field of healthcare. The study focuses on major elements of entrepreneurship and explores a trade-off versus a paradox approach, aiming at understanding whether entrepreneurs consider merely a trade-off or both a trade-off and a paradoxical approach.

2.2. Method

In the past decade, qualitative research has advanced significantly regarding strengths and legitimacy, methodological progress, and contribution to advancing knowledge in management studies (Bluhm et al, 2011), among other aspects. Hence, this study adopts a qualitative approach by adapting major practices of the Grounded Theory approach (Corbin & Strauss, 1990; Glaser, 1978; Glaser & Strauss, 1967). This approach gives room for interpretation and adaptation; therefore, scholars commonly consider Grounded Theory more a research paradigm than a methodology.

Unstructured interviews, that is, interviews not following a pre-structured interview guide (Corbin & Morse, 2003), are the richest sources of data for a Grounded Theory approach (Corbin & Strauss, 2014). The data for this research comes from an exploratory investigation of entrepreneurial challenges in healthcare start-ups. The study consists of 16 unstructured interviews, conducted in person or over phone. Sample size followed the concept of saturation, when the collection of new data does not shed any further light on the subject of the study (Glaser & Strauss, 1967). Established literature suggests 12 as the minimum number of interviews for grounded theory studies (Guest et al., 2006). In this study, data saturation occurs after the first 11 interviews. Interviews lasted 45 to 90 minutes. Respondents were founders of technology start-ups in health care. They were between 35 and 67 years of age, highly educated,

and with only one female participant. Rather than directing the respondents to talk specifically about challenges and tensions they faced, the interviews encourage respondents to explain the story of their start-up, from idea to business. This approach reduces the risk of losing important related phenomena.

2.3. Results: Major elements of paradox

Using a Grounded Theory approach, four major dimensions emerge from the data: technology, market, customer, and team (Figure 1). Prior work on practice of entrepreneurship mentions a strong team, an attractive market, compelling new products or services, and strong evidence of customer interest as key elements of successful start-ups, thus supporting these dimensions (Cusumano, 2004, 2013; Kanter, 2011). The eco-system and the environment also affect venture creation and growth. A right choice in a given context might need adjustments in a different context and environment (Gans & Stern, 2003). Because of specific laws and regulations, the healthcare industry has a special environment, within which entrepreneurs sometimes cannot make a choice. Start-ups face various regulations and institutional limitations. In the case of medical devices or drugs, clinical trials and FDA approval are the most important institutional challenges of the field. These time-consuming processes make most investments in this field a long-term investment and thus less attractive for investors who look for short-term returns. However, despite the long-term nature of such investments, healthcare entrepreneurs manage to secure funding also through networks and previous investors. Some entrepreneurs choose a trade-off approach to decide whether to enter the medical market or not. A founder of a dermatology company chose not to: “We said that we wanted to develop something which could rapidly be transferred to the market. To do so, we had to focus on materials that could potentially be regulated as cosmetics.” Having decided to develop a non-medical product, they avoided all the regulations which apply to medical products and could enter the market quickly.

This study categorizes the challenges that entrepreneurs face under these four categories and explores whether a trade-off approach or both a trade-off and a paradox approach would apply. The study confirms that the common way entrepreneurs' respond to those challenges is choosing a trade-off over a paradoxical approach. However, 15 out of 16 interviewees have taken a paradoxical approach at least once.

2.3.1. Technology

An attractive technology is an essential component to attract the target customer. Successful entrepreneurs' technologies focus on unmet needs. Looking at available alternatives and having the ability to fulfill unsatisfied needs allow a technology to create value and become attractive for investors as well as potential customers. When deciding about innovations, entrepreneurs often face tensions between incremental and breakthrough, simplicity and complexity, exploitative and explorative (Figure1). The study shows that for each of these challenges, entrepreneurs tend to take different approaches.

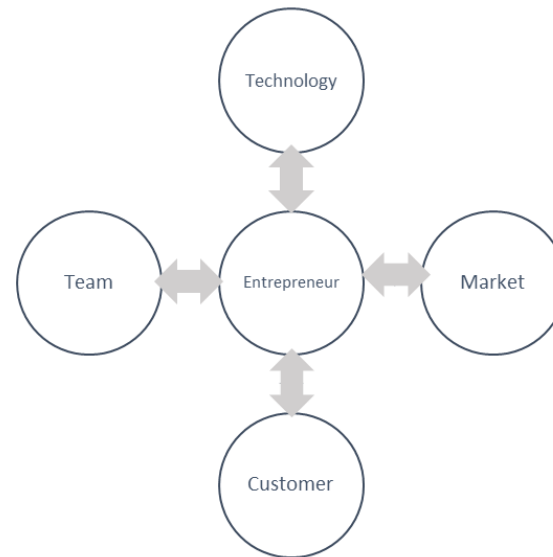
Regarding exploitative versus explorative innovations, healthcare entrepreneurs prefer to choose a both/and solution, a paradox. They seek to pursue both options simultaneously, so that they can take advantage of both. Exploitative innovation keeps the current technology fresh, whereas the explorative innovations provide new value, which can enhance the existing technology or provide an improved alternative (Jansen et al., 2006).

As regards trade-offs, simplicity is always a choice over complexity. Founders know that simplicity is a key factor for their products to diffuse faster. Nevertheless, they are also aware that designing simple products is more labor intensive. A founder of a design company for medical devices explains: "Sometimes the outset of the simplest products, from the user experience, are often the most complex to execute. The amount of complexity that goes into making something simple is often unrecognized by companies."

Figure 1: Paradoxes and trade-off of entrepreneurship.

Option A	Option B	Early Stage	Advanced Stage
Exploitative	Explorative	A & B (Paradox)	A & B (Paradox)
Incremental	Breakthrough	B (Trade-off)	B (Trade-off)
Simplicity	Complexity	A (Trade-off)	A (Trade-off)

Option A	Option B	Early Stage	Advanced Stage
Passion	Preparedness	B (Trade-off)	A & B (Paradox)
Risk Aversion	Risk Taking	B (Trade-off)	B (Trade-off)
Improvisation	Planning	A (Trade-off)	A (Trade-off)
Reactiveness	Proactiveness	A & B (Paradox)	A & B (Paradox)



Option A	Option B	Early Stage	Advanced Stage
Single market Application	Multiple market Application	A (Trade-off)	A & B (Paradox)
Market pull	Technology push	B (Trade-off)	B (Trade-off)
Short-term orientation	Long-term orientation	A (Trade-off)	A & B (Paradox)
High entry barrier	Low entry barrier	A (Trade-off)	A (Trade-off)

Option A	Option B	Early Stage	Advanced Stage
Market pull	Technology push	B (Trade-off)	B (Trade-off)
Simplicity	Complexity	A (Trade-off)	A (Trade-off)
Early adopter	Late adopter	A (Trade-off)	A & B (Paradox)

Similarly, considering the highly technological eco-system of healthcare in the Cambridge area, breakthrough ideas win-over incremental ones. This case is another clear trade-off. Breakthrough technologies in this field face heavy resistance. A founder of a medical device company confirms that time has affected this environment positively. He recalls the first drug delivery devices, externally attached to patients. “The choices that we had to make at that time, given that we had to convince all players that these devices are viable, were different from today, when drug delivery devices have proven their real potential.”

Entrepreneurs tend to create their companies around more breakthrough ideas and then implement incremental changes at a later stage.

“When I think of incremental, I think of a lot of big companies doing incremental improvements on their products, whereas a lot of younger companies are more disruptive in nature. They are developing some cutting edge technology which is going to make a major change, while larger established companies are just making small twists to existing products” (the founder of a technology start-up in healthcare).

At the same time, in terms of breakthrough technologies, timing plays a key role too. If the market is not ready, a breakthrough idea might need to wait years for market acceptance (Parasuraman, 2000).

2.3.2. Market

Identifying an attractive market is another key factor of successful start-ups. Sustainable start-ups are capable of identifying markets with high potential for growth, allowing their young firms to be profitable. Founders seek to enter markets with higher entry barriers because these barriers allow them to remain profitable for a longer period. The first challenge that entrepreneurs face is identifying the best market application. They apply specific filters to get the best result (Lages, 2016). First, they consider the background of the founders and the

features of the technology. To make a decision, they apply both approaches. Some criteria only allows an either/or solution, a trade-off. Some call for a paradox. Scientific founder of a dermatological company recalls that initially, their product aimed to treat a certain type of skin irritation. They would then follow a technology push approach. Once they published their work and received media coverage, they received enquiries from individuals with a certain type of allergy, which a regular use of that material could treat. Following this call from the market, founders shifted to a market pull approach: “We thought: there is a need. This seems like if we develop that product, there is opportunity for it to rapidly disseminate to the market.” Another founder of an IT company in health care believes in choosing an application which fits capacities of both market and company: “What we did was to choose an application which was not too small to ensure that we earn enough money, but also not too big. Because then it would be too hard for us to manage or it would become interesting for bigger companies to develop the same product and compete with us”.

When facing the tension of deciding between a single versus multiple market applications, early stage start-ups normally focus on a single application to go to the market as fast as possible because they have scarce resources and their technology is young. In a later stage, because of business maturity and improvements of technology, they do consider trying a variety of market applications. Occasionally, upon acquiring a young firm, the new firm may define new applications, force leaving existing markets, and enter new market spaces.

2.3.3. Customers

A start-up needs customers to succeed. Another challenge that founders face is showing customers that their technology offers added value and assuring them that the venture will not fail. Naturally, entrepreneurs have to start with either a technology push or market pull approach. Given the breakthrough nature of the healthcare industry, technology push is the most

common approach. A market pull approach in a business-to-consumer (B2C) context requires an accurate understanding of users' needs. Understanding users' passions, preferences and motivation is always on the top of entrepreneurs' check-list. The founder of an IT technology company for healthcare met 90 of his future customers personally:

“We sat down with the doctors and showed them the benefits of our software step by step. The hardest thing is to get the first customer. As for getting the second customer, when someone else did it, they would be happy to do it too.”

This personal approach would not work this well in business-to-business (B2B) because of the complex nature of organizations in the healthcare eco-system. The founder of a software company explains the selection process of the first insurance companies to offer their new technology:

“We had certain funds for market research, so we selected the ones who are more advanced. Some insurance companies view technology more favorably, some even consider it a threat. So part of our research was ‘Which companies are more likely to use our technology?’ and so we identified the insurance companies which are more open to change. For example we found a manager who was younger than others and was willing to try our new technology.”

Another challenge that technology entrepreneurs face is whether or not to involve the users in the development of new technologies. The dominant perspective is a clear paradoxical approach; that is, involving users in those stages of NPD where R&D engineers value and require their inputs the most. The stages vary depending on sector and technology. Identifying the right users for this process is another challenge in this sector. In healthcare, the real user is often different from the buyer. Taking this into account in an early stage is a key factor of successful businesses. A serial entrepreneur in health care and education says:

“We developed a software and doctors loved it. We negotiated with hospitals and they were willing to install it. Only when we concluded the final product, we found out that the real users are the IT team of the hospital. They rejected the product right

away and for good reasons: data protection and security. We had to shut that company down, because we failed to identify the right users”.

Literature on user innovation divides users into two major categories: early versus late adopters (Jahanmir & Lages, 2016). In the field of medical devices, early adopters are those physicians who are willing to take part in the clinical trial. When facing the challenge of listening to the feedback of early versus late adopters, founders prefer to focus on early adopters in the early stage of their start-up, a trade-off approach. At a later stage, they consider both early and late adopters, a paradoxical approach. The founder of a drug delivery device company believes that start-ups should start by listening to early adopters: “As start-ups we want to focus on the early adopters first. Those are going to be our first customers. So we want to go and sell to individuals that are very receptive to the message and then we work from there.”

Jahanmir and Lages (2015a) defend that late adopters can provide companies with valuable insights. Featuring the work of Jahanmir and Lages (2015a) in *The Wall Street Journal*, Wells (2016) also confirms the growing importance and highly influential role of late adopters in shorter product life cycles of today. In line with this line of research, the founder of a drug delivery device company believes in the critical role of late adopters:

“I think late adopters are great individuals for feedback. Early adopters tend to understand the market and tend to look for solutions which might not be a hundred percent accurate. Late adopters criticize the process or the technology or the interaction with the technology. That is pretty valuable. So listening to those individuals that are either resistant to buy it, resistant to use it, or have some challenges using it, is pretty critical.”

The co-founder of another medical device company believes that start-ups need early adopters to convince late adopters:

“If you have done it right, you have collected the data from the early adopters, which were your clinical trials. And you need the results from early adopters to convince the late adopters. So you cannot do the paradox – A and B at the same time. You can do it, but you will not see any benefit from having the late adopters in the front of the market launch. To me that’s sort of passive acquisition of that customer. We are not going to spend any time getting them. When early adopters find out about you, if they were not in the clinical trial, they have heard about you in some medical conference and they call you and they say I want your product. Late adopters don’t call you. They just don’t for our kind of market.”

2.3.4. Team

The fourth element, a strong team, is among the most debated factors that can lead to start-ups success. Entrepreneurs and their traits play major roles in venture creation and success. Entrepreneurial traits could also affect venture capitalists’ willingness to invest. Although every business starts with a passion about an idea (Cardon, 2008), what investors want to see is preparedness for creating a business. The challenging nature of starting a business requires both a reactive and a proactive approach. In an early stage of venture creation, because of high uncertainty, founders need to be able to take risks and improvise to adjust to the rapid changes in their environment. “We take quantified risks”, says a serial entrepreneur in healthcare IT, “It is like jumping from a plane, but with a parachute.”

Start-ups need to build a team with members sharing the same vision, with skills and characteristics which complement one another. They should strive growth but also be ready to fail. “You need to be grounded in something which is bigger than just earning money,” believes the founder of a medical device company. Finding the right people is one of the first challenges that entrepreneurs face while creating a start-up. A serial entrepreneur and founder of several

successful companies believes that typically start-ups in the medical field start with two members of the team: the scientific founder and the business founder. The scientific founder has a very strong role in the very beginning. As they advance in creating the start-up and bringing the technology to the market, the role of the scientific founder decreases, while the role of the business founder increases. One challenge that technical entrepreneurs face is the tension between being a technical expert and being a business manager or a sales person. The founder of a technology start-up in medical devices believes that this is a challenge, which many technical founders face:

“Many of us started with being good at doing something technical and we can get so far on our own by doing that. But you get to a certain point, where in order to grow, either you need to shift perspective or you need to partner with someone who can complement you in business development and similar tasks. For me that was the biggest challenge.”

As the start-up advances, founders often need to make a choice between looking for job candidates in the traditional way and using their network. In most cases, network wins over traditional hiring process. For founders, convincing people they know is easier and faster. This situation normally happens in informal contexts. Then, the new partner knows another person who would share the same vision and could be passionate about the idea and so the venture grows gradually using founders' network. The founder of a software company in healthcare says that he and his co-founders are very careful when selecting employees: “We need to be thinking beyond just one project. It is a long-term evaluation of trends and potential employees' passion for learning and exploring those trends.” A serial entrepreneur and founder of an online platform says that she teamed up with a co-founder whom she knew through past projects. “I talked with him and he got pretty excited and then he said ‘I know someone who would be interested as well’, so we all sat down and everybody was on board”. When looking for more senior partners, inviting former mentors is entrepreneurs' safer and often less expensive choice

over hiring experienced executives from the job market. Location also plays a role in this challenge. In an environment like Cambridge/Boston, firms compete on hiring the best talents. Start-ups often have to compete with larger multi-nationals. “We decided to move to Florida, since the salaries are lower and we thought the location is more attractive to our future employees. But to convince someone to leave this city [Cambridge], you still need to pay Cambridge salaries”, reports founder of a medical device company. “We had to return”, he concluded.

2.4. Conclusion and Directions for Further Research

“It is every day, multiple times a day, you are doing option A, option B,” says a successful serial entrepreneur. Decisions are any entrepreneur’s daily challenge. The sample of this study consists of entrepreneurs in healthcare, striving for success in the complex context of medical field, where market and customer definition are often not like any other field. As an example, if founders depend on pharma industry to develop their business and if pharma industry has no interest in that idea, the idea remains an interesting science project, never turning into a business. The exploratory findings show that like any other field, entrepreneurs in the field of health care and medical devices face daily challenges and options. Results do not indicate a defined pattern of how entrepreneurs face those tensions or make their decisions. However, these exploratory findings show that trade-off is not the only approach that entrepreneurs take. Paradox is another approach in the sample’s type of decisions. Within the same dimension, entrepreneurs might follow both a trade-off and a paradoxical approach. In early stage start-ups, a paradoxical approach occurs only in the cases of reactive versus proactive and exploitative versus explorative attitude. Conversely, in later stages, paradox would also apply to passion versus preparedness, improvisation versus planning, selecting a single versus multiple marketing applications, and listening to early versus later adopters (Figure 1).

Cambridge (MA, USA) has a rich eco-system of start-ups in healthcare. Future research may explore what makes entrepreneurship in healthcare different from other fields. Researchers can also examine the features of this network of start-ups and identify which behind-the-scene factors lead to creation, success, survival, or failure of these ventures. Future research may explore which challenges of entrepreneurship are more subject to a paradoxical rather than a trade-off approach and in which contexts. Would applying existing systematic decision making tools (Lages, 2016) affect the type of approaches founders take? Furthermore, researchers can examine the effect of a paradoxical versus a trade-off approach on start-ups' performance and survival. Future research can also explore whether considering late adopters of previous similar technologies, or late adopters of competitors in the research and development phase (Jahanmir & Lages, 2015b), would affect the diffusion of start-ups' new technologies. To achieve this, scholars first need to explore the characteristics of late adopters. Thus, researchers are encouraged to develop measures to assess late adopters' attributes.

Chapter 3 Essay 2 - The late adopter scale: A measure of late adopters of technological innovations

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Abstract

The diffusion of innovation is an interesting topic for researchers and practitioners. However, researchers often focus on the first half of the diffusion of innovation curve, ignoring the late adopters. This article presents two studies with high-tech products (mobiles and laptops) that measure the attributes of late adopters. The first study of mobile phones uses 50 initial items. After Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), a refined version of these items permits to develop an initial version of the late-adopter scale. The study tests the new scale on a sample of laptop users. The final scale is multi-dimensional, presents nomological and discriminant validity and has three dimensions: (1) slowness of adoption, (2) resistance to innovation, and (3) skepticism. All three late-adopter scale dimensions significantly associate with low price preference. In both samples, skepticism associates with high preference for simple products, low lead-user profile, and low product involvement. Discussion focuses on the implications of this new scale to theory and practice of new product development and diffusion of innovation in high-tech firms.

Keywords: *Diffusion of innovation; late adoption; laggards; late adopters; adoption of innovation; technological innovation; simplicity*

“New product success and failure is often decided before the new product project even enters the product development phase.” (Cooper, 1987, p. 237)

3.1. Introduction

Top marketing and management scholars have been pushing the fields of New Product Development (NPD) and innovation forward (Behrens & Ernst, 2014; Choffray & Lillen, 1978; Lester, 1937; Perreault Jr., 2014). Cooper and Kleinschmidt (1987, p. 215) argue: “If businesses are to survive and prosper, managers must become more astute at selecting new product winners”. Later, Kim and Srivastava (1998) show that in the case of high-tech firms with short technology cycles, developing strategies is vital to speed-up trial adoptions. Understanding the diffusion of innovation process; that is, the process of acceptance of a specific product over time by an individual linked to a social system (Katz et al., 1963; Rogers, 1962), is critical to better comprehend why consumers adopt a product more quickly and make that product a market winner.

The diffusion of innovation curve (Rogers, 1962) introduces five adopter categories: innovators, early adopters, early majority, late majority, and laggards. Rogers argues that the adoption of innovation is a social process in which if an adopter talks to a potential adopter about an innovation which works for the first adopter, then the second one is more likely to adopt that innovation. Thus, researchers emphasize on early-adopters and their role in the diffusion process (Bohlmann et al., 2010; Dell’Era & Verganti, 2011; Hinz et al., 2014; Huh & Kim, 2008; Iyengar et al., 2011; Liao & Cheng, 2014; van Eck et al., 2011).

Little empirical evidence exists about the second half of Rogers’ curve: late majority and laggards, hereinafter referred to as “late adopters”. To increase the likelihood of products’ success, researchers and practitioners should target not only innovators, but also other user categories (Mahajan & Muller, 1998), particularly late adopters (Jahanmir & Lages, 2015a).

Prior research also shows that start-up founders consider late adopters as a source of new ideas or product feedback. However, in the process of firm creation, these users do not receive sufficient attention (Jahanmir, 2016).

Why are late-adopters important? First, before firms begin to develop new products, they must understand and monitor late adopters. A better understanding of this last 50% of users in an early stage of the NPD process allows firms to get access and use the insights of these users in their NPD process. Implementing late adopters' insights can help firms convert late-adopters of current products to early-adopters of the next generation, therefore squeezing Roger's curve. Second, accurate understanding of consumers' preferences and purchase behavior contributes to innovation's diffusion and success (Shi et al., 2014). Research shows that firms' success does not merely rely on the early but also on the continuous use of the technology (Son & Han, 2011). By identifying late adopters, firms can understand late adopters' post-adoption behavior and influence their repurchase intention.

Third, late adopters are difficult to convince about a product. They point out differences between marketing claims and delivered products (Slater et al., 2007). By using the feedback of these "opponent" users (Cavusoglu et al., 2010), firms can address critical market needs and remove obstacles to crossing the chasm (Moore, 2006).

Fourth, late adopters value products' core attributes. Therefore, firms can use them to increase value while cutting costs and to develop GloCal solutions to satisfy common needs across the globe. Because late adopters have different needs and expectations from those of early adopters, their unique inputs might be useful to conquer new market segments and enter emerging economies.

Finally, by identifying late-adopters of competitors and understanding their reasons for late adoption, firms can get insights about competitors' limitations and use those insights to improve the current/future generation of their own products.

Existing literature of the field lacks a clear measure to assess late adopters' attributes. Four reasons justify the need for such a measurement scale. First, researchers and firms need a measurement tool to have a clear definition of these users and to support existing conceptualizations of domains and findings in the field of diffusion of innovation. Second, different adopter groups have different characteristics (Läpple & Van Rensburg, 2011). Different authors propose different models to identify consumers' reaction to innovations (Davis, 1989; Davis et al., 1989; Läpple & Van Rensburg, 2011; Parasuraman, 2000; Ratchford & Barnhart, 2012). All these authors defend that different user categories respond differently to innovations. These differences result in different needs and expectations. The first essential step to address and fulfill late adopters' different needs is to identify them through a measurement scale. Third, although substantial advances occur in different areas of innovation and marketing metrics, these advancements have limited applicability to business reality (Lages et al., 2009). Each new product launch faces diffusion barriers. A successful product launch requires proper market preparation and supporting activities to overcome those barriers (Beard & Easingwood, 1996; Chen & Granitz, 2012; Talke & Hultink, 2010). The late-adopter scale enables firms and researchers to identify late adopters and thus understand their reasons for late adoption. Knowing those reasons prior to the launch of the next generation could help firms manage and overcome barriers to adoption. Finally, open innovation argues that good ideas do not come only from inside the organizations (Chesbrough & Crowther, 2006; Dahlander & Gann, 2010). Thus, firms require the re-establishment of their innovation system, through which external factors, such as users, appear in the NPD process (Chiaroni et al., 2010). After identifying late adopters, firms intending to implement open innovation can include these users in their innovation process and benefit from their insights. For example, if manufacturers know that a set of late adopters exists for a specific generation of products, those manufacturers could establish priorities in their NPD process by listening to the previously ignored voices of these unsatisfied users.

3.2. Measurement of Late Adoption

The literature refers to technology innovation as a critical aspect of industrial competitiveness (da Silveira, 2001). Therefore, to develop a measurement scale to assess characteristics of late adopters, this study focuses on technologies: mobile phones and laptops. Previous research defines late adopters building on their personal attitude as well as their attitude toward products (Moore, 2006; Rogers, 2003). Following these works, this study's scale presents three dimensions, representing major attributes of late adopters: (1) slowness of adoption (SLOW_ADOPT), (2) resistance to innovation (RES_INNOV), and (3) skepticism (SKEPT). All items belong to Rogers' (2003) and Moore's (2006) description of adopter categories.

The first dimension, slowness of adoption, refers to the amount of time that individuals take to adopt (Rogers, 2003). Adoption over time is critical to evaluate diffusion of innovation. This construct assesses whether the user belongs to the group of adopters who adopt the product later than others (Uhl et al., 1970). The second construct, resistance to innovation, appears as a case of resistance to change (Bagozzi & Lee, 1999; Tsinoopoulos, et al., 2014). The literature indicates that late adopters are not only resistant to change, but also suspicious of agents of change. Late adopters want to be certain that an innovation does not fail before they adopt it (Rogers, 2003). Uncertainty is a key factor in the process of diffusion (Rogers, 2003) and plays an important role in the adoption of technological innovations (Olsen et al., 2014). Thus, the third construct, skepticism, describes users' doubtful approach toward innovations and the benefits that novel products provide (Rogers, 2003; Slater et al., 2007).

3.3. Study 1: The Case of Mobile Phone Adopters

3.3.1. Research setting and survey instrument development for study 1

Study 1 focuses on users of mobile phones. Pre-testing comprises three stages. The first stage involves the refinement of the survey instrument and cover letter. The initial survey consists of 50 items drawing from user characteristics appearing in the work of Rogers (2003) and Moore (2006) together with other critical related factors from established literature in innovation. The second stage involves refining the measures through interviews with people capable of understanding the nature of the concept being measured Churchill (1979). Finally, the third stage consists of refining the survey instrument with academic judges and product users. Several judges (university lecturers in marketing, finance, and sociology) assess the content and face validity of the items.

To assess informants' proper understanding of the survey instrument, respondents indicate their level of English (from zero to native). The study excludes those with low level of English. Respondents assess all items using a 5-point Likert scale (from "1- strongly disagree" to "5- strongly agree"), considering their experience with their own mobile phone.

3.3.2. Data profile and assessment of non-response bias for study 1

A questionnaire provides the data. The sample builds on the criteria of having and using a mobile phone. Following earlier research (Batra et al., 2012), the study uses a sample of graduate-student mobile phone users (52.4% male and 47.6% female) with an average age of 26 (85% between 20 and 30 years old and 15% over 30). Out of the 135 mobile phone user participants we obtain a final valid sample of 105 users with high level of English. We test non-response bias by assessing the differences between the early (the first 75%) and late (the final

25%) respondents of completed questionnaires with regard to the means of all the variables (Armstrong & Overton, 1977). No significant differences exist between the two groups of questionnaires.

3.3.3. Measurement model of study 1

To conduct exploratory factor analysis (EFA), and because of sample size limitations, the initial 50 items were divided into two groups building on Rogers' and Moore's description of late adopters: the first group of 31 items referring to users' attitude toward a product and the second group of 19 items regarding users' personal attributes. Ten factors emerge from conducting the EFA using varimax rotation: Factors one to five (11 items) emerge out of the EFA for the first group, while factors six to ten (15 items) emerge out of EFA for the second group. The analysis stops considering EFA factors after over 50% variance explained in each group. The 26 items were subjected to a confirmatory factor analysis (CFA), using full-information maximum likelihood (FIML) estimation in LISREL 8.51 (Jöreskog & Sörbom, 1993). The CFA reduces the initial list of 26 items to a final list of nine items (Table 1).

Figure 1 shows the standardized estimates of each item on its intended construct. The chi-square for this model is significant (chi-square = 46.55, 25df, $p = 0.00553$). Because the chi-square varies depending on sample size, the study includes the assessment of Normed Fit Index (NFI = 0.93), Non-normed Fit Index (NNFI = 0.95), the Comparative Fit Index (CFI = 0.96), and the Incremental Fit Index (IFI = 0.96).

3.3.4. Nomological and discriminant validity of study 1

Nomological validity is confirmed if all constructs correlate significantly with a certain outcome of interest (Churchill, 1979). Results of testing the measures with respect to low price

preference ($_{LOW_PRICE}$) (Table 2 and 3) reveal that users taking longer to adopt a product/service are also willing to allocate less financial resources to that product/service. The overload of information about competing alternatives and/or lack of technological knowledge about products can lead to buying decisions based on the simplest rational factor: price. Jobber and Shipley (2012) argue that setting low prices associates with an increase in market share. Thus in the absence of other indicators, users take price as an indicator of quality (Zeithaml, 1988). This, however, does not mean that late adopters of a product lack financial resources. The use of price as an indicator is more about willingness to allocate those resources to that product. The study demonstrates nomological validity, as all three dimensions of the late-adopter scale correlate positively and significantly with low price preference ($r_{(RATE_ADOP*LOW_PRICE)} = 0.34, p < 0.01$, $r_{(RES_INOV*LOW_PRICE)} = 0.35, p < 0.01$, $r_{(SKEPT*LOW_PRICE)} = 0.36, p < 0.01$) (Table 2 and 3).

To demonstrate discriminant validity, all dimensions must independently relate to outcomes of interest. This procedure demonstrates that the scale dimensions are not the same construct measured with three different scales (Churchill, 1979). The study includes three additional outcomes in the model: product simplicity, lead-user profile, and product involvement (Table 2). Results show a negative correlation between skepticism and product involvement ($r_{(SKEPT*PROD_INVOLV)} = -0.40, p < 0.01$) as well as lead-user profile ($r_{(SKEPT*LUP)} = -0.22, p < 0.05$) (Table 3). This result suggests that customers who are skeptical toward innovations involve less with the products and are not at the leading edge of markets (Morrison et al., 2004). Empirical research shows that that uncertainty has an impact on technology adoption (Ulu & Smith, 2009). Further, a positive correlation exists between skepticism and product simplicity ($r_{(SKEPT*PROD_SIMPL)} = 0.31, p < 0.01$), suggesting that being suspicious, late adopters prefer simple products (Jahanmir & Lages, 2016).

A negative correlation exists between resistance to innovation and product involvement ($r_{(RES_INNOV*PROD_INVOLV)} = -0.22, p < 0.05$), implying that late adopters are less involved with a product. The negative correlation between resistance to innovation and lead-user profile

($r_{(\text{RES_INOV}*\text{LUP})} = -0.23, p < 0.01$) complements this result. This result confirms the need for new methods to involve late-adopters and lag-users in the development of innovative ideas to overcome barriers to adoption (Jahanmir & Lages, forthcoming). Overall, dimensions of the late-adopter scale present discriminant validity, as all three operate independently on different outcomes.

Table 1. The late adopter scale

Constructs, Scale Items, and Reliabilities	
Slowness of Adoption (Mobile: $\alpha = .92$; $\rho_{\text{vc(n)}} = .84$; $\rho = .91$ / Laptop: $\alpha = .70$; $\rho_{\text{vc(n)}} = .70$; $\rho = .82$)	
SA1	I was a very late adopter of this product.
SA2	I was one of the last to adopt this product.
Resistance to Innovation (Mobile: $\alpha = .72$; $\rho_{\text{vc(n)}} = .55$; $\rho = .83$ / Laptop: $\alpha = .63$; $\rho_{\text{vc(n)}} = .50$; $\rho = .75$)	
RI1	I am suspicious of agents of change (people who like change, speak with you about change, try to promote change, etc.).
RI2	I must be certain that a new idea does not fail before I adopt.
RI3	I believe resistance to innovation is entirely rational.
RI4*	My innovation decision process is relatively long.
Skepticism (Mobile: $\alpha = .72$; $\rho_{\text{vc(n)}} = .55$; $\rho = .78$ / Laptops: $\alpha = .70$; $\rho_{\text{vc(n)}} = .67$; $\rho = .79$)	
SK1	I approach innovations with a skeptical and cautious air.
SK2	I often fear high-tech a little bit.
SK3*	I can be stubborn in resistance to buying new products.

Note: α : internal reliability (Cronbach, 1951); $\rho_{\text{vc(n)}}$: variance extracted (Fornell & Lacker, 1981);

ρ : composite validity (Bagozzi, 1980)

All scales were measured using a 5-point Likert-scale:

1- strongly disagree; 2-disagree; 3-neither agree nor disagree; 4- agree; 5- strongly agree

*Item excluded after CFA in Study 2.

Figure 2. CFA model of study 1. The case of mobile phone adopters

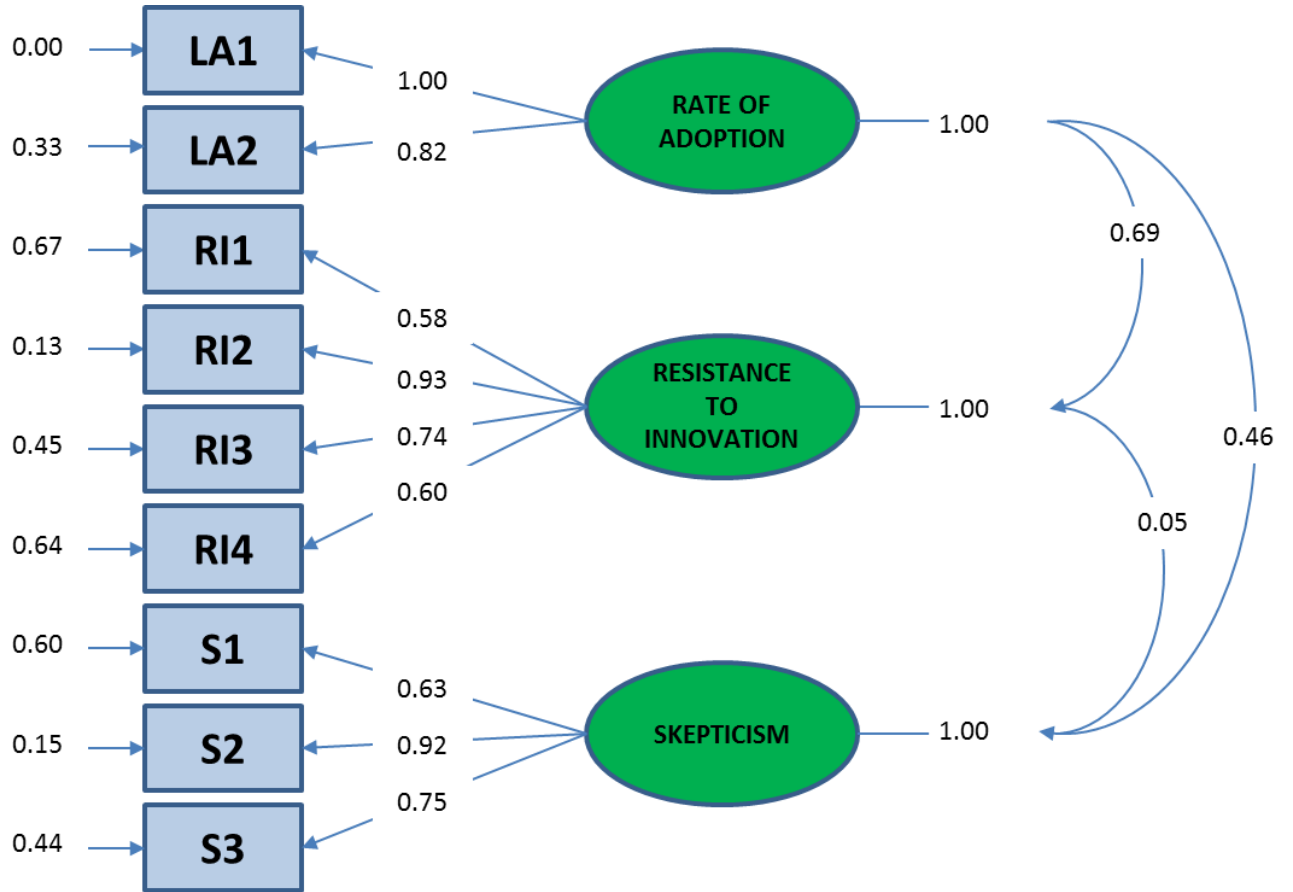


Table 2. The late adopter scale

Thinking about the product that you use, to what extent do you agree with the following sentences?

LOW PRICE PREFERENCE (Moore, 2006)(Mobile Phone: $\alpha = .70$ / Laptop: $\alpha = .55$)

- I prefer to buy this product when products are extremely mature and prices are cheaper.
- I will not support high price margins in this sector.
- I often prefer low-cost products in this sector.

PRODUCT SIMPLICITY (Inspired by Maeda, 2006)(Mobile Phone : $\alpha = .63$, Laptop: $\alpha = .80$)

- I like simple products.
- I trust simple products.

LEAD-USER PROFILE (Inspired by von Hippel, 1986)(Mobile Phone : $\alpha = .84$, Laptop: $\alpha = .83$)

- In the past, I modified products myself.
- In the past, I developed products myself.
- In the past, I came up with new solutions for problems.

PRODUCT INVOLVEMENT (New measure)(Mobile Phone : $\alpha = .73$, Laptop: $\alpha = .70$)

- I am a demanding customer about this product.
- I care about the product details.

All scales were measured using the following 5-point likert-scale:

1- strongly disagree; 2-disagree; 3-neither agree nor disagree; 4- agree; 5- strongly agree

Table 3. Correlations with the three constructs of the late-adopter scale

	Sample 1 [mobile phones]			Sample 2 [laptops]		
	Slowness of adoption	Resistance to Innovation	Skepticism	Slowness of adoption	Resistance to Innovation	Skepticism
Low price preference	0.34**	0.35**	0.36**	0.26**	0.31**	0.18*
Product simplicity	-0.07	0.15	0.31**	0.09	0.18*	0.21*
Lead-user profile	-0.11	-0.23**	-0.22*	0.17	0.13	-0.18*
Product involvement	-0.08	-0.22*	-0.40**	-0.12	-0.11	-0.21*

* $p < 0.01$ (one-tailed)** $p < 0.05$ (one-tailed)

3.3.5. Assessment of common method bias in study 1

The analysis of common method bias comprises two stages (Podsakoff & Organ, 1986). First, to avoid common method bias during data collection, respondents are not aware of the purpose of the study. Items appear in sections with recoded titles, which have neutral meaning to respondents. Common method bias is tested by a CFA containing all the constructs of the final model (Figure 1). Poor goodness-of-fit indices indicate the absence of common method bias (NFI = 0.57, NNFI = 0.45, CFI = 0.59, IFI = 0.60, GFI = 0.64, SRMR = 0.18, RMSEA = 0.28).

3.4. Study 2: The Case of Laptop Adopters

3.4.1. Research setting and survey instrument development of study 2

Using the findings of Study 1 as a basis, the study applies a refined version of the survey instrument to users of laptops. Study 2 uses the same methodology as Study 1 to develop, test, and implement the survey instrument.

3.4.2. Data profile and assessment of non-response bias for study 2

A questionnaire provided the data. The study uses a sample of laptop users, 42% female, 58% male, whose age is between 18 and 73 years old (mean: 29; 68% below 30 and 14% above 40). The final valid sample consists of 100 users (out of 126). Non-response bias testing follows the same procedure as in Study 1.

3.4.3. Measurement model of study 2

After CFA of study 1, in this study, the nine remaining items are subjected to CFA in a new sample. After CFA purification, the items diminish from nine to seven (RI4 and SK3 excluded, Table 1). The chi-square for this model is 15.54 (13df, $p = 0.27509$). In comparison to the first model, with this sample, the values of additional fit indices increase: the Normed Fit Index (NFI) = 0.94, Non-normed Fit Index (NNFI) = 0.97, the Comparative Fit Index (CFI) = 0.98, and the Incremental Fit Index (IFI) = 0.98 (Figure 2)

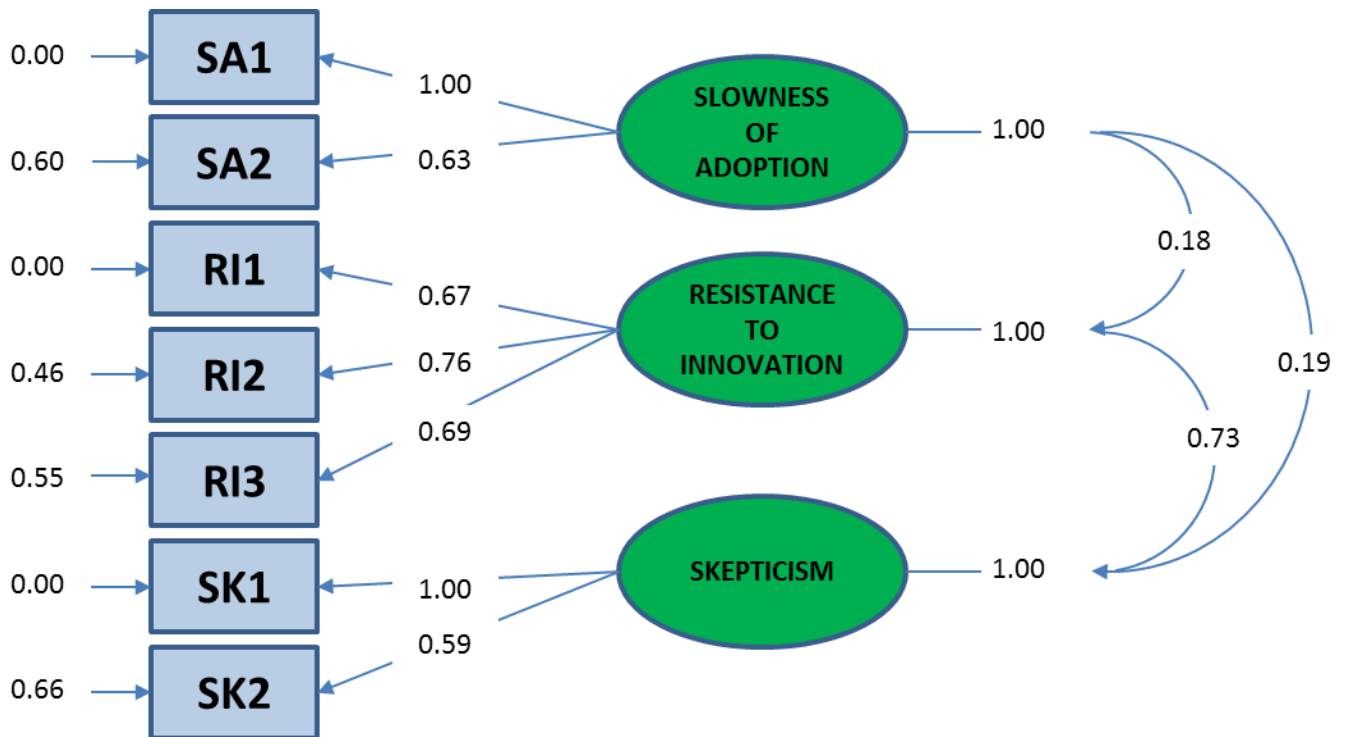
3.4.4. Nomological and discriminant validity of study 2

To assess nomological validity (Churchill, 2003) across both studies, this research tests the measures of this study with respect to low price preference (LOW_PRICE) (Table 2). Results show that all three constructs of the late-adopter scale correlate positively with low price preference ($p < 0.05$, $r_{(RATE_ADOP*LOW_PRICE)} = 0.26$, $p < 0.01$, $r_{(RES_INOV*LOW_PRICE)} = 0.31$, $p < 0.01$, $r_{(SKEPT*LOW_PRICE)} = 0.18$) (Table 3).

To assess discriminant validity, the research tests the correlations between each dimension of the model and the three outcomes appearing in study 1 (Table 2 and 3). Aligned with the first study, a negative correlation exists between skepticism and product involvement ($r_{(SKEPT*PROD_INVOLV)} = -0.21$, $p < 0.05$) as well as lead-user profile ($r_{(SKEPT*LUP)} = -0.18$, $p < 0.05$). This result confirms that skeptical users are less interested in getting involved with a product and do not have the characteristics of the users at the leading edge of markets (Morrison et al., 2004). The data show a positive correlation between both skepticism and resistance to innovation and product simplicity ($r_{(SKEPT*PROD_SIMPL)} = 0.21$, $p < 0.05$, $r_{(RES_INNOV*PROD_SIMPL)} = 0.18$, $p < 0.05$), confirming that users who are more skeptical and resistant to innovations prefer products that are simple to use.

All dimensions of the Late-Adopter Scale correlate with different outcomes. Therefore, the model demonstrates discriminant validity.

Figure 3. CFA model of study 2. The case of laptop adopters



3.4.5. Assessment of common method bias in study 2

This study assesses common method bias through the two stages mentioned in study 1 (Podsakoff & Organ, 1986) (Poor goodness-of-fit indices of the CFA model, containing all constructs of Figure 2: NFI = 0.75, NNFI = 0.67, CFI = 0.78, IFI = 0.79).

3.5. Conclusion and Directions for Further Research

Most research in diffusion of innovation deals with innovators, early adopters, and the majority. No study addresses the assessing characteristics of late adopters. The results show that three

constructs can measure late adopters' attributes. Although this study does not capture all dimensions of late adopters, the research represents a major step forward in the direction of capturing these overall evaluations. The late-adopter scale enables researchers and practitioners to consider these users as a new source of valuable information.

Although recent research indicates that experienced and committed managers are in an excellent position to take future decisions about process improvement and product design, having a customer focus is critical (Silva et al., 2014). In a market where daily challenges constitute a main trait, managers should devote their attention to all user categories, considering both similarities and differences among them.

The results show that late adopters allocate less financial resources to certain products, are less involved with the product, and prefer simple solutions. Such inputs help managers to identify unfulfilled needs of late adopters. Thus this study's scale allows managers to better understand the characteristics of late adopters and what they value. Knowing the reasons for late adoption enables firms to improve their products building on late-adopter's insights, address late adopters in a different way, reduce their innovation adoption time, accelerate the adoption of innovations and thereby squeeze the diffusion of innovation curve. Knowing late adopters' preference for simple products allows firms to increase value while cutting costs through simplifying over-engineered products and offering sophisticated technology which is simple to use.

Future research should analyze characteristics of the majority and innovators, and also apply the late-adopter scale to other industries and services. Managers and researchers may apply the late-adopter scale as a tool for identifying barriers to and drivers of diffusion of innovation. Researchers are also encouraged to consider late adopters as a source of new ideas. The challenge would be to create a tool, which allows late adopters to get involved in the new product development process and generate new ideas. Development of such a tool will allow researchers and practitioners to get access to a new source of innovative ideas.

Chapter 4 Essay 3 - The lag-user method: Using laggards as a source of innovative ideas

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Abstract

The literature on user innovation has not considered laggards – the last group of users to adopt a product – as a source of new ideas for innovative products and services. In this paper, we develop the Lag-User Method to investigate laggards’ role in the process of idea generation and new product development (NPD) and so enable firms to gain access to their insights. We study laggards for four years in three countries and apply the Lag-User Method to different technologies, products, and services, thereby generating 62 innovative ideas across a wide range of industries and sectors. These ideas are discussed with executives to obtain managerial insights. Our studies reveal that laggards who generate new ideas (i.e. lag-users) can enrich NPD. Being coached through the systematic Lag-User Method, they can come up with radical, really new, or incremental innovations. Moreover, applying the method increased laggards’ perception regarding their a) understanding of innovation, b) perception that people can learn to innovate, c) perception of their ability to develop new products on their own, d) confidence about their own new ideas, and e) perception of considering themselves capable of innovating. Thus, we propose that by involving lag-users in idea generation and NPD process, both academia and firms can improve the effectiveness of NPD, overcome barriers to adoption of innovations, cross the chasm, and accelerate the diffusion of their new products or services.

Keywords: *user innovation, laggard, lag-user, simplicity, resistance to innovation, NPD, method, diffusion of innovation*

4.1. Introduction

An extensive and well established body of research investigates creative consumers as a source of innovative ideas for products or product improvements (Alexy, Salter & Criscuolo, 2011; Kristensson, Gustafsson & Archer, 2004; Magnusson, 2009; Poetz & Schreier, 2012). This research field began with a focus on the problem-solving abilities of consumers as applied it to consumption-related problems (Hirschman, 1980, 1993). This was followed by an examination of antecedents and consequences of creativity in a consumption context (Burroughs & Mick, 2004), and then describing and classifying those consumers (Kozinets et al., 2008). Researchers in this field have also investigated the factors influencing consumers' creativity, such as technology, culture, and government (Berthon et al., 2012). Moreau and Dahl (2005) explore how input and time constraints can affect the way consumers process information during that creativity process and also how the process itself can affect creativity. Managerial implications of dealing with creative consumers and their role as a source of novel ideas have also received attention (Berthon et al., 2007; Page & Pitt, 2011).

Another stream of research on user innovation focuses on lead-users (e.g. Hienerth & Lettl, 2011; Mahr & Lievens, 2012; Marchi et al., 2011). Lead-users are those whose current needs will become common in the market place only in the future. They develop solutions to those needs and benefit considerably from the solutions (von Hippel, 1986, 2005). Literature around this topic has focused on identifying lead-users and involving them in the NPD process (Urban & von Hippel, 1988), investigating lead-user communities (Morrison et al., 2000), comparing the Lead-User Method with other approaches (Herstatt & von Hippel, 1999), and also assessing the performance of the lead-user approach (Lilien et al., 2002).

Another research stream explores the role of innovators and/or early adopters on innovation (e.g. Chesbrough & Crowther, 2006; Droge et al., 2010; Engel et al., 1969; Frattini et al., 2014). Innovators and early adopters are the first two categories of adopters of an innovation. Innovators are willing to take risks to adopt innovations while early adopters have strong

opinion leadership among users who follow. Both have higher social status, have sufficient financial resources, and are well educated (Rogers, 2003). Despite extensive research on these different categories of users, earlier literature on user innovation shares a key limitation: studies do not explore the role of laggards in idea generation and their possible impact on innovation. In this paper we focus on this overlooked group of adopters and investigate their role in idea generation and NPD.

Laggards are the last group of users to adopt a product. Researchers do not agree on the total percentage of users who are laggards, as this can change from product to product. For example, while Rogers' (2003) Diffusion of Innovation Curve indicates that 16% of users are laggards, Mahajan et al. (1990) estimate laggards at 21.9%. We propose that a new challenge in research and business should be to involve laggards in the NPD process, coach them to innovate, and use them as a rich source of idea generation. Although laggards do not see themselves as innovators, they represent a significant percentage of users. As such, it is critical to find the right approach to leverage on their dormant knowledge. We believe that there is a need to look at them and develop an appropriate method through which firms and researchers can benefit from laggards' insights and understand their needs and expectations. Moreover, as laggards think differently from the rest of the consumers, they should be considered as a new source of sticky information. The unfulfilled needs of these resistant consumers might represent the amplified voice of the mainstream consumer. Seeing the reasons for their late adoption may well help firms overcome barriers to adoption of innovations (Talke & Hultink, 2010) and possibly lead to faster adoption and a shorter diffusion of innovation curve. Moreover, laggards are situated at the end of Rogers' Diffusion of Innovation Curve (Rogers, 2003). As they are located after the "chasm" (Moore, 2006), laggards' insights and knowledge can help companies understand what kind of consumers they should expect behind the "chasm". Therefore, investigating laggards could enable firms to cross the "chasm" and extend the product life cycle.

4.2. The Lag-User Method

Inspired by the lead-user and new product development literature, we developed the Lag-User Method. This method can be used by researchers and practitioners to involve laggards in the process of idea generation and NPD. The data for our paper come from six different studies in three different countries from laggards who generate new ideas (i.e. lag-users), as well as focus groups and interviews with executives.

Users are believed to be sources of commercially successful products (Shah, 1999; von Hippel, 1986; Morrison, Roberts & von Hippel, 2000). Researchers have proposed the Lead-User Method as a tool for companies to involve lead-users, the leading edge of target markets, in NPD (von Hippel, 1986; Urban & von Hippel, 1988). As mentioned above, lead-users are defined as those that have needs ahead of their time, who develop solutions to those needs, and who benefit to a great extent from these solutions (von Hippel, 1986). Laggards, on the other hand, show less interest in a product. Although laggards also have reasons for their late adoption and have certain unfulfilled needs, contrary to lead-users, they might not be conscious of those needs. Often they are not interested in emerging trends and alternative solutions, and so they would not think about developing a solution of their own. Therefore, in the case of laggards, it is not only about identifying them and profiting from the solutions they provide, but it is also about coaching and training them to become lag-users. They need an adjusted innovation method in order to be trained to start questioning the existing standards, recognize their unfulfilled needs consciously, and develop a solution-driven mindset in order to come up with new innovative ideas to fulfill their needs. Therefore, although the two methodologies might have slight similarities, they are not synonymous, as studying lead-users alone will not provide firms with a complete perspective for their innovation and NPD process.

The Lag-User Method was confirmed and validated through an exploratory study, and later tested on new samples. By applying this method, we aim to involve laggards in the NPD process, coach and encourage them to come up with new ideas and so provide firms and

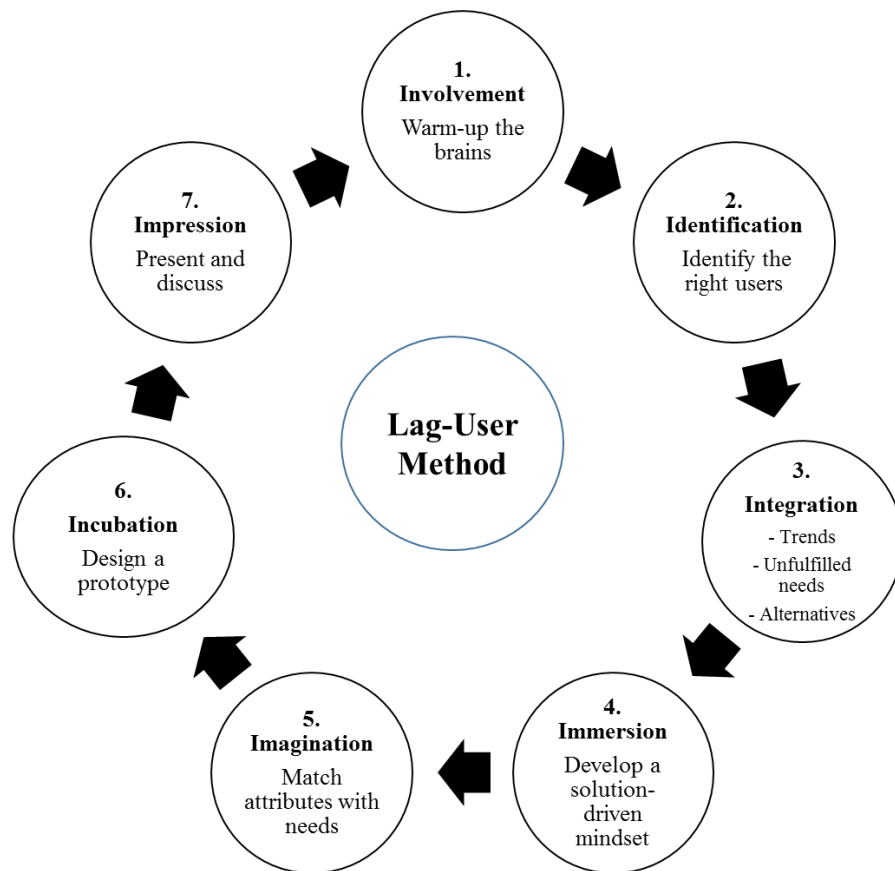
researchers with access to laggards' knowledge and insights. We also seek to better understand whether or not lag-users can question existing standards, what kind of problems they identify in different products, whether these problems are different from those identified by innovators, whether they can come up with new ideas, and whether those ideas would find acceptance among companies as well as in the marketplace. Moreover, we would like to explore the effects of this method on laggards' perceptions regarding their a) understanding of innovation, b) perception that people can learn to innovate, c) perception of their ability to develop new products on their own, d) confidence in their own new ideas, and e) perception of considering themselves capable of innovating.

The Lag-User Method follows seven steps (Figure 1). In line with the most recent literature on innovation and NPD (e.g. Lakshmanan & Krishnan, 2011; Viswanathan & Sridharan, 2012; Ziamouet al., 2012) we collect our data from university students attending different seminars. We select our sample as groups of MBA or master students in a friendly atmosphere who share enthusiasm for the topic discussed, "whose members engage jointly in group actions to accomplish collective goals and/or to express mutual sentiments and commitments" (Bagozzi & Dholakia, 2006:45). Research shows that peer input has a positive impact on the delivered solution (Franke, Keinz & Schreier, 2008) and fosters creativity (Chenag & Yang, 2014). A study by Wu and Fang (2010) indicates that consumer to consumer interaction is positively associated with idea generation. Moreover, working with peers and receiving their valuable feedback can facilitate the process of NPD (Hienerth & Lettl, 2011). Therefore, the participants worked in groups (Hoegl & Parboteeah, 2007) and had the support and guidance of the authors of this article during the seminar. In addition to several forms that were specifically developed to support the implementation of the Lag-User method, a variety of pedagogical tools were used to enhance the learning experience and the effectiveness of the process (e.g. examples of past projects, videos, exercises, slides, brainstorming). Below we present a very brief summary of the seven steps of our method that were covered during the seminar.

Step 1. Involvement (Group)

During Step 1 participants are asked to think about an object that they use on a regular basis, identify problems in that product, and then come up with solutions to solve each problem. This helps participants to break the ice and “warm up their brains” by starting to question existing practices and presenting possible alternatives.

Figure 4. The Seven Steps of the Lag-User Method



Step 2. Identification (Individual)

Following an introduction to Rogers’ Diffusion of Innovation Curve (Rogers, 2003) and adopter categories, in step 2 we identify which users might be associated with specific products or services. Participants are asked to work individually and identify goods or services for which they consider themselves to be innovators, majority, or laggards. For validation purposes, each one then writes down the specific reasons why she/he identifies her/himself in that user category

for those particular products or services. After validation, groups are formed based on the product lists and objectives of each study.

Step 3: Integration (Group)

During this step, participants are informed which product or service they will be working on for this project. This is followed by an explanation that from this step on, they will focus on the selected product/service. Having been informed about the assigned product/service, participants answer questions about three units of analysis: market, product, and themselves as consumers:

1. From your point of view what are the important emerging trends regarding this product (PESTEL analysis)? (Market trends)
2. What available alternative products can you think of? (Alternative products)
3. What are your specific needs that this product does not fulfill? (Unfulfilled needs)

Step 4: Immersion (Group)

Here participants are encouraged to develop a solution-driven mindset. They are asked to focus on top common and recurring needs and/or problems of their product/service and then identify at least one opportunity for each problem and identify one or more hurdles to achieving that opportunity.

Step 5: Imagination (Group)

In this step participants start to design their dream product/service. They are asked to determine how general ideas could be applied to create solutions. They are expected to define ideal attributes for the new product/service and justify why they think those attributes are ideal.

Step 6: Incubation (Group)

In this stage, while creating solutions, participants identify three inputs: need, expected form and shape, and finally the technology or service used to create the solution. After applying the SCAMPER technique (Substitute, Combine, Adopt, Modify, Put, Eliminate, Reverse or Rearrange) they create a prototype (Eberle, 1996). Company representatives can get involved at this stage of the process.

Step 7: Impression

In the final step participants present their prototypes, discuss takeaways from the project and share lessons learned with other participants. Every product/service emerging from this stage might re-enter into our cycle again for further refinement with new users.

We tested our method on six samples, which generated a total of 62 innovative ideas. Below we report the results of each study. Table 1 presents a description of the sample of each study. It also contains two items that we used to validate whether our sample had a complete understanding of the main subject being studied in this work.

4.2.1. Exploratory Study: Refining the Research Instrument

Our method is inspired by the current new product development and lead-user literature, where laggards are typically not part of the NPD process. In this work we are dealing with a new category of users getting involved in idea generation and NPD process. Taking this into consideration, the aim of our exploratory study is to validate our method in the context of laggards. We also wish to see whether our new approach needs any modifications or adjustments. Thus the goal of our exploratory study is to validate a new framework, which is built on the cumulative knowledge of past research and converges the existing know-how in the field of new product development into the new context of laggards. The method was confirmed on our first sample during a seminar in France in which eight innovative ideas were developed.

Despite being a first attempt, the method used in the exploratory study revealed itself to be effective. Having concluded our exploratory study, our assumption was validated that after coaching and guiding them through our systematic method, laggards are able to question existing assumptions, generate ideas, and suggest prototypes for the future generation of products or services. Our exploratory study also demonstrated the value of crowdsourcing (Poetz and Schreier, 2012) and revealed that working in teams and the crowdsourcing process resulted in novel ideas (Hoegl & Parboteeah, 2007). Moreover, this study showed that while

working in mixed groups and using the input from laggards, participants tended to develop really new or incremental innovation (see Table 2, Garcia and Calantone, 2002). In an early stage of our research, our exploratory study confirms the suitability of our method for this purpose as well as the important role of laggards in idea generation. Similar to other studies, some products developed by laggards in this study were later introduced to market. For example, SafEasy is a cloud solution for saving data which is now being offered by several software companies and service providers. LifeLink is another example of cloud services. One more example is Wine Flash Code. This solution has now entered the market in the form of an application. This application allows users to find out more about the origin, type, price, and proper use of the wine simply by scanning the bar code.

Table 4. Description of Samples

	Number of Innovative Ideas / Groups	Country	Number of Participants	Average Age	% Female	% Male	Number of Nationalities	Average Years of Professional Experience	Do you understand the difference between a laggard and a non-user?*	To what extent do you understand what a laggard is?*
Exploratory Study	8	France	22	23	32	68	5	-	4.7	4.4
Study One	16	Cyprus	31	31	55	45	5	7	4.5	4.5
Study Two	9	Germany	17	24	21	79	2	7	4.8	4.5
Study Three	9	France	18	24	77	23	4	3	4.9	4.9
Study Four	12	Cyprus	24	31	50	50	7	6	4.7	4.7
Study Five	8	Cyprus	16	31	67	33	2	5	4.8	4.9

* Single items measured for each study, using a 5-point Likert scale (1 – not at all to 5 – completely)

4.2.2. Study One: Comparing Innovators and Laggards as a Source of Novel Ideas

Based on findings and results of our exploratory study, in study one we applied the Lag-User Method to a new sample and 16 innovative ideas were developed. The major purpose of this study is to understand whether insights provided by laggards can be different from those provided by innovators. We divided our participants into 15 groups (8 Innovators, 7 Lag-Users) and an individual used as a control, without any introduction to the topic. An interesting observation of this study was that several examples of participants were innovators for one technology and laggards for another, e.g. innovator for e-books, laggard for social media (e.g. Facebook) or innovator for cameras and laggards for smartphones.

Users can be innovators as a result of the need to be the first to have a certain product, product features, convenience, value for money, employer's interest and motivation. Users can be laggards because of product features, unclear value for money (they buy after product price falls), lack of need or interest, lack of financial resources, social pressure to use a product (e.g. "All my family is using online banking, so I had to", or "All my friends are on Facebook, so I had to join Facebook too"), and finally fear of product failure, i.e. recognizing the value only after using the product. This finding confirms and strengthens existing definitions about laggards. Literature (Rogers, 2003; Moore, 2006) defines laggards based not only on their own characteristics (e.g. past oriented, traditional mindset) but also based on their attitude toward products (resistant to change, no opinion leadership). Taking the latter into consideration, the same user can be an innovator/early adopter for one product and a laggard for another, depending on whether or not that product is subject to common reasons for being a laggard, for example not fulfilling the needs, being complex, or having no interest in or clear need for that product.

As we sought to determine the inputs of the two ends of the diffusion of innovation curve, namely innovators and laggards, about the same product, we built parallel groups for each user

category. Among others, we had four groups working on laptops (two laggard groups and two innovator groups) or three groups working on mobile phones (two laggard and one innovator group). Each participant could join only one team. For simplification purposes, Table 3 shows only four examples of products developed in study one.¹ We found that innovators and laggards have different perceptions of user-friendly products as well as different needs and expectations. This study showed that while innovators identified more sophisticated needs and problems (e.g. more options on laptops or more applications for smart phones), laggards seek simplicity and convenience (e.g. fewer programs on a laptop, simplified iPhone). However, we found out that on some points both had common needs, e.g. considering laptops, both innovators and laggards mentioned longer battery life, light weight, and compatibility with other devices as their major needs. Laggards were concerned with technological complexity and customization to their simple needs (e.g. inexpensive and simple smartphones or less complicated laptops). They mentioned that although they have sufficient financial resources, they are not willing to allocate their resources to specific products. To a certain extent this finding challenges earlier work, which defends that laggards have fewer financial resources and have lower social status (Rogers, 2003; Moore 2006). In reality, laggards belong to all social classes but are more selective regarding the allocation of their financial resources to products and services that are not satisfying their needs. To evaluate the market potential of products developed by lag-users as well as products developed by innovators, we asked each group to prepare an elevator pitch to present their new idea to other groups. Each participant was given the same amount of “Monopoly cash” (a note of 500€, one of 200€, one of 100€ and one of 50€) to invest individually as a Business Angel in his/her top four groups (one note per group). Participants were not allowed to invest in their own groups. Among the top five groups receiving more than

¹ A complete list of 62 innovative ideas developed in all of the five studies can be provided upon request. Among others, these ideas include products and services developed in the following sectors: cloud solutions, mobile applications, social networks, financial services, consumer electronics, household products, automotive industry, and hospitality.

2000 euros we had three lag-user and two innovator groups. Among the top nine groups (i.e. receiving more than 1000 euros) we observed the same number of laggard and innovator groups getting the same amount of investment. In the seven groups that received less than 1000 euros we had four innovator and two lag-user groups. The idea in last place (received only 100 euros) was developed by the individual used as a control, who did not follow any particular innovation method. This suggests that the Lag-User Method training has a relevant impact on participants. Having completed the process, innovators concluded that simple solutions could be innovative, i.e. new successful ideas do not need to be complicated. In addition, one participant even mentioned that the idea generated through the Lag-User Method motivated him to start his new business. Lag-users also mentioned that they understood that not only innovators, but also lag-users are important and can contribute to innovation. On the whole, participants mentioned that they found the method an “exciting and wonderful” journey, which helped them become aware of their capability to innovate. One lag-user concluded: “It was fun to think about an innovation for a product for which I am classified as a laggard!”

Table 5. New Products Developed by Lag-User Participants of the Exploratory Study and Corresponding Type of Innovation

	Product	New Product	Product Description	Radical	Really New	Incremental
Team 1	Sushi	Sushi My Way	Sushi My Way is a Sushi Restaurant, in which customers can combine their favorite ingredients, aligned with local tastes. The restaurant also serves typical fast food, pasta, and salads. (e.g. for children).		X	
Team 2	Sushi	Sushi Party	Sushi Party is a sushi machine with integrated rice cooker (e.g. for parties)			X
Team 3	Eastpack	X-Pack	X-Pack is a modern and ecological back-pack with heating system and solar energy.		X	
Team 4	External Hard Disc	SafEasy (Cloud Hard Disc)	SafEasy is a cloud hard disc, i.e. a cloud space that replaces heavy hard discs. It is fast and secure and users can have access to their files saved in the cloud the moment they go online.			X
Team 5	iPhone	LifeLink (Cloud Synchronization)	LifeLink is a website where users can register and synchronize all the data from their smart phones (e.g. applications, contacts, messages, photos, etc). They can have access to the data anytime they go online. (e.g. if they lose or forget their phone).		X	
Team 6	Wine	Wine Flash Code	Wine Flash Code is part of a label on wine bottles, to help novice wine consumers get to know and appreciate wine. The Flash Code provides customers with all the required data about the origin, taste, right occasion, and right dishes.		X	
Team 7	Cider	Strongbow (New Image for Cider in France)	A new branding and communication strategy was developed to change the positioning of Cider in France, e.g. through new packaging and new advertising campaigns.			X
Team 8	Coffee Cup	Compact Thermos (Coffee Cup with New Features)	Compact Thermos is a collapsible dish washer resistant thermos. It is environmentally friendly and takes little space, because it is collapsible.		X	

On the whole, study one revealed that insights provided by laggards are different from those of innovators. Our voting results showed that ideas generated by both groups can find acceptance among other consumers. Findings of this study also revealed that before learning the method laggards do not see themselves capable of innovating, e.g. one participant of this study mentioned: “But we are laggards, how could we innovate?”

However, at the end of the sessions, laggards came up with new popular ideas and indicated that the Lag-User Method helped them to understand and implement the process of innovation. Moreover, we found out that lag-users seek customized and simple products, and if guided, are very well able to define their needs and develop a prototype of their ideal product. This – from a manufacturer’s point of view – is an important piece of information. For example while innovators developed sophisticated laptops in our study, lag-users came up with “human friendly laptops”, a very basic version of a laptop that fulfills only basic needs. Similarly, while an innovator group working on smartphones came up with the idea of a waterproof smartphone called “iDive”, a lag-user group working on the same product developed the sPhone (s for simple), which is a very simple and uncomplicated version of a smartphone. More recently, we can observe that leading companies are launching waterproof and simpler versions of smartphones in the market. Once again, this suggests that innovative ideas and prototypes proposed by laggards seem to be of interest to general users.

Table 6. Selected New Products Developed by Participants of Studies One and Two and Corresponding Type of Innovation

Study	Category	Original Product	New Product	New Product Description	Radical	Really New	Incremental
One	Innovator	Laptop	Netpad	Net pad is a combination of a netbook and a tablet, having both a keyboard and a touchpad on the screen. The screen can be used separately as a tablet. The keyboard serves as a dock-station for charging battery.		X	
One	Innovator	Smartphone	iDive	iDive is a water proof smartphone that resists underwater pressure and can be used by divers.		X	
One	Lag-User	Laptop	RollTop	Rolltop is a tablet to which a small portable printer roll and projector are attached. In addition to the touch pad, the user can write the text with the special pen on the screen and the text will automatically be transmitted into the document.	X		
One	Lag-User	Smartphone	sPhone	sPhone (s for simple) is an extremely inexpensive and simple mobile phone with a modern design, powered by solar energy.		X	
Two	Innovator	Online Banking	Banking App	An application for online banking, accessible via fingerprints, which connects all your bank accounts.	X		
Two	Innovator	Mobile Apps	Mobility App	Mobility App is an application that embodies all you need in a city, e.g. information about public transport, navigation, traffic, etc.		X	
Two	Lag-User	Social Network	New Social Network	Social network with new features for data security, i.e. the user has complete control of his data, regarding who can see it and to whom it is sold. Once the data is sold, the user receives a commission.			X
Two	Lag-User	Online Shopping	New Experience of Shopping	Local stores for online shoppers with at least one sample of each product, which allows buyers to touch the product and try the clothes. Orders can be delivered to local shops or directly to customers.		X	

4.2.3. Study Two: Understanding the Role of Lag-Users in Developing New Services

The main purpose of study two was the application of Lag-User Method to services in order to see whether laggards can contribute to service development. Having been asked to identify services for which they considered themselves innovators or laggards, participants mentioned a variety of products around online services, e.g. online banking, online shopping, mobile internet, various mobile applications, online magazines, and online flight check-in.

Lag-users mentioned lack of interest in the product, other priorities, limited financial resources, more critical point of view toward products, and existing product alternatives as reasons why they are lag-users. Innovators, on the other hand, mentioned different reasons, e.g. looking for the best available solution and its advantages, curiosity about new technologies, thinking unconventionally, and being fast adopters.

Also in this study several participants found it difficult to think out of the box, because they often reject new ideas. One participant mentioned: “It was difficult for me to think of new ideas, because the picture of existing products was in my mind all the time.” “Giving weird solutions a chance” was one of the difficulties mentioned. As in study one, participants were asked to prepare an elevator pitch. We followed the same voting process described for study one.

For this study we had a total of 9 groups (4 innovator groups, 4 lag-user groups and 1 control individual, who was also a lag-user). Among the top four ideas receiving more than 2000 Euros, we had two lag-user and two innovator groups. We had one lag-user group, receiving more than 1000 euros. In the four groups that received less than 1000 euros we had two innovator groups and two lag-user groups.

Having concluded the Lag-User method, participants mentioned that they were motivated to complete the whole process of innovation and called the Lag-User Method “an exercise in courage”. While a lag-user participant mentioned that, “The exercise showed that all of us can innovate”, another mentioned: “In the beginning I thought I would not be so innovative, but in

the end I realized that innovation can be learned.” Another lag-user participant mentioned: “I was having a lot of fun. What I liked was that it [the Lag-User Method] made me play with my limits. It pushed me to leave my limits out. It was a lot about freedom and courage. That is why I think this is something people should do more of, maybe as a hobby with friends at home.”

With a focus on services, study two revealed that the Lag-User Method can also be applied to services. In study two we found out that not only innovators, but also lag-users can generate new service ideas. Thus, through the Lag-User Method, laggards can be involved in new service development and thus help service providers to use their insights as a rich source of novel ideas. Table 3 shows a selection of services developed in study two.

4.2.4. Study Three: Applying Lag-User Method to Consumer Goods

Study three applies the Lag-User Method to products that consumers use in their routine daily life. In this study 9 groups were formed based on common consumer goods or services mentioned by participants, for which they considered themselves to be laggards. Table 4 shows two examples that our lag-user participants worked on as well as the products developed by them to fulfill the needs that the initial product is not fulfilling. Study three showed that not only in the case of high-tech products, but also regarding normal consumer goods or services, lag-users can come up with breakthrough innovations. Having different groups working on the same products (e.g. two groups working on laptops or two groups working on clothes) showed that lag-users identify similar needs and problems in a product, for which they can later provide various solutions.

4.2.5. Study Four: Can the Lag-User Method Help Companies Move from Products to Services?

In this study we focused simply on lag-users. While working on consumer goods, in study four we observed if the new product would be consumer goods or services. Twelve innovative ideas were developed at the end of this study. To begin with, participants made two lists of consumer goods and services for which they considered themselves to be lag-users. We noticed that the majority of participants mentioned modern technology products (e.g. smartphone, tablets) and online services (e.g. social networks, online shopping). So 12 groups were formed based on the products that participants had in common.

Participants referred to the following reasons why they are laggards: being suspicious about new technologies and services, being resistant to change, having difficulties in changing habits, being forced by the society to adopt a product, being unwilling to allocate financial resources to specific products, waiting for others to use and approve/recommend a product, being careful and demanding (customized products), and lack of information about the product. Moreover, we observed that all groups working on online services (e.g. social networks, online shopping) mentioned privacy, (unlimited) use of personal information, and data security as the major needs/problems that the products do not fulfill.

Participants found it difficult to “find creative ideas for a common product.” Several participants mentioned that they found it easier to identify products for which they were a laggard rather than products for which they were an innovator. Others mentioned that for them it was easier to think of technological products rather than services. As lag-users they also found it challenging to work on a product they do not really “like”. Table 4 shows two examples of innovative ideas developed in study four. Results showed that out of four groups working on consumer goods, two came up with services. More specifically, after analyzing the laptop industry, one team proposed a leasing service that could provide consumers with the latest model laptop at any time and place needed. Another project in the car industry led to the launch of a two-wheel vehicle

rental service that could be complimentary to the parking of cars. These findings suggest that through lag-user innovation, we can help companies to move from consumer goods to services.

4.2.6. Study Five: Bringing the Lag-User Method to Firms

In study five in cooperation with two major five-star hotel chains, we focused on services offered by these companies, in order to see the extent to which lag-user innovation is accepted by firms. The final results were then discussed with executives of the same organizations. Since in this study we cooperated with two hotel chains, participants were supposed to work on the lists of the services offered by these hotels. After explaining the concept of the Diffusion of Innovation Curve, participants were asked to go through each list and select the service(s) for which they consider themselves to be laggards. Based on the responses, we formed 8 groups of two: 7 laggard groups and one majority group, which was used as control. Issues discussed in this study were mainly around flexibility, privacy, and safety issues. Table 4 offers one example of a product and one of a service developed in study five.

Study five showed that although our lag-user participants found it more difficult to work on services, they were able to identify their unfulfilled needs and consequently come up with solutions to fulfil those needs. Having concluded this study, we presented and discussed the results to two managers, from each one of the major hotel chains involved in this study. Both managers believed that the majority of services developed by lag-users could be implemented in their organizations and so find acceptance among the rest of their customers. They mentioned that those services, which could not be implemented immediately, would definitely fit into their organization after some minor adjustments. For example, in the case of Ultimate Experience Bar Table, while one manager believed that she could apply this solution without modifications to another business unit, namely the restaurant, the second manager was less receptive to this idea because offering customized drinks in the bar would reduce the time-saving effect of mass-customization. However, he was receptive to another function of the table, the drink order

function, because this feature could reduce staff costs. Another example is customized theme parties for corporate events. Our second manager mentioned that his organization was working on exactly the same idea and was positively surprised by the fact that users were also thinking about the same service. He confirmed that he could use insights provided by our lag-user participants to find the perfect match between user-led and manufacturer-led innovations.

Both managers confirmed that using lag-users can help them identify unfulfilled needs of their customers. They agree that once they fulfil those needs or simplify the existing solutions, laggards could adopt more quickly and so turn into innovators or early adopters. Initially the two managers had different attitudes towards ideas provided by lag-users. This shows the importance of manufacturers or service providers being receptive to ideas provided by laggards. While one was more open and saw opportunities to implement the ideas in different units of the organization, the other rejected the initial ideas because he was expecting ideas 100% customized to his organization's vision. After some thoughts he realized that some ideas had much potential and others could be used after some adjustments.

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Table 7. Selected New Products Developed by Lag-Users in Studies Three, Four, and Five

Study	Initial Product	Developed Product
Three	Public Transport	Bus à la Carte, a public transport service designed for people living in the countryside, which is available upon phone call.
Three	Car	P & R with two-wheel vehicle rental service, i.e. you park your car in the P & R, take a bike or a motorbike and go to the city center.
Four	Beauty Products	Lett-Use Cream, an organic natural cream based on lettuce, sold at reasonable prices
Four	Pharmaceuticals	Fuzzy Ginger Powder, natural ginger-based energy product
Five	Bar	Ultimate Experience Bar Table is a table with tablet technology. Customers can play games on the table, order their drinks, customize the ingredients of their drinks, and even watch the barman preparing their drinks.
Five	Private Parties	Pocket Party Planner is an application through which you can plan a party in only a few minutes. You can customize your party to your budget and needs, you can rate the hotel after the party and share your experience with other users of the app.

4.3. Theoretical and Managerial Implications

“The real voyage of discovery consists not in seeking new landscapes but in having new eyes.”

(Marcel Proust)

We believe that our study has four major implications for research. First, literature defines laggards as having lower education, lower social status, and low financial liquidity (Rogers, 2003). However, our studies reveal that laggards can be among any social or educational class and that in the case of some laggards, although they have high financial liquidity, they are not willing to allocate those resources to that specific product.

Second, we found that unlike lead-users, lag-users do not provide us with ready and user-tested prototypes. There is no user innovator communities around laggards. It is our challenge to identify these users, coach them and involve them in the NPD process.

Third, results of our studies showed that after following the Lag-User Method, lag-users were able to present radical, really new, or incremental innovations (Garcia & Calantone, 2002), which can work in the market place.

We measured different items before and after applying the Lag-User Method and found that after following the method, their perception of several aspects about innovation significantly increases, namely regarding their a) understanding of innovation, b) perception that people can learn to innovate, c) perception of their ability to develop new products on their own, d) confidence about their own new ideas, e) perception of considering themselves capable of innovating (Table 6). This confirms that through our method, laggards' negative attitudes toward innovations can change. Although initially they believe “But we are laggards, how could we innovate?” at the end they start believing in their ability to innovate and to develop new ideas. Having concluded the Lag-User Method, participants were also greatly persuaded that by following a structured method (e.g. Lag-User Method) they can come up with new ideas. Finally, the focus on users helps organizations to develop innovations which address constant changing needs (Silva et al. 2014) and create value while cutting costs (Kim & Mauborgne, 2005).

We applied the Lag-User Method to innovators, i.e. the first category of users to adopt a product. Empirical findings reveal that although both innovators and lag-users contribute to new product development, they have different perceptions of user-friendly products as well as different needs and expectations. Comparing laggards and innovators as a source of innovative ideas showed that as laggards are less familiar with a given product, they are less influenced by prior knowledge and very often think more “out of the box” or “with no box”. We found that unlike innovators, laggards are resistant to change and difficult to convince about a new product. To a certain extent this confirms earlier empirical work revealing that laggards are resistant to innovations and have a skeptical attitude toward novel products (Jahanmir & Lages, 2016). Additionally, this confirms past conceptual work that supports the idea that laggards are believed to be suspicious of new products, reluctant to change and skeptical of agents of change (Rogers 2003, Moore 2006). Nevertheless, they can clearly define their needs for customized products. Therefore, we can consider them as a very useful source of new ideas, which might be of interest to the masses (i.e. mass-customization).

Our studies also present managerial implications. First, our findings reveal that laggards are more critical consumers. Therefore, their insights can help firms find out more about weaknesses of their products/services and differentiate between relevant and irrelevant issues regarding their products/services. Targeting what is really imperative across different markets (e.g. the need for sophisticated technology that is simple to use) can lead manufacturers, service providers, and tech firms to develop products that will satisfy the needs of millions of users. Using the insights of laggards allows companies to focus on similarities and common needs across different markets. This will enable them to follow a “glocal vision” and develop simple products that will work simultaneously in global and local markets. Consequently, firms will be able to cut costs and benefit from economies of scale while satisfying local needs and thereby increase their performance (Lages, 2012; Lages et al., 2013).

Second, success lies in making competitors irrelevant through value innovation and by creating new market spaces (Kim & Mauborgne, 2005). Our findings reveal that laggards and their new insights can be used by companies to identify emerging trends, explore new and unknown market spaces, and

create blue oceans. For example, laggards identified ways to create value while cutting costs by crossing different industries (see Table 3: iDive and Rolltop; Table 4: P&R vehicle rental services and bar table). Moreover, if firms use laggards' inputs to convert products' weaknesses into strengths, they might squeeze the Roger's curve (2003) horizontally, i.e. reduce the adoption time, overtake the competitors, and extend the product life cycle.

Third, research shows that laggards are more brand loyal than other users (Uhl et al., 1970). Using laggards' insights enables companies to develop products or services that fulfil their specific needs. As such, companies will be able to maintain these users as loyal customers for a longer period of time than other user categories.

Fourth, laggards are believed to contribute to negative word of mouth. However, once convinced to adopt a product, they can be used to create positive word of mouth among non-adopters. Being the most recent customers, their word of mouth will be more powerful to convert non-adopters into adopters. For example, by better understanding the adoption process of laggards and factors that affect their decisions, we could speed up the adoption of slow ideas (see: Gawande, 2010; Haynes et al., 2009).

Finally, we discussed our findings with managers of service and technology companies to a) test the feasibility of our results, b) find the right match between lag-user innovation and manufacturer expectations, and c) discuss possibilities of implementing the solutions and prototypes created by lag-users. We also presented our findings to three focus groups with a total of 28 executives to obtain managerial insights about the Lag-User Method. A summary of the contribution of this study to innovation as well as research and development practice is presented in Table 5.

The interviewees of the industries we worked with indicated that they were not aware of some of the problems identified by lag-users. They confirmed that solutions/prototypes created by lag-users could be partly implemented without modifications in their company, be modified and implemented, or be implemented in other strategic business units.

Our executive focus groups confirmed that a) lag-users' critical insights are useful to help companies determine the reason for their late adoption; b) lag-users are a rich source of information for

converting a product's weakness into strength; c) their insights can help firms overcome their limitations, modify a product to avoid decline, and expand the product life cycle, or develop the new generation of products to address a larger market segment, for example by simplifying over-engineered products, as well as offering easy-to-use solutions and user-friendly designs. As mentioned by an executive, lag-users' needs are the "amplified needs of the majority" and thus cannot be ignored. Firms might also use insights of lag-users to create or improve their existing toolkits for user innovation (von Hippel, 2001).

4.4. Directions for Further Research and Conclusion

Laggards are normally ignored by practitioners and researchers. This might have two reasons. First, since they are more demanding than other customers, they are not enthusiastic about a firm's product/service. Second, because they only adopt a product when they absolutely have to. Although sometimes it might not be pleasant to listen to their voice, it can be more unpleasant if we do not. For many firms, losing the input of laggards means losing an opportunity to improve their products/services and consequently losing a significant part of customers to competitors.

Future work is encouraged to explore the impact of the Lag-User Method on companies' innovation and technology management and examine how the Lag-User Method contributes to intra- and inter-organizational learning of innovation, can create competitive advantage for firms, enables firms to squeeze the Rogers' curve (2003), cross the chasm and increase the product life cycle.

Table 8. Managerial Implications

<p>Managers of organizations believe in the Lag-User Method because:</p> <p>Laggards represent a significant portion of the market. As they are more resistant to change, they often are an “amplified voice” of the complaints and unmet needs of the market.</p> <p>It is critical to understand the needs and expectations of lag-users properly because they often complement those of other users.</p> <p>Their proposals are often viable and can often be implemented with some minor adjustments (as demonstrated by several examples presented here that were recently launched in the market).</p> <p>Laggards can innovate through a systematic method.</p>	<p>Through the Lag-User Method, laggards can help companies to:</p> <p>Come up with prototypes for the new generation of products.</p> <p>Overcome barriers to adoption of innovations (i.e. “cross the chasm”) and have a faster adoption of their products (i.e. squeeze the diffusion of innovation curve).</p> <p>Develop incremental, really new, and breakthrough innovations.</p> <p>Think more “out of the box” or “with no box”, because laggards are less influenced by prior knowledge.</p> <p>Diversify and move from consumer goods to services (or vice-versa).</p> <p>Simplify over-engineered products, design more user-friendly products, and generate ideas to address the needs of the majority.</p> <p>Develop “glocal” solutions that allow cutting costs while satisfying local needs.</p> <p>Develop mass-customized products addressing a larger market segment.</p> <p>Identify and fulfil laggards’ unmet needs, and hence gain more market share.</p> <p>Get ideas to modify products in order to expand the product life cycle and avoid decline.</p> <p>Identify the weakness of a product and turn it into a strength.</p> <p>Identify laggards’ specific needs in an industry and consequently win laggards of competitors by transforming them into our own innovators and/or early adopters.</p> <p>Identify emerging trends in order to overtake existing alternatives.</p>
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Table 9. Perceived Impact on Participants *

To what extent do you agree with the following questions?		Study 2			Study 3			Study 4			Study 5		
		Before	After	Difference	Before	After	Difference	Before	After	Difference	Before	After	Difference
1	I have a complete understanding of innovation.*	3.118	4.250	1.132 ***	3.444	4.556	1.112 ***	3.583	4.250	0.667 ***	3.844	4.313	0.469 ***
2	I believe people can learn to innovate.*	3.706	4.313	0.607 **	3.778	3.944	0.166 (ns)	3.292	4.042	0.750 ***	3.563	4.031	0.468 **
3	I can develop ideas for new products on my own.*	3.176	4.063	0.887 ***	2.944	3.889	0.945 ***	3.250	4.125	0.875 ***	2.844	3.625	0.781 ***
4	I am confident about my new ideas.*	3.294	3.688	0.394 (ns)	2.833	3.611	0.778 **	3.667	4.125	0.458 **	3.156	3.813	0.657 (ns)
5	I consider myself to be an innovator.*	2.353	3.867	1.514 ***	2.944	3.444	0.500 **	2.917	3.542	0.625 **	2.625	3.094	0.469 ***

***p<0,01; **p<0,05 (2-tailed)

Obs. Having completed study one, authors concluded that it would be important to gather data about the perceived impact of our method on participants. Therefore, these data are available for studies two to five.

* Single items measured at the beginning and end of each study using a 5-point Likert scale (1 – not at all to 5 – completely).

Different personal and environmental characteristics are among reasons of late adoption. Exploring this untouched field can have a significant impact on theory and practice across various disciplines. We encourage researchers to identify different determinants of late adoption in different contexts, such as in Web 2.0 and social media (see: Berthon et al., 2012; Kietzman et al., 2011), in an international context (e.g. developed versus emerging markets) or in a B2B context (e.g. in the software industry, where the product life cycles are short relative to machinery, where the product life cycles are longer).

Based on our studies with lag-user teams, follow-up discussions of our findings with executive focus groups and interviews with managers of the industries studied, we propose that by involving lag-users in the NPD process firms can address a wider range of consumers, create new market spaces, and increase value while cutting costs. Moreover, there is a clear need to develop measurement scales to identify where the laggards and late-adopters for different industries are (see as examples: Jahanmir & Lages, 2013, 2014).

Assuming that innovation is a dynamic process, we would like to point out that our method can be seen as a flexible sequence of actions. We believe that each step is worth considering since, for example, it will help firms save time and resources. Although we do suggest following the steps in the presented order, in some contexts some steps might not be applicable, some might need adjustments, and others might need to be repeated. We believe that this flexibility is part of the non-linear nature of innovation and creativity.

In conclusion, we propose that lag-users are an untapped source of new ideas and value, surprisingly overlooked by both theory and practice. Several solutions proposed by laggards who went through the Lag-User Method over the past four years have been later introduced to the market by the companies involved in the study or by other global brands. This demonstrates the relevance of different ideas generated by lag-users. As such, we believe that our current research helps to advance the innovation field by being the first to investigate lag-

users and to consider their valuable insights for new product and service development as well as research and development practice.

Chapter 5 Conclusion and implications

This dissertation presents three essays exploring dominant topics in the fields of innovation and entrepreneurship. Inspired by theories of entrepreneurship, diffusion and adoption of innovations as well as user-led innovation, we present a new approach toward entrepreneurial decision-making and the role of late adopters in idea generation and new product development. Essay 1 applied a grounded theory approach to explore approaches that entrepreneurs take while making decisions. Using semi-structured interviews with founders of start-ups in healthcare and medical devices, four dimensions emerge: technology, market, customer and team. Although the sample of this study consists of entrepreneurs in healthcare, where defining market and customer is not as simple as other fields, our exploratory findings show that entrepreneurs in the field of healthcare and medical devices face daily challenges and options. We find that entrepreneurs consider both a trade-off or a paradox approach. Within the same dimension, they might follow a trade-off at the early stage of venture creation and a paradoxical approach in a later stage. For example, results show that at an early stage, founders focus on early adopters as a source of ideas and feedback, whereas later on they consider both early and late adopter.

Following the results presented in Essay 1, Essay 2 applies survey instrument to identify characteristics of late adopters. Using a sample of 105 users of mobile phones, the study presents a measurement scale with three dimensions: Slowness of Adoption, Resistance to Innovation and Skepticism. The scale is then validated on a second sample of 100 users of laptops. Results show that late adopters of technologies take longer to adopt a new product. They are resistant to new ideas and have a skeptical point of view toward innovations. The study also shows that late adopters feel less involved with a product and prefer simple products at a lower price.

The scale presented in Essay 2 allows managers to identify late adopters and what they value. After successfully identifying the late adopters, in Essay 3 we present the Lag-User Method. Lag-User Method is an innovative new product development method. Late adopters do not identify themselves as being capable to innovate. They need to be coached and guided so that they can question existing standards, express their concerns and come up with new ideas. The

Lag-User Method is adjusted to the specific characteristics of late adopters. Through a systematic step-by-step process, late adopters learn how to come up with new ideas for innovative products. Table 10 presents a brief summary of the studies.

The three essays have major implications for both theory and practice. First, by identifying the late adopters of technologies and exploring their contribution to idea generation, founders could consider their input even in the early stage of firm creation and use those insights to create products that could guarantee venture's success and survival.

Second, these studies reveal that late adopters can be among any social or educational class, can have higher levels of education and financial liquidity. However, if a product does not present a clear value to them, they are not willing to allocate any financial resource to that specific product.

Third, unlike innovators or lead-users, lag-users do not generate new ideas independently. They are not members of existing user communities to exchange ideas. Thus companies need to spend more time and effort to identify them. Our studies show that once we identify them and allow them to follow the Lag-User Method, they will be able to express their unfulfilled needs and come up with radical, really new or incremental innovations to fulfil those needs.

Getting access to late adopters' ideas is an important factor for companies who want to remain competitive and have a larger market share. Since late adopters are critical consumers, they can help companies identify their products' weaknesses and help them develop new products that address a larger market segment and diffuse faster.

In conclusion, we propose that late adopters can play a key role both for start-ups and for established firms. We believe this dissertation advances the innovation and entrepreneurship field by being the first to explore late adopters, their role and valuable insights for venture creation, new product and service development as well as research and development practices.

Chapter 6 References

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