THE HATEFUL SIX – FACTORS HINDERING ADOPTION OF INNOVATION AT SMALL AND MEDIUM SIZED ENTERPRISES

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Full paper

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Abstract

Adoption of innovations within small and middle-sized enterprises (SMEs) employing fewer than 250 employees is limited compared to large companies. Within the current study, our goal is to identify hindering factors influencing adoption of innovation within SMEs. To identify this, we conducted a case study on the usage of mobility related innovations within 20 small and medium-sized enterprises. We found six crucial factors hindering SMEs of adoption of innovations: perceived unbalance of risks and chances, compatibility with daily work routine, lacking fit in individual business processes, complexity in infrastructure investments, IT know how and amount of costs for setup. Our study contributes to an extended understanding of the theory of adoption of innovations. Based on the identification of these factors, the study provides practical implications for SMEs to integrate innovations into current business processes. The results foster the adoption of innovation within SMEs.

Keywords: innovations, adoption of innovations, small and medium-sized enterprises, mobility services

Introduction

Small and medium sized enterprises (SMEs) represent an integral part of the economy of a country. In the European Union more than 90% of all enterprises belong to this group and more than 60% of all employees are working for a SMEs (European Commission 2016). They are a very heterogeneous group and operate in quite different sectors, such as trade, service, agriculture, construction and manufacturing. Innovations enable enterprises to increase their productivity and continuously improve their performance (e.g. Sorescu et al. 2003).

Despite the positive effects of innovations, the adoption is quite low among SMEs (Chaudhury and Bharati 2008). This has already been analyzed in literature (Chaudhury and Bharati 2008), but the exact causes of this low adoption rate remain unclear. Additionally, it is not clear how the adoption of innovations can be improved among SMEs. We therefore pose the following research question:

Which are the factors hindering adoption of innovation among small and medium sized enterprises?

To address this research question, we draw upon the theory of innovation adoption of Rogers (2003) and conduct a case study about the adoption of mobility related innovations among SMEs. The case study focuses on identifying hindering factors of innovation adoption. These factors are subsequently generalized and it is discussed how the adoption of innovation can be improved.

The remainder of the paper is structured as follows. First, we present the theoretical background on SMEs, innovation and innovations adoption. Second, our research approach is shown. Third, the

conducted case study and the identified hindering factors are described. Fourth, guidelines how to improve the adoption of innovations are presented. Finally, the paper ends with limitations, possible future research and a conclusion.

Theoretical background

The following section gives a brief overview of characteristics and classification of small and medium-sized enterprises (SMEs) within Europe. Furthermore, innovations and the adoption of innovations within SMEs are described.

Characteristics of small and medium-sized enterprises (SMEs)

In 2012, about 22 million SMEs existed in the European Union and they employed about two thirds of the working population. SMEs are important for the total employment and are regarded as the engine of the European economy (European Commission 2016).

Small and medium-sized enterprises (SMEs) can be classified from the quantitative as well as from the qualitative perspectives. Quantitative definitions refer to quantitative criterions, such as size and turnover (Schauf 2009). According to the European Commission, the category of small and medium-sized enterprises (SMEs) includes enterprises that employ fewer than 250 members and have a turnover below 50 million per year and / or a balance sheet that does not exceed 43 million euro per year (European Commission 1995). From a qualitative perspective, main characteristics of SMEs refer to the personality of the entrepreneur which is the head and often owner of the enterprise and a personal relationship of the firm to customers, suppliers and significant other persons. Moreover, goods and services are made according to individual needs of customers and the relationship of management and employees is close and informal. The organization as itself is able to react quickly on environmental changes (Mugler 2008). Innovations and adoption of innovations has been found to be highly relevant within SMEs. Thus, within the following section, the relationship of SMEs and the adoption of innovations is characterized.

Innovations within SMEs

Innovation is defined as "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers 2003). The main aspects of innovation include change and at least partly novelty (e.g. Hauschildt 2007) and the adoption of an idea or a specific behavior to an organization (Damanpour 1991).

Innovations are highly related to economic growth. They are perceived as important accelerators of economic progress, resulting in an increase of productivity and continual performance (e.g. Dodgson et al. 2008; Sorescu et al. 2003; Xiao et al. 2013) and improving ecosystem performance (Riedl et al. 2009). Furthermore, the innovation potential is considered to be a key requirement for a company's performance and competitiveness (Andergassen et al. 2009). Several studies pointed out the connection between a company's potential in innovation and market results (e.g. Barker and Duhaime 1997; Markides 1997). Moreover, Allocca and Kessler (2006) stated that the capability to develop innovations is essential in terms of first-mover advantages, successful products and long-term growth. Thus, the authors concluded that successful implementation of innovations within SMEs is positively related to performance and growth.

One the one hand, Ritchie and Brindley (2005) found SMEs to be high potential for the implementation of innovations facing their adaptivity, entrepreneurial spirit and adaptive potential. They are associated with essential advantages, such as lack of bureaucracy, efficiency, informality, internal communication systems and both flexibility and adaptivity (Rothwell 1989). Using knowledge, they are able to generate innovations and gain competitive advantage in order to gain more profit (Kotelnikov 2007; Loh and Koh 2004).

On the other hand, it has been shown that SMEs are less likely to innovate than larger companies are (Tan 2010). Moreover, Cohen and Kleppler (1996) and Acs and Audretsch (1991) showed that effort in R&D is positively associated with company size. Additionally, Kimberly and Evanisko (1981) found that one essential aspect, the adoption of innovations, is significant higher in large firms as they adopt an innovation earlier than SMEs. One reason for a reduced innovation activity within SMEs was found by

Winch and Bianchi (2006), who showed that SMEs face increased pressure in innovation effort due to restricted resources and capabilities.

Adoption of innovations

In terms of adoption of innovations, Rogers (2003) defined it as the "relative speed with which an innovation is adopted by members of a social system" (p. 221). It is mainly determined by five characteristics which contribute to the main understanding of the adoption rate.

First, the relative advantage of an innovation refers to the amount to which an innovation is subjectively perceived as being better than the previous idea which is displaced, i.e. a ratio of the expected benefits and the costs of adoption of an innovation. Thereby, relative advantage includes aspects such as economic profitability, low initial cost, a decrease of comfort, social prestige and saving time and effort.

Second, compatibility affects the rate of adoption. This means the amount to which an innovation is seen as being consistent with current morals, previous experiences and demands of future adopters. Thus, a high compatible innovation is more certain to adopters, shows greater fit to a person's situation and is perceived as more familiar. An innovation can show compatibility with existing sociocultural morals and beliefs, earlier concepts and customer's needs for an innovation.

Third, the rate of adoption is influenced by complexity as the amount to which an innovation is subjectively perceived as being simple or difficult to follow and apply. While some ideas tend to be obvious in their understanding for adopters, others are not. Therefore, Rogers (2003) suggested that the degree of complexity of an innovation is negatively related to the rate of adoption.

Fourth, trialability refers to the amount to which an innovation may be explored in a defined, i.e. restricted, manner. In general, innovations that can be investigated by participants tend to be adopted more quickly than innovations that cannot. As the possibility of personal investigation can reduce uncertainty about a recent idea, the trialability of an innovation is supposed to be positively related to the rate of adoption.

Finally, observability as the degree to which the results of an innovation are visible to others, is supposed to be positively related to the rate of adoption. While some ideas are easily observed and communicated to people, others are difficult to observe or describe. Thus, the amount of observability affects the rate of adoption. The adoption of an innovation and innovative thinking within organizations is an essential part in order to gain superior customer value (Knox 2002).

In addition to this, further aspects such as the type of innovation-decision, the nature of communication channels diffusing the innovation at various states in the innovation-decision process, the nature of the social system in which the innovation is diffusing and the extent of change the agents' promotion efforts in diffusing the innovation influence the rate of adoption. As the perceived attributes of an innovation showed to explain between 49 and 87 percent of the variance, we focused on these main aspects to investigate innovation adoption in small and medium-sized enterprises. Figure 1 provides an overview of variables determining the rate of adoption.
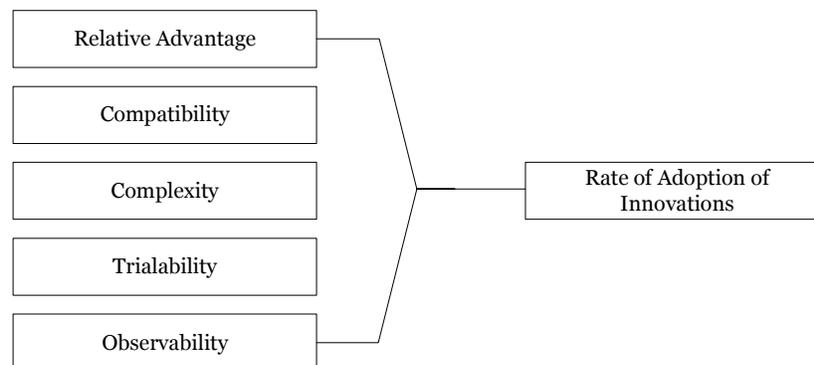

Figure 1: Variables Determining Rate of Adoption (Rogers 2003)

Previous results both showed the high relevance of innovation and the given characteristics of innovative companies. Despite the flexibility and adaptivity of SMEs, the rate of adoption of innovations is still rare. Thus, our study supports to close this research gap by investigating hindering factors of innovations with SMEs. Therefore, the goal of our paper is to answer the following question: Which are the hindering factors preventing adoption of innovation within small and medium-sized enterprises?

Case Study: Mobility innovations at SMEs

Research method

In order to derive guidelines for the adoption of innovations at SMEs, we first conducted a case study about mobility innovations at SMEs to identify the hindering factors of innovation adoption. As this is a quite novel approach in the SMEs innovation literature, we have chosen case study research (Yin 2009). This is based on the fact that our research paper addresses mainly the descriptive question of what hindering factors of innovation within SMEs are. According to Shavelson and Towne (2002), this is the most important fact for appropriateness of case study research. Furthermore, in order to illuminate a specific situation and gain in-depth understanding of the situation, case study research supports us in collecting data in field settings and making observations (Yin 2006). Thus, the guidelines for conducting case study research of Yin (2009) and Eisenhardt (1989) form the theoretical basis of our research approach.

Choosing our sample, we focused on the specific kind of SMEs naming tradespeople within Europe. We chose this particular sample of various jobs as 1) adoption of innovation within tradespeople is lower compared to other SMEs (Zentralverband des Deutschen Handwerks e.V. 2014) and 2) innovation performance within Europe is lower compared to other countries, such as the U.S. and Japan (Commission 2015). Using this sample, we intend to gather results of high reliability. In addition, Böhmann et al. (2014) pointed out the high potential of service systems in innovations.

Mobility related service innovations at SMEs have been chosen as unit of analysis based on two aspects. First, due to the shift from products to services in the current economy, there has also been a shift in the focus of innovations (Plattfaut et al. 2012; Wang et al. 2010). This has led to higher relevance and a high number of available service innovations. Thereby, in accordance within previous definitions of innovation, service innovation as a particular case of innovation are defined as a "rebundling of resources that create novel resources" to some actors, for example the customer (Lusch and Nambisan 2015, p. 161). In accordance with previously described definitions of innovation (e.g. Hauschildt 2007), the main common aspect is the character of novelty. Second, as mobility represents a major aspect of the daily work routine of SMEs. For instance, craftsmen work at their customers' site and local shop owner transport goods to their customers. Additionally, there are quite a lot of mobility innovations in the business-to-consumer market for example car sharing solutions such as DriveNow or Car2go and ride sharing such as Uber or BlaBlaCar (Schreieck in press). However, these in the business-to-consumer market established innovations have hardly been adopted by SMEs. Therefore, this represents a case where on the market available innovations are not adopted by SMEs.

The data collection for the case study is based on 20 semi-structured interviews that were conducted between April and September 2015. Table 1 gives an overview of the interviews. All interviews have been conducted face-to-face and have been recorded and transcribed. Some additional questions were sent to the interviewees via e-mail after conducting the interview to remove any uncertainties.

Interview	Occupation	Number of interviewees	Average Length [min]
1	Construction	1	37 min
2-3	Courier	2	10 min
4	Nursing Service	1	28 min
5-9	Domestic Engineering	5	25 min
10-11	Store	2	21 min
12-13	Workshop	2	25 min

14	Courier	1	28 min
15	Building Cleaning	1	24 min
16	Insurance agent	1	14 min
17-18	Consulting	2	19 min
19-20	Start-Up	2	9 min

Table 1: Overview of conducted interviews

We analyzed the conducted interviews with a category coded content analysis technique (Mayring 2010). The coding categories were based on the characteristics of innovation adoption after Rogers (2003), because they determine the adoption rate of innovation. These characteristics have also been used in other SMEs innovation studies (Tan 2010; Teo et al. 2004). The atlas.ti software package was used to support coding and analysis.

Hindering factors that influence mobility related service innovations

The following sections describe factors that hinder the adoption of mobility related service innovations by SMEs. These hindering factors are ordered according to the characteristics of innovation after Rogers (2003).

Characteristics of adoption of innovation according to Rogers (2003)	**Identified hindering factors**
Relative advantage	Perceived unbalance of risks and chances
Compatibility	Compatibility with daily work routine
	Lacking fit in individual business processes
Complexity	Complexity in infrastructure investments
	IT know how
Trialability	Amount of costs for setup
Observability	---

Table 2: Identified hindering factors of adoption of innovation based on Rogers (2003)

Perceived unbalance of risks and chances

One hindering factor is that SMEs often do not focus on possible positive aspects of an innovation and thus show an unbalance of risks and chances. Based on the fact that mainly skill-based qualifications are required and paid, they do not put priority on how innovations could improve their daily work routine. Instead, they rather focus on negative aspects, such as costs and effort. For instance, they do not perceive possible advantages of a system that tracks the position of their cars:

"I do not expect much advantages of tracking my cars, because additional costs as well arise."(P4#4)

Additionally, it is harder for mobility related innovations to create a relative advantage for SMEs in comparison to the business-to-consumer market because of their strict daily timetable, which does not allow much flexibility. However, a certain degree of flexibility is necessary for mobility related innovations such as car sharing solutions:

„First, we need it [a car] at the right time and second, I do not want to wait until there is a car available in my area. Additionally, an available car could be 1km away, but I do not want to walk there by foot. (P20)

Compatibility with daily work routine

Innovations have to be compatible with daily working routines of SMEs. On the one hand, this is difficult to install facing occupational characteristics. For example, plumbers cannot use car sharing as they have all of their equipment in their car and cannot predict which tools are going to be used during a job.

"They need their car permanently on site. It is really their tool cabinet. It is a driving workshop." (P 1: #1)

On the other hand, there are some SMEs which have the potential to use car sharing solutions based on the fact that they do not have much equipment. Therefore, they are able to plan their appointments in advance:

"This service [car sharing] is mostly for our office. We have fixed pool cars and everybody can use them. [...] However it is necessary to stick to the booking plan. It can always be the cas that you do not get a car, because none of them is free." (P 1: #1)

Therefore, a mobility-related service innovation has to include all the equipment which is needed in daily work routine in order to meet the needs of every occupation.

Lacking fit in individual business processes

Another hindering factor is that there is a lacking fit in individual business processes and thus hardly any standardized processes within SMEs exist. If standardized processes exist at all, workarounds are often used, because of their flexibility (Roeder et al. 2014). A lot of the tasks of SME are ad-hoc and have a low predictability. This variability for instance makes it difficult to use innovations that rely on predictability:

"That [using car sharing] is not possible. Everything is improvisational and unpredictable"(P 7)

„This happens quite often and you have to be very flexible. For instance, a client calls and says that you have to clean something urgently [...]. You have to be able to react quite quickly." (P10)

Complexity in infrastructure investments

A complexity related hindering factor is that it is necessary to have a certain infrastructure for the usage of a lot of mobility related innovations. For instance, the usage of car sharing requires a smartphone and internet connection. However, these basics are often not present in SMEs. They use old mobile phones because of their durability and they sometimes work at places where there is no mobile reception such as in the basement of buildings.

"Cellular network is very import for working effectively. Nowadays, it is not possible to work without it"(P 1: #1)

IT know-how

Another hindering factor is that IT know-how or at least affinity is not always present in SMEs (Tan 2010). They are often quite small enterprises with only a few employees. The employer needs to combine several roles in one person, but traditionally he is only an expert in his specific domain. He often does not have the knowledge to be the chief digitalization or information officer. In our interviews we have found that IT know-how increases with the size of the SMEs.

Amount of costs for setup

In general, the amount of costs for setup is relatively low in the case of mobility related service innovations. Most of them can easily be tested and there are no huge set-up costs, because mobility related innovations are quite common in the business-to-consumer market. For instance, it is only necessary to download an app and to register in order to try a car sharing solution. Many other innovations only require downloading a certain app. However, there are also innovations that cannot easily be tested. These are mostly innovations for specific use cases, such as a vehicle tracking service for mobile nursing services:

"A few years ago, I had a trial version for one month. It was quite nice, because I could see on my notebook where somebody was driving around" (P4#4)

Observability

In general, the observability of mobility related innovations is quite high. They are quite common in the business-to-consumer market and therefore are easily observable by SMEs. Because of this, this characteristic of innovations should not be a problem in the context of mobility related innovations.

Discussion

The previously case study focused on mobility related innovations for SMEs. In total, six hindering factors have been identified which are shown in figure 2.
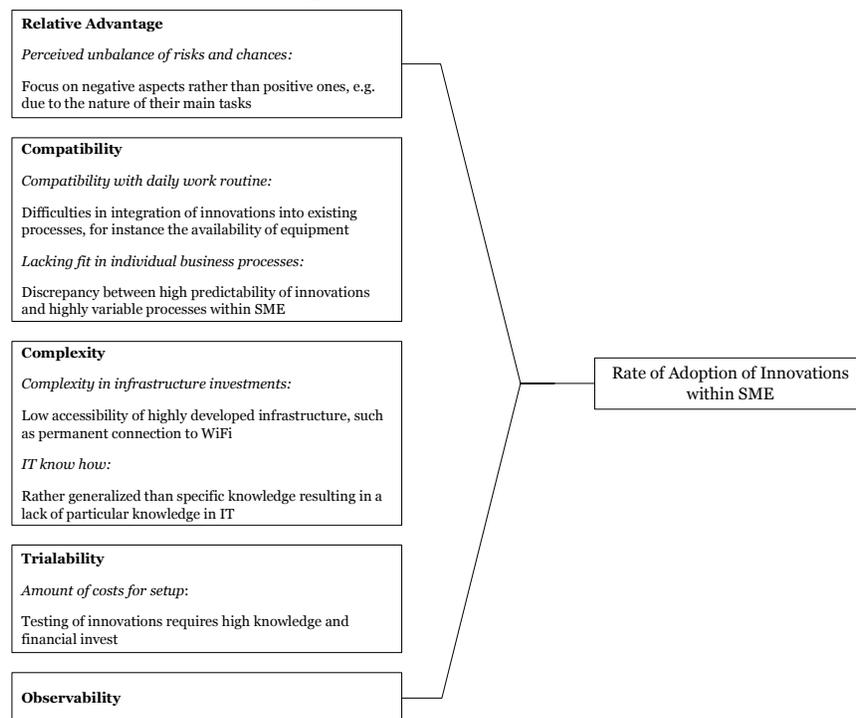

Relative Advantage

Perceived unbalance of risks and chances:

Focus on negative aspects rather than positive ones, e.g. due to the nature of their main tasks

Compatibility

Compatibility with daily work routine:

Difficulties in integration of innovations into existing processes, for instance the availability of equipment

Lacking fit in individual business processes:

Discrepancy between high predictability of innovations and highly variable processes within SME

Complexity

Complexity in infrastructure investments:

Low accessibility of highly developed infrastructure, such as permanent connection to WiFi

IT know how:

Rather generalized than specific knowledge resulting in a lack of particular knowledge in IT

Trialability

Amount of costs for setup:

Testing of innovations requires high knowledge and financial invest

Observability

Rate of Adoption of Innovations within SME

Figure 2: Identified Hindering Factors affecting the rate of adoption of Innovations within SMEs

The case study showed that SMEs hardly think about potential concepts and possible advantages of a certain innovation. This might be related to the fact that the owners of the SMEs need to make the strategic decision whether to use an innovation on their own, but not necessarily have the required knowledge or skills for that (Tan 2010). This is different in larger enterprises as they often have experts that can be consulted before make a decision. As a consequence of the absence of higher-level skills, SMEs prefer using existing technology (Scott et al. 1996).

Facing this disadvantage, a clear communication and explanation of the advantages in a transparent way is mandatory. As innovations often open up a possible, but not necessarily deliver direct advantage, it is crucial to communicate how advantages can be obtained. Furthermore, the advantages should be monetarily quantified if possible as this makes it easier to convince SMEs.

The compatibility characteristic of innovations after Rogers (2003) is as well crucial for the adoption of innovations among SMEs. Innovations have to be compatible with daily routines of SMEs as existing work

practices will not be adopted in order to use a certain innovation. Therefore, based on daily routines of SMEs, innovations have to be developed to seamlessly fit into the existing work practices. As SMEs often show a lack of defined standard processes (Claudia et al. 2013), the innovation should be quite flexible and easily adoptable to the specific situation of a SMEs.

The complexity characteristic of an innovation is another determining factor. Innovations for SMEs have to be quite simple in two ways: First, they should not have to rely on high infrastructural requirements. SMEs do not have the latest technologies and it is not common that every employee has a company smartphone. The underlying reason can be transferred to limited financial resources which are supposed to be main issues within SMEs (Oakey 1997).

Additionally, innovations have to be robust regarding the infrastructural requirements. SMEs often work in precarious situations where cell reception cannot always be guaranteed. Second, innovations should not require high-technological IT know-how facing its moderate role in the education of traditional SMEs jobs, like plumber, carpenter or mobile nursing service (Tan 2010). Because of this, a basic requirement of innovations refers to a simple operating interface in order to meet their particular needs.

Another important characteristic of innovations is trialability. Innovations should not have high set up costs to guarantee triability and testability of an innovation for a certain period of time before the final purchase decision. In contrast to larger organisations having resources to evaluate innovations with high set up costs, SMEs only dispose a very limited budget (Oakey 1997).

It might be the case that a particular innovation requires a certain infrastructure resulting in high set up costs. For instance, the tracking of the cars of a SMEs requires GPS beacons or smartphones in the cars. Instead of selling this hardware to the SMEs, it could be better to rent it out or to have a usage based fees that already includes the set up costs.

Implications, limitations and future research

We contribute to the existing theory by deepening the understanding of innovation within SMEs, a currently underrepresented research area. The developed guidelines can be used by researchers to explain the failure of innovation adoption within SMEs. Additionally, we contribute to practice in different ways. The developed guidelines can be used for the development of innovations for SMEs, as they show which aspects should be considered. Additionally, the guidelines are useful for the marketing of innovations as they show how SMEs should be convinced.

Our research is not free of limitations. One limitation refers to the aspect that we only focused on mobility-related innovations while it might be the case that they have specific characteristics limiting the generalizability of our results. However, focusing on mobility related innovations has the advantage that many different types of SMEs are affected.

Another limitation might be that the interviews focused on exemplary SMEs companies and therefore did not cover all types and branches of SMEs. For example, previous research showed that companies in business differ highly from those in manufacturing in terms of innovation performance (Rubalcaba et al. 2010). However, we conducted 20 interviews covering ten branches of SMEs. This considerably high number of firms should ensure that various aspects have been considered.

Future research directions refer to the previously discussed limitations. For example, it can be investigated whether the identified hindering factors also represent other than mobility-related innovations. Furthermore, additional branches of SMEs could be analyzed as SMEs have different characteristics. Thus, it could be the case that certain hindering factors are more relevant than others. Future research could also conduct case studies about successful as well as unsuccessful innovation adoptions at SMEs. Moreover, further research could integrate the hindering factors of technical innovations at SMEs.

Acknowledgement

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