Stephan Böhm
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Proceedings of the IWEMB 2018

Second International Workshop on Entrepreneurship in Electronic and Mobile Business

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Preface

The International Workshop on Entrepreneurship in Electronic and Mobile Business (IWEMB) is a joint initiative of the Center of Advanced E-Business Studies (CAEBUS) at the RheinMain University of Applied Sciences in Wiesbaden, Germany, and the International College of the National Institute of Development and Administration (ICO NIDA) in Bangkok, Thailand.

The aim of the initiative is to offer a platform for researchers in the fields of electronic and mobile business in order to generate relevant new insights and international exchange of ideas. The mission of this workshop is to bring together young and experienced researchers from institutions all over the world to discuss current electronic and mobile business research topics as well as innovations and trends in related markets. A particular interest of the initiative is to strengthen cooperation in academia between researchers from Europe and Asia.

The second IWEMB was held on September 24 and 25, 2018 in Wiesbaden. All the papers in these proceedings were reviewed and accepted for publication by the program committee and presented at the conference.

Contents

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Analysis of Online Payment Methods in Germany

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Abstract—The ongoing growth of e-commerce in Germany results in an increasing variety and usage of online payment methods, enabling customers and retailers to choose the most beneficial payment method. Selling products or services via the internet is always an impersonal transaction, which leads to the existence of different risks, benefits, or disadvantages for both sides. Other aspects that need to be considered are the comfort, speed, and usability of an online payment method. The aim of this study is to analyze the adoption of online payment methods by consumers in Germany as per Rogers's diffusion of innovation theory. This analysis is based on different studies that surveyed the usage of online payment methods over a series of time. The analysis led to different conclusions about future adoption of the several online payment methods.

Keywords—Diffusion of innovation, e-commerce, online payment, PayPal, technology adoption.

1. Introduction

For a long time in history, cash payments had been the only relevant payment option available in an economy; but the past few decades, especially, have yielded many different methods, parallel to the increasing digitalization of society. The introduction of credit and debit cards can be seen as the beginning of innovative payment systems, but e-commerce is probably the biggest driving force for the innovation of new payment methods. Online payments build the interplay between payments and information technology in a quick, safe, and convenient way (Hankun et al., 2016; Siau et al., 2004). However, an increasing supply of payment methods leads to the necessity of choosing a payment method that seems to be the most beneficial one. Especially when a purchase is done online, the choice of the payment method becomes an important issue, not just for the customer, but also for retailers. Moreover, selling products or services via the internet is always an impersonal transaction, which includes different risks, benefits, or disadvantages for both sides. On the one hand, a customer, for example, can only limitedly check the product online while ordering. On the other hand, the retailer always faces the fundamental risk of payment defaults or fraud.

Other aspects considered by customers and retailers are the comfort, speed, and usability of online payment methods (OPMs). Does an OPM fit into the fast-changing environment of the online world? Can it be used easily so that customers get used to paying with it on a daily basis, just as they have done with credit and debit cards? Moreover, how can it be described that despite the increased digitization of the world and higher worldwide broadband internet penetration (ITU, 2017), numerous electronic and online payment systems have failed and have not reached the critical mass of users (Oh, 2006)? In the context of increasing e-commerce markets, consumers and retailers need to think about their selection of OPMs and retailers need to identify why specific OPMs have been successful and others have failed. Generally, the high market volume (e.g., the German e-commerce market in 2015: 65.34 billion euro) and the increasing number of e-commerce transactions lead to a rapid development of OPMs (Schmitt, 2016).

Due to the increased importance of e-commerce markets, the number of digital transactions will increase. Strengthening broadband internet penetration supports the implementation of OPMs (ITU, 2017; Mishra et al., 2016). Therefore, it is necessary to figure out, which OPMs have reached the critical mass and which are the reasons for that development. Though the reasons of the development are various and differ between markets and countries on the bases of policies, cultural aspects, and technical features (Hankun et al., 2016), this consideration focuses on the development of the OPMs in the German electronic market. The aim of this study is to present the development process of the most important OPMs in the German e-commerce market. Moreover, this study will discuss and evaluate changes of OPM usage in Germany by analyzing the adoption and the attributes of the payment methods as per Rogers's diffusion of innovation theory.

This paper is structured as follows: After the introduction in Section 1, Section 2 will present the literature regarding the adoption and diffusion of online services. In Section 3, the definition of OPMs will be described. Section 4 will give an overview about the research methodology. In Section 5, a short overview of Rogers's diffusion of innovation theory will be given, and an analysis of the OPMs in the German e-commerce market under the criteria of the diffusion theory will be illustrated. Section 6 closes this paper with an interpretation of the results and a short perspective regarding the future work.

2. Literature Review

As mentioned in Section 1, different studies with the aim of analyzing the usage and the most important criteria of OPMs have been done already. The OPM market includes four stakeholder groups: (a) consumers, (b) retailers/merchants, (c) financial institutions, and (d) infrastructure providers (Oh, 2006). In general, each group tries to reap their individual benefits out of the development of OPMs. These benefits need to overcompensate the evolving costs and risks in the development process. It can be expected that only if the critical mass of a specific OPM is reached can the positive network effects exceed the costs and perceived risks (Arthur, 1996; Hanseth,

2000; Oh, 2006; Shapiro & Varian, 1999). However, retailers are probably more interested in gaining knowledge about OPMs, since the right selection of OPMs has an economic impact for them. Therefore, various parties and systems are included in the development process of an OPM. From a retailer's perspective, there is often an interplay between providers, financial institutions, and services that implement the specific OPM (Oh, 2006). Here, the developers of an OPM have to deal with and bridge the problems of interoperability.

In this context, aspects of comfort, security, risk, and costs from both consumers' and retailers' points of view have to be reflected upon. When talking about the creation of value or costs, it is necessary to portray the role of payment service provider (PSP) in the online payment market. PSPs offer different payment-related services, like the technical integration of OPMs into online shops, the credit assessments of customers, management of online accounts (like online banking), or receivables management. The costs of OPMs include not only the costs of each OPM but also fees for using the services of the PSPs. Based on this, retailers can decide whether or to what extent they want to manage their OPMs via PSPs.

In this respect, it will be examined below which OPMs are being used by consumers and which are not, and why. Furthermore, the strengths and weaknesses of each system – including transaction costs, risks, size of payments, and payment time – need to be identified (Chau & Poon, 2003; Liao & Wong, 2004; Yu et al., 2002). These factors influence the conversion rates of consumers, which is an important parameter for the success of online retailers (Weinfurtner et al., 2013). For the satisfaction of potential customers, it is necessary to guarantee the integration of the most preferred OPMs. From the retailers' perspective, the (implementation) costs as well as the risks of OPMs must be taken into account. Furthermore, retailers should be aware of changes that could affect the future usage of OPMs and should adjust their portfolio regularly to improve their conversions and costs. The fact that 42.9 percent of German online shops still integrated new OPMs into their portfolio between 2013 and 2015 indicates a continuing fluctuation in the market (Klees et al., 2016).

However, consumers are more concerned about the security of their personal data, transactions/information exchange, and infrastructure (secure platform/infrastructure) of the OPM (Kumar Mohan & Gireesh Kumar, 2015; Oh, 2006). The transactions should not be time consuming (Oh, 2006), but security and trust (in transmission quality and mechanisms of the OPM) are crucial factors while using an OPM (Chen, 2008; Hankun et al., 2016; Kim et al., 2010; Lu & Su, 2009; Mahfuz et al., 2016; Tsiakis & Sthephanides, 2005; Wang et al., 2003; Zhong et al., 2013). In this regard, security and trust are the basic requirements for the use of OPMs (Castaneda & Montoro, 2007; Dinev & Hart, 2006). Consumers consider an OPM to be insecure if they perceive (a) system vulnerabilities (such as malware leaks), (b) unreliable devices, and/or (c) third-party access (Hankun et al., 2016; Wu & Fan, 2010; Yang et al., 2011). Consequently, security and trust would be among the major factors that decide whether an OPM would be used or not (Chen, 2008; Hankun et al., 2016; Kim et al., 2010; Lu & Su, 2009; Mahfuz et al., 2016; Tsiakis & Stephanides, 2005; Wang et al., 2003; Zhong et al., 2013).

Apart from the technical barriers for using OPMs, demographic factors like education and income also influence the adoption and usage of OPMs and other online services quite heavily (Liébana-Cabanillas et al., 2015; Sarel & Marmorstein, 2003a; Sarel & Marmorstein, 2003b; Teo et al., 2015). In the end, consumers are responsible for the transaction of the payment. In addition, consumers need to be motivated, because they are often in the old "cash on delivery" mind-set and prefer credit cards (Mishra et al., 2016; Wong et al., 2004), while culture and lifestyle positively enhance behavior in online banking and online payments (Wong et al., 2004). Due to state restrictions, usage hurdles can arise (Trappey & Trappey, 2001). Contrarily, retailers do consider the authenticity and verification of the financial transactions to a greater degree. At the least, there is a fear that they might not receive the payment from the consumer (Oh, 2006).

Despite the security risks and other lacking aspects, OPMs are economically reasonable, because they allow financial transactions in a convenient and time-saving way (AC Nielsen Consult, 2002; Howcroft et al., 2002;

Karjaluoto et al., 2002; Laforet & Li, 2005). A supportive fact is that internet penetration over the past ten years has increased quite heavily. Nowadays, about half of the world's population uses the internet (ITU, 2017). For the presented case in Germany, 87 percent of the population (older than 10 years) use the internet (Destatis, 2017). As consumers become more familiar with the frequent use of OPMs, this promotes the spread of OPMs in various areas of life (Bhattacherjee, 2002; Karjaluoto et al., 2002; Mukherjee & Nath, 2003; Thornton & White, 2001). Consequently, more and more people use OPMs for online services such as online shopping and entertainment. As mentioned above, the consumers prefer fast and convenient financial transactions. In addition, consumers rate service levels higher when transactions (for payments and banking) are faster, cheaper, and more convenient (Karjaluoto et al., 2002).

Following the study of Rogers (2003), it would be normally assumed that an innovation is fully adopted or does not reach the breakeven. Based on the literature, it is apparent that parameters like convenient and fast transactions support the adoption of OPMs, whereas lacking digital literacy of customers and security risks hinder the usage and adoption of OPMs. Due to this, payment methods have different advantages and disadvantages, and it can be expected that the degree of adoption of different OPMs varies. For this reason, it must be assumed that the different OPMs would not reach the degree of a full adoption, due to the diverse customer preferences. Therefore, this study will contribute to the existing research in the application of Rogers's diffusion of innovation theory in regard to nonappearance of a full adoption of an innovation. Based on a higher usage rate of the internet (Briglauer, 2014; ITU, 2014; Koutroumpis, 2009; Monopolkommission, 2011), it can be hypothesized that the degree of usage/adoption of OPMs increases over time, but it will not reach a degree of full adoption.

3. Definition of Online Payment Methods

Here, this study defines OPMs as payment methods that enable consumers to purchase products or services through an online shop, online service, or

entertainment application, regardless of the device used to fulfill this purchase.

Since the beginning of e-commerce, a variety of OPMs have been entering the market, often with a different functionality from the already existing OPMs. In general, this study follows the categorization by ibi research (consulting and research institute of the University of Regensburg), which sorted OPMs depending on their functionality. This led to the creation of the categories "classical payment methods", "card payments", "digital wallets", and "mobile payments" (Bolz et al., 2014). Unlike the study of ibi research, payments that are done using cards are also considered as classical payment methods. Due to the consideration of the time dimension between 1998 and 2015, several OPMs are not considered in this study, because new OPMs like "cryptocurrencies" are in the beginning of their diffusion process. Therefore, they have not reached a comparable level of diffusion like the other considered methods. Here, the OPMs that have comparable adoption and diffusion curves are discussed. This selection also follows the importance of OPMs in Germany. The considered OPMs – (a) invoice, (b) credit card, (c) direct debit, (d) prepayment, (e) cash on delivery, and (f) PayPal – are the most known and used OPMs in Germany (see Table 1.1).

4. Research Methodology

With an emerging e-commerce market worldwide, the need for research in this field is also increasing. Several research institutes publish different studies with the aim to deliver exhaustive information regarding the different aspects of e-commerce. However, one of the bigger topics are the OPMs, analyzed from a customer's and a retailer's point of view. A review of different studies revealed that similar aspects had been analyzed by different institutes, like the usage of OPMs by users or the supply of OPMs in online shops. The focus of these studies had mostly been to gather enough information so that executives could make decisions based on a comprehensive understanding of the online payment market. So far, only consumer payment studies conducted by the financial services firm Total System Services,

based on Rogers's diffusion of innovation theory, relied on the use of general payment methods (TSYS, 2016). They analyzed the percentage of usage for each payment method and plotted each on Rogers's bell-shaped curve in order to predict emerging trends. A problem, which derives from such an approach, is that the bell-shaped curve and the classification into adopter categories are based on a complete adoption of an innovation. Plotting payment methods into the bell-shaped curve based on consumer usage level at a certain time would be the wrong approach, since the bell-shaped curve only visualizes the adoption frequency of a normally and completely adopted innovation. So by doing so, it would be assumed that the adoption of every payment method was normally distributed without analyzing the adoption rate over time at all. Furthermore, the usage level does not describe the frequency but the cumulative adoption rate of an innovation, so it would have to be plotted into Rogers's S-shaped curve and not into the bell-shaped curve. Using Rogers's model to analyze the adoption of OPMs is certainly a good approach to improve predictions of usage for the future, but for a significant analysis the consideration of adoption over time is indispensable.

The previous sections have presented various reasons why consumers would or would not use an OPM. As introduced, the development of the adoption and diffusion of OPMs in markets depends on political, cultural, technical, and demographical aspects (Hankun et al., 2016). To get an overview about possible impact factors of the diffusion of OPMs, this study will exemplarily consider the development of market shares (based on number of customers) and the adoption/diffusion process of the OPM in the German electronic market. This analysis will be useful to build a base for further considerations and comparisons of the OPM diffusion process in different countries. Besides the acquisition of knowledge regarding the possible impact factors, it will be useful to figure out which OPMs are dominant in a market and why they have reached this market status.

Therefore, the research questions of this study are as follows: (a) How did consumers adopt OPMs in Germany in the past? (b) Which level of

adoption have they reached until today? and (c) How will they adopt OPMs in the future?

In order to visualize the cumulative curve and the frequency curve of adoption regarding Rogers, historic data on the offer of OPM options by the retailers and their use by the customers was necessary. For a continuous visualization of the consumer adoption rates, the data must have been polled in similar time intervals and the methodology must be comparable. After reviewing the history of OPM research in Germany, it turned out that only the series of studies from the Institut für Wirtschaftspolitik und Wirtschaftsforschung (IWW), an institute for economic policy and economic research at the University of Karlsruhe, in cooperation with the E-Commerce Center (ECC), a part of an institute for trade research in Cologne, fulfilled these requirements. In 1998, they had performed the first study regarding the usage of OPMs from a consumer's view, called the "Internet-Zahlungssysteme aus Sicht der Verbraucher" (IZV), which led to a series of eleven studies in total, from IZV1 to IZV11 (see Table 1.2).

5. Rogers's Diffusion of Innovation Study

This paper is oriented toward Rogers's diffusion of innovation study, in which he presents attributes that affect the adoption of an innovation and clusters adopters into categories. The attributes he defines are the following: (a) relative advantage, (b) comparability, (c) complexity, (d) trialability, and (e) observability (Rogers, 2003). Relative advantage is positively related to the adoption rate and is the degree to which an innovation is perceived better than the innovation it supersedes. Compatibility is positively related to the rate of adoption and describes the degree to which an innovation is compliant to existing values, experiences, and needs of the social system. Complexity is negatively related to the rate of adoption and describes the difficulty of understanding an innovation. Trialability is positively related to the rate of adoption and is the degree to which an innovation can be tried out before. Observability is positively related to the rate of adoption and is the degree to which the results of an innovation are visible to others.

One key aspect regarding the adoption of innovations is the rate of adoption, which is described as "the relative speed with which an innovation is adopted by members of a social system" (Rogers, 2003: 221). For the analysis of the adoption rate, Rogers visualized the frequency of adoption while observing his innovation examples over time, which resulted in a bell-shaped curve and in an S-shaped curve when cumulating the number of people who already adopted an innovation over time. Both curves are illustrated in Figure 1.1.

His studies also revealed that individuals of a social system do not adopt at the same time; thus, many different researchers defined different categories of adopters (Rogers, 2003). Rogers's approach was to divide adopters based on their innovativeness, where innovativeness is a relative dimension and the degree "to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system" (Rogers, 2003: 280). The foundation of Rogers's categorization is also based on the bell-shaped curve of adoption frequency, which also applies to a normal distribution, as discussed earlier. Therefore, he also applied further statistical parameters such as the mean and standard deviation to divide adopters into five categories. Since the bell-shaped curve describes the frequency of adoption for an innovation that is adopted by 100 percent of a social system, the mean of an adoption frequency arrives when 50 percent of the individuals are already adopters. The range of people who adopt among the mean and the mean minus one standard deviation are called the early majority, which is 34 percent of the social system. Next to them is the group of early adopters, which are among the range of the mean minus one standard deviation and mean minus two standard deviations. They account for 13.5 percent and adopt an innovation before the early majority. The first to adopt an innovation are the innovators, which include only 2.5 percent and are included in the range between zero and the mean minus two standard deviations. On the right side of the mean are the late majority, who are also 34 percent of the social system, and the laggards, who are the remaining 16 percent. Obviously, the late majority adopts an innovation after the early majority and are included in the range between the mean and the mean plus

one standard deviation, while the laggards are included thereafter, in the last range (Rogers, 2003). A visualized distribution of the adopter categories among the bell-shaped curve can be seen in Figure 1.1.

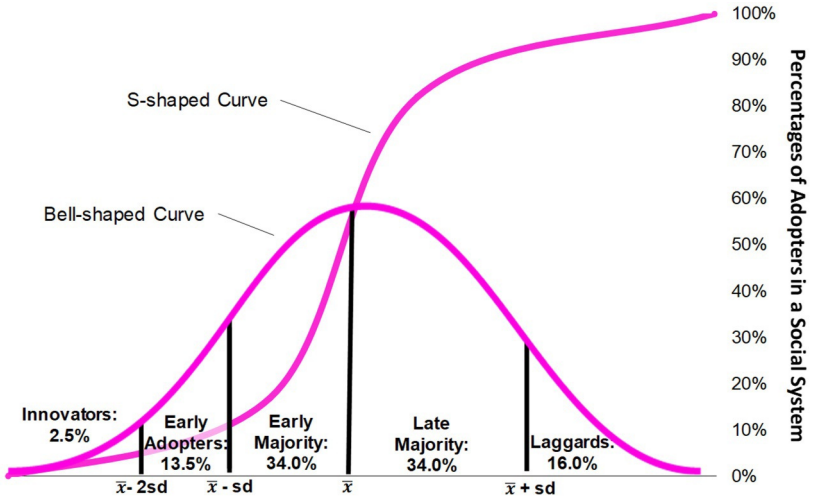

Figure 1.1: Cumulative Adopters, Adoption Frequency, and Adopter Categories (Rogers, 2003)

6. Analyzing the Consumers' Adoption of Different Online Payment Methods in Germany

Before accomplishing the adoption analysis of OPMs through consumers in Germany, it had to be defined how to understand adoption in the case of OPM usage. Rogers defines adoption as the "decision to make full use of an innovation as the best course of action available" (Rogers, 2003: 177). In terms of OPM usage, it cannot be assumed that a consumer is able to make full use of only one payment method, since the selection of an OPM depends on the availability of that OPM in an online shop. Therefore, customers probably adopted several OPMs over time. To analyze this adoption, a questionnaire was developed.

Based on the review of the studies of the IWW and the ECC, a questionnaire was developed to collect data on OPMs used by consumers. The results of this survey were the basis for the adoption analysis, but it was necessary to correct the results (percentages) since it cannot be assumed that an OPM could be seen as adopted if it was used only once. A similar questionnaire was surveyed by ibi research in 2012. They surveyed not only if customers used an OPM at least once but also if they had used the OPM in the past twelve months (Weinfurtner et al., 2013). In this respect, it was assumed that the results of this survey are the best possible estimate for the adoption. The ratio between the overall usage and the usage in the past twelve months was calculated for each OPM and applied for every result of the studies from the IWW and the ECC in order to estimate the adoption level for every year. In addition, not every OPM was included in the analysis. Rather, there was a focus on the OPMs with the highest utilization rates (in Germany). This resulted in the selection of the invoice, direct debit, cash on delivery, prepayment, credit card, and PayPal payment methods. An overview of the calculated ratios is provided in Table 1.1 for each of the selected OPMs.

Table 1.1: General Usage and Usage in the Past Twelve Months by OPM

Payment Methods	ibi research: General Usage of OPMs by Customers (%)	ibi research: Usage in the past twelve months (%)	Ratio (%)
Invoice	87.00	71.00	81.61
Direct Debit	72.00	54.00	75.00
Cash on Delivery	30.00	5.00	16.67
Prepayment	74.00	34.00	45.95
Credit Card	83.00	74.00	89.16
PayPal	70.00	58.00	82.86

For an adequate visualization of the cumulative adoption and the frequency of adoption, the knowledge about the timing of the studies was necessary. Most studies were evaluated over several months, so the month in the middle of this time period was set as the moment of the adoption. Since the

results of IZV1 and IZV2 were only found summarized in the publication of IZV5 (Ketterer et al., 2002), a month in between both studies were set as the moment of the adoption. Furthermore, some of the studies are not representative, so the analysis of adoption can only be seen as a rough estimation. A detailed description of each study, containing the period of time and the level of representativeness, is presented in Table 1.2.

There are further limitations as the questionnaires differ from year to year. During IZV4 and IZV5, the credit card option was divided into three sub-options. Consumers could choose between credit card payments with SET or SSL encryption and credit card payments without encryption. All these methods were summed up under the option "credit card."

A special approach was necessary for IZV5, IZV6, and IZV8. These studies divided the sample into two different groups regarding the way they were selected. If the customers were made aware of the study through a provider of OPMs, they were allocated to the second group in IZV5 (Ketterer et al., 2002) and IZV6 (Ketterer et al., 2003) and to the first group in IZV8 (Krüger et al., 2006); all other customers were allocated to the other group. Therefore, only the other groups were considered for the analysis of adoption in order to ensure undistorted results.

The OPM direct debit was surveyed as paper-based direct debit and online direct debit in IZV6 till IZV8. Since the sum of both percentages even exceeded 100 percent in the IZV6, there are obviously overlapping effects between both options. Therefore, the percentages for direct debit between IZV6 and IZV8 will not be part of the adoption analysis.

Table 1.2: Studies Used for the Analysis of Consumers' Adoption in Germany

Study	Period of Time When Surveying Consumers	Set Moment of Time	Representativeness of Sample	Reference
IZV1 + IZV2	October 1998–January 1999 (IZV1) and April–July 1999 (IZV2)	February 1999	No information	(Ketterer et al., 2002: 2–9)
IZV3	November 22, 1999–January 25, 2000	December 1999	No, because of the self-selection of the sample	(Ketterer, 2000: 2–12)
IZV4	November 15, 2000–January 31, 2001	December 2000	No, because of the self-selection of the sample	(Ketterer, 2001: 2–24)
IZV5	December 2001–February 2002	January 2002	No estimation done by the institute	(Ketterer et al., 2002: 9–22)
IZV6	December 2002–February 2003	January 2003	No estimation done by the institute	(Ketterer et al., 2003: 5–51)
IZV7	March–May 2004	April 2004	No, because of the excess of technology-affine men	(Krüger & Leibold, 2004: 5–45)
IZV8	August–October 2005	September 2005	No, because of the excess of young, highly educated, and experienced men	(Krüger et al., 2006: 6–46)
IZV9	August 2008	August 2008	No, because of the excess of men	(Krüger et al., 2008: 9)
IZV10	December 2010	December 2010	Yes	(Rodenkirchen & Krüger, 2011: 6–15)
IZV11	December 2012	December 2012	No information	(Klees et al., 2013a: 2–4)
IZ 2013	October 2013	October 2013	Yes	(Klees et al., 2013b: 12–24)
ECC Vol. 19	December 2014	December 2014	Yes	(Klees et al., 2015: 23–68)
ECC Vol. 20	December 2015	December 2015	Yes	(Klees et al., 2016: 13–58)

Another issue regarding the studies IZV6, IZV7, and IZV8 was that the results for PayPal had been counted together with other OPMs that required an e-mail address. The option "e-mail" included (a) in IZV6, PayPal and Anypay; (b) in IZV7, PayPal, Moneybookers, and other options based

on an e-mail; and (c) in IZV8, PayPal and Moneybookers. Thus, the percentage points for PayPal were estimated by taking half of the percentages for the option "e-mail" for IZV6 and IZV8 and a third of the percentages for IZV7. IZV9 was the only study that examined only the use for the past six months and did not contain any general analyses or statements on the use of the OPMs. Therefore, IZV9's data could not be used for the adoption analysis at all. Even though the ECC did evaluate the question of general usage of OPMs (in the ECC payment study Vol. 20), they only published percentages of awareness and no further information regarding the usage (Klees et al., 2016). Thus, this study could not be used for the adoption analysis. After considering these restrictions, a graph that describes the cumulative number of adopters was visualized for each OPM and compared to the S-shaped curve of a completely and normally adopted innovation regarding Rogers (see Figure 1.2).

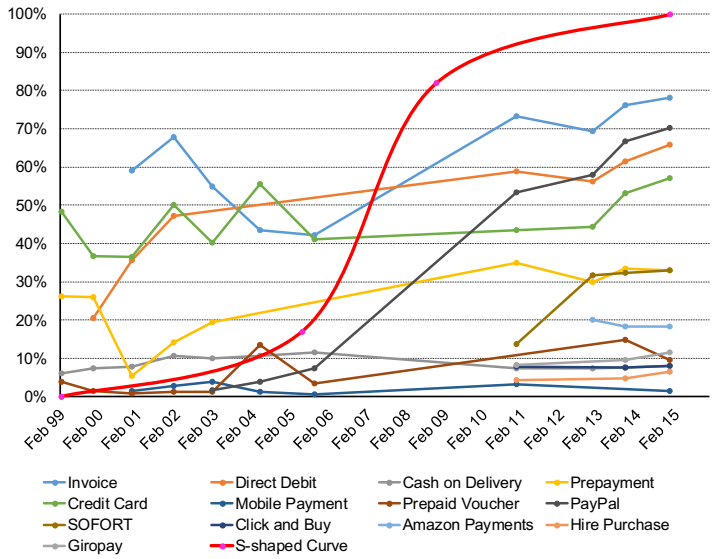

Figure 1.2: Curves of the Cumulative Number of Consumers' Adoption of Each OPM, Based on the Studies from the IWW and the ECC

Similar to that, the frequency of adoption was visualized in Figure 1.3. Frequency was calculated by subtracting the cumulative number of the previous point of measurement from the cumulative number of adoption at the point of measurement.

As might be expected, the classical payment methods invoice, credit card, direct debit, and prepayment already had a high adoption level around the year 2000, since these OPMs were already in use. The adoption levels of these OPMs have not changed significantly in the past 16 years, except for some deviations that could also be justified by the unrepresentative samples of the IZV studies at that time (Ketterer, 2000). We can also assume that these OPMs were not perceived as innovations since Rogers defined an innovation as an idea, practice, or object that is perceived as something new (Rogers, 2003). In fact, none of the OPMs reached 100 percent usage, which indicates incomplete adoption for each of these OPMs, what is not surprising since they are all competing innovations.

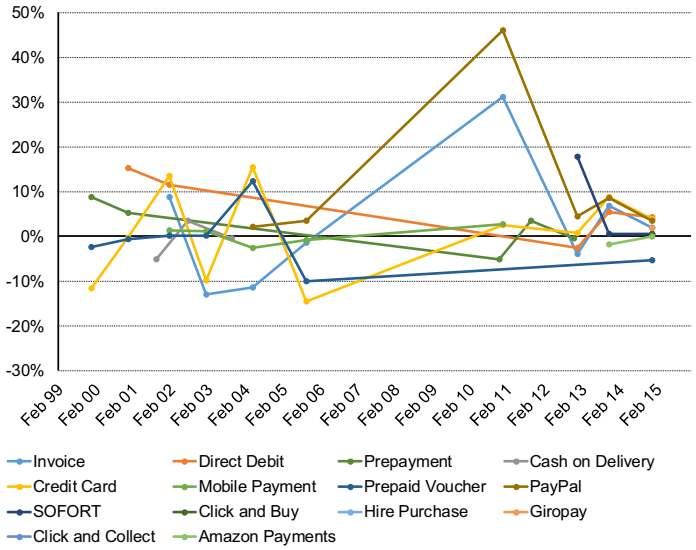

Figure 1.3: Frequency Curves of Consumers' Adoption of Each OPM, Based on the Studies from the IWW and the ECC

However, it is also noteworthy that the new OPM PayPal is now one of the most adopted OPMs in Germany. It is the only OPM for which adoption over time seems to be normally distributed, similar to the S-shaped and bell-shaped curves of Rogers. Rogers suggested that the adoption rate of an innovation starts decreasing after reaching the mean, which would be the point after 50 percent of all German online shoppers adopted an OPM. When looking at the year 2010, we see that after 50 percent of the consumers adopted PayPal, the frequency started decreasing, similar to a normal distribution. So following Rogers, the OPM PayPal fulfills the five determining attributes for adoption in a positively affecting manner. Since PayPal seems to be successfully and normally adopted, Rogers's approach of adopter categorization can also be applied. The cumulative number of adoption through customers amounted to 70.18 percent, which states that adoption had reached the late majority stage. Nevertheless, the successful adoption of PayPal so far does not assure a complete adoption, because as already discussed in the beginning, OPMs are all competing innovations. As long as customers can choose between several OPMs in an online shop, users who want to avoid paying with PayPal can still select an alternative payment option. In this context, it should not be expected that any of the OPMs would ever reach a complete adoption.

In general, due to the increased importance of e-commerce, the usage of the different kinds of OPMs increases over time (see Figure 1.2). This development will be generally supported by (a) a higher degree of broadband infrastructures, (b) increased broadband internet penetration, and (c) a greater supply of internet services, which lead to a higher usage of digital transactions (Briglauer, 2014; ITU, 2014; ITU, 2017; Koutroumpis, 2009; Mishra et al., 2016; Monopolkommission, 2011). Therefore, more and more people use OPMs to do digital transactions and each of the presented OPMs shows an increasing usage over time.

As mentioned above, the different kinds of OPMs compete with each other, and therefore, it must be expected that with the significant rise of PayPal, the other traditional methods like prepayment, credit card, and direct debit increase in a relatively low degree or (will) decrease (see Figure

1.2). However, OPMs are put under pressure not only by the introduction of PayPal. For example, if one looks at the beginning of the introduction of OPMs in Figure 1.2, it can be seen that the adoption of the prepayment method has been significantly reduced by the introduction of direct debit and payment on account. This development is not surprising, as invoice payment and direct debit are more customer-friendly than prepayment.

In combining the knowledge of a greater customer base and the curves in Figure 1.2, new customers mostly use the OPMs PayPal, invoice, and direct debit, because these three OPMs show the strongest increase over the considered period. This would be supported by the fact that customers prefer to use an option to pay online that they are already familiar with (lock-in effect). Therefore, customers only switch to a new payment option if the new method would be more useful in a significant number of criteria or if they use an internet service for which the new OPM is necessary.

Of course, different internet services have implemented different types of OPMs, depending on their business model and the preferences of their customers. Based on Figure 1.2, it is therefore no wonder that internet services and retailers have mostly implemented the OPMs PayPal, direct debit, credit card, and invoice. Since retailers get secure and direct financial transactions from the customers through PayPal, direct debit, or credit card for online transactions, it is to be expected that the retailers prefer implementing these payment methods in their online shops. Therefore, the customers who want to use these merchants' shops are virtually forced to adopt these payment methods.

To sum up, the adoption or rejection of an OPM depends on (a) the customers and their decision about security and convenience, (b) retailers and their decision about the practicability and security of financial transactions, and (c) competition between the different OPMs. In further research, the examination of customer adoption must be considered together with the retailer adoption of the OPM.

7. Conclusion

The analysis shows that invoice and PayPal are the most frequently used OPMs in Germany, while classical OPMs such as direct debit, credit card, and prepayment are just behind. The high adoption of PayPal can be explained when taking notice of the five attributes that Rogers defined as affecting the adoption of an innovation. The relative advantage of PayPal over all pre-existing OPMs is that it has a much easier and faster payment process, since the customer only needs to log in via e-mail and password during the online purchase to initiate the payment. It is also less complex than most other OPMs since the customer can enter the data during the payment process and does not need to visit any other websites. Since a PayPal account can be easily opened up online and without any delay, the trialability of it is very low, which also positively affects the adoption rate as per Rogers's theory.

The observability of PayPal does not really differ from that of other OPMs. In terms of system comparability, PayPal differs from the other payment methods, as PayPal initially requires (online) registration, which can have a negative impact on acceptance by (new) customers in Germany. One key aspect of all classical payment methods is that adoption of these OPMs probably would not increase in the future, since Figure 1.2 illustrates very well that the adoption has stayed constant over time. However, some current changes in the payment industry could still cause a change in the usage of classical OPMs. The introduction of instant payments had a positive effect on prepayments, since retailers would receive the money instantly and not with at least one working day's delay. (Weinfurtner & Stahl, 2016). On the other hand, once the initial barriers are overcome, PayPal is very easy and comfortable to handle, which explains the high acceptance rate and similarity with Rogers's normal distribution curve. Probably the biggest advantage of invoice payments is the possibility to pay with a delay of mostly 14–30 days after the product has been successfully shipped and assessed by the buyer. But PayPal has also announced a new feature that allows payments after 14 days (PayPal, 2018).

An overall aspect that could have a negative effect on all of the presented OPMs could be the rise of mobile payments in Germany. If providers like Apple Pay or Android Pay finally enter the German market, they could gain huge numbers of subscribers, since there is no real competitor in Germany at the time and these two payment methods also allow their customers to use their mobile wallets for online purchases. Considering this, the adoption rate for mobile payments in online shops will probably increase.

In summary, it can be concluded that even if the observed OPMs are already in a late stage of adoption, future changes in usage will probably occur due to technical or legal changes in the payment context, as in the examples mentioned earlier. Especially, the adoption of mobile payments will be a huge driver in the payment industry and could be an interesting focus for future studies.

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Analysis of Travel Blogs by Means of NoSQL Techniques: First Results

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Abstract—By means of mobile apps, travelers are able to share their experiences during trips. Thus, large amounts of user-generated content are created that describe the experiences of travelers on their trips around the world. This information is of interest for future travelers and for travel destinations. Travel reports, which have been posted on one travel blog platform covering all continents, were analyzed by means of NoSQL technologies. In order to start an evaluation, two countries were selected. In this paper, the results for New Zealand and Thailand are presented. A geographical visualization gives first insights into how travelers are distributed across a country. In order to explain the geographical distribution across a country, the report's content is investigated, additionally. First results show that travel reports can be assigned to places of interests or to different destinations.

Keywords—MapReduce, NoSQL, New Zealand, Thailand, travel blogs, visualization.