

A Comparison of Online Banking in the Czech Republic and in Other Selected EU Countries

Petra Nagyová

Bachelor's Thesis
2020



Tomas Bata University in Zlín
Faculty of Humanities

Univerzita Tomáše Bati ve Zlíně

Fakulta humanitních studií

Ústav moderních jazyků a literatur

Akademický rok: 2019/2020

ZADÁNÍ BAKALÁŘSKÉ PRÁCE

(projektu, uměleckého díla, uměleckého výkonu)

Jméno a příjmení:	Petra Nagyová
Osobní číslo:	H170420
Studijní program:	B7310 Filologie
Studijní obor:	Anglický jazyk pro manažerskou praxi
Forma studia:	Prezenční
Téma práce:	Porovnání online bankovníctví v České republice a ve vybraných zemích EU

Zásady pro vypracování

Shromáždění materiálů k tématu
Studium odborné literatury
Formulace cílů práce
Analýza vybraných zemí
Vyvození a formulace závěrů práce


Forma zpracování bakalářské práce: **Tištěná/elektronická**
Jazyk zpracování: **Angličtina**

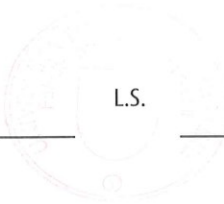
Seznam doporučené literatury:


- Khan, Fatima Hajera. 2017. „E-Banking: Benefits and Related Issues.“ *American Research Journal of Business and Management* 3, no. 1: 1-7
- Mejstřík, Michal, Magda Pečená, and Petr Teplý. 2014. *Bankovníctví v teorii a praxi: Banking in Theory and Practice*. Prague: Carolinum.
- Onyiriuba, Leonard. 2016. *Bank Risk Management in Developing Economies*. London: Academic Press.
- Reed, Chris, Ian Walden, and Laura Edgar, eds. 2014. *Cross Border Electronic Banking: Challenges and Opportunities*. 2nd ed. Abingdon: Routledge.
- Shah, Mahmood, and Steve Clarke. 2009. *E-Banking Management: Issues, Solutions, and Strategies*. Hershey, PA: Information Science Reference.

Vedoucí bakalářské práce: **Ing. Šárka Papadaki, Ph.D.**
Ústav podnikové ekonomiky

Datum zadání bakalářské práce: **8. listopadu 2019**
Termín odevzdání bakalářské práce: **11. května 2020**


Mgr. Libor Marek, Ph.D.
děkan


L.S.


Mgr. Roman Trušník, Ph.D.
ředitel ústavu

Ve Zlíně dne 27. února 2020

PROHLÁŠENÍ AUTORA BAKALÁŘSKÉ PRÁCE

Beru na vědomí, že

- odevzdáním bakalářské práce souhlasím se zveřejněním své práce podle zákona č. 111/1998 Sb. o vysokých školách a o změně a doplnění dalších zákonů (zákon o vysokých školách), ve znění pozdějších právních předpisů, bez ohledu na výsledek obhajoby ¹⁾;
- beru na vědomí, že bakalářská práce bude uložena v elektronické podobě v univerzitním informačním systému dostupná k nahlédnutí;
- na moji bakalářskou práci se plně vztahuje zákon č. 121/2000 Sb. o právu autorském, o právech souvisejících s právem autorským a o změně některých zákonů (autorský zákon) ve znění pozdějších právních předpisů, zejm. § 35 odst. 3 ²⁾;
- podle § 60 ³⁾ odst. 1 autorského zákona má UTB ve Zlíně právo na uzavření licenční smlouvy o užití školního díla v rozsahu § 12 odst. 4 autorského zákona;
- podle § 60 ³⁾ odst. 2 a 3 mohu užít své dílo – bakalářskou práci - nebo poskytnout licenci k jejímu využití jen s předchozím písemným souhlasem Univerzity Tomáše Bati ve Zlíně, která je oprávněna v takovém případě ode mne požadovat přiměřený příspěvek na úhradu nákladů, které byly Univerzitou Tomáše Bati ve Zlíně na vytvoření díla vynaloženy (až do jejich skutečné výše);
- pokud bylo k vypracování bakalářské práce využito softwaru poskytnutého Univerzitou Tomáše Bati ve Zlíně nebo jinými subjekty pouze ke studijním a výzkumným účelům (tj. k nekomerčnímu využití), nelze výsledky bakalářské práce využít ke komerčním účelům.

Prohlašuji, že

- elektronická a tištěná verze bakalářské práce jsou totožné;
- na bakalářské práci jsem pracoval samostatně a použitou literaturu jsem citoval. V případě publikace výsledků budu uveden jako spoluautor.

Ve Zlíně

....

.....

1) zákon č. 111/1998 Sb. o vysokých školách a o změně a doplnění dalších zákonů (zákon o vysokých školách), ve znění pozdějších právních předpisů, § 47b Zveřejňování závěrečných prací:

(1) Vysoká škola nevydělečně zveřejňuje disertační, diplomové, bakalářské a rigorózní práce, u kterých proběhla obhajoba, včetně posudků oponentů a výsledku obhajoby prostřednictvím databáze kvalifikačních prací, kterou spravuje. Způsob zveřejnění stanoví vnitřní předpis vysoké školy.

(2) Disertační, diplomové, bakalářské a rigorózní práce odevzdané uchazečem k obhajobě musí být též nejméně pět pracovních dnů před konáním obhajoby zveřejněny k nahlázení veřejnosti v místě určeném vnitřním předpisem vysoké školy nebo není-li tak určeno, v místě

pracoviště vysoké školy, kde se má konat obhajoba práce. Každý si může ze zveřejněné práce pořizovat na své náklady výpisy, opisy nebo rozmnoženiny.

(3) Platí, že odevzdáním práce autor souhlasí se zveřejněním své práce podle tohoto zákona, bez ohledu na výsledek obhajoby.

2) zákon č. 121/2000 Sb. o právu autorském, o právech souvisejících s právem autorským a o změně některých zákonů (autorský zákon) ve znění pozdějších právních předpisů, § 35 odst. 3:

(3) Do práva autorského také nezasahuje škola nebo školské či vzdělávací zařízení, užije-li nikoli za účelem přímého nebo nepřímého hospodářského nebo obchodního prospěchu k výuce nebo k vlastní potřebě dílo vytvořené žákem nebo studentem ke splnění školních nebo studijních povinností vyplývajících z jeho právního vztahu ke škole nebo školskému či vzdělávacího zařízení (školní dílo).

3) zákon č. 121/2000 Sb. o právu autorském, o právech souvisejících s právem autorským a o změně některých zákonů (autorský zákon) ve znění pozdějších právních předpisů, § 60 Školní dílo:

(1) Škola nebo školské či vzdělávací zařízení mají za obvyklých podmínek právo na uzavření licenční smlouvy o užití školního díla (§ 35 odst. 3). Odpirá-li autor takového díla udělit svolení bez vážného důvodu, mohou se tyto osoby domáhat nahrazení chybějícího projevu jeho vůle u soudu. Ustanovení § 35 odst. 3 zůstává nedotčeno.

(2) Není-li sjednáno jinak, může autor školního díla své dílo užit či poskytnout jinému licenci, není-li to v rozporu s oprávněnými zájmy školy nebo školského či vzdělávacího zařízení.

(3) Škola nebo školské či vzdělávací zařízení jsou oprávněny požadovat, aby jim autor školního díla z výdělku jím dosaženého v souvislosti s užitím díla či poskytnutím licence podle odstavce 2 přiměřeně přispěl na úhradu nákladů, které na vytvoření díla vynaložily, a to podle okolností až do jejich skutečné výše; přitom se přihlédne k výši výdělku dosaženého školou nebo školským či vzdělávacím zařízením z užití školního díla podle odstavce 1.

ABSTRAKT

Czech abstract

Cílem bakalářské práce je provést analýzu a porovnat online bankovníctví ve vybraných evropských zemích se zaměřením na osvojení internetového bankovníctví, bankovní poplatky a zabezpečení. Bakalářská práce se dělí na dvě části, teoretickou a praktickou. V teoretické části se nejprve zaměřuji na popis elektronického bankovníctví, typy služeb a jeho vývoj. Dále jsou zmíněny výhody a nevýhody internetového bankovníctví a rovněž oblast zabezpečení. Pátá kapitola je úvodem do internetového bankovníctví v EU, čímž práce zároveň přechází do části praktické. Praktická část je věnována charakteristice elektronického bankovníctví ve vybraných evropských zemích, konkrétně v České republice, Německu, a Dánsku. Na závěr je pak Česká republika porovnána s těmito zeměmi.

Klíčová slova: internetové bankovníctví, bankovní poplatky, bankovní služby, zabezpečení, rizika, porovnání

ABSTRACT

English abstract

The aim of the bachelor thesis is to analyze and compare online banking in selected European countries with a focus on the adoption of internet banking, bank fees, and the security. The bachelor thesis is divided into two parts, theoretical and practical. In the theoretical part, I firstly focus on the description of electronic banking, types of services, and its development. The advantages and disadvantages of internet banking are also mentioned, as well as the area of security. The fifth chapter is an introduction to internet banking in the EU, which also turns the work into a practical part. The practical part is devoted to the characteristics of electronic banking in selected European countries, specifically in the Czech Republic, Germany, and Denmark. Finally, the Czech Republic is compared with these countries.

Keywords: internet banking, bank fees, banking services, security, risks, comparison

ACKNOWLEDGEMENTS

First of all, I would like to express sincere gratitude to my supervisor Ing. Bc. Šárka Papadaki, Ph.D. for her valuable advice to my Bachelor's thesis. Secondly, I would like to thank my parents for giving me the chance to study and for their endless support. Lastly, I would also like to thank my friends who have supported me all the time.

I hereby declare that the print version of my Bachelor's/Master's thesis and the electronic version of my thesis deposited in the IS/STAG system are identical.

CONTENTS

INTRODUCTION	10
I THEORY	11
1 DEFINITION OF E-BANKING	12
1.1 TYPES OF ELECTRONIC BANKING	12
1.1.1 Electronic funds transfers or EFT	12
1.1.2 ATMs (Automated Teller Machines).....	12
1.1.3 Credit and Debit cards.....	13
1.1.4 Home banking	13
1.1.5 Internet banking/ Smart banking.....	13
1.1.6 Mobile banking / Smartphone banking.....	14
1.1.7 Phone banking / Telebanking.....	14
1.1.8 GSM banking	15
1.1.9 WAP banking.....	15
2 THE EVOLUTION OF E-BANKING.....	16
3 PROS AND CONS OF E-BANKING	17
3.1 THE ADVANTAGES OF INTERNET BANKING.....	17
3.1.1 Consumer Base.....	17
3.1.2 Efficiency	17
3.1.3 Customer Service	17
3.1.4 Image.....	18
3.1.5 Choice and Convenience for Customers	18
3.1.6 Better consumer interest rates, cost reduction.....	18
3.2 THE DISADVANTAGES OF INTERNET BANKING.....	18
3.2.1 Bank relationships	19
3.2.2 Transaction issues	19
3.2.3 Service problems	19
3.2.4 Security Direct	19
4 INTERNET BANKING SECURITY.....	20
4.1 THE PIN AND TAN SYSTEM	21
4.1.1 An additional way of sending TANs to an internet banking user.....	21
4.2 SIGNATURE.....	21
4.3 ANONYMITY	21
4.4 AUTHENTICATION.....	22
4.5 DIVISIBILITY.....	22
4.6 ATTACKS	22
4.6.1 Phishing.....	23
4.6.2 Pharming	23
II ANALYSIS	24
5 INTRODUCTION TO INTERNET BANKING IN THE EUROPEAN UNION.....	25
6 INTERNET BANKING IN THE CZECH REPUBLIC.....	27

6.1	BANK FEES.....	27
6.2	ADOPTION OF USING INTERNET BANKING	30
6.3	SECURITY	32
7	INTERNET BANKING IN GERMANY.....	34
7.1	BANK FEES.....	34
7.2	ADOPTION OF USING INTERNET BANKING	35
7.3	SECURITY	37
8	INTERNET BANKING IN DENMARK.....	39
8.1.1	Dankort.....	39
8.1.2	NemKonto	39
8.1.3	NemId.....	40
8.2	BANK FEES.....	40
8.3	ADOPTION OF USING INTERNET BANKING	42
8.4	SECURITY	43
8.4.1	eSafeID.....	44
9	COMPARISON.....	46
9.1	BANK FEES.....	46
9.2	ADOPTION OF USING INTERNET BANKING	47
9.3	SECURITY	48
	CONCLUSION	50
	BIBLIOGRAPHY	51
	LIST OF ABBREVIATIONS	56
	LIST OF FIGURES	57
	LIST OF TABLES	58

INTRODUCTION

Since banking products and interest rates have become less diverse, banks are trying to offer unique services to attract new customers. Furthermore, an easy-to-use system needs to be designed to meet all the user's needs while being safe. Bank customers, especially the older population, have also to familiarize themselves with electronic banking systems and their advantages. E-banking enables a bank to bring banking services directly to a client's home or office, and expand its relationship with its customers.

In addition to these opportunities and advantages, E-banking offers financial institutions risks, in particular the increased use of IT. Thus, each bank has to adopt various approaches and strategies for e-banking. Efficient and high-quality online support is the key to the success of e-banking services.

The security concerns are also discussed and how they should be managed effectively. The main practical part of this thesis analyses the current situation of internet banking in European countries. The first part discusses the banking generally, technology, security, and the development of online banking. The theoretical section consists of four chapters which serve as the basis for the research work.

The purpose of this analysis is to demonstrate that online banking transactions are rapidly grow and became more and more used. The first chapter describes in detail the status of e-banking, and the major e-banking services available to European bank customers. The second chapter describes the evolution of internet banking. Chapter three of this study examines the advantages and disadvantages of the banks as well as from the customers' side. The fourth chapter analyzes the importance of the level of security required by eBanks, the advanced technologies to verify the bank's identity and the customer's identity, potential threats, and cyber-attacks. Finally, it seeks to document the situation of the internet banking in the EU countries in the empirical part of this thesis. It provides an insight into current situation of e-banking in terms of products offered by banks, and at the same time how adoption of e-banking has changed in the Czech Republic during the last few years and what it has been like in other selected European countries, concretely in Germany and Denmark.

I. THEORY

1 DEFINITION OF E-BANKING

Typically, electronic banking (e-banking) payment products can be understood according to Mejstřík et al. as “a payment system, in which every interaction between a client and a bank or the use of a bank product is done via the internet.” (Mejstřík et al., 2014, 427)

In other words, Khan’s definition of e-banking is “an umbrella term for the process by which a customer may perform banking transactions electronically, rather than by check or cash and visiting a branch. E-banking also includes the systems that enable customers of banks, individuals or businesses, to access accounts, transact business, or obtain information on financial products and services through a public or private network, including the Internet.” (Khan, 2017, 1)

1.1 Types of electronic banking

Financial services are one of the most essential businesses in developed economies. Inside this, the largest sector is banking. There are several types of banks differing in the type and number of services they provide. (Shah, 2009)

1.1.1 Electronic funds transfers or EFT

Electronic Funds Transfer (EFT) is a system fund, whereby anyone who needs to make payment to another person/company can approach his/her bank and make a cash payment or give the authorization to transfer funds directly from his/her account to the bank account of the receiver. Details such as the receiver’s name, bank account number, account type (savings or current account), bank name, city, branch name, etc. ought to be outfitted to the bank at the time of requesting, so that money comes to the receiver’s account accurately and in a shorter period of time. (Miryala, 2015)

1.1.2 ATMs (Automated Teller Machines)

Automatic Teller Machine (ATM) is an electronic device in a public place, which empowers the clients of the bank to conduct financial transactions 24 hours a day, seven days a week. It could be a gadget that permits client who has an ATM card to perform schedule managing account exchanges without the help of the bank staff. In expansion to cash withdrawal, ATMs can be utilized for payment of utility bills, transfer money between their bank accounts, store of cheques and cash into accounts, etc. (Miryala, 2015)

1.1.3 Credit and Debit cards

Credit / Debit cards are being broadly utilized within the nation as they give a valid form of making payments for products and services instead of cheques and cash. Banks issue credit cards to their clients. (Miryala, 2015) The debit card can only be obtained by the client who has money in a bank account at any given time. In contrast, the credit card shows the loan that the client draws and pays interest after a specified time. (Bank of America, 2019)

1.1.4 Home banking

Home banking is a service which is used by a bank customer to handle his/her bank account through a personal computer, at home or in the office. The main features of home banking systems are the high level of security, comfort, ease of use, the openness of the system, extensive communication options, networking, definition of users and their rights, automated data transmission, and the option to define a combined signature specimen. A bank computer program and a client computer program are two parts of home banking. The bank program serves as a communication server. It receives calls, verifies customer identities, receives, or sends data to clients, and generates digital receipts. (Chovancová, 2006)

1.1.5 Internet banking/ Smart banking

Internet Banking is a platform to operate several online banking purchases through a personal computer. Internet banking may be accessed either from the house or office or from any public place, although for security reasons is advised not to be used in public places. Despite this, a client must first ask for an identification code and that is the reason why he/she cannot avoid visiting the bank. After opening the website of the bank, the consumer merely chooses internet banking and, in addition to appropriate identification, can carry out passive or active operations. As much resources as practicable can be provided through solid internet banking. Strong internet banking can offer as many services as possible. The graphical interface, transparency, simplicity, and unambiguity of use are no less essential. Comprehensibility of the language defines the consistency and level of interpretation of menu items, data fields and general text information sent to a customer. (Chovancová, 2006)

1.1.6 Mobile banking / Smartphone banking

M-banking is a way of banking in which the client can check or transact from his/her account from any place within the world with the assistance of his/her mobile. (Miryala, 2015)

SMS banking is a form of mobile banking that uses short text messages sent through the mobile phone of the client. The client will automatically receive information about the balance of his/her account: an SMS is sent to the client directly after particular activity or on request the client sends the bank correctly. Data sent on request primarily concerns current interest rates or currency exchange rates. This task is easy for the bank because the information is publicly available, and no protection is needed. A client can request information on the balance in his/her account, which is not public information and must be protected when it is received.

For this reason, passwords are used. The client must know the code of each transaction, including constant and variable symbols. Occasionally, the entire message containing data separated by symbols has up to fifty characters, and that is the main reason why users can make mistakes easily. This is often a limiting factor for customers, which reduces the comfort factor in this service. (Chovancová, 2006)

Mobile banking began catching on in 2007 when the iPhone first came out.

Over the years, the mobile banking experience has come a long way thanks to advancements in data sharing and other behind-the-scenes technologies improving.

In 2010, according to A. Ianniciello, vice president of consumer and Mbanking at Q2. "Mobile banking was almost a novelty and it was about the size of the device."

Mobile banking applications will inform the user in case of overspending more than is the limit, instantly transfer money and help control limits on his/her cards to minimize spending. The applications also enable providing services such as getting account updates, taping a button on a bank app to contact a customer service agent, or making payments by peer-to-peer. (Wisniewski, 2020)

In 2019, a new trend offering mobile wallets was introduced. Digital wallets provide users with the option to connect debit or credit cards with their smartphones, allowing them to make contactless payments in online stores. (Phaneuf, 2019)

1.1.7 Phone banking / Telebanking

Bank gives the customer a telebanking number through a mobile or a landline from anywhere, and the client can get to his account with the help of the user-friendly menu. Telebanking encourages the client to do whole non-cash related banking on the phone.

Beneath this Programmed Voice Recorder is utilized for less stressful inquiries and exchanges. For complicated inquiries and exchanges, we use manned phone terminals. Bank provides a customer with a telebanking number from anywhere via smartphone or on-line, and the customer can reach his account with a user-friendly interface. Telebanking allows the user to conduct whole non-cash banking on the internet. Within this programmed voice recorder, less intense enquiries and conversations are included. They use staffed mobile terminals for complex inquiries and exchanges.

(Essays UK, 2018)

1.1.8 GSM banking

GSM banking, in other words, mobile banking, is the communication medium supporting communication with the bank via mobile phones. GSM SIM Toolkit is a software interface that makes arbitrary changes to the mobile phone screen. SIM Toolkit technology is based on the principle that the monetary institute uploads a special application to the client of the mobile phone, which is automatically incorporated into the device menu. This means that only the functions that are activated and paid for will appear on the user menu. For using this service, the client must be a member of a bank offering to administer accounts through the GSM SIM Toolkit, have a mobile phone supporting the GSM SIM Toolkit system, and use a special SIM card for banking services. (Chovancová, 2006)

1.1.9 WAP banking

WAP is regularly contrasted with web pages. Unlike web pages that show up on a PC screen, WAP shows its output on a small mobile phone display, and for this reason, WAP specializes mainly in text data. Through WAP banking utilizing a mobile phone and authorization symbols, it is possible to get information about transaction history or account balance, check current currency rates, deposit term deposits, etc. One necessity for using the service is that the consumer must have a mobile phone that supports WAP technology. Security is given by an electronic key. (Chovancová, 2006)

2 THE EVOLUTION OF E-BANKING

From the early 1980s, distance banking products and services via electronic media have been the ancestor of contemporary home banking products and services. As Koskosas states the term "internet" became popular in the early 1990s, referring to the use of a terminal, keyboard, and TV to access the banking system using a telephone. Online services began in New York in 1981 when the four major banks (Citibank, Chase Manhattan, Chemical, and Manufacturers Hanover) provided home banking services using the videotex program. (Koskosas 2011, 50-51)

The spread of online banking has coincided with the spread of high-speed broadband connections and the increasing maturation of the internet population. Another factor in e-banking growth is that banks have discovered the benefits of e-banking and have become keener to offer it as an option to customers. (Shah and Clarke, 2009)

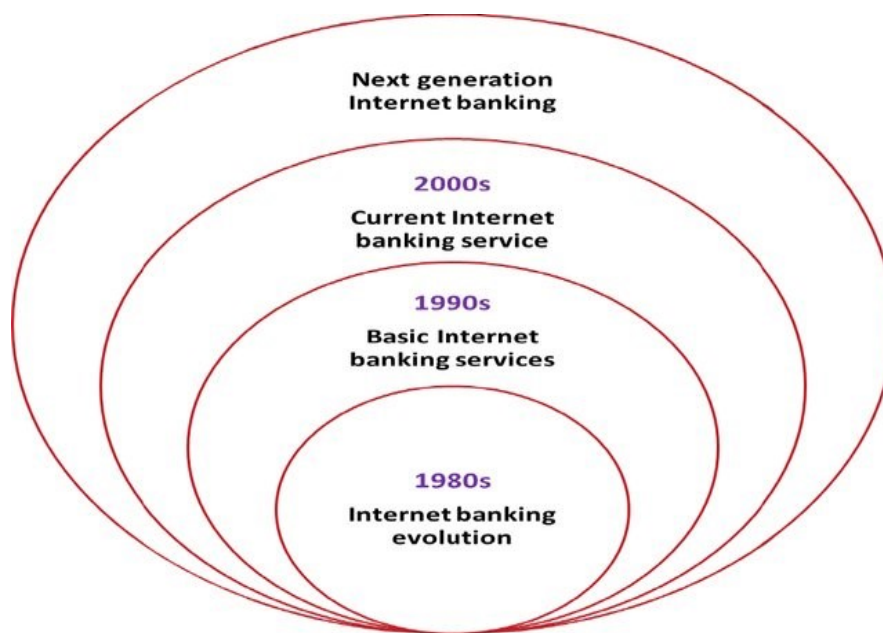


Figure 1 Evolution of e-banking.

(Source: A. Seetharaman Saurabh and Singhal Pankaj Galdhar. Information & Knowledge. "Customers' Expectations for Next Generation Internet Banking" Journal of Information & Knowledge, January 2016.)

3 PROS AND CONS OF E-BANKING

E-banking has now become an essential part of life for banks which respect their customers and urge them to transact banking in simple, safe, and confidential way. Indeed, banks see it as a competitive benefit, and as a way how to fast and effectively expand their business beyond geographic obstacles. (Shannak, 2013)

3.1 The advantages of internet banking

Banks and consumers have benefits in online banking services. In order to help banks gain competitive advantages and raise market shares, electronic banking is a granted strategic weapon. In addition, electronic banking services will save the valuable resources needed by conventional banking services.

From a consumer's perspective, it was found that electronic banking provides customers with faster, more comfortable, and more reliable service. However, consumers are reluctant to use electronic banking services, they are concerned about security risks and may not be able to cope with electronic banking applications adequately. (Shah, 2015)

For banks

3.1.1 Consumer Base

The web enables banks to reach a whole new market and profitable businesses and the reason is that there are no geographic barriers to the internet. The internet also provides a fair competition for small banks who would like to connect to their clientele. (Essays UK, 2018)

3.1.2 Efficiency

By providing their customers with internet access, banks became more competitive. The internet offers a nearly paperless system for banks.

Organizations often have to re-engineer their business processes, integrate systems, and promote agile working practices in order to incorporate internet banking. These are the actions, which often result in greater efficiency and agility in organizations. However, radical organizations are also often linked to risks such as low employee productivity, or the collapse of traditional services to the customer base. (Shah and Clarke, 2009)

3.1.3 Customer Service

Internet banking not only allows customers to have a wide range of products, it also requires other services that are not available in any sector of industry.

The customer has not to visit a branch. An individual can print documents, forms, and applications on the internet and be able to easily search for information instead of waiting and asking for a teller. With better and faster choices, the bank will undoubtedly be able to build better customer relationships and satisfaction. (Essays UK, 2018)

3.1.4 Image

E-banking helps to enhance the image of the organization as a customer-focused, innovative organization. It was especially relevant in the early days as only the most innovative organizations were implementing this platform. Despite its current availability today, an attractive banking website with a broad portfolio of innovative products still enhances a bank's image. This image also helps in becoming effective at e-marketing and attracting a growing customer base. (Essays UK, 2018)

For customers

3.1.5 Choice and Convenience for Customers

In the battle over customers, providing a unique experience is the compelling element that will retain customers. A 'customer first' approach is critical for success in e-banking. Customers hold the key to success, and companies must find out what different customers want and provide it using the best available technology, ensuring that they are acting on the latest, most up-to-date information. In modern business environments, customers want more excellent choices. They want the traditional range of banking services, augmented by the convenience of online capabilities and a sharper focus by banks on developing personal relationships with customers. (Essays UK, 2018)

3.1.6 Better consumer interest rates, cost reduction

The client does not have to maintain the minimum balance required in many banks. Online banking usually has the best rates as they strive to cut costs by recruiting a limited number of employees (not necessary tellers) and avoiding costs for buildings. (Essays UK, 2018)

3.2 The disadvantages of internet banking

Internet banking seems to be an obvious decision to exchange for it for the troubles of traditional money management. There are, however, potential internet banking problems, which may not be known to customers. Before entering the internet banking, consumers

must weigh the advantages and disadvantages. Some of internet banking's disadvantages include the following:

3.2.1 Bank relationships

A traditional bank allows developing personal relations with the bank. Knowing local employees can be advantageous if a customer requires a loan or exceptional service, which is not generally offered to the public. When a bank manager changes the terms of the client's account, and personal circumstances usually have some discretion. They can help customers with solving problems like the reversal of a charge that is not being paid. (Koskosas, 2011)

3.2.2 Transaction issues

Facing complex transactions and solving bigger problems that sometimes require meetings in person. A traditional bank can organize meetings and call experts to solve this particular problem. In addition, some direct banks can make international transactions harder or impossible. If the customer regularly deposits cash, it can be more convenient and efficient to have a traditional bank with a drive window. (Koskosas, 2011)

3.2.3 Service problems

Some direct banks may not provide the full financial services that traditional banks provide, such as insurance and brokerage accounts. Sometimes traditional banks offer loyal customers exclusive services such as preferred prices without additional costs. Moreover, online services like notarial services and guarantees of bank signatures are not available. For many financial and legal transactions, these services are necessary. (Koskosas, 2011)

3.2.4 Security Direct

Banks are subject to the same legislation and regulations as FDIC's traditional banks and accounts. Highly evolved encryption software is designed to keep information on account safe, but no system is perfect. The internet is an open network, and financial transactions are still accompanied by high-security risks such as internet fraud. That is also one of the main reasons why people hesitate to bank online. Different security methods are being tested, and therefore there is still some way to win the trust of a vast majority of customers. (Shah and Clarke, 2009)

4 INTERNET BANKING SECURITY

Internet banking is a specific banking area, a part of the e-banking industry that enables people virtually everywhere in the world to interact with their banking accounts. Web banking addresses a small number of new trends, such as customer requirements, everywhere services, product time to the critical markets, and increasingly complex challenges in back-office integration. The safety of online financial transactions belongs to one of the biggest challenges. E-banking increases security risks and exposes previously isolated systems potentially to open and unsafe environments. Security violations mostly fall into three categories: violations of serious criminal offenses (fraud or financial information theft), violations of casual hackers (defacement causing a crash of websites), and defects in systems design and installation that cause security breaches (authentic users who can see or can deal with other users). All these threats could have serious financial, legal, and reputational consequences. (Shah and Clarke, 2009)

Criminal activity associated with abusing the banking payment cards is variable. It is conditioned foremost by the technical advancement of culprits, in attention from the side of payment cardholders of payment cards and technological progress of society. Financial losses caused by misusing the banking payment cards are very high world-wide. Compared to any other time in its history, the payment card industry faces an increasing variety of security challenges as the transaction environment grows in size and complexity. With more stakeholders, payment channels, and people driving the use of payment cards, the need to enhance the integrity of an increasingly dynamic system while ensuring global acceptance is more important than ever. On a global level, fraud continues to migrate from more secure to less secure regions and channels. Criminals are targeting not just unmonitored, stand-alone, point-of interaction devices, but also launching sophisticated attacks on the private networks of well-known entities, such as significant data processors and top-tier merchants. All these factors can lead to fraud attacks that can cause erosion in confidence and global acceptance as financial institutions seeking to avoid risk may move to block transactions at a country or regional level. Since one of the biggest concerns relating to security in e-commerce applications is the use of the credit/debit cards, the failure to secure the card information can cause significant damage to the organization in terms of financial fraud, identity theft, legal regulations, loss of consumer confidence. Every client must protect his/her payment card against theft and consequent malfeasance. The banks themselves have an effort to protect their clients from illegal malfeasance by other people. Every bank has,

therefore, on their website instructions on how to use payment cards safely. These instructions could protect the client sufficiently against theft and malfeasance of the payment card. The problem is that payment card holders often do not follow the instruction relating to PIN code to keep it safe. Many clients are afraid of forgetting the PIN code and consequently make an error of writing it down on a piece of paper and carry it together with their payment card. In this way, the clients expose themselves to the malfeasance of their payment cards. (Korauš et al., 2016)

4.1 The PIN and TAN system

The PIN and TAN is a system where the PIN is a password used to authenticate transactions for the log-in, and TANs for a one-time transaction authentication password. TANs can be distributed in different ways. Using a security token is the most secure way to use TANs. The time and a unique secret stored in the security token depends upon the generated TANs. Usually, internet banking with PIN/TAN is done via a web browser using SSL secured connections, so that there is no additional encryption needed. (Griffin, 2018)

4.1.1 An additional way of sending TANs to an internet banking user

By sending the TAN of the current bank transaction to the mobile phone (GSM) of the user via SMS, the transaction number and information are generally quoted in the text of the SMS. The TAN is only valid for a short period. (Griffin, 2018)

4.2 Signature

Internet banking, where all transactions are digitally signed and encrypted. Depending on the specific application, the keys for signature generation and encryption may be stored on smart cards or any memory medium. (Shah and Clarke, 2009)

4.3 Anonymity

The issue of privacy is a subset of security issues that banks have to face. Increasing the sequence of the sender's personal information and improving transaction security. Examples of private data on internet banking include the number of transactions, the date and time of a transaction, and the name of the dealer where the transaction occurs. (Shah and Clarke, 2009)

4.4 Authentication

Encryption can make transactions safer, but it is also necessary to ensure that none at either end of the transaction can change data. There are two ways in which someone can check the integrity of the message. The secure Hash algorithm is a form of verification that protects the data against possible modifications (Pfleeger, 2003). In practice, the sender sends the data generated by the Hash algorithm. The recipient carries out the same calculation and compares the two to ensure that everything is correct. If the two results are different, there has been a change in the message. A third party called the Certification Authority (CA), with both the sender and the recipient trust is the other way of verifying that the electronic currency or the digital signature it receives is real. (Shah and Clarke, 2009)

4.5 Divisibility

Electronic funds can be divided into different currency units, similar to the real cash value. Electronic money, for example, needs to be responsible for pennies and nickels.

At least to some extent, internet banking has become the norm of many simple banking transactions. In fact, that might be safer for consumers to check their accounts, pay their bills, and transfer money from one account to another. However, because internet banking is an excellent addition to consumer banking, it is not necessarily a substitute for their brick-and-mortar peers in all cases. (Shah and Clarke, 2009)

4.6 Attacks

Most internet banking attacks are based on users' misapprehension about stealing log-in data and valid TANs. Phishing and pharming are two well-known examples of these attacks. Cross-site scripting and trojan horses can also be used to steal log-in information same as the horses. An approach for the attack of internet banking methods based on the signature is to manipulate the software in a way to display the correct transactions on the screen. There are few anti-attack measures. The use of Class 3 card readers also prevents software manipulations using signature-based internet banking variants, such as digital phishing and pharming certificates. Customers should use virus scanners and be careful with downloaded software email attachments, in order to secure their systems against viruses, horses, and worms. (Shah and Clarke, 2009)

4.6.1 Phishing

Internet-supported email and SMS scams are a growing potential risk in online banking. Banking via websites, mobile, or email appears to be risky just as other forms of internet banking. It helps customers to make inquiries, check account balances, pay bills, transfer money, and generally carry out basic self-service banking. In order to authenticate transactions, the PIN, password, or token is required. Unfortunately, fraudsters often manipulate these security features and defraud banks and account holders. Primarily, this happens where fraudsters set up fake websites of banks or send emails purported to be sent by the banks to get PIN, password, or other banking information all by deception. (Onyiriuba, 2016, 49)

Phishing is considered as one of the biggest threats. It is also known as carding or brand spoofing. The simplest way is to define this term as a method of sending a fake email to a recipient who is deceptively imitating a legal institution intending to divulge confidential information from the recipient, such as a credit card number or bank account password. This email usually encourages the recipient to visit a website and enter confidential information here. As a result, the information provided is stolen and misused for profit. Phishing is generally referred to fishing, where a “crook is casting hooks” in the hope that a few victims will get caught. The first phishing attack against a financial institution appeared for the first time in July 2003 and the main targets were E-loan, E-gold, Wells Fargo, and Citibank. The phishers refined their attacks, both for email and malware, and began targeting specific secondary targets. (Lance, 2007)

4.6.2 Pharming

Pharming is another way of obtaining sensitive access codes. Malicious software forges a host file domain resolution on the client’s computer or tries to exploit the DNS server which resolves the domain name. The attacker replaces a fraudulent IP address with a well-known domain name. The URL appears genuine even though the user is on a fake domain. One recommendation how to prevent these attacks is to download up-to-date antivirus and firewalls. (Bankenverband, 2007)

II. ANALYSIS

5 INTRODUCTION TO INTERNET BANKING IN THE EUROPEAN UNION

In European countries, the growth of online banking reveals certain common features. Internet banks that offered only online services initially have moved to a mixed model using other platforms such as mobile banking and financial consultants. Independent internet banks are scarce. The majority traditional banks have developed an internet platform in order to diversify their source of distribution. Nevertheless, several banking companies have also set up separate internet banks that act as independent organizations with their brands.

We look at the development of online banking in the Czech Republic and in selected EU countries, concretely in Germany, and Denmark. These EU countries not only represent a variety of banking structures but also differ in their economic structure, and particularly in their adoption of new technologies. These external factors may affect internet banking success. Online banking is the most common way to carry out financial transactions in Europe today. People make transfers between accounts and make payments through their online banking for basic tasks such as checking balance or monitoring their transaction history. As internet banking becomes more and more advanced, customers can now use their online bank account even more, such as credit application, investments, research, or the purchase of financial products. With online banking, digital banks now have a share of most people's daily lives to provide more advanced online banking services than ever before. In addition to providing solutions to customers' current requirements, top online banks must also anticipate future customer needs. The current challenge for Europe's online banks is to offer a complete digital banking solution. The best European online banking companies offer a wide variety of banking services: low fees, support services, and easy-to-use interface. EMIs (electronic money institutions) belong among the financial institutions that deliver online banking. These are not conventional banks, and their services are primarily limited to money transfers and the exchange of currency. Online consumers are still seeing EMIs as banks and using their services as a traditional bank. These online banking services are an alternative to the conventional branch banks rather than just a smartphone app offered by the traditional bank. (International financial services, 2019)

In 1995, the first purely internet bank in the world called Security First Network Bank was founded in the US in Kentucky. After two years of operation, the bank ceased its banking services and embarked on the development of electronic banking software. After this occurrence, internet banking began to expand dynamically around the world.

Along with the development of the internet in all sectors and its integration into everyday life, the internet has also started to be used in banking transactions where interbank transactions and e-banking payments are common. However, it is not the same in all European countries. In some countries, internet banking has seen an enormous increase and popularity. Elsewhere its use has recorded only slow increase. (Ministerstvo průmyslu a obchodu, 2020)

6 INTERNET BANKING IN THE CZECH REPUBLIC

After a temporary slowdown in the previous year, the GDP growth reached 4.6%, without any more significant threat to macroeconomic or financial stability.

The Czech banking sector has continued to deliver a high degree of stability despite all the challenges, as has been repeatedly confirmed by the results of the demanding tests carried out by the Central Bank. According to European Banking Authority (EBA) compared to the previous years, the NPL ratio has dropped further to 1.6% and was the fifth - lowest among the EU Member States. (Česká národní banka, 2019)

Even though individual banking branches remain a key location, the big part of administration has moved to the internet. There is a high chance that banks will be able to open an account only from the comfort directly from the client's home in short period of time. Although, it is possible to create a bank account on the banking home pages or set their service level, still the client has to visit one of their branches to complete the process of signing the contract, make the first deposit, and officially open a bank account.

Documents that are needed for completing the opening of the bank account are the following: identity card, insurance card, birth certificate, and passport. (Finance, 2019)

6.1 Bank fees

The country has a strong banking network. There is a mix of national and international banks offering all the expected bank services and financial products. Many Czech banks in previous years charged their clients some sort of monthly fee for maintaining an account (generally somewhere between 40-60 CZK, and they also charged a fee for a debit card (somewhere from 150-200 crowns for the first card and up to 450 crowns annually when an additional card was needed. (Hedvicakova and Svobodova, 2018).

Table 1 Bank fees in selected Czech banks (own creation based on data from banks' websites, April 2020)

	Česká spořitelna/ Moje zdravé finance	ČSOB/ Plus Konto	Komerční bank/ Můj účet
Maintaining an account	100 CZK / month (€ 3.7) or 50 CZK / month (€1.84) or free of charge (special requirements)	Free of charge If turnover=10 000 CZK or 69 CZK / month (€ 2.53)	Free of charge
ATM withdrawal (own bank)	Free of charge	Free of charge	Free of charge
ATM withdrawal (foreign bank)	40 CZK (€ 1.47)	40 CZK (€ 1.48)	39 CZK (€ 1.43)
ATM withdrawal (abroad)	125 CZK (€ 4.59)	100 CZK (€ 3.67)	99 CZK (€ 3.64)
Debit card included	✓	✓	✓
Credit card included	No 50 CZK/ month (€ 1.84)	No 30 CZK/ month (€ 1.10)	No 390 CZK /year (€ 14.32) = 1.19 € / month
Internet banking/ Mobile banking	George internet banking Free of charge	Smart banking Free of charge	Moje banka 6 CZK (€ 0.22)
Internet Payments Incoming	0 CZK	0 CZK	0 CZK

Outgoing	0 CZK	5 CZK (€ 0.18)	6 CZK (€ 0.22)
Euro payment (SEPA)	0 CZK / 20 CZK	5 CZK (€ 0.18)	6 CZK (€ 0.22)

Note * Exchange rate 1 CZK = 0,03672 € to date April 29, 2020

According to Table 1, we can see that currently some banks in the Czech Republic still charge some sort of fee, but in contrast to the previous years, the charges were reduced, and also there is often no fee for maintaining an account. Although fees for other services usually replace this fee for maintaining an account. There may be an ATM fee (often between 40-60 Czech crowns for one of bank's machines but more often is for the use of another bank's ATM, and some banks may even charge a small fee for transactions. Another problem might come up when the debit card is lost. At some banks, it is possible to expect high charges to have it blocked, or for a card replacement can be charged an additional fee.

Table 2 Offered services and benefits in selected Czech banks (own creation based on data from banks' websites, April 2020)

	Česká spořitelna	ČSOB	Komerční bank
Establishment of internet banking	Free of charge	Free of charge	Free of charge
Fee for onetime order	5 CZK	Free of charge	6 CZK
Password change	✓	✓	✓
Limit change	✓	✓	✓
Authorization via SMS	✓	✓	✓
Online arrangement of other services (loan, overdraft, credit card)	✓	✓	✓

Česká spořitelna has introduced the new George internet banking, which is more modern and easier to use. In addition to design changes, the developers also worked on a higher level

of security and the ability to customize the appearance of banking. Login has also been simplified. The new internet banking offers its users a better overview of their finances, clever transaction search, automatic sorting of payments and payment by photo. The George application is also available on a mobile phone. (Česká spořitelna, 2020)

ČSOB's modern internet banking brings a wide range of practical functions. The overview in current account provides the client with a tiled layout and everything that the he/she might need can be found in the vertical menu. The most used functions are hidden under the so-called quick buttons at the top of the banking. Thanks to banking, it is possible to get an overview of investments, mortgages or even a pension. Also, all settings such as limits and blocking of payment cards might be made through it. Another advantage is that the clients can buy new products without visiting the bank. Like all banks, ČSOB emphasizes security. In addition to careful security, the bank encourages clients to always log in through her website, not through a search engine. The Smart Banking application is used for mobile phones. (ČSOB, 2020)

Komerční bank focused mainly on the introductory page with an overview of products. Clients now have access to all important transactions directly from the home page. They have everything important in mind so that they do not forget anything, whether it is an overview of products, unauthorized payments, or direct debits. The customer will find accounts, cards, insurance, and investments in one place. You can set up multi-person access to your current account. Payments are protected by SMS and electronic signature. There is also an internet banking application for mobile phones called Mobilní banka. (Komerční banka, 2018)

6.2 Adoption of using internet banking

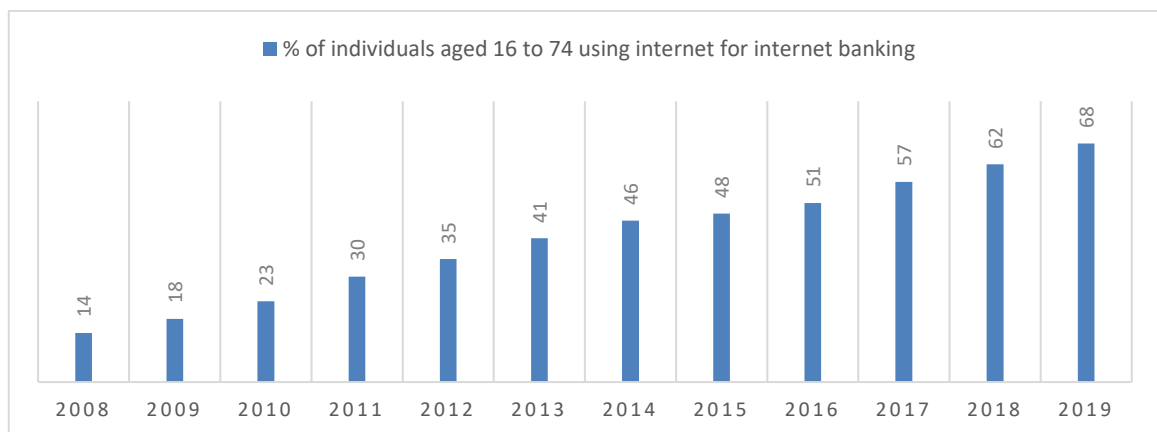


Figure 2 Adoption of using internet banking (% of individuals aged 16 to 74) in the Czech Republic (own creation based on Eurostat data from 2008-2019)

In 2019, the ČSÚ released the publications, where said that 81 % of Czechs over the age of 16 used the internet, while 70 % of them used a smartphone. Almost all 15-year-olds had internet access at home and could use a mobile phone. Also, less than a fifth of Czech households was without the internet. Three-quarters of them were senior households, and in most cases, the reason was that they do not want internet at home or cannot manage it. By contrast, the statistics show that 97 % of children live in households with internet access, and 92 % have a computer or tablet at home. As smartphone usage develops rapidly, the number of people using their phones to access the internet is also increasing. At the end of 2018, there were 8.3 million phones in the Czech Republic with active data service for internet access. As figure 2 shows, internet banking in the Czech Republic is becoming highly used form of financial services, and its share has grown over time. While in 2008, 14 % of users used internet banking, in 2019, it was 68 %. Most users are between the ages of 25-34 (88 %) and the least among those over 75 (8 %). However, elderly is the most progressive in acquiring online banking. Over the past ten years, the proportion of the indicator monitored in old-age pensioners has increased nearly tenfold. (Český statistický úřad, 2020)

Online banking, together with online shopping, is thus the most used internet service among the Czech population and shows the increasing adoption of information technologies among individuals, even among seniors. This development points to the ongoing digital transformation of Czech society, which should, however, be reflected in the acquisition of more demanding computer skills. (Ministerstvo průmyslu a obchodu, 2020)

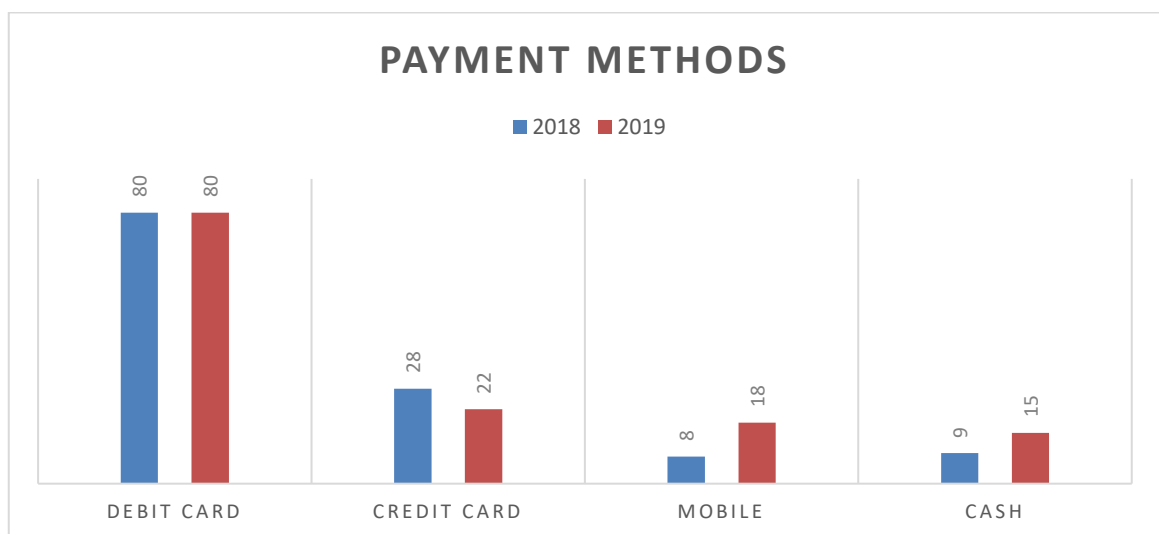


Figure 3 Preferred payment methods used in Czech republic (Source: Novinky. 2019. “Platby kartou v Česku jasně vedou, hotovosti se ale lidé nechtějí vzdát”)

With every year the amount of money in circulation is higher, and the number of ATM withdrawals is also growing according to a current SC&C agency survey for the Czech Banking Association (CBA). The growing popularity of card payments is also evidenced by the numbers of the Association for Payment Cards. However, the so-called smart payment methods (for example by mobile phone) are becoming more and more popular among Czech citizens. According to this survey, a fifth of the population pays by simply attaching a mobile phone to the payment terminal. In 2018, only 8 % paid this way. In order to be able to pay, for example, with mobile phone, the user need to upload bank card to a special application supported by his/her bank and, of course, by the phone. The most often it is Google Pay or Apple Pay.

Moreover, one third of Czechs would welcome its abolition, because they believe it would bring more freedom in shopping. However, another third are completely against it and see the abolition of cash as a restriction of personal freedom. (Buřínská, 2019)

6.3 Security

The majority of Czech banks use authentication SMS sent as a regular SMS.

After confirming the banking operation, the bank will send the authentication code to the registered mobile phone via SMS, which a user will manually overwrite in the specified field in internet banking. In addition, Komerční bank offers option of signature certificate where the banking operation is confirmed by a signature certificate. This is a password-protected encrypted file that is stored on a disk in a computer or on a transfer disk (USB, CD, etc.).

Another common type used for secure login is signature certificate stored on a chip or optical card. Here banking operations are confirmed by a signature certificate on a chip or optical card. To confirm the banking operation, a special chip card and a chip card reader is needed. It is available either for laptops or for desktop computers (connection via USB).

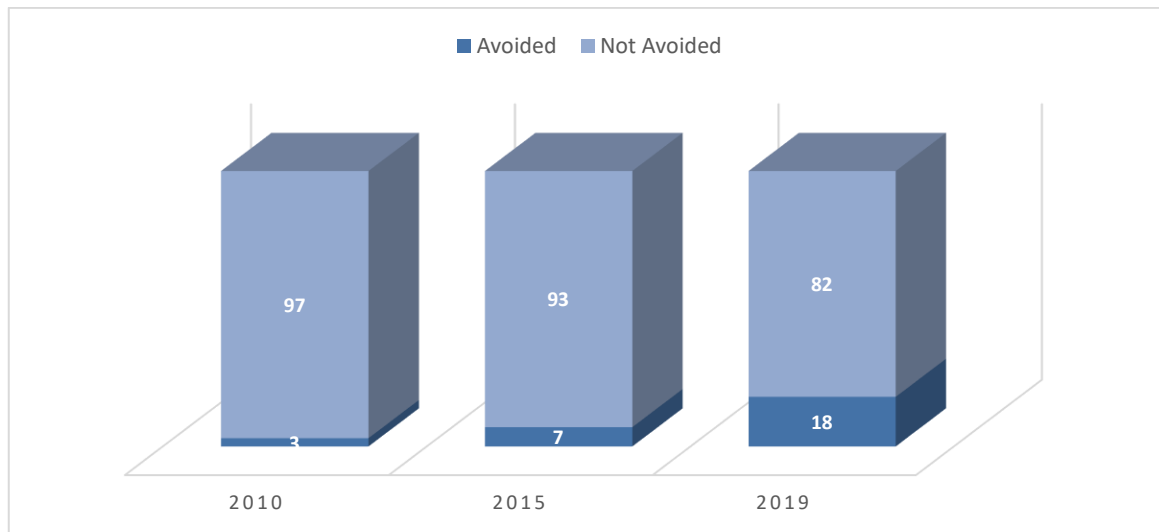


Figure 4 Share of individuals (% of individuals aged 16-74) avoided internet banking due to security concerns in the Czech Republic (own creation based on Eurostat data 2010, 2015 and 2019)

As the adoption of using internet banking in the Czech Republic is increasing, the concerns about security are increasing too. In 2015, 7% Czechs avoided internet banking due to fear of security meanwhile in 2019 the number has almost tripled.

7 INTERNET BANKING IN GERMANY

In the summer of 2018, the German economy lost a lot of momentum. Since then, German industry fully integrated into the international trade and supply chains, has been stuck in a marked phase of weakness with deficient GDP growth. Downturn of the global economy and the high levels of volatility due to current trade conflicts have hit the German industry. In 2019, GDP growth in Germany was only 0.7% after around 2 % on average over the last five years. (BankenVerband, 2020)

7.1 Bank fees

Table 3 Bank products and fees in selected German banks (own creation based on data from banks' websites, April 2020)

Operation	Deutsche Bank/ Basis Aktivkonto	Commerzbank AG/ BasisKonto	Postbank/ Giro Basis
Bank account	Free of charge (students or age >30) 5.90 €/ monthly	6.90 €/ monthly	5.90 €/ monthly
ATM withdrawals	Free at CashGroup ATMs	Free at CashGroup ATMs	Free at CashGroup ATMs
ATM withdrawal abroad	1% of withdrawal, min. € 5.99 €	1 % of withdrawal Minimum 5,98 €	(up to 1,000 €) 1.50 € per transaction, Any other withdrawal (above 1,000 €) free
Debit card included	✓	✓	✓
Credit card included	No 39€ / year =3.25 €/ month	No 39,90 € / year =3.25 € / month	No 29,00 € / year = 2.41€/ month
Internet banking/ Mbanking	Free of charge	Free of charge	Free of charge

Payments via e-banking	Free of charge	Free of charge	Free of charge
Euro payment (SEPA)	Free of charge	Free of charge	Free of charge

7.2 Adoption of using internet banking

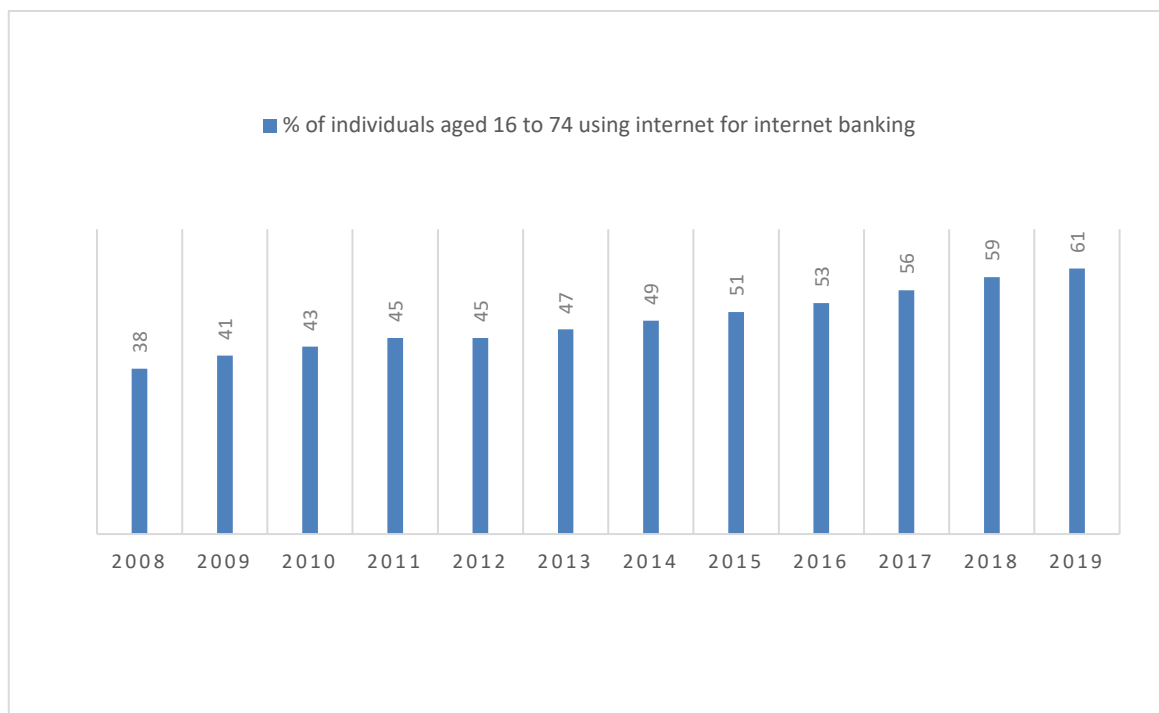


Figure 5 Adoption of internet banking (% of individuals aged 16-74) in Germany (own creation based on Eurostat data from 2008-2019)

The research on behalf of the Federal Statistical Office Destatis showed that in 2018, 51% Germany’s population used private internet banking. Even though it represents an increase of more than ten percent throughout the last decade. Nevertheless, Germany remains far behind relative to other European countries. In Eurostat study from 2017, Germany was ranked 14th out of 28 EU countries for total usage of internet banking, just behind precursors that represented the Nordic countries Denmark (88%), Finland (86%) and the Netherlands (85%). (Carter, 2019)

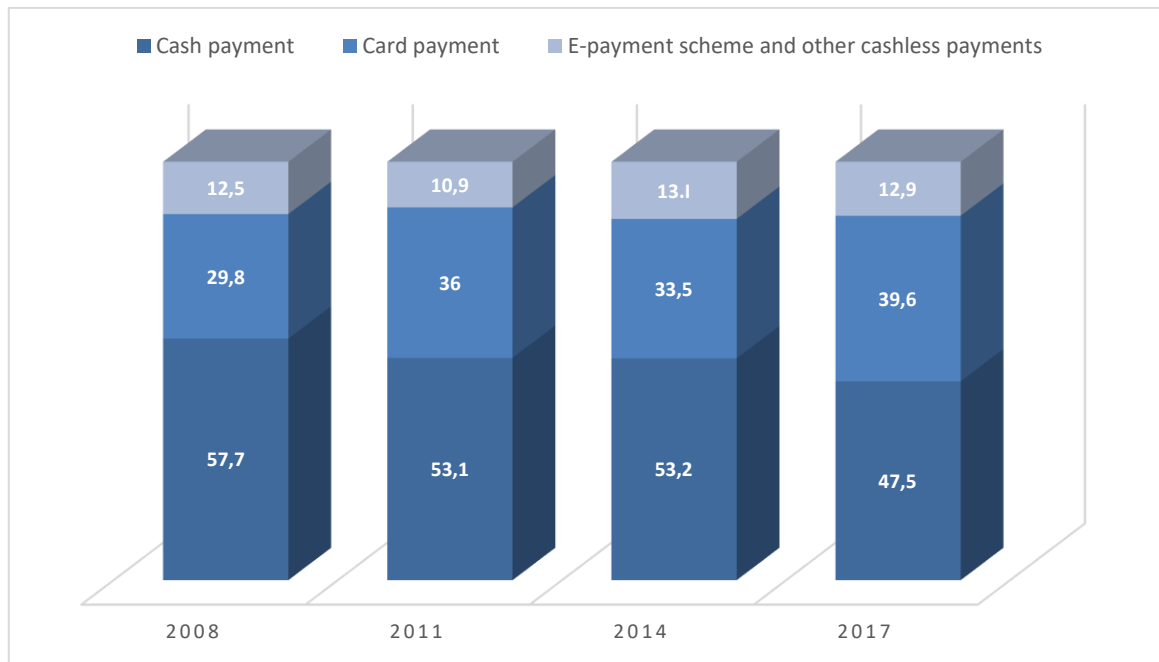


Figure 6 The German Population Prefers Cash over Cards and E-Payments (Source: Bundesbank, 2019)

German consumers prefer mortar banking rather than internet banking. Evidence of data-support stems from the German population's payment actions. Members of the German Central Bank's representative survey reported that almost 50 percent of their sales point of total transactions remained in cash in 2017. This is one of the world's highest level. Recent central bank information indicates that 78% of payments made in retail outlets were still in cash. Within a European background, the penetration of online banking penetration is relatively poor in Germany. (S&P GLOBAL RATINGS, 2019)

In 2018, the Germans used more cards for payments than bills for the first time. According to report by the EHI Retail Institute in Cologne, 48.6% of sales were paid with a debit or credit card, compared with 48.3% in cash. (Deutsche Bundesbank Monthly Report 2019)

However, Germany still has one of the highest rates of cash use in the European Union. The most significant explanations for German people's close connection with cash are their urge to secure personal details and anonymity. (Schütz, 2019)

7.3 Security

As banking fraud is becoming more sophisticated in the digital age, there were registered around 800,000 incidences of bank card fraud in Germany in 2016, costing around €132 million of damage. (Expatica, 2020)

However, a new EU directive to make internet banking safer comes into effect. The adjustments to online banking in Germany come as part of a new EU directive called PSD2. PSD2 is intended to increase security in online banking and strengthen consumer protection across Europe. Onwards, anyone wanting to check their balance online quickly will need some additional unique identifiers, in addition to a username and password.

As a unique identifier will might serve a biometric fingerprint, a card reader, or a unique code sent via SMS or an app. Although, the long lists of TAN numbers are still sometimes used by German banks, it seems that this started to become obsolete.

In Germany, it is assumed that digital conservatism is caused by the high importance of security problems for the population. Therefore, it is concluded that the lack of digital banking demand is the result of the population's expansion. Historically, people in Germany have been spread evenly across the regions. Economic growth is less pronounced than other nations, as Germany's large, medium-sized enterprises (SME sector), for example, provides a more rural climate with attractive opportunities for jobs. The fact that branches are fully available may go a long way to explain the lack of demand in digital banking.

Another fact is that Germany's population is much older than that of many other countries in Europe, and its age has a secure connection with lower digital literacy and conservatism. However, the digitally indigenious population is increasing with smartphones, the public attitude to banking is currently still conserving. German banks need to track consumer preferences and be able to adapt to changes. (S&P Global Ratings, 2019)

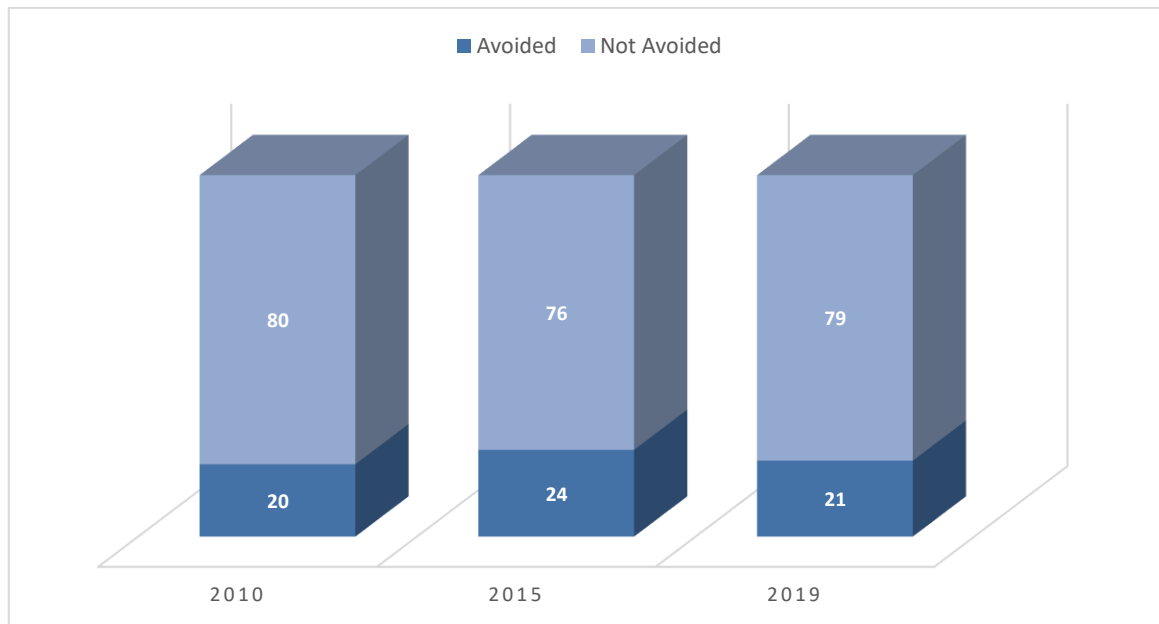


Figure 7 Share of individuals (% of individuals aged 16-74) avoided internet banking due to security concerns in Germany (own creation based on Eurostat data from 2010, 2015 and 2019)

On figure 7 we can see that about 20 % Germans have avoiding internet banking because of security concerns. Eurostat statistics also indicate that this approach has not changed significantly during the last nine years.

8 INTERNET BANKING IN DENMARK

Eurostat statistics reveal that Norway, Denmark, Finland, and the Netherlands are the four most active European countries in terms of online banking. Over 90% of their citizens use online banking. (Eurostat, 2019)

A few large international groups and numerous small institutions characterize the Danish banking sector. By 2019, banks and mortgage banks were not required to meet various capital and liquidity standards in the wake of the crisis. Nevertheless, several Danish banks and mortgage banks have already agreed to follow the standards in 2014/2015. The Danish financial market has played an active part, thus rendering the financial environment more stable at a faster rate than the authorities initially expected. The finance industry plays a crucial role in Denmark's digitalization. Thus, the Danish fintech group has become very popular in recent years. Denmark is regarded as a leader of the digital financial industry, a role which has been accomplished in part by public-financial cooperation. The Danish financial sector is already actively contributing in different areas to financing a sustainable transition. Denmark has made great progress toward becoming a sustainable society on an international level. Only Sweden is higher in the UN SDG ranking.

Denmark has adopted a transparent policy about how banks manage the activation of accounts, ensuring that each bank needs detailed paperwork. The required documentation is the following: a photo identification card or passport and the CPR code, which is a personalized code for all citizens with a length of ten digits. In addition, a bank may still require evidence of income however a basic bank account can be opened as a person has a CPR number and obtains a residence permit. A non-resident cannot open a bank account since he/she must have a CPR number that is issued after becoming a resident. (Fyidenmark, 2019)

8.1.1 Dankort

The Dankort is the major debit or credit card bank in Denmark. The Danes have adopted the contactless Dankort in such a large style that over half of all purchases today are contactless. The success of the contactless payments seems to be in their speed and security. (Dankort, 2020)

8.1.2 NemKonto

All citizens and companies registered with Denmark must have a NemKonto account. A NemKonto is a standard bank account. The majority Danish residents and businesses

sometimes receive payments from the government sector. All payments made by public institutions will be transferred directly to this account. Some private companies are also able to make payments to NemKonto, such as insurance and pension companies.

The NemKonto can be established in a single manner, as a private person, when the client has a NemID or digital signature, or the client can assign a NemKonto account. (Nemkonto, 2019)

8.1.3 NemId

In Denmark, banks must register with NemID, which is a digital signature that allows access to public and private online banking with the same log-in information. The log-in consists of two parts. The first part is a password and sign-in. The second part is provided as a code card. Each code card contains a list of one-time passwords available when the reservation is done. If all the codes are on the card, the new code card will be automatic. If necessary, another code card can be used. (NemID, 2019)

8.2 Bank fees

Table 4 Bank products and fees in selected Danish banks (own creation based on data from banks' websites, April 2020)

	Danske Bank	Nordea Bank Danmark	Sydbank
Maintaining account	DKK 30/quarter =DKK 10/month (€ 1.34)	DKK 180/year =DKK 15/month (€ 2.01)	DKK 15/month (€ 2.01)
ATM withdrawal (own bank)	DKK 0	DKK 0	DKK 0
ATM withdrawal (foreign bank)	DKK 15 (€ 2.01)	2% of the amount withdrawn, minimum per withdrawal 50.00 DKK = € 6,70 minimum fee (€ 0.12)	DKK 8 (€ 1.07)
Debit card included	✓	✓	✓

Credit card included	No DKK 250/year (€ 33.51) = € 2.79 /month	No DKK 250/year (€ 33.51) = € 2.79 / month	No 295 DKK (€39.55) = € 3.29 / month
Internet banking/ Mobile banking	DKK 150/ year (€ 2.01) = DKK 12/ month (€ 1.60)	DKK 100/year (€ 1.34) = DKK 8/ month (€ 1.07)	DKK 0/year
Apple Pay / Google Pay	✓	✓	✓
Payment Transfers via e-banking	Standard transfer DKK 0	Standard transfer DKK 2 (€ 0.27)	Standard transfer DKK 0
Euro payment (SEPA)	Free of charge	Free of charge	Free of charge

*Note: Exchange rate 1 DKK = 0,1341 EUR to date April 29, 2020

For Denmark are common charges for managing an account. It is usually free to withdraw cash from the bank or a cash machine of own bank. However, there will be charges by using it from other bank machines.

From 2018, EU stores are no longer allowed to demand a fee when paying by credit card, such as Nordea Gold. This means that the credit card can be used freely in Denmark and the other countries of the EU without any extra costs. (Nordea, 2019)

8.3 Adoption of using internet banking

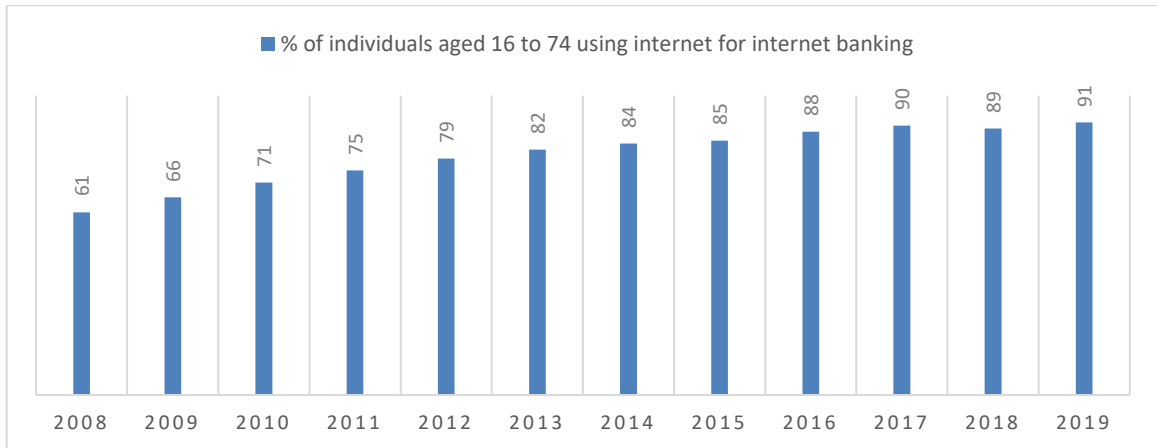


Figure 8 Individuals using internet for internet banking in Denmark (own creation based on Eurostat data from 2008-2019)

This graph shows that internet banking adoption in Denmark in 2009 was already at a very high level. In 2009, 61% of Danes were using internet banking, and during the next ten years thanks to Danes’ ability to adapt digitisation fast and with ease, the number increased to 91%.

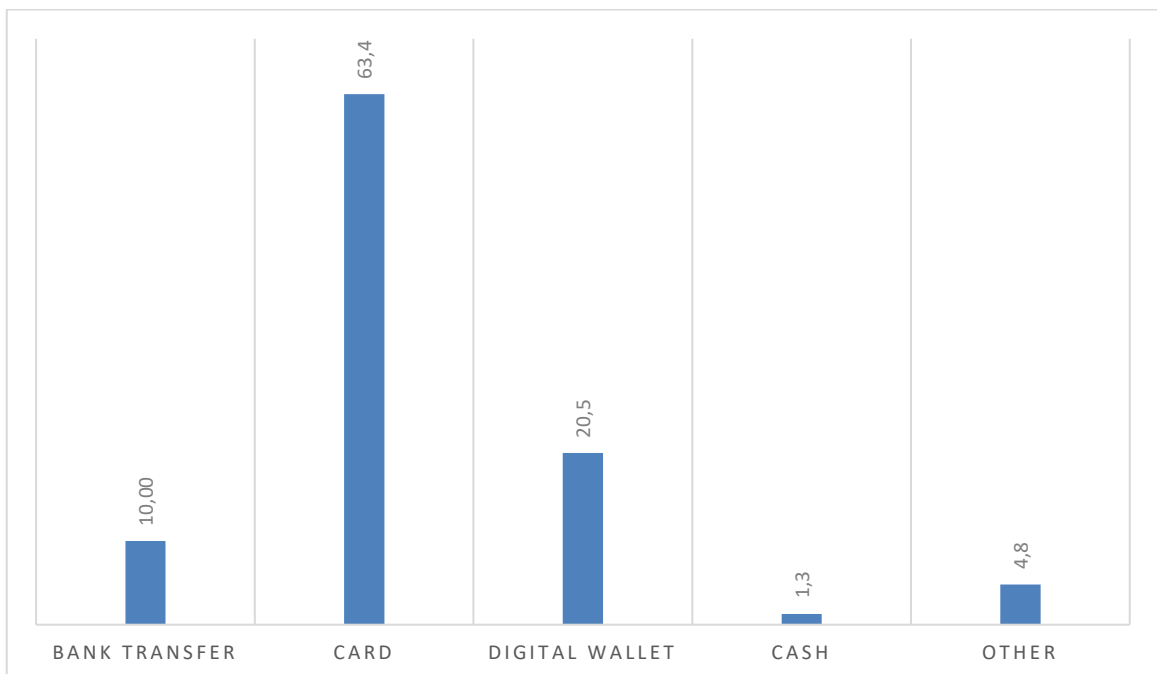


Figure 9 Preferred payment methods in Denmark in 2019

(Source: J. P. Morgan. 2019. “Payment Trends”, Global Insights Report)

Denmark has embraced digital transactions, including card payments, faster than other countries. MobilePay was launched by Danske Bank in 2013 and it became as a payment method at shops and websites the following year. The payment service has more than 4 million users and is working with other platforms to make mobile payments available across Europe through the European Mobile Payment Systems Association in order to compete with the other platforms like Apple Pay or Google Pay.

MobilePay's success shows that digital payments have become a priority for technology firms worldwide, from Google to Tencent. Payment companies, one of the world's most appreciated businesses, may even earn profits by demanding a low buying charge. Danes are early internet adopters, irrespective of whether they are paying or ordering digitally. According to the central bank of the nation, many citizens live "more or less without currency" in Denmark and more will be needed in the future. But that does not imply that Denmark is completely free of cash. The nation has a cash law, which generally ensures that citizens who work there have the freedom to use cash whenever they want to. Many Danes hold onto banknotes as a store value to ensure that vulnerable groups, such as the elderly are not neglected during the digital transformation (Detrixhe, 2019)

8.4 Security

Denmark has a standardized personal signature system that is implemented as the automatic authentication for all standardized government services and is used by the finance sector to provide customers with a digital signature to access bank details. Although the digitalization of both banking and government is exceptionally high, this commonly accepted approach leads to the reasonably small online fraud rates. Whenever it is possible, Denmark uses current legal structures that allow the court to understand the law while adapting it to emerging technology. This has enabled the adaption of the legal system to for example, the emergence of spam using regulations originally intended for telephony and mail. Laws can be adjusted to specify new technology later, but broad frameworks enable rapid reaction to new trends. (Global Cybersecurity Index, 2018)

Danske Bank's District protection mechanisms secure consumer interaction with Danske Bank and ensure that the company's data is detected and distributed in a manner that district-friendly access is not necessary. Financially binding transfers are physically checked such that data cannot be distorted between the client and the Danske Bank during transmission. (Danske Bank, 2020)

8.4.1 eSafeID

The new security solution of the Danske Bank Group is called eSafeID, which manages user identifications, security codes, and personal passwords. The security of the eSafeID solution is based on generally accepted encryption standards. The key is temporarily stored in a user's computer memory and only exists for the duration of the session. When the session is completed, the key expires and a new key is created. The keys are used to encrypt and sign data from and to Danske Bank. This is a two-factor authentication system that is based on something that the customer already knows for example password and something he/she owns such as an eSafeID app generating security codes.

District login is possible with an eSafeID device user ID, password and security code. Such elements classify the customer prior to the transfer of any sensitive details.

The electronic signature feature of the eSafeID protection solution focuses on temporary keys. Only after such keys are reached, the electronic signature can be used. Therefore, it cannot be overlooked or neglected. It is necessary to remember that only the electronic signature is distributed through the internet. After the client logs in to e-banking, eSafeID can be used to search and secure passwords.

(Danske bank, 2020)

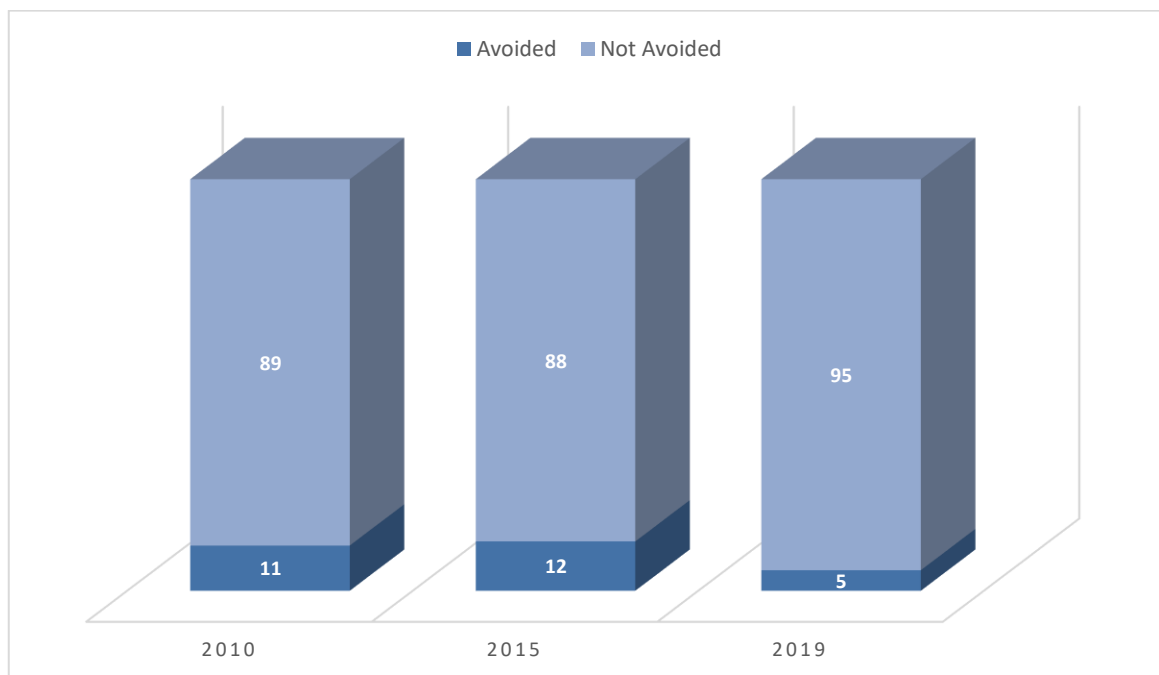


Figure 10 Share of individuals (% of individuals aged 16-74) avoided internet banking due to security concerns in Denmark (own creation based on Eurostat data from 2010, 2015 and 2019)

From the graph, it is possible to conclude that most users in Denmark are not very concerned with the security of internet banking, despite the fact, that the country is more vulnerable thanks to its higher digitisation than in other countries. The high adoption of e-banking systems in Denmark (see figure 9) suggests that many people are prepared to trust e-banking systems in the absence of compelling, publicly known evidence about security breaches leading to financial loss by e-banking customers.

From 2009 to 2016, the number of cyber-attacks in Denmark increased by 42 per cent. In the same period, on the other hand, the number of reported burglaries decreased by 8 per cent, according to figures from Statistics Denmark. (Thomsen, 2018)

Nevertheless, this vulnerability may be turned into an advantage as Denmark has the potential to become the world's leading cyber security nation.

Denmark is the third most cyber safe nation in Europe, according to Microsoft Security Intelligence Research, with 1.60% of overall cyber-attacks in Europe. The Czech Republic was rated ninth in the top ten cyber-secure countries with 2.74% of the overall assaults. In the meantime, Germany ended 15th with 3,61% of all cyber-attacks. (Microsoft Security Intelligence Report, 2018)

9 COMPARISON

The aim of this chapter is to compare the Czech Republic with the selected EU countries (Germany and Denmark). The comparison is based on three criteria: bank fees, the adoption of internet banking, and the area of security.

9.1 Bank fees

Table 5 Comparison of bank fees (Ø) in selected EU countries (own creation)

	Czech Republic	Germany	Denmark
Maintaining an account	Usually free of charge or fee around € 2	€ 6 – 7	Around € 2
ATM withdrawals at own bank	Free	Free	Free
ATM withdrawals abroad/per one withdrawal	Around € 1	€ 3 –10	€ 2 –7
Debit Card	Free	Free	Free
Credit Card	Around € 1	Around € 3	Around € 3
Internet banking/ Mobile banking	Free of charge	Free of charge	€ 1- 2
Euro payment	Usually free of charge or small fee € 0.20	Free of charge	Free of charge

*Note: the amount of charge is calculated per month

Based on this work, I concluded that electronic banking in the Czech Republic is almost comparable with states abroad. Banks are quite similar as far as e-banking products are concerned, and no bank has miss e-banking nowadays. Applications are also comparable in different banks same as in different countries, but this analysis showed that in most banks in the Czech Republic, there is usually a very small fee or even a zero fee for maintaining an account and using the service, but some internet transactions are already charged in contrast to Germany and Denmark, where the fees for account maintenance are higher, but on the other hand there is a zero fee for transactions via internet. It is typical that when it comes to the electronic form of communication, the fees are lower or even there are no fees than when

the client makes transactions in electronic form. When analysing banking services and fees in selected EU countries, I came across the capacity of bank fees and insufficient information provided on the websites of foreign banks. The main issue was that not all foreign banks have available necessary information and official documents in English, especially German banks. But this is not a case in the Czech Republic. Czech banks have available information in both Czech and English. I almost managed to find out the necessary information, but due to some missing data, I could not accurately compare fees with the Czech Republic. Another issue for accurate comparison was that every bank has its own special packages and requirements for clients.

9.2 Adoption of using internet banking

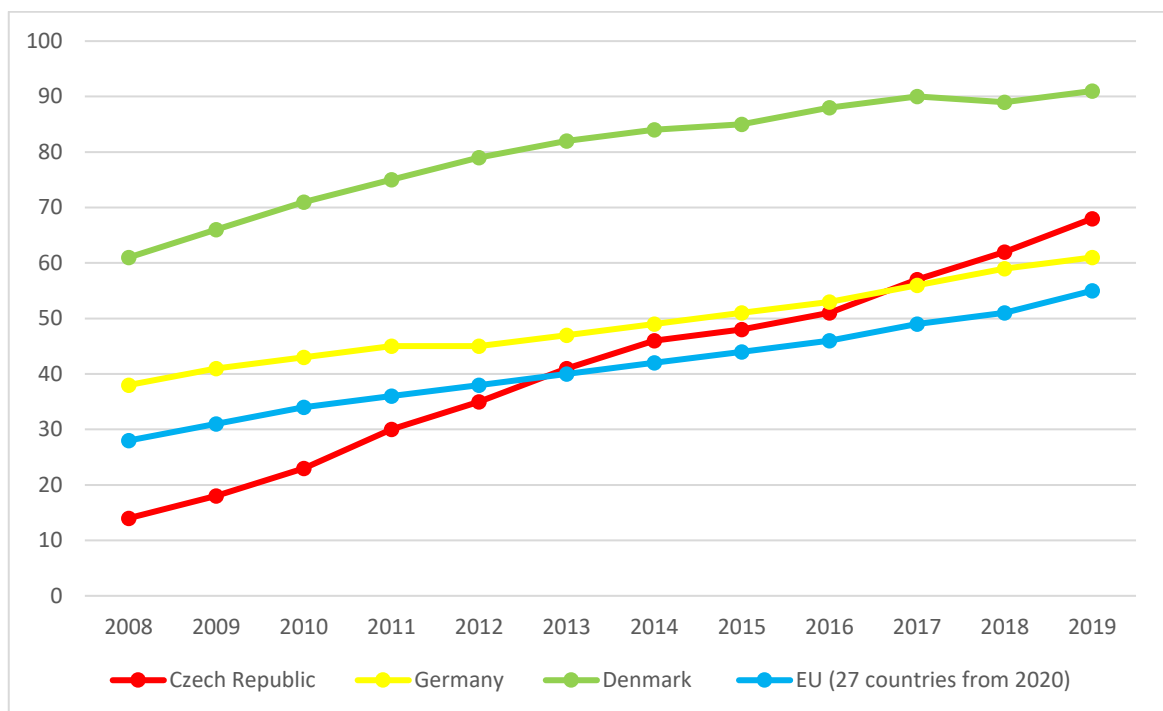


Figure 11 Development of internet banking penetration (own creation based on Eurostat data from 2008-2019)

Figure 21 shows the share of people using internet for internet banking in EU selected countries. Among selected countries, internet banking is generally the most common in Nordic countries. In Denmark, the internet usage for banking operations is above average, and the share of individuals using internet banking increased from 60% in 2008 to the current 91%. Among the Czechs, the popularity of internet banking is growing, and in order for the Czech Republic to approach the values of 90 percent of people using the internet banking in

future, it is necessary to persuade senior citizens, in particular, to start using these technologies. So far, many people of retirement age are concerned about these technologies and fear the misuse of access data or the breach of account protection. It is up to the banks to bring new products to these people or to motivate them to use these online products. As the Czech Republic, is still compared to its largest and richest neighbour, Germany in economic and salary level we can also see from the graphs

In 2014, the Czech Republic has exceeded the EU average, and is rising per year. In addition, internet banking is being used more and more within the European Union. In 2009, for example, the share of clients using this service was approximate 31%. Now internet banking in the EU is used by more than 50% of users, and every year, the number of clients increases. According to Eurostat the difference is mainly due to the different quality and speed of internet connections in the states. (Eurostat, 2019)

9.3 Security

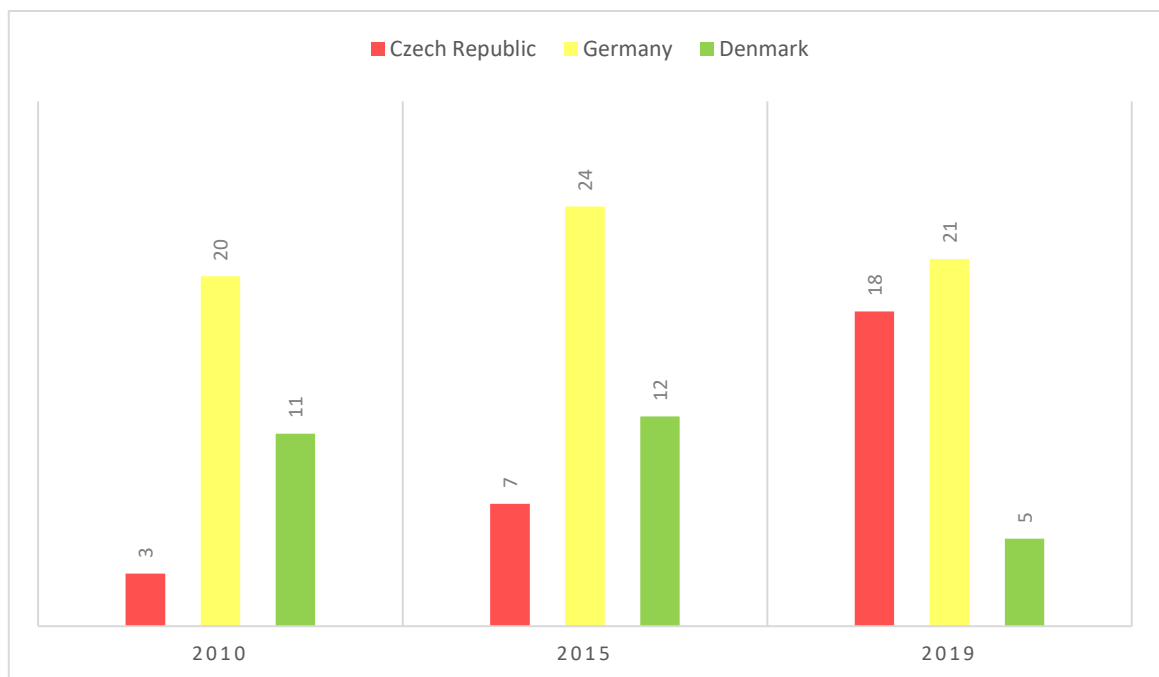


Figure 12 Share of people avoided internet banking due to security concerns in selected EU countries (own creation based on Eurostat)

This graph shows that although Denmark is the most digitalized, thus making the country more sensitive to its data, people in Denmark do not concern very much about security. In addition, the number of people who avoided internet banking due to security issues dropped

to 5% in 2019 compared to 2015, when the figure was 12%. Figure 12 reveals that Denmark may be considered as the safest nation relative to other two countries. In the Czech Republic, on the other hand, these concerns about security grow every year. In 2019, 18% Czechs avoided internet banking due to security in contrast to 2010 when the number reached only 3%. In Germany it is clear to see, that they are keeping their conservative approach and do not trust the internet banking the most. Over 20 % Germans avoided internet banking because of their disbelief to electronic system.

CONCLUSION

The aim of my bachelor thesis was to compare internet banking in the Czech Republic and in other selected EU countries to the set criteria and then to predict future development based on my data. Banks in the Czech Republic and abroad are trying to reach a certain level in the number of services offered to satisfy their clients who use this electronic form of communication more and more often. Significant differences in the products offered cannot be observed among the banks surveyed in the Czech Republic and other EU countries. In terms of fees, banks are quite similar, and as far as e-banking products are concerned, no bank has miss internet banking and mobile banking nowadays. The actual comparison of the internet banking of individual banks was quite complicated because each bank tries to offer its client its specific product within various packages and benefits that do not correspond to the basic tariff and due to this, the fees may significantly vary. Despite these facts, I believe that the work has succeeded in offering readers a certain level of comparison in terms of bank fees.

Regarding the adoption of internet banking in the selected countries, the popularity of internet banking in the European Union is increasing every year and among the selected countries, the adoption of internet banking in the Czech Republic is the fastest during the last years, even faster than in its largest neighbouring country – Germany.

In terms of security, as one of the most cyber-secure country in the European Union might be considered Denmark. Every citizen in Denmark is owner of a national eIdentity (NemID) and their own digital mail. In terms of further development of security and digitization, the Denmark's digital system using NemID could be the inspiration for the Czech Republic.

BIBLIOGRAPHY

Chovancová Adriana. 2006. "Forms of electronic banking." *Biatic*, 14, no. 6: 22-25

Griffin, Ry'mone. 2018. *Internet Governance*. Waltham Abbey: ED-Tech Press.

Khan, Fatima Hajera. 2017. "E-Banking: Benefits and Related Issues." *American Research Journal of Business and Management* 3, no. 1: 1-7

Kujur, Teju, and Shah, Ahmad Mushtaq. 2015. "Electronic Banking: Impact, Risk and Security Issues." *International Journal of Engineering and Management Research* 5, no. 5: 207-212

Lance, J. 2007. *Phishing bez záhad*. Prague: Grada Publishing a.s.

Mejstřík, Michal, Magda Pečená, and Petr Teplý. 2014. *Bankovníctví v teorii a praxi: Banking in Theory and Practice*. Prague: Carolinum.

Miryala, Ramesh Kumar. 2015. *Trends, Challenges & Innovations in Management*. Hyderabad: Zenon Academic Publishing.

Onyiriuba, Leonard. 2016. *Bank Risk Management in Developing Economies*. London: Academic Press.

Pfleeger, P. Charles, and Lawrence, Shari. 2003. *Security in Computing*. 3rd ed. New Jersey: Prentice Hall.

Shah, Mahmood, and Steve Clarke. 2009. *E-Banking Management: Issues, Solutions, and Strategies*. Hershey, PA: Information Science Reference.

Shannak, O. Rifat. 2013. "Key Issues in E-banking Strengths and Weaknesses: The Case of Two Jordanian Banks." *European Scientific Journal: Amman Jordan* 9, no. 7: 239-263

Shaq, Mushtaq. 2015. "Electronic Banking: Impact, Risk and Security Issues." *International Journal of Engineering and Management Research* 5, no. 5: 207-212

Electronic sources

Bank of America. 2020. "Credit vs. debit: What's the difference." Accessed January 15, 2020. <https://bettermoneyhabits.bankofamerica.com/en/personal-banking/difference-between-debit-and-credit>

Bankenverband. 2007. "Online Banking Security." Accessed February 13, 2020. <https://fi-portal.commerzbank.com/portal/media/fi/footer/security/onlinebankingsicherheit.pdf>

BankenVerband. 2019. "Germany's banking sector: Facts & Figures." Accessed March 5, 2020. <https://www.ebf.eu/germany/>

Buřinská, Barbora. 2019. "Platby kartou v Česku jasně vedou, hotovosti se ale lidé nechtějí vzdát." Accessed April 28, 2020. <https://www.novinky.cz/finance/clanek/platby-kartou-v-cesku-jasne-vedou-hotovosti-se-ale-lide-nechteji-vzdat-40303302>

B2BPAY. 2020. How to open a bank account in Germany. Accessed February 28, 2020. <https://www.b2bpay.co/comment-ouvrir-un-compte-bancaire-en-allemande>

Carter, Abi. 2019. "Only 51 percent of people in Germany use online banking." Accessed April 20, 2020. <https://www.iamexpat.de/expat-info/german-expat-news/only-51-percent-people-germany-use-online-banking>

Český statistický úřad. 2020. "Internet používá přes 80% obyvatel Česka." Accessed February 26, 2020. <https://www.czso.cz/csu/czso/internet-pouziva-pres-80-obyvatel-ceska>

Česká národní banka. 2019. "Rizika pro finanční stabilitu a jejich indikátory." Accessed February 18, 2020.

https://www.cnb.cz/export/sites/cnb/cs/financni-stabilita/.galleries/rizika_pro_fs/rizika_pro_financni_stabilitu_a_jejich_indikatory_prosinec_2019_cz.pdf

ČSOB. 2020. "ČSOB smartbanking." Accessed April 26, 2020. <https://www.csob.cz/portal/people/accounts/internet-and-mobile-banking/smartbanking>

Česká spořitelna. 2020. "George. A Name That Means Commitment." Accessed April 26, 2020. <https://www.csas.cz/en/internet-banking/george>

DanskeBank. 2020. "Security." Accessed March 12, 2020. <https://danskeci.com/ci/transaction-banking/security/security>

DanskeBank. 2020. "Security". Accessed April 30, 2020. <https://danskeci.com/ci/transaction-banking/security/security>

Detrixge, John. 2019. "As Denmark turns away from cash, a payment app has more likes than Facebook." Accessed April 28, 2020. <https://qz.com/1724326/mobilepays-app-is-more-popular-than-facebook-in-denmark/>

Deutsche Bundesbank Monthly Report. 2019. "The costs of payment methods in the retail sector". Accessed April 24, 2020.

<https://www.bundesbank.de/resource/blob/800766/0462923c3587a2d98f2c2db5b71047ae/mL/2019-06-kosten-zahlungsmittel-data.pdf>

Essays, UK. 2018. "The Various Forms of E-Banking Information Technology." Accessed January 15, 2020. <https://www.ukessays.com/essays/information-technology/the-various-forms-of-e-banking-information-technology-essay.php?vref=1>

European Banking Federation. 2018. "Banking in Europe: EBF Facts & Figures 2018." Accessed March 14, 2020. <https://www.ebf.eu/wp-content/uploads/2018/09/Banking-in-Europe-2018-EBF-Facts-and-Figures.pdf>

Eurostat. 2018. "Internet banking on the rise." Accessed April 15, 2020. <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20180115-1>

Eurostat. 2019. "Individuals using the internet for internet banking." Accessed March 28, 2020.

<https://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=0&language=en&pcode=tin00099>

Expatica. 2020. "The banking system in Germany." Accessed March 7, 2020. <https://www.expatica.com/de/finance/banking/banking-in-germany-1090571/>

Finance. 2020. "Jak založit běžný účet." Accessed February 18, 2020. <https://www.finance.cz/ucty-a-sporeni/bezne-ucty/abeceda-beznych-uctu/jak-zalozit-bezny-ucet/>

Fyidenmark. 2019. "Banking in Denmark." Accessed March 12, 2020. <https://www.fyidenmark.com/bankinginDenmark.html>

Global Cybersecurity Index. 2018. ITU Publications. Accessed April 30, 2020. https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf

Hedvicakova, Martina, and Svobodova, Libuse. 2018. "The Use of Internet and Mobile Banking in the Czech Republic." Accessed February 22, 2020.

https://www.researchgate.net/publication/328246665_The_Use_of_Internet_and_Mobile_Banking_in_the_Czech_Republic_17th_IFIP_WG_611_Conference_on_e-Business_e-Services_and_e-Society_I3E_2018_Kuwait_City_Kuwait_October_30_-_November_1_2018_Proceedings

- Hertzum Morten, Jørgensen Niels, and Nørgaard, Mie. 2004. "Usable Security and E-banking: Ease of Use vis-à-vis Security." *Australasian Journal of Information Systems* 11, no. special issue: 52-65. Accessed March 14, 2020. https://www.researchgate.net/publication/30062989_Usable_Security_and_E-Banking_Ease_of_Use_vis-a-vis_Security
- Iamexpat. 2019. "Important changes to online banking in Germany from September." Accessed March 7, 2020. <https://www.iamexpat.de/expat-info/german-expat-news/important-changes-online-banking-germany-september>
- International Financial Services. 2019. "Europe's Best Online Banks 2019-2020." Accessed April 15, 2020. <https://www.gbo-intl.com/europe-best-online-banks-2019/>
- Komerční banka. 2019. "Upgraded application MojeBanka Internet banking." Accessed April 26, 2020. <https://www.kb.cz/en/o-bance/novinky/2018/vylepsena-aplikace-mojebanka>
- Kourauš, Anton, Dobrovič, Ján, Ključnikov Aleksander, and Gombár, Miroslav. 2016. "Consumer Approach to Bank Payment Card Security and Fraud Banking." *International Journal of Security and Sustainability Issues* 6, no. 1: 86-102. Accessed February 28, 2020. http://jssidoi.org/jssi/uploads/papers/21/Koraus_Consumer_approach_to_bank_payment_card_security_and_fraud.pdf
- Koskosas Ioannis. 2011. "The Pros and Cons of Internet Banking: A Short Review." Accessed January 15, 2020. https://www.researchgate.net/publication/227489888_THE_PROS_AND_CONS_OF_INTERNET_BANKING_A_SHORT_REVIEW
- Lifeinduesseldorf. 2019. "6 of the Best Banks for Expats in Germany." Accessed March 5, 2020. <https://lifeinduesseldorf.com/best-expat-banks-germany/>
- Ministry of Finance. 2019. Digitisation of the Public Sector in Denmark. Accessed April 20, 2020. <file:///C:/Users/42060/Downloads/Jens%20Krieger%20Ryen%20II.pdf>
- Ministerstvo průmyslu a obchodu. 2020. "Internetové bankovníctví se v ČR těší rostoucí oblibě." Accessed April 18, 2020. https://www.mpo.cz/assets/cz/rozcestnik/analyticke-materialy-a-statistiky/tydenik-ekonomicky-aktualit/2020/2/5_tyden_2010.pdf
- NemiID. 2020. "Introduction to NemiID." Accessed April 18, 2020. https://www.nemid.nu/dk-da/om-nemid/historien_om_nemid/hvad_er_nemid/
- NemKonto. 2020. "NemKonto/Easy Account". Accessed April 25, 2020.

<https://www.nemkonto.dk/da/ServiceMenu/Engelsk>

Nordea. 2019. "Tariff of charges for personal customers." Accessed April 24, 2020.

https://www.nordea.dk/Images/144275766/Priser_serviceydelser_privat_UK_01.11.2019.pdf

Phaneuf, Alicia. 2019. "State of mobile banking in 2020: top apps, features, statistics and market trends." Business Insider. Accessed April 18, 2020. <https://www.businessinsider.com/mobile-banking-market-trends>

S&P Global Ratings. 2019. "Tech Disruption in Retail Banking: German Banks Have Little Time for Digital Catch-Up." Accessed April 18, 2020. <https://www.spglobal.com/en/research-insights/articles/covid-19-daily-update-april-29-2020>

Shaq, Mushtaq. 2015. "Electronic Banking: Impact, Risk and Security Issues." International Journal of Engineering and Management Research 5, no. 5: 207-212

Schütz, Simon. 2019. "For Many Germans, Cash Is Still King". NPR. Accessed April 24, 2020. <https://www.npr.org/2019/06/09/728323278/for-many-germans-cash-is-still-king?t=1589050221152>

Thomsen, Moelgaard Jeppe. 2018. Cyber security: vulnerability can be turned into an advantage. <https://www.dtu.dk/english/news/2018/10/dynamo-theme-1-eng-saarbarheden-kan-vendes-til-en-fordel?id=0e74e51e-eaeb-4d04-a268-ac581af34028>

Suominen, Matti. 2001. *E- Banking in the Nordic Countries – Its Emergence and Perspectives*. Accessed April 18, 2020.

[https://www.researchgate.net/publication/228846018_E-](https://www.researchgate.net/publication/228846018_E-banking_in_the_Nordic_countries-its_emergence_and_perspectives)

[banking_in_the_Nordic_countries-its_emergence_and_perspectives](https://www.researchgate.net/publication/228846018_E-banking_in_the_Nordic_countries-its_emergence_and_perspectives)

Wisniewski, Mary. 2020. *5 key benefits of mobile banking in 2020*. Accessed March 15, 2020. <https://www.bankrate.com/banking/checking/benefits-of-mobile-banking/>

Zeman, Miroslav. 2019. "Česko je historicky ekonomicky slabší než Německo. Právo&poradna." Accessed April 18, 2020. <https://www.bankovnipoplatky.cz/cesko-je-historicky-ekonomicky-slabsi-nez-nemecko-34642>

LIST OF ABBREVIATIONS

ATM	Automated Teller Machine
EBA	European Banking Authority
EFT	Electronic Funds Transfer
EU	European Union
SMS	Short Message Service
GSM	Global System for Mobile Communication
WAP	Wireless Application Protocol
FDIC	The Federal Deposit Insurance Corporation
PIN	Personal Identification Number,
TAN	Transaction Number, a one-time password used to authorize a transaction
EMIS	Education Management Information System
HBCI	Home Banking Computer Interface
ID	Identification
NPL	Nonperforming Loan

LIST OF FIGURES

<i>Figure 1 Evolution of e-banking.</i>	16
<i>Figure 2 Adoption of using internet banking (% of individuals aged 16 to 74) in the Czech Republic (own creation based on Eurostat data from 2008-2019)</i>	30
<i>Figure 3 Preferred payment methods used in Czech republic (Source: Novinky. 2019. “Platby kartou v Česku jasně vedou, hotovosti se ale lidé nechtějí vzdát”)</i>	31
<i>Figure 4 Share of individuals (% of individuals aged 16-74) avoided internet banking due to security concerns in the Czech Republic (own creation based on Eurostat data 2010, 2015 and 2019)</i>	33
<i>Figure 5 Adoption of internet banking (% of individuals aged 16-74) in Germany (own creation based on Eurostat data from 2008-2019)</i>	35
<i>Figure 6 The German Population Prefers Cash over Cards and E-Payments (Source: Bundesbank, 2019)</i>	36
<i>Figure 7 Share of individuals (% of individuals aged 16-74) avoided internet banking due to security concerns in Germany (own creation based on Eurostat data from 2010, 2015 and 2019)</i>	38
<i>Figure 8 Individuals using internet for internet banking in Denmark (own creation based on Eurostat data from 2008-2019)</i>	42
<i>Figure 9 Preferred payment methods in Denmark in 2019</i>	42
<i>Figure 10 Share of individuals (% of individuals aged 16-74) avoided internet banking due to security concerns in Denmark (own creation based on Eurostat data from 2010, 2015 and 2019)</i>	44
<i>Figure 11 Development of internet banking penetration (own creation based on Eurostat data from 2008-2019)</i>	47
<i>Figure 12 Share of people avoided internet banking due to security concerns in selected EU countries (own creation based on Eurostat)</i>	48

LIST OF TABLES

<i>Table 1 Bank fees in selected Czech banks (own creation based on data from banks' websites, April 2020)</i>	28
<i>Table 2 Offered services and benefits in selected Czech banks (own creation based on data from banks' websites, April 2020)</i>	29
<i>Table 3 Bank products and fees in selected German banks (own creation based on data from banks' websites, April 2020)</i>	34
<i>Table 4 Bank products and fees in selected Danish banks (own creation based on data</i> <i>.....)</i>	40
<i>Table 5 Comparison of bank fees (Ø) in selected EU countries (own creation)</i>	46

