Doctoral thesis (PhD)

MAPPING THE ONLINE SHOPPING AND ELECTRONIC PAYMENT HABITS OF UNIVERSITY STUDENTS USING THE UTAUT-MODEL

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1. THE BACKGROUND, OBJECTIVES AND HYPOTHESES OF THE RESEARCH

Internet use is constantly growing thanks to technological progress. Consumers can buy anything, anywhere, with just a few clicks. The internet has become the most effective tool for selling all kinds of goods, from FMCG (fast-moving consumer goods) to luxury fashion items.

Nowadays, online shopping is a widely accepted way to buy/demand products and services. However, the study of online consumer behavior is still relatively underdeveloped. Although online shopping is no longer a new topic, there are still many unanswered questions about what determines consumers' willingness to buy.

CALVO-PORRAL AND PESQUEIRA-SANCHEZ (2019) argue that age is one of the most determinant factors for engagement with technology.

As online shopping has grown, so have electronic payment solutions GRZELCZAK and PASTUSIAK (2020) show that in Central and Eastern Europe, non-cash payments made up the largest share of payments by credit card. They also showed that socio-demographic factors influence the shift from cash to non-cash payments, including educational attainment, income received, and disposable assets. In Hungary, the proportion of people preferring electronic payments was 58% in 2023. Of these, 53% said they preferred electronic payment solutions primarily for convenience, while 48% (also) emphasized security. The main objective of the MNB's e-payments strategy is to ensure that by 2030 at least two-thirds of all transactions in the economy as a whole are carried out electronically (MNB, 2024).

The study of online shopping and electronic payment habits is a very topical area, and it is important to map the habits of different age groups in this field. Therefore, I focus on university students and map their online shopping and electronic payment habits. To better understand the factors behind university students' online shopping and electronic payment habits and their willingness to adopt a particular technology, I apply the Unified Theory of Acceptance and Utilize of Technology (UTAUT) model. The focus of my doctoral dissertation is on undergraduate students studying in the field of economics, with a special emphasis on undergraduate students. The reason for this is that the research is mainly concerned with Generation Z, who have grown up with the Internet and are in a position to experience digital and technological developments in their daily lives. Generation Z

includes those who were born between 1993 and 2005 according to TURNER (2015) and those born after 1995 according to STEWART, (2017). And AGÁRDI et al (2021) defined Generation Z as those born between 1995 and 2010. In addition, I focus on students studying economics or related fields because I believe that they are more knowledgeable in traditional and digital finance due to their studies, and therefore the research topic may be closer to them.

I will start by analyzing the literature in order to build up and implement the primary research with an appropriate level of background knowledge.

I base the literature analysis on three main pillars: online shopping, electronic payment, and the UTAUT-model.

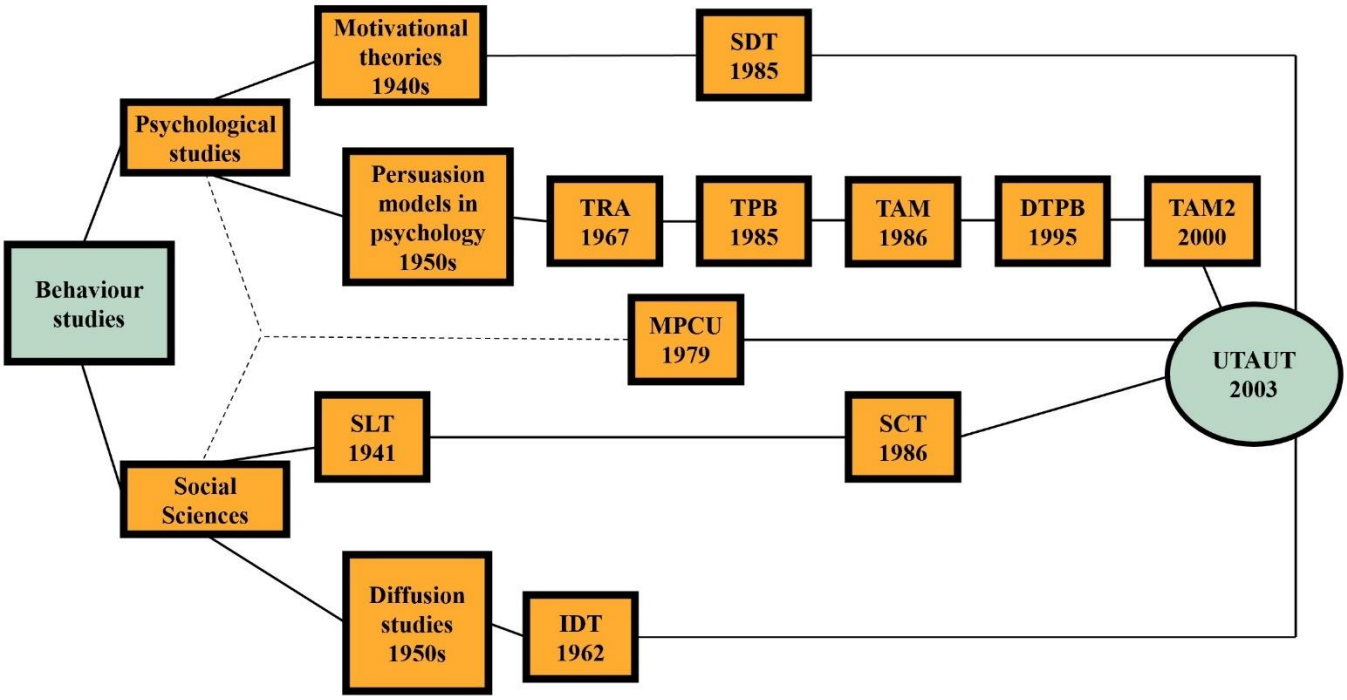
Within online shopping, I will compare online and traditional shopping channels and explain the concepts related to e-commerce. It is important to identify reliable and up-to-date statistical data at both international and national levels. In any case, I focus on the online shopping habits of Generation Z, as this age group is the primary target group of the primary research. In addition to the above, I will also discuss the role of demographic factors in online shopping and the potential risks of online shopping. In the field of electronic payments, I will examine the role of Internet banking in Europe. I detail the different electronic payment habits in Hungary and explain the different types of electronic payment solutions. FinTech services are also a focus of the research, so I will be sure to explain the concepts involved and look at both banking and non-banking services in a broad sense. In any case, I consider it important to focus on the benefits and risks of electronic payments. The third pillar of the research is the UTAUT-model. Particular emphasis has been placed on a detailed description of the model on which the primary research is based. The literature review has played a prominent role in this area, as I have mapped previous research based on this well-established UTAUT-model. I gathered information on how such a model should be properly integrated into primary research. I studied the claims of existing research and adapted those relevant to my topic to my primary research.

The UTAUT is a model developed (VENKATESH, 2012) to explain how users intend to use and apply an information system (VENKATESH, 2003).

The UTAUT has gained great popularity due to its comprehensive nature and its ability to predict technology adoption in different contexts (ALQHATANI et al., 2022; AL-RAHMI et al, Numerous studies have confirmed the effectiveness of the UTAUT-model in predicting the adoption of different technologies such as mobile banking, social media (ALISMAIELl et al., 2022; ALMOGREN - ALJAMMAZ, 2022; AL-RAHMI -OTHMAN, 2013) and online shopping (KIM - SHIN, 2017). Furthermore, the UTAUT-model has been applied to compare technology adoption across cultures and countries. Several factors influencing technology adoption can be incorporated into the model, making it a valuable tool for understanding user behavior (VENKATESH et al., 2008; TAHERDOOST, 2018; AL-RAHMI et al, 2023). Organisations can use these models to design and implement technology that users are more likely to adopt and use (DAHRI et al., 2021; AL-RAHMI et al., 2023, ALALWAN, 2019; ALMULLA - AL-RAHMI, 2023; ARAIN et al., 2019; AL-MAATOUK et al., 2020).

The UTAUT-model is the result of a literature review and synthesis of eight different models. The eight models are The Theory of Reasoned Action (TRA), the Technology Acceptance Model 1-2 (TAM1 and TAM2 - Technology acceptance model), the Motivational Model (MM), the Theory of Planned Behavior (TPB) and the hybrid model of TAM, the Model of PC Utilization (MPCU), the Innovation Diffusion Theory (IDT) and the Social Cognitive Theory (SCT) (VENKATESH, 2012; VENKATESH, 2003).

Figure 1: Evolution of the technology adoption theories leading to the development of UTAUT



Source: own editing, 2024.

Firstly, I illustrate the basic model with a diagram to ensure the model is transparent. I will then explain in detail the variables of the model. I consider it important to complement the basic model in order to add color and quality to the research. Thus, I add additional factors to the basic model and also illustrate them. In order to properly incorporate the model into my own work, I will examine previous research on the topic and adapt the various statements to the primary research.

The primary research will be a quantitative survey of university students. The statements of the UTAUT-model are rated by the students on a Likert scale. I would like to clarify that the topic of electronic payments and FinTech is considered in general in the literature analysis. There are questions in the questionnaire that examine these areas in general. However, by using a set of statements based on the UTAUT-model, in this thesis, I focus on the electronic payment solutions provided by non-banking, FinTech companies and startups and their willingness to adopt them. My aim is to sort students into relatively homogeneous groups (clusters) according to their attitudes towards the adoption of online shopping and non-bank, FinTech services.

As a qualitative research, I will conduct focus group interviews with 10-10 participants on both online shopping and electronic payments. In this case, the quantitative research was followed by qualitative research, the reason being that my aim was to survey a large number of students on the topic for the first time. Then, by asking the questions that emerged during the survey and after the clustering, I aimed to target a narrow group of university students in order to try to delve deeper into the topic. In the thesis, I have kept the chapter references in the dissertation to help the reader find information.

The main objective of the dissertation *is to investigate the consumer behavior of university students studying at the Faculty of Economics and Business Administration (or a similar field of study but with a different name) of 13 universities in the country, in the field of online shopping and non-bank (FinTech) electronic payment solutions, based on the Unified Theory of Technology Adoption and Use (UTAUT), through a questionnaire survey and focus group interviews. My aim is to understand what variables contribute to the adoption of online shopping and non-bank electronic payment solutions among university students. Furthermore, I aim to explore which factors raise concerns among students when it comes to using FinTech services. Finally, building on the UTAUT-model, I organize students into relatively homogeneous groups (clusters) according to their attitudes towards the adoption and use of online shopping and non-bank (FinTech) electronic payment solutions.*

Under the main objective of the dissertation are the objectives of the dissertation and the related hypotheses, which I have summarised in tables in *Table 1*.

Table 1: Issues (CC), objectives (C), hypotheses (H) related to online shopping, electronic payment and the UTAUT model

1. pillar **Questions about online shopping**	**Objectives**	**Hypotheses**	**Research methods**
1 KK: What are the characteristics of students' online shopping habits?			
1 Kka: Which negative aspects dominate online shopping among students?	**C1:** My aim is to analyse which of the possible negatives and dangers associated with online shopping are the most significant for students	**H1:** The fact that students find it inconvenient to return a faulty or spoilt product ordered online is a more significant negative than the lack of in-person product selection	primary (questionnaire survey and focus group interview)
2. pillar **Questions about electronic payment**	**Objectives**	**Hypotheses**	**Research methods**
2 KK: What electronic payment solutions and platforms do students use?			
2 Kka: When do university students use electronic payment solutions?	**C2:** My aim is to examine by gender, for women and men, the specific cases where students use electronic payment solutions	**H2:** The proportion of female students who use electronic payment solutions for online purchases is higher than the proportion who use these payment solutions in traditional shops	primary (questionnaire survey)
2 Kkb: How safe or risky do university students consider the various electronic payment solutions?	**C3:** My aim is to shed light on how students assess the risks associated with different electronic payment solutions	**H3:** Students consider bank transfer the safest among electronic payment solutions	primary (questionnaire survey)

3. pillar **Issues arising from the use of the UTAUT model**	**Objectives**	**Hypotheses**	**Research methods**
3 KK: How do the variables of the individually augmented UTAUT-model assess the acceptance of online shopping and electronic payment among university students?			
3 Kka: What are the perceived risks that conscious students are most afraid of when shopping online?	**C4:** My aim is to investigate which of the perceived risks are the most feared by students for whom awareness is a key factor when shopping online	**H4:** In the cluster where university students are the most conscious of their online purchases, the most significant perceived risk for them is that the personal data they provide when shopping online is misused and used without permission	primary (questionnaire survey)
3 Kkb: Are women or men more aware of non-bank electronic payment services among the students surveyed?	**C5:** My aim is to find out whether women or men consider themselves more aware of non-bank electronic payments	**H5:** Among university students, women perceive themselves as more aware of non-bank electronic payment solutions than men	primary (questionnaire survey)
3 Kkc: Are students who are more open to trying out and adapting new technologies more likely to use a digital crypto wallet compared to other students?	**C6:** My aim is to investigate the role of perceived innovativeness and artificial intelligence on the use of digital crypto wallets	**H6:** Students for whom perceived innovativeness and the role of AI in non-bank electronic payments are key have used digital crypto wallets more than other students	primary (questionnaire survey)

Source: own editing, 2024.

2. DATABASE AND DESCRIPTION OF THE METHODS USED

I conducted a literature analysis on the topic, using primarily an electronic database, Scopus. Scopus is a multi-disciplinary bibliographic database of scientific journals organized into an organized hierarchy of disciplines and sub-disciplines (HASSAN et al., 2019).

In the primary research, I first used a questionnaire survey as a quantitative method and then a focus group interview as a qualitative method. In addition to the exploratory nature of the primary research, my aim was to test the hypotheses (Chapter 1) already described above.

Table 2: Research methodology

Exploratory research methods: secondary data	
Methods	**Place, purpose of the thesis**
Literature analysis	Literature review (Scopus database, open access journal articles in English, statistical data: KSH, STATISTA, etc.)
Descriptive research methods: questionnaire survey	
Online and paper-based survey (online - Google form)	Structured data collection on university students' attitudes towards online shopping and electronic payment
Incorporation of the UTAUT model into the survey, modelled on existing research	A unified theory of technology adoption and use
Measurement and scale training: comparable scale training	
Nominal scale-up	Design of questionnaires: demographic data, creating clustering options, calculating distributions
Measurement and scale training: non-comparable scale training	
Discrete rating scale: Likert scale	Application of Likert scale for the analysis of consumer and user attitudes (UTAUT model based statements)
Mathematics statistics methods	
Factor analysis (KMO indicator, Bartlett test, rotated factor matrix, reliability test)	Processing questionnaires, analysing data (UTAUT-model based sets of statements)
Cluster analysis, cross-tabulations, Chi-square test	Drawing conclusions from the questionnaire survey

Applied software	
SPSS	descriptive statistics (distribution ratios, arithmetic mean, median, mode, skewness, interquartile range), factor analysis, KMO and Bartlett test, cluster analysis, cross-tabulation analysis
Microsoft Excel	analysing the data obtained from the questionnaire surveys, producing graphs
Exploratory research methods: qualitative research	
Focus group interviews	To survey university students using a questionnaire survey

Source: own editing, 2024

2.1. Procedure for literature analysis

The literature review included a mapping of online and traditional shopping channels, an introduction to e-commerce concepts, an analysis of Generation Z's online shopping habits, a detailed analysis of the role of demographic factors in online shopping, and a description of the risks associated with online shopping. In addition to the above, the literature analysis also included a clarification of the concepts related to electronic payments, a description of the different electronic payment solutions, a description of the concepts related to FinTech, a detailed description of the perceived benefits and risks of electronic payments and finally a detailed description of the UTAUT model.

I examined the topic from a geographical perspective, globally and at European and national levels. To obtain the most up-to-date and reliable statistical data, I mainly used the EUROSTAT, KSH, and Statista databases. In addition, I have also targeted the following domestic sources on electronic payments: MNB FinTech and Digitalisation Report (2024), MNB Payment System Report (2024), and Electronic Payment Solutions Handbook (Fintechzone 2024). The overall research was structured in such a way that the literature review and primary research were in continuous alignment.

In identifying the keywords, I focused on three main areas, online shopping, electronic payment solutions, and finally, in terms of methodology, the UTAUT model.

online shopping

Keywords in English: online shopping, internet shopping, e-commerce, consumer behaviour, product categories, purchase intention, advantages, disadvantages

electronic payment

keywords in English: online payment, digital payment, electronic payment, mobile payment, FinTech, e-wallet, blockchain, financial innovation, artificial intelligence, advantages, disadvantages

UTAUT model

keywords in English: UTAUT, UTAUT model, online shopping, electronic payment

In the second phase of the research, I used logical operators to determine the relationships between the result sets:

AND = the "AND" relationship between terms

OR = "OR" relationship between terms, choice between synonym groups

" " = search for a specific term;

* = replaces a character

Within the Scopus database, I only analysed open access scientific journal articles in English.

2.2. Primary research process

The primary method of collecting information was qualitative, using focus group interviews. As a quantitative method, I conducted a questionnaire survey with university students.

The first step in the primary information collection was a questionnaire survey, from September 2023 to December 2023. The target group were full-time undergraduate students, Master's students, PhD students, and students enrolled in higher education vocational training. The design of the questionnaire sample was significantly ahead of time. To determine the proportions, I used the higher education statistics (2020) available on the Education Office website. At the time of designing the questionnaire sample, this source was publicly available, where the gender distribution by faculty was also given. Due to the wide distribution of the questionnaire survey, I started with the proportions previously

specified and did not modify them. *Table 3* shows the universities targeted in the primary survey.

Table 3: Universities targeted in the primary research

Targeted universities	Number of students	Number of planned respondents	Actual number of respondents (after data cleaning)
Budapest University of Economics	14363	278	30
Budapest University of Technology and Economics	2091	40	107
University of Debrecen	4066	79	477
Széchenyi István University	2142	41	155
University of Miskolc	1956	38	35
Eötvös Loránd University	3835	74	0
Budapest Metropolitan University	4015	78	0
Corvinus University of Budapest	8240	160	17
University of Óbuda	1032	20	70
University of Pannonia	2222	43	0
University of Pécs	2577	50	42
University of Szeged	2363	46	4
Szent István University (MATE)	2752	53	11
		1000 students	**948 students**

Source: own editing, 2024.

I planned to involve 1000 people in the research. In total, 966 people completed the questionnaire. Unfortunately, some students did not complete the questionnaire or their one-sided answers gave the reason that they did not take the response seriously. Thus, after data cleaning, I was finally able to use 948 responses as a basis for the evaluation.

In the first instance, the survey was conducted online using Google Forms. The necessary steps were taken to conduct the survey, dean's permissions were obtained and contacts at the universities were contacted by email. Thus, the distribution of the link to the questionnaire was done with the assistance of university lecturers. I would like to thank the lecturers for their helpfulness.

Completing the questionnaire was of course voluntary and completely anonymous. Unfortunately, the response rate from universities was not as high as I had intended. Thus, the sample was concentrated on the students of the Faculty of Business and Economics of the University of Debrecen (50.3%). I attended the classes in person at the University of Debrecen and submitted the questionnaire on paper because the online form was not sufficiently efficient. Of course, I asked permission to attend the classes, and at the end of the classes I filled in the questionnaire with those who volunteered to do so. I added the paper questionnaires one by one to the online forms. The questionnaires took students approximately 15-20 minutes to complete.

Although I tried to involve a high number of students in my research, I could not ensure representativeness in the implementation of the research.

I divided the questionnaire survey into three parts. First, the questions focused on online shopping habits. The aim of the questions was to find out how often and from which devices students most often make their online purchases. Furthermore, in relation to the time of completing the questionnaire, which product categories were most frequently purchased in the last year? Students rated statements about the advantages and disadvantages of online shopping on a Likert scale. Then, building on the UTAUT-model, students were asked to rate 27 statements on a Likert scale of 1 to 5, where 1 - not at all true for me, 5 - absolutely true for me, and 0 - don't know/no answer.

I was helped in translating the statements into Hungarian by several friends who speak English at a native level.

I also looked at electronic payment habits. I also wanted to find out what electronic payment solutions students are familiar with and how often they use them. On a Likert scale, students rated statements about the benefits and potential risks of electronic payments. I also aimed to find out in which specific cases students use electronic payment solutions and which electronic payment platforms they use. Then, building on the UTAUT model, I asked students to rate 31 statements on a Likert scale of 1 to 5, where 1 - not at all true for me, 5 - absolutely true for me, and 0 - don't know/no answer.

Finally, the third and final part of my questionnaire contained questions on socio-demographic variables.

The questionnaires were tested. I had university students fill it in, 8 in total, who told me about their experiences and I corrected the questionnaire to make it more readable and logical, taking into account their feedback.

The responses were analyzed using SPSS mathematical statistical analysis software. I used descriptive statistics, which means that the information was collected, summarised, and quantified. I calculated distribution ratios, arithmetic mean, median, mode, skewness, and interquartile range. I also performed cross-tabulation analyses (SAJTOS - MITEV, 2007).

My variables can be characterized by nominal, ordinal (Likert scale), and ratio scale levels of measurement. For nominal variables, I tested for independence using the Chi-square test.

Following the questionnaire survey, I conducted two focus group interviews. The focus group interviews were conducted online, the reason being that students from four universities were unable to participate in person due to distance. I conducted the focus group interviews in a Webex meeting.

There were two interviews, the reason for this was that I was investigating the students' online shopping habits in one interview, and in the other interview, I focused on electronic payment habits. It would have been time-consuming to accomplish the thematic analysis in one interview. First, I investigated online shopping habits, the interview was scheduled for 26 June 2024 from 18:00 to 20:00. 10 students participated as planned, with the difference that 1 male instead of 1 female from the Budapest University of Technology and Economics finally registered for the online interview. The second interview focused on the electronic payment habits of university students. The interview took place on 27 June 2024 from 18:00 to 19:40. 10 participants also took part in this interview. This time again, 1 male instead of 1 female from the Budapest University of Technology and Economics participated in the online interview. The participants of the interview were rewarded with a gift voucher, adapted to the needs of the students. Most of them requested vouchers for clothes shops, bookshops, and grocery stores.

The first focus group interview focused on the online shopping habits of university students. The introduction was followed by an association game and then I focused on mapping online shopping habits. Among other things, I asked how often, on which device, and which product categories students buy. I asked the interviewees to guide me through an online shopping process. I placed the participants in different situations to gain more insight into

online shopping habits and underlying factors that influence students' decisions when shopping online. I asked students to name 2 to 2 advantages and disadvantages of online shopping based on their experiences. I then grouped the participants into teams based on the principle that people with similar attitudes and attitudes towards online shopping were put into a group and the small groups were given the task of designing the most ideal online shop for them.

The other focus group interview focused on mapping electronic payment habits. Again, the introduction was followed by an association game, and then I asked the participants how often and in which specific cases they use electronic payment solutions and which electronic payment platforms they prefer. I was also interested in knowing whether the size of the amount or the reliability of the online shop determined the payment method chosen by the participants. I also explored the interviewees' most unpleasant experiences with electronic payment. I also assessed the participants' preference for bank or non-bank electronic payment solutions and why. This time, there were also some exercises where the students had to imagine themselves in different situations, and this time the students had to list 2 to 2 advantages and disadvantages related to electronic payments.

For the focus group interview, I used the results of the questionnaire survey to identify the participants. A total of 471 people from universities other than the University of Debrecen completed the questionnaire. Based on the responses received from each university, I proportioned the share of universities in the sample. In addition to the University of Debrecen, I selected the three universities whose share exceeded 5% of the total sample. Thus, I planned to include students from four universities in the focus group interview, these four universities being Széchenyi István University, Budapest University of Technology and Economics, Óbuda University, University of Debrecen. The ratio of the four universities in relation to each other:

- University of Debrecen (59%)
- Széchenyi István University (19%)
- Budapest University of Technology and Economics (13%)
- Óbuda University (9%)

I planned to involve the largest number of students, 6 from the University of Debrecen, inviting 2 men and 4 women. Then I planned to involve two students from Széchenyi István University, 1 male and 1 female. From the Budapest University of Technology and Economics, I planned to include 1 male and 1 female from Óbuda University in the qualitative research. I focused on undergraduate students at all universities, as 72.7% of the respondents also completed their questionnaire at the undergraduate level.

3. MAIN FINDINGS OF THE THESIS

In this chapter, I detail the results of the objectives and hypotheses formulated at the beginning of the thesis. I also present the data supporting the acceptance or rejection of each hypothesis and the methods used. In total, I have examined the validity of six hypotheses for the topic under study.

C1: My aim is to analyze which of the potential negatives and dangers of online shopping are the most significant for students. The literature analysis (*chapter 2.1.6, chapter 2.4.3*) highlighted the prominent role of perceived risk in the adoption of online shopping. According to PAVLOU (2003), the following uncertainties can arise in consumers when shopping online: financial risk, performance risk, time risk, physical risk, social risk, and psychological risk. Similar results were obtained by MARTINS et al. (2014). Once a purchase is made, consumers may experience difficulties in exchanging or returning the purchased product (KEISIDOU et al., 2011). Much of the previous research in this area has confirmed that functional risk has a significant impact on consumers' purchasing decisions (BHUKYA - SINGH, 2015; BRUWER et al, 2013; MARTINS et al., 2014; PARK - TUSSYADIAH, 2017; RAY - SAHNEY, 2018). In addition, in contrast to the offline environment, online shopping leads to uncertainty as online shoppers cannot touch, feel, or try the product they are buying (BOWEN and BOWEN, 2015). **C1** and H1 are based on online shopping as a pillar.

H1: The fact that students find it inconvenient to return a faulty or spoiled product ordered online is a more significant negative than the lack of personal choice. *In section 4.1.2,* the evaluation of the questionnaires was presented in tabular form, showing how the students rated the statements about the disadvantages of online shopping on a Likert scale (1 - not at all true for me, 5 - completely true for me). For the evaluation, I used the 4 and 5 markers to indicate whether the statements were true or extremely true for the individual. I examined the question by cross-tabulating the three clusters previously developed for online shopping with the two negatives under study. *From Table 14* in Section 4.1.4, it can be seen that the lack of personal product choice is most pronounced in the KL2 'open doubters' (19.1%) and KL3 'adopters, active adopters' (18.1%) clusters. The fact that students find it cumbersome to return spoiled or defective products is the most significant problem in KL3 (28.1%). It is

a similarly significant problem in KL2 (27.3%). Overall, students' finding it problematic to return unsuitable or defective products is a more significant negative (62.6%) than the lack of personal product choice (42.3%).

In the focus group interview, participants were asked to list 2 to 2 advantages and disadvantages of shopping online. *In chapter 4.2.1,* I have collected the 3 most important disadvantages mentioned by the students. In the table, I have listed the disadvantages in the order in which they were mentioned most often. Thus, the most prominent negative for students is the problem of returning products, followed by the lack of personal choice of products, and thirdly the lack of confidence in the handling of personal data. Thus, in addition to the questionnaire survey, the focus group interview confirmed that the return of spoilt and faulty products is a more significant negative factor among university students than the lack of personal choice when it comes to online shopping. Thus, **hypothesis H1 is accepted.**

Table 4: Proof/refutation of hypothesis 1

Hypothesis	Literature	Detailed result	Accepted/Rejected
H1: The fact that students find it inconvenient to return a faulty or spoilt product ordered online is a more significant negative than the lack of in-person product selection	*Chapter 2.1.6, Chapter 2.4.3*	*4.1.2. 4.1.4 Chapter 4.2.1.*	**Accepted**

Source: own editing, 2024

C2: I aim to examine, by gender, for women and men, the specific cases where students use electronic payment solutions. *2.2.2. In Chapter 2.2,* the literature analysis revealed that in Hungary, cash payments in shops have been steadily declining, decreasing by 61.5% from 2018 to 2022 (STATISTA, 2023c). Based on the Hungarian National Bank (MNB) Payment System Report 2024, it can be concluded that there has been an increase in the turnover and share of electronic payment methods in Hungary. Looking at the year 2023, the overall share of electronic payments for in-store purchases increased to 39%, with an increase of 5 percentage points, and for bill payments, the share increased to 76%. **C2** and **H2** are based on electronic payments as a pillar.

H2: The proportion of female university students using electronic payment solutions for online purchases is higher than the proportion of women who use these payment solutions in traditional shops. *In section 4.1.3,* I examined in general terms the specific cases in which university students use electronic payment solutions. I then used cross-tabulation analysis to examine the same issue by gender, which is also presented in *section 4.1.3.* 96.7% of the female respondents to the questionnaire survey use electronic payment solutions when shopping online, while 85.1% use them when shopping in shops. In addition, *in chapter 4.1.4,* I have also investigated whether university women prefer to use electronic payment solutions when shopping online or in shops for the three clusters of electronic payments. The table in *Chapter 4.1.4* shows that 60.6% of university women use electronic payment solutions when shopping online, while 54.2% use them when shopping traditionally in shops. In both cases, members of the KL3 cluster "*adopters, active users" are* the most frequent users of electronic payment. Both results indicate that more female university students use electronic payment solutions when shopping online as opposed to in-store. Thus, **I accept hypothesis H2.** Although the two approaches led to the same results, there is a significant difference in the proportions (96.7% and 60.6%), which is because the clusters are based on 779 (instead of 948) completions, as I did not take into account the 0 (don't know/no answer) responses to the statements and the clusters developed rely on mapping non-bank (FinTech) electronic payment habits.

Table 5: Verification/refutation of hypothesis 2

Hypothesis	Literature	Detailed result	Accepted/Rejected
H2: The proportion of female university students using electronic payment solutions for online purchases is higher than the proportion of women who use these payment solutions in traditional shops.	*Chapter 2.2.2.*	*4.1.3.* *4.1.4.* *Chapter*	**Accepted**

Source: own editing, 2024

C3: My aim is to shed light on how students assess the risks associated with different electronic payment solutions. Literature supports that perceived risk is a determinant of technology adoption and thus influences the adoption of electronic payments. *In section*

2.2.5, I discuss the perceived risks of electronic payments in more detail. THAKUR and SRIVASTAVA (2014) and SLADE et al. (2015) find that people's perception of risk significantly influences the adoption of mobile payments. We can talk about performance or operational risk. Operational risk includes problems caused by inadequacies or malfunctions of web-based financial sites such as online banking (BARAKAT - HUSSAINEY, 2013). Financial risk refers to the possibility of monetary losses during monetary transactions (FORSYTHE et al., 2006; GAI et al., 2018). Furthermore, money-related risks can be transaction errors or account misuse. **C3** and **H3** are based on the UTAUT model as a pillar.

H3: Among the electronic payment solutions, students consider bank transfers to be the safest. *In chapter 4.1.3*, it is explained in detail how the students were asked to rate which electronic payment solutions they consider more secure and which ones they consider more risky. The responses to this question highlighted the validity of the hypothesis. The students were asked to rate on a Likert scale of 1 to 5 how secure they found each payment solution to be: bank transfer, instant transfer with secondary account identifiers, web card, mobile wallet, digital wallet, digital crypto wallet, QR code payment, group direct debit. I have described each payment solution in 1-2 sentences in the questionnaire to help students answer. In the evaluation, I took the scores 4 and 5 as indicating that they considered the payment solution to be secure or fairly secure, while I took the scores 2 and 1 together as indicating that they considered it to be risky. This means that more than three-quarters of students (78.0%) think that bank transfers are safe. Thus, students find this electronic payment option the safest. The question was also explored by looking at which electronic payment solutions (in general) are considered the most secure by clusters of non-bank electronic payment habits. For the cross-tabulation analysis, I have used the labels 4 and 5 (secure, fairly secure). *Table 19* in chapter 4.1.4 shows that all electronic payment solutions without exception are considered more secure by the "doubters" cluster KL2 compared to the "unbanked electronic money cluster" KL1. Furthermore, without exception, all listed electronic payment solutions are considered safer by KL3 "Acceptors, active users" compared to KL2. Overall, the 779 university students grouped in the three clusters consider bank transfers (78.9%) to be the safest. This is followed by mobile wallets (62.6%). Thus, hypothesis **H3 is accepted.**

Table 6: Verification/refutation of hypothesis 3

Hypothesis	Literature	Detailed result	Accepted/Rejected
H3: Students consider bank transfers the safest electronic payment solution	*Chapter 2.2.5.*	*4.1.3.* *4.1.4.* *Chapter*	**Accepted**

Source: own editing, 2024

C4: I aim to investigate which of the perceived risks are the most feared by students for whom awareness is a key factor in online shopping. I have already referred to the literature on perceived risks of online shopping above for **C1** and **H1**, so I will not go into it here. C4 and H4 are based on the UTAUT model as their main pillar.

H4: In the cluster where university students are the most conscious of their online purchases, the most significant perceived risk for them is that the personal data they provide when shopping online is misused and used without permission. I tested the validity of this hypothesis by focusing on the cluster of students who are most aware. This cluster is the third (KL3) "adopters, active users". I have cross-tabulated this cluster with the statements on perceived risk. The statements had to be rated by the students on a scale from 1 to 5 (1 - not at all true for me, 5 - completely true for me). For the evaluation, I used the frequency of the scores on a scale from 1 to 5. I focused on the 1 and 2 markers, the reason being that all statements on perceived risk were worded as "not worried". Consequently, I looked at responses 1 and 2 that the statement is not true for the person, i.e. that they are worried. The results can be found in *section 4.1.4*, where the table shows that 9% of cluster members are concerned that the products and/or services they have bought online do not meet their expectations. 13.1% are concerned that the personal data they have provided during their online purchases will be misused and used without their permission. 14.6% are concerned that they may suffer a financial loss (cheaper elsewhere, incurring additional costs) when shopping online.

Thus, I conclude that **I reject** hypothesis **H4** because members of the cluster in which students consider themselves most conscious are more afraid of financial loss than of misuse of personal data.

Table 7: Verification/refutation of hypothesis 4

Hypothesis	Literature	Detailed result	Accepted/Rejected
H4: In the cluster where university students are the most conscious of their online purchases, the most significant perceived risk for them is that the personal data they provide when shopping online is misused and used without permission	*Chapter 2.1.6.*	*Chapter 4.1.4.*	**Rejected**

Source: own editing, 2024

C5: I aimed to explore whether women or men consider themselves more aware of non-bank electronic payments. The literature review highlighted the importance of consumers being aware when shopping online and making electronic payments. *Chapter 2.2.2* shows that in 2023, there were regrettably more than 182,000 successful electronic payment fraud cases in Hungary, worth more than HUF 8 billion. Of these abuses, phishing is the most common method (71%). Unfortunately, a very large part of the domestic population is not prepared to deal with the changes brought about by digitalisation from a cybersecurity perspective. As highlighted *in Section 2.4.4,* financial literacy has been found to influence financial behaviour (Lusardi - Mitchell, 2014), which requires an understanding of how people understand basic financial concepts (Klapper et al, Individuals who can achieve a high level of financial literacy can acquire essential skills to make informed financial and investment decisions, increase their financial freedom, enhance their self-confidence and autonomy, and improve their quality of life (GOMBER et al., 2017).

H5: Among university students, women perceive themselves to be more aware of non-bank electronic payment solutions than men.

This hypothesis belongs to the third pillar, as it is based on a set of assertions about the user awareness of the UTAUT model. To test the validity of the hypothesis, a cross-sectional analysis. I used gender and three statements on the awareness of the UTAUT model as the basis for the analysis. On a Likert scale, students rated the statements. I used the frequency of responses of 4 and 5 for gender, as these indicate whether the statement is true or extremely true for the student. The first statement was "I know the differences between electronic payment and the alternative payment methods I have used in the past". 78.6% of

men and 71.2% of women think they know the differences. The next statement was "I have enough information about the advantages and risks of using electronic payment". 79.0% of men and 70.4% of women think they have enough information.

Finally, the third statement is: "I am generally familiar with electronic payment services". 80.7% of men and 77.0% of women think they have the necessary knowledge. The significance level was $p<0.001$ in all cases.

A detailed table on this can be found *in chapter 4.1.3.* For all statements, it is confirmed that among university students, men perceive themselves as more self-conscious compared to women, so **hypothesis H5 is rejected.**

Table 8: Verification/refutation of hypothesis 5

Hypothesis	Literature	Detailed result	Accepted/Rejected
H5: Among university students, women perceive themselves to be more aware of non-bank electronic payment solutions than men.	*Chapter 2.2.2.* *Chapter 2.4.4.*	*Chapter 4.1.3.*	**Rejected**

Source: own editing, 2024

C6: I aim to investigate the role of perceived innovativeness and artificial intelligence in the use of digital crypto wallets among university students. *In section 2.4.2,* I describe the importance of consumer innovativeness, which refers to the learning process that influences the overall cognitive process of an individual and is determined by aspects such as the environment and the attitudes of others towards a given technology. Considering the theories of the TAM model and the UTAUT model, it is necessary to look at consumer innovativeness to assess the extent to which individuals adopt new technology and what factors play a key role in the adoption process (Kim-Kang, 2023). *Section 2.4.5* draws attention to the role of artificial intelligence in the process of technology adoption. The role of artificial intelligence in the acceptance of non-bank electronic payment solutions was considered important to investigate. I could not find any study within the Scopus database that used a UTAUT model to investigate the adoption of non-bank electronic payment

solutions by users, so I could only use some sources as a reference when adapting the set of statements, but I ended up formulating the statements myself.

H6: Students for whom perceived innovation and the role of artificial intelligence in non-bank electronic payments are key have used digital crypto wallets more than other students. Among university students, I was able to develop three clusters on their attitudes towards the adoption of non-bank electronic payments. Among the clusters, I highlighted the one in which both perceived innovativeness and AI play a dominant role compared to the other clusters. I used a cross tabulation analysis to examine the relationship between clusters and statements on perceived innovativeness and AI. The statements were to be rated by the undergraduate students on a scale from 1 to 5 (1 - not at all true for me, 5 - completely true for me). For the evaluation, I used the frequency of the scores on a scale from 1 to 5. I focused on the 4 and 5 markers, i.e. whether the statement was true or fairly true for the student. The significance level was $p<0.001$ in all cases. The results obtained are presented in *section 4.1.4*, where the table shows that, of the three clusters, members of the third cluster (KL3 - "Accepting, actively applying") feel most strongly that the statements on perceived innovativeness and AI are true for them. Consequently, I believe that this cluster will be the one with the highest percentage of non-bank electronic payments using digital crypto wallets.

I used cross-tabulation analysis to examine the role of crypto wallets in each cluster. The significance level was $p < 0.05$. The results are presented in *Section 4.1.4*, where the table shows that although there is not much variation, KL3 does not have the highest proportion of digital crypto wallet usage. Namely, for KL3 this proportion is 11.6%, while for KL2 "doubters" it is 5.8% and finally for KL1 "cluster of unbanked electronic money users" the highest is 12.5%. Thus, hypothesis H6, that students for whom perceived innovativeness and the role of AI is decisive in the field of unbanked electronic payments have already used digital crypto wallets in a higher proportion, compared to the other students, **is rejected.**

Table 9: Verification/refutation of hypothesis 6

Hypothesis	Literature	Detailed result	Accepted/Rejected
H6: Students for whom perceived innovation and the role of artificial intelligence in non-bank electronic payments are key have used digital crypto wallets more than other students.	*Chapter 2.4.2.* *Chapter 2.4.5.*	*Chapter 4.1.4.*	**Rejected**

Source: own editing, 2024

4. NEW OR NOVEL RESULTS OF THE THESIS

In this chapter I present the main findings and novel results of my thesis. The main findings of the dissertation have already been discussed in the *conclusions and recommendations* chapter.

T1: I have successfully used the UTAUT model, based on which a non-representative questionnaire survey of nearly 1000 students in economics was used to investigate the online shopping habits of undergraduate students and to create well-differentiated groups through factor and cluster analysis. The groups were named "traditional buyers" (12%), "open doubters" (39%), "adopters, active adopters" (49%).

T2: The results of the research revealed that for students who are reluctant to shop online, open to shop online and already actively using online shopping, the more significant negative aspect of online shopping is the problem of returning faulty or spoiled products, compared to not having the possibility to choose products in person. This is particularly true for cluster KL3, "adopters, active users" (49%).

T3: The results of the research also revealed that among the non-representative university students surveyed, of nearly 1,000 respondents, those in the "adopters, active adopters" cluster (49%) in KL3 claim to be the most aware of online shopping, for whom the most significant perceived risk, based on the UTAUT-model, is the potential financial loss (cheaper product elsewhere, additional costs incurred when shopping online).

T4: I have successfully used the UTAUT-model, based on which a non-representative questionnaire survey of nearly 1000 students in economics was used to assess the habits of university students in the field of economics towards the adoption of non-bank electronic payment solutions and to create well-differentiated groups through factor and cluster analysis. In doing so, I integrated the factors of perceived innovativeness and artificial intelligence into the conceptual model. The resulting clusters were named "cluster of unbanked e-money adopters" (7.2%), "doubters" (37.4%), adopters, active adopters (55.5%).

T5: The non-representative survey of nearly 1,000 respondents revealed that male university students are more aware of FinTech electronic payment solutions than female university students.

T6: In addition, the non-representative survey of nearly 1,000 respondents also revealed that both male and female university students use electronic payment solutions most often when shopping online. However, an analysis of the three clusters of non-bank payment habits revealed that only 35.4% of men use electronic payment solutions for online purchases, compared to 60.6% of women. However, for both men and women, those in the KL3 "Accepting, active users (55.5%)" group are the most likely to use electronic payment for online purchases.

T7: Finally, the non-representative survey of nearly 1,000 respondents also showed that, although it can be assumed that students who perceive innovation and the role of AI as key drivers for FinTech electronic payments they are also more likely to have used digital crypto wallets. However, the results of the research show that students who perceive perceived innovativeness and the role of AI as being are not more open to using digital crypto wallets.

5. THE PRACTICAL USE OF THE RESULTS

Based on the results, I made the following recommendations to improve and support online shopping and electronic payment habits.

One of the findings of the research is that for students, returning a faulty or spoiled product ordered online is a more significant negative than losing the opportunity to choose the product in person when shopping online. This finding points to the need, as mentioned by students in the focus group interview, for companies to work further on the return system, as students find this process problematic, time and energy-consuming. Students want to ensure that they do not have any inconvenience or extra work if a product is not suitable for them. It is suggested that sellers find a solution to this problem, for example, by including a return label in the package when they send out packages to consumers, which they can simply stick on the package, and a QR code that they can scan to call the courier for an appointment.

Among the electronic payment solutions, students consider bank transfers to be the safest. This suggests that, as a result of continuous innovation, although many new electronic payment solutions are available (mobile wallets, crypto wallets, QR code payments, payment requests, group direct debits, etc.), students still consider the classic bank transfer to be the safest. This highlights the need for both banking and non-banking service providers to make efforts to increase young people's confidence in the various electronic payment solutions. The focus group interview proved that not all electronic payment solutions are known to students and that they are not familiar with FinTech services, this lack of information and ignorance about electronic payment solutions increases the uncertainty among students.

It is important to raise students' awareness of both online shopping and electronic payments. Both the questionnaire survey and the focus group interviews revealed that students are not aware of the concept of certain electronic payment solutions and are not aware of their possibilities and risks. It would be worthwhile to organize more lectures and workshops for students outside university classes, where key figures from the banking and non-banking (FinTech) sector could be invited as guest speakers. This would provide students with the opportunity to be exposed to different payment solutions on a theoretical and possibly practical level. Students would then be able to increase their knowledge of the

subject and would have the opportunity to ask questions freely at the end of the lectures. They could also try out the different applications and carry out transactions in demo versions without any risk.

It would also be worthwhile to raise students' awareness by offering them the opportunity to submit applications on online shopping and electronic payments, to be placed and rewarded. This would help them to explore the subject fully on their own.

In addition, it would be worth contacting students who are interested in the subject. Provide them with the opportunity to gather as much information as possible through expert interviews with key figures from the banking and non-banking sectors. It would be useful to have a blog on this subject aimed at students or to publish the results of such interviews in university journals.

In some cases, at a theoretical level, it is also worthwhile to help students become better informed within the framework of university courses, for example, within marketing courses, particular emphasis should be placed on how students can identify trustworthy online shops, how to order in a way that is as secure as possible and involves minimal data disclosure. Students should be informed of all the potential dangers of online shopping, not to discourage them from shopping online, but to guide them towards making informed choices in the online shopping process.

Nowadays, in finance classes, it is important to focus on electronic payment solutions, both banking and non-banking, at a theoretical level. In the focus group interviews, almost everyone said they were not aware of non-bank electronic payment solutions. It is difficult for students to understand the underlying processes behind non-bank payment solutions or the legal environment in which they are operating. They are also unaware of the potential risks. Students must be informed and aware of the issues involved, and to this end, they should be provided with as much knowledge as possible in their university classes.

And information is not only important for students, as all ages are affected, regardless of their level of education. Consumer organizations should keep consumers/users informed of potential risks.

Maximum protection of users is important, and the presence of artificial intelligence means that security measures and consumer protection need to be more focused than ever.

I believe that two-factor authentication should be added to all online shopping and electronic payment processes.

While there are risks to AI, there are also benefits to consider. Students need customer service available 24 hours a day, 7 days a week. Virtual assistants can make this possible, but not all online shops have been able to adapt to these IT developments, which otherwise cost them a considerable amount of money. I believe it is important to standardize the expectations of a webshop, and implementation should be supported by various ICT tenders. The greatest success can be achieved by making a service as personalized as possible, and the use of artificial intelligence and chatbots could help to achieve this. However, many entrepreneurs are not at all aware of the concept and potential of AI. I consider it important to provide uniform training for online shop operators through online communication platforms. This would ultimately contribute to improving the user experience and satisfaction.

6. PUBLICATIONS ON THE SUBJECT OF THE THESIS

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Subject: PhD Publication List

Candidate: Edina Piros
Doctoral School: Doctoral School of Management and Business
MTMT ID: 10083343

List of publications related to the dissertation

Articles, studies (4)

1. **Piros, E.**, Fehér, A.: COVID-19 hatásának vizsgálata az egyetemi hallgatók online élelmiszer-vásárlói magatartására a TAM-modell segítségével.
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3. **Piros, E.**, Fehér, A.: Az élelmiszer-vásárlói magatartás vizsgálata online környezetben: Szakirodalmi áttekintés.
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List of other publications

Articles, studies (1)

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The Candidate's publication data submitted to the iDEa Tudóstér have been validated by DEENK on the basis of the Journal Citation Report (Impact Factor) database.

04 November, 2024

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