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SCIENTIFIC PAPER

FACTORS AFFECTING ACCEPTANCE OF SMART RETAIL SOLUTIONS IN HUNGARY: AN EMPIRICAL STUDY USING UTAUT2 MODEL

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Abstract: *In today's digitalisation process, retail is also undergoing a transformation, with the emergence of new smart solutions. Integrating intelligent solutions into a business model means new strategic challenges for retailing companies. The aim of the research is to examine the factors influencing the behavioural intention and use behaviour of smart retail solutions (SRS). The proposed model was based on the extended Unified Theory of Acceptance and Use of Technology (UTAUT2). Data was collected by conducting a questionnaire of 302 Hungarian respondents. Confirmatory factor analysis (CFA) and partial least squares (PLS-SEM) estimation were implemented. The results showed that behavioural intention is significantly and positively influenced by effort expectancy and it is significantly and negatively influenced by facilitating conditions. Most of the respondents are not yet regular users of SRS, and the market penetration of front-end intelligent solutions in retail is considered as rather low*

Keywords: *smart retail, UTAUT2, consumer survey, CFA, SEM-PLS, industry 4.0*
JEL Code: M10, M31, O14

1. INTRODUCTION

Digital solutions have become part of our everyday lives, fundamentally changing people's habits and behaviour. With the development of information and communication technology, online consumption is growing rapidly (Kim, 2021). Digitalisation is the defining process of our time, affecting business, including almost all areas of retail. New business models are emerging to which companies must respond in order to remain competitive (Demeter, 2020; Matyusz & Pistrui, 2020a; Molnár, 2018; Pantano & Vannucci, 2019; Rekettye, 2020; Satoglu et al., 2018; Sikos et al., 2019; Tushar & Sachi, 2017). The fourth industrial revolution is fundamentally changing the way companies operate and succeed in the marketplace. Corporate strategies need to be repositioned to keep pace with the ongoing digital transformation.

With the rapid evolution of technology and changing consumer habits, the retail industry worldwide is striving to develop new retail practices. Retail businesses are seeking new technologies and are dependent on technological advances. The UN's ninth Sustainable Development Goal "Industry, Innovation and Infrastructure" describes the goal of building resilient infrastructure, promoting inclusive and sustainable industrialisation and fostering innovation (Chen & Shang, 2021; United Nations, 2015)

Within the digital transformation retail sector has changed a lot in recent years, with physical and digital boundaries becoming increasingly blurred, which have also led to the emergence of new business models in this sector (Sikos et al., 2019). The emergence of e-commerce is a global phenomenon in developing countries (Yang et al., 2021). The share of all IoT (Internet of Things) devices grew by 73 percent between 2015 and 2019 and is expected to grow by nearly 183 percent globally by 2025 compared to 2019 (Louie, 2020).

Between 2020 and 2025, the global smart retailing market is estimated to grow at a CAGR of 23.6 percent, and is expected to be worth $62.5 billion (USD) worldwide by 2025. Of this USD 62.5 billion, Europe will account for a significant share of approximately 30 percent (MarketsAndMarkets, 2020).

Traditional linear retail supply chains have been replaced by Digital Supply Networks (DSNs), where the transparent and real-time flow of information allows for more effective strategic decision-making and value creation is no longer limited to products and services. The new retail strategies based on these new foundations can essentially be broken down into front-end and back-end processes, according to Deloitte (Tushar & Sachi, 2017). This division was also used to delimit the research area. The digital tools used in front-end retail processes include digital tools for customer experience, store design, pricing, payment and loyalty programs such as smart fitting rooms, digital shelf communication, scan&shop solutions, smart shopping carts, self-service checkouts, virtual walls, loyalty programs based on blockchain technology or online shopping applications (Tushar & Sachi, 2017). Back-end processes include the areas of background administration, HR, finance or warehouse and inventory management (Matyusz & Pistrui, 2020a; Tushar & Sachi, 2017).

2. THEORETICAL BACKGROUND

2.1 Smart retailing

Digitalization processes have given rise to the concept of smart retail, which has grown out of the smart city concept in recent years. The spread of smart retail can be attributed to several factors. On the one hand, advances in technology have led to innovations such as QR codes, RFID scanners, touch screens and smartphones; on the other hand, after the 2008 global crisis, many businesses have moved online (Droogenbroeck & Hove, 2021; Pantano, 2014; Sikos et al., 2019). The Covid-19 pandemic has facilitated the spread of these tools to a greater extent than expected (Dannenberg et al., 2020; Shankar et al., 2021). The pandemic-induced expansion has led/is leading to the emergence of consumer groups in markets who may not have shopped online (Stolp, 2020) or were less open to using smart devices in their purchases.

The emergence of continuous innovation is leading to a rethinking of commercial processes, in which the relationship between sellers and buyers and the purchasing process is being transformed (Pantano & Timmermans, 2014; Sikos, 2018). Pantano and Timmermans (Pantano & Timmermans, 2014) identified six main elements of smart retailing: (1) rapid responsiveness, (2) change in knowledge management, (3) smart partnering, (4) change in salesperson's job, (5) service access, (6) change in consumption.

Providing smart devices or solutions to customers is only one part of smart retailing, as it requires a whole strategic shift in approach to integrate these solutions into the business model. Pantano and Timmermans' (Pantano & Timmermans, 2014) smart retail model illustrates the areas that need to be addressed and strategically managed in order for a business to properly integrate these devices into its business model. This research is mostly related to the area of consumption change (6), contributing to the digitalisation and automation strategy of retail companies.

2.2 Technology Acceptance Models

The evolution of technology acceptance models has played a key role in testing the user acceptance of a technological innovation. In 1985, the first widely used model for the acceptance of new technologies (Technology Acceptance Model - TAM) was published, which was prompted by the spread of personal computers (F. Davis, 1985). It was at this time that the consumer acceptance of technological innovations became increasingly important and, consequently, the way in which the potential flaws of a technology could be filtered out. Although it is worth noting that the TRA (Theory of Reasoned Action) model, which is attributed to Fishbein and Azejn (1975), and the TPB (Theory of Planned Behaviour) (Ajzen, 1991) are considered to be the predecessors of the TAM model. Due to the fact that new technologies were born, and nowadays digital transformation gives us new devices and new digital solutions, these models and theories have been changing from the 70's. Following the emergence of the TAM model, the evolution of models of technology adoption has led to a number of theories (Table 1) (Keszey & Zsukk, 2017; Palau-Saumell et al., 2019; Taherdoost, 2018).

Table 1. Main theories and their authors of technology acceptance models

Models/theories	Cources
Perceived Characteristics of Innovating Theory (PCIT)	(Moore & Benbasat, 1991)
The Model of PC Utilization (MPCU)	(Thompson et al., 1991)
Motivational Model (MM)	(F. D. Davis et al., 1992)
Igbaria's Model (IM)	(IGBARIA et al., 1994)
Diffusion of Innovations Theory (DOI)	(E. M. Rogers, 1983; Everett M. Rogers, 1995)
Social Cognitive Theory (SCT)	(Bandura, 1986; Compeau & Higgins, 1995)
Extension of TAM (TAM2)	(Venkatesh & Davis, 2000)
Uses and Gratification Theory (U&G)	(Katz et al., 1973)
Unified Theory of Acceptance and Use of Technology (UTAUT)	(Venkatesh et al., 2003)
Technology Acceptance Model 3 (TAM3)	(Venkatesh & Bala, 2008)
Extension of Unified Theory of Acceptance and Use of Technology (UTAUT2)	(Venkatesh et al., 2012)

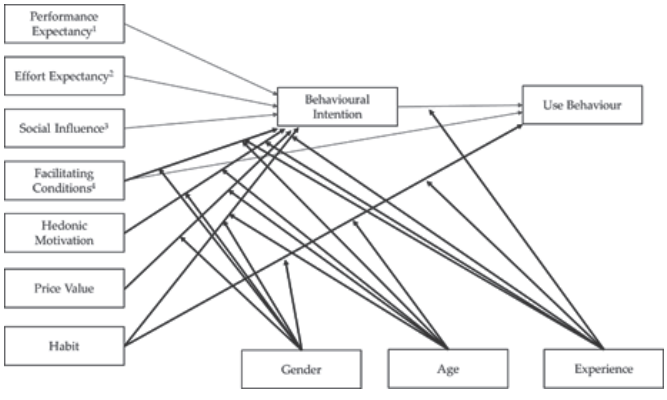
The research methodology presented in this paper is based on the extension of Unified Theory of Acceptance and Use of Technology (UTAUT2) by Venkatesh et al. (Venkatesh et al., 2012). The enhanced method is based on the UTAUT model, which analyses the acceptance of innovations, primarily in workplace settings (Venkatesh et al., 2003). The UTAUT2 model focuses on ordinary technological innovations used not only in workplace but in everyday life. International studies have examined the adoption of a number of smart devices and solutions using the UTAUT2 model (Table 2).

Table 2. Examining unified theory of technology adoption and use (UTAUT2) in some international research.

Investigated area	Cources
mobile Internet	(Venkatesh et al., 2012)
e-health individual adoption	(Goulão, 2014)
mobile app based shopping	(Tak & Panwar, 2017)
focus of age in healthcare	(Murugesh-Warren et al., 2015)
voice Assistants	(Kessler & Martin, 2017)
mobile banking	(Alalwan et al., 2017)
e-payment	(Indrawati & Putri, 2018), (Acharya et al., 2019)
mobile payment	(Wei et al., 2021)
mobile apps for restaurants	(Palau-Saumell et al., 2019; Yang et al., 2021)
e-money products	(Putra et al., 2019)
advanced driver assistance system	(Jun et al., 2019)

The original UTAUT2 model is structured with seven variables directly influencing behavioural intention, one variable indirectly and two variables directly influencing use behaviour, and it is contained three moderating variables (Figure 1).

Figure 1. Structure of the UTAUT2 model



Note: 1. moderating variable: gender and age; 2. moderating variable: gender, age and experience; 3. moderating variable: gender, age and experience; 4. moderating variable influencing use: age and experience

Source: (Venkatesh et al., 2012)

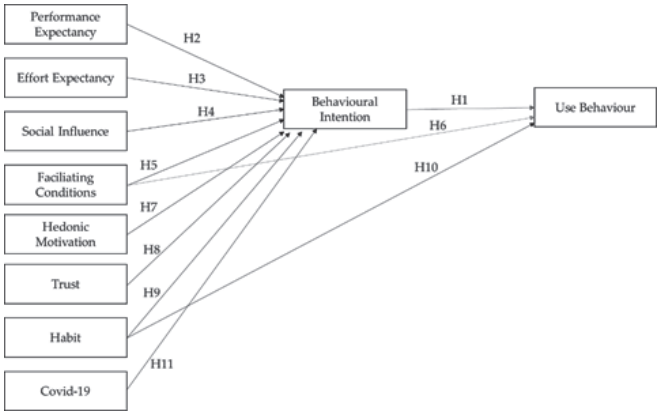
Performance expectancy variable express the extent to which the system or device under test contributes to the user's improved productivity in everyday life. Effort and energy investment required by the user to use it is measured by the effort expectancy variable. How important or unimportant they feel it is to use a device or system, what others think about it, is measured by the social influence variable. Facilitating conditions have a direct impact on both behavioural intention and use behavioural. The variable measures the extent to which users have the necessary technical tools and knowledge about the device under study. The hedonic motivation variable aims to measure the extent to which customers feel that using the devices is fun and how much pleasure they derive from using them. The price value variable measures the perceived usefulness of the user in using the devices under investigation in relation to the price of the device. The user's habits have a direct impact on both the intention to use and the actual use. The habit variable measures the user's established habits in relation to the analysed solutions (Alalwan et al., 2017; Keszey & Zsukk, 2017; Macedo, 2017; Raman & Don, 2013; Venkatesh et al., 2012).

The focus of the research was defined in terms of digital solutions for the front-end of retail. A key objective of the study is to examine consumers' perceptions of smart retailing solutions (SRS) in Hungary with the extended Unified Theory of Acceptance and Use of Technology Model (UTAUT2) (Venkatesh et al., 2012). Within the key objective the aim was to examine the affecting factors of SRSs' behavioural intention and use behaviour.

2.3 Research model and hypothesis development

Due to the specificities of the topic, it was necessary to modify the original UTAUT2 model. Price value variable were excluded from the proposed model because consumers do not have to pay directly for the use of the smart retail devices. The variable experience was also excluded due to the cross-sectional nature of the current research. Instead, trust, which is linked to smart retail solutions, was included as a test criterion. An additional set of statements was created on the effects of the Covid-19 pandemic (Covid-19). Such an adaptation of the UTAUT2 model has been previously reported in other studies (Acharya et al., 2019; Alalwan et al., 2017; Indrawati & Putri, 2018; Palau-Saumell et al., 2019; Putra et al., 2019; Raman & Don, 2013; Roy et al., 2018; Tak & Panwar, 2017).

Figure 2. Research model



So far this area has not been investigated using this method in Hungary. The hypothesis development was mostly based on the literature review; however, Covid-19 pandemic hypothesis is its own hypothesis (Table 3).

3. METHODOLOGY - MEASURES AND DATA COLLECTION

In order to test the hypothesises in this paper, a survey was applied. A pilot survey was conducted in February 2021 to filter out the possible inaccuracies. The final questionnaire

Table 3. Research hypothesises

Hypothesises	Sources
H1: The Behavioural Intention directly and positively influences the Use Behaviour of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H2: Performance Expectancy directly and positively influences the Behavioural Intention of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H3: Effort Expectancy directly and positively influences the Behavioural Intention of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H4: Social Influence directly and positively influences the Behavioural Intention of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H5: Facilitating Conditions directly and positively influences the Behavioural Intention of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H6: Facilitating Conditions directly and positively influences the Use Behaviour of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H7: Hedonic Motivation directly and positively influences the Behavioural Intention of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H8: Trust directly and positively influences the Behavioural Intention of SRSs.	(Acharya et al., 2019; Indrawati & Putri, 2018)
H9: Habit directly and positively influences the Behavioural Intention of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H10: Habit directly and positively influences the Use Behaviour of SRSs.	(Macedo, 2017; Palau-Saumell et al., 2019)
H11: Covid-19 pandemic directly and positively influences the Behavioural Intention of SRSs.	Own hypothesis

was available online between 1 March 2021 and 16 June 2021, and at the beginning of the questionnaire the research goal and definitions were introduced to the respondents with the aim of ensure competent responses. The survey was conducted using a non-probability sampling method (snowball sampling). The total number of respondents to be assessed was 302 of which all were assessable, so no exclusion was necessary. The statements were compiled based on the applied model (Annex A1). For each of the 9 constructs, respondents rated 34 statements on a scale of 1 to 7, where 1 was 'strongly disagree' and 7 was 'strongly agree'. For Use Behaviour also a 7-point Likert scale was available, where 1 was 'never use' and 7 was 'use daily'. Measurement scales are in line with the research of Venkatesh et al. (Venkatesh et al., 2012).

An analysis of demographic characteristics of respondents were performed. Amongst the respondents in terms of gender, 65.1% were female and 34.9% were male. 29.9% between age of 40-49 and the 18-29 and 30-39 age groups were almost equally represented (25.9% and 24.8%) indicating that the over-50s are less interested in the topic. 68.4% of the respondents own a diploma and 25.5% were studied on high school level. 53.2% said they live on their salary but have little to put aside, while 22.7% of the respondents said they can live on their salary and they can put aside well and almost the same number of respondents (21.6%) said their income is just enough to live on, but they can no longer save.

4. RESULTS

4.1. Measurement model

For data analysis IBM SPSS 25 and AMOS 26.0 software packages were used to validate the research model and test our hypothesises. Maximum likelihood estimation procedure was followed for evaluate the measurement model and the structural model. In the first step the measurement model was assessed by analysing the validity and reliability of the constructs. It is shown in Table 4 that all constructs have greater value than 0.7 in terms of Cronbach's Alpha, and concerning composite reliability all construct reached the adequate level (CR>0.7) (Hair et al., 2010) . AVE value of the latent constructs all but one above the limit value of 0.5 (Hair et al., 2010).

Table 4. Measurement model tests

Constructs	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Performance Expectancy (PE)	0.885	0.83	0.62
Effort Expectancy (EE)	0.884	0.89	0.66
Social Influence (SI)	0.914	0.91	0.78
Facilitating Conditions (FC)	0.739	0.70	0.44
Hedonic Motivation (HM)	0.926	0.93	0.80
Trust (TR)	0.902	0.88	0.65
Habit (HT)	0.870	0.86	0.57
Covid-19 (CV)	0.889	0.89	0.73
Behavioural Intention (BI)	0.903	0.84	0.73

To test for multicollinearity, VIFs (Variance Inflation Factors) were calculated, and values obtained between 1.942 and 4.710, which are below the threshold value of 5, indicate multicollinearity is not an issue in this study (Hair et al., 1995).

Confirmatory factor analysis (CFA) was implemented in which factor loadings were assessed. In order to improve the model fit and eliminate loadings below threshold, four items were dropped. In the final model all items had a greater factor loading than 0.5, which were found statistically significant and model fit indexes show appropriate fit (Table 5). Chi-square test have limitation and it is sensitive to sample size (West et al., 2012) therefore in line with Wheaton et al. (1977) and Kline (2015) CMIN/df, IFI, TLI, CFA, RMSEA were considered to report model fit.

Table 6 shows the discriminant validity of the analysed constructs, where heterotrait-monotrait ratio was applied. In this analysis the values obtained were compared to a threshold value of 0.9 (Henseler et al., 2016), where most of the values were under the criterion. Three values do not meet the criterion, however they do not exceed 1.0 (Henseler et al., 2016).

Table 5. Measurement model loadings

		Factor loadings	t-value
Performance Expectancy (Venkatesh et al., 2012)			
PE1	I find smart retail solutions useful in my daily life.	0.76	15.33***
PE3	Using smart retail solutions help me accomplish things more quickly.	0.80	16.34***
PE4	Using smart retail solutions increase my productivity.	0.80	
Effort Expectancy (Venkatesh et al., 2012)			
EE1	Learning how to use smart retail solutions is easy for me.	0.83	18.06***
EE2	My interaction with smart retail solutions is clear and understandable.	0.75	15.59***
EE3	I find smart retail solutions easy to use.	0.80	17.26***
EE4	It is easy for me to become skilful at using smart retail solutions.	0.86	
Social Influence (Venkatesh et al., 2012)			
SI1	People who are important to me think that I should use smart retail solutions.	0.87	21.33***
SI2	People who influence my behaviour think that I should use smart retail solutions.	0.88	21.65***
SI3	People whose opinions that I value prefer that I use smart retail solutions.	0.91	
Facilitating Conditions (Venkatesh et al., 2012)			
FC1	I have the resources necessary to use smart retail solutions.	0.58	7.52***
FC3	Smart retail solutions are compatible with other technologies I use.	0.71	9.74***
FC4	I can get help from others when I have difficulties using smart retail solutions.	0.70	
Hedonic Motivation (Venkatesh et al., 2012)			
HM1	Using smart retail solutions is fun.	0.88	21.65***
HM2	Using smart retail solutions is enjoyable.	0.93	24.20***
HM3	Using smart retail solutions is very entertaining.	0.88	
Trust (Acharya et al., 2019 and Indrawati & Putri, 2018)			
TR1	I believe that smart retail solutions are reliable.	0.84	14.02***
TR2	I rely on smart retail solutions.	0.96	15.55***
TR3	If I use smart retail solutions on my own device (e.g. smartphone, computer), I think my data will be kept confidential.	0.71	20.30***
TR4	I believe that when I use a smart retail tool, my data and activities do not fall into unauthorized hands.	0.71	
Covid-19 (own statements)			
CV1	Because of the Covid-19 pandemic, I currently use more smart retail solutions than I did before the epidemic.	0.82	16.92***
CV2	I feel that due to the Covid-19 pandemic, smart retail solutions are closer to me than they were before the epidemic.	0.90	19.13***
CV3	The Covid-19 pandemic has made it clear that there is a greater need for smart retail solutions than it used to be.	0.85	
Habit (Venkatesh et al., 2012)			
HB1	The use of smart retail solutions has become a habit for me.	0.93	16.48***
HB2	I am addicted to using smart retail solutions.	0.56	9.73***
HB3	I must use smart retail solutions.	0.51	8.84***
HB4	Using smart retail solutions has become natural to me.	0.94	16.80***
HB5	I'd rather shop in a store where I can use smart retail solutions. (Own statement)	0.73	
Behavioural Intention (Venkatesh et al., 2012 and Indrawati & Putri, 2018)			
BI2	I will always try to use smart retail solutions in my daily life.	0.82	
BI3	I plan to continue to use smart retail solutions frequently.	0.89	19.48***

*Notes. Model fit: Chi-square (χ2)=915.906, df=366, p=0.000; CMIN/df=2.502; IFI=0.934; TLI=930; CFI=0.929; RMSEA=0.071; **p<0.01*

Table 6. Discriminant validity – Heterotrait-Monotrait ratio (HTMT)

	PE	EE	SI	FC	HM	TR	HB	CV	BI
PE									
EE	0.791								
SI	0.678	0.365							
FC	0.720	0.931	0.409						
HM	0.883	0.687	0.583	0.585					
TR	0.838	0.658	0.498	0.674	0.696				
HB	0.882	0.724	0.774	0.601	0.728	0.682			
CV	0.754	0.522	0.623	0.545	0.594	0.525	0.709		
BI	0.956	0.774	0.630	0.675	0.844	0.737	0.993	0.686	

4.2. Structural model - Hypothesis Analysis

Relationships of the research model were analysed to test eleven hypothesises. Structural equation modelling (SEM) was performed by doing bootstrapping procedure where model fit indexes (Table 7) indicating appropriate fit. Results shows that effort expectancy and facilitating conditions significantly influenced behavioural intention. Based on the significant results H3 was supported since effort expectancy (=0.650, p<0.05) has a positive direct effect on behavioural intention. Regarding hypothesis H5, a significant result was obtained that facilitating conditions has direct effect on behavioural intention (=0.608, p<0.05), however this relationship is negative therefore this hypothesis is not supported while it is an interesting result. Other hypothesises (H1, H2, H4, H6, H7, H8, H9, H10, H11) of the model were rejected which means other variables have no effect on behavioural intention and use behaviour.

Table 7. Effects on endogenous variables

Hypothesis	Relationship	Standardized Coefficient (β)	Sig.	Hypothesis validation
H1	BI→UB	-0.444	0.593	Not supported
H2	PE→BI	0.243	0.481	Not supported
H3	EE→BI	0.65***	0.02	Supported
H4	SI→BI	0.107	0.165	Not supported
H5	FC→BI	-0.608***	0.009	Not supported
H6	FC→UB	-0.082	0.397	Not supported
H7	HM→BI	-0.08	0.402	Not supported
H8	TR→BI	0.121	0.563	Not supported
H9	HB→BI	0.569	0.567	Not supported
H10	HB→UB	0.974	0.266	Not supported
H11	CV→BI	0.057	0.414	Not supported

*Notes. Model fit: Chi-square (χ2)=967.361, df=393, p=0.000; CMIN/df=2.461; IFI=0.928; TLI=914; CFI=0.927; RMSEA=0.070; ***p<0.05*

5. DISCUSSION AND CONCLUSIONS

The main goal of this paper was to analyse among respondents what are the main influencing factors of SRS acceptance and how the analysed variables influence behavioural intention and use behaviour. The findings of this study can provide guidance for retailers in Hungary which can be the main drivers for consumers to try or use smart solutions. UTAUT2 model was used to answer the research hypothesises where 31 statements were adapted from international research and 3 statements (one construct) were created to investigate the influence of Covid-19 pandemic situation.

Based on the findings of the structural model the main influencing factor of behavioural intention are effort expectancy and facilitating conditions. Findings about effort expectancy are consistent with Venkatesh et al. (2012), Raman & Don (2013), Macedo (2017) and Acharya et al. (2019). Respondents seems to learn and use these technologies rather easily therefore the easier it is to use, the more likely customers are to want to use it.

In terms of facilitating conditions significant negative relationship was detected which indicate that the existence of facilitating conditions does not mean that the intention to use is positively influenced. Wei et al. (2021) also found negative relationship with behavioural intention, but their result was not significant.

In this research coronavirus had no significant impact on behavioural intention among Hungarian respondents.

Performance expectancy, social influence, hedonic motivation, trust, and habit have neither proven relationship with behavioural intention in this research. Behavioural intention also not considered as an influencing factor to use behaviour. Several studies (Macedo, 2017; Morosan & DeFranco, 2016; Putra et al., 2019; Raman & Don, 2013; Wei et al., 2021) rejected a few of these hypothesises, but it is important to note that not so many of the hypotheses tests are rejected at the same time. As validated statements were used in the proposed model (except statements about the pandemic situation) the results indicate to examine descriptive statistics.

The results of the descriptive statistics (Annex A1) show that high standard- and relative standard deviation values were observed, and that there are also notable differences (>2.0) between the mode and the mean values. Respondents' opinions can rather be described as heterogeneous. The responses on habit show an interesting result, as most respondents gave a score of 1.0 for each statement and the mean scores cannot be considered as high on the seven-point Likert scale. Most of the respondents are not yet regular users of smart retail solutions as confirmed by the fact that mean value for use behaviour was 1.99 on seven-point likers scale, which can be considered as low level use. Consequently, they did not necessarily respond based on numerous, but rather on little or no experience. This is also supported by the fact that at the time of the survey, the analysed smart solutions were not widely available in Hungary because Hungarian companies first focusing on improve the efficiency of back-end processes, and after these improvements they starting to focus on the digitisation of front-end activities (Matyusz & Pistrui, 2020b). Overall, the use of these devices is not yet established in Hungary, therefore the factors influencing the behavioural intention and use behaviour are not yet cleared.

From a managerial perspective, the findings have implications for retail store managers and operators. Based on the findings of this study in early adoption stage of the intelligent front-end retail solutions it is important to keep device handling simple and user friendly. As the introduction of SRS is still in its infancy in Hungary, therefore one of the most important tasks for retail companies is to build consumer confidence and incentives to use new technologies. Data security should be an important aspect of the market launch where data and activities do not fall into unauthorized hands.

6. Limitations and Future Research

This research was conducted among Hungarian respondents, and the results cannot be generalized due to the sampling method, therefore the results should be interpreted with caution. In Hungary, the market penetration of front-end intelligent solutions in retail was rather low during the survey

period therefore the findings may not be applied to countries that are more technologically advanced.

Markets are changing rapidly due to digital transformation, so the research should be repeated in a few years. This will allow us to see how the findings in this publication change over time. Furthermore, moderating effects (e.g. gender, age, income) should also be investigated in the future, although this was not the aim of this current paper.

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Appendix A

Table A1. Statements and descriptive statistics of Modified Extended Unified Theory of Acceptance and Use of Technology Model (UTAUT2)

Code	Constructs and items	Mean (N=302)	Mode	S.D.	Relative S.D. (%)
Performance Expectancy (Venkatesh et al., 2012)					
PE1	I find smart retail solutions useful in my daily life.	5.16	7.00	1.707	38.321
PE2	Using smart retail solutions increase my chances of achieving things that are important to me. (dropped)	4.60	7.00	1.875	33.751
PE3	Using smart retail solutions help me accomplish things more quickly.	4.88	6.00	1.518	36.064
PE4	Using smart retail solutions increase my productivity.	4.47	6.00	1.885	57.386
Effort Expectancy (Venkatesh et al., 2012)					
EE1	Learning how to use smart retail solutions is easy for me.	4.64	5.00	1.776	33.067
EE2	My interaction with smart retail solutions is clear and understandable.	5.20	7.00	1.753	40.773
EE3	I find smart retail solutions easy to use.	5.08	7.00	1.832	31.104
EE4	It is easy for me to become skilful at using smart retail solutions.	3.41	1.00	1.959	42.192
Social Influence (Venkatesh et al., 2012)					
SI1	People who are important to me think that I should use smart retail solutions.	3.11	1.00	1.931	62.178
SI2	People who influence my behaviour think that I should use smart retail solutions.	3.07	1.00	1.922	62.605
SI3	People whose opinions that I value prefer that I use smart retail solutions.	2.90	1.00	1.876	64.764
Facilitating Conditions (Venkatesh et al., 2012)					
FC1	I have the resources necessary to use smart retail solutions.	6.29	7.00	1.364	21.690
FC2	I have the knowledge necessary to use smart retail solutions. (dropped)	4.54	6.00	1.803	39.727
FC3	Smart retail solutions are compatible with other technologies I use.	4.60	6.00	1.836	39.916
FC4	I can get help from others when I have difficulties using smart retail solutions.	4.83	7.00	1.757	36.354
Hedonic Motivation (Venkatesh et al., 2012)					
HM1	Using smart retail solutions is fun.	4.68	7.00	1.873	40.065
HM2	Using smart retail solutions is enjoyable.	4.53	5.00	1.781	39.357
HM3	Using smart retail solutions is very entertaining.	3.87	1.00	1.955	50.495
Trust (Acharya et al., 2019; Indrawati & Putri, 2018)					
TR1	I believe that smart retail solutions are reliable.	4.64	5.00	1.698	36.630
TR2	I rely on smart retail solutions.	4.53	6.00	1.776	39.173
TR3	If I use smart retail solutions on my own device (e.g. smartphone, computer), I think my data will be kept confidential.	4.02	5.00	1.864	46.371
TR4	I believe that when I use a smart retail tool, my data and activities do not fall into unauthorized hands.	3.74	4.00	1.872	50.119
Covid-19 (own statements)					
CV1	Because of the Covid-19 pandemic, I currently use more smart retail solutions than I did before the epidemic.	3.78	1.00	2.252	59.598
CV2	I feel that due to the Covid-19 pandemic, smart retail solutions are closer to me than they were before the epidemic.	3.75	1.00	2.110	56.188
CV3	The Covid-19 pandemic has made it clear that there is a greater need for smart retail solutions than it used to be.	4.06	4.00	2.054	50.640
Habit (Venkatesh et al., 2012)					
HB1	The use of smart retail solutions has become a habit for me.	3.52	1.00	2.046	58.168
HB2	I am addicted to using smart retail solutions.	1.97	1.00	1.525	77.261
HB3	I must use smart retail solutions.	2.54	1.00	1.787	70.355
HB4	Using smart retail solutions has become natural to me.	3.70	1.00	2.037	55.029
HB5	I'd rather shop in a store where I can use smart retail solutions. (Own statement)	3.25	1.00	1.841	56.724
Behavioural Intention (Indrawati & Putri, 2018; Venkatesh et al., 2012)					
BI1	I intend to continue using smart retail solutions in the future. (dropped)	4.73	7.00	2.027	42.847
BI2	I will always try to use smart retail solutions in my daily life.	3.07	1.00	1.934	62.998
BI3	I plan to continue to use smart retail solutions frequently.	4.15	6.00	1.986	47.824
BI4	I highly recommend that others use smart retail solutions. (dropped)	3.83	4.00	1.911	49.849

Use Behaviour was measured on 7-point scale (1: "never use" and 7: "use daily").

Note: All other items based on 7-point scale (1: „strongly disagree" and 7: „strongly agree").