

Article

The Impact of ‘Compulsory’ Shifting to Use e-Services during COVID-19 Pandemic Restrictions Period on e-Services Users’ Future Attitude and Intention “Case Study of Central European Countries/Visegrád Group (V4)”

Pierre Alassaf ^{1,*}  and Zsigmond Gábor Szalay ²

¹ Doctoral School of Economic and Regional Sciences, Hungarian University of Agriculture and Life Sciences, Páter Károly u. 1., H-2100 Gödöllő, Hungary

² Department of Agridigitalization and Extension Activities, Institute of Rural Development and Sustainable Economy, Hungarian University of Agriculture and Life Sciences, Páter Károly u. 1., H-2100 Gödöllő, Hungary

* Correspondence: pierrealassaf@hotmail.com; Tel.: +36-308591545

Abstract: This study takes advantage of COVID-19 experience in regards of ‘compulsory’ shifting toward using e-services to evaluate Central European countries’ citizens’ future attitude and intention to keep using e-services after COVID-19 pandemic precautionary measures end regarding the case study of Visegrád Group (V4) countries: Czech, Hungary, Poland and Slovakia, considering the impact of users’ satisfaction with e-services during that period, taking age and gender as control variables. Total of 354 survey responses used in analyzing distributed questionnaire answers. The study found 84% of V4 countries’ users between 18–35 years old were satisfied and willing to keep using e-services, whereas only 44.5% of 46–55-year-old users have this future willingness, the vast majority of oldest respondents between 56–65 don’t intend to keep using e-services after COVID-19 pandemic precautionary measures end, while only 16.6% having the intention to do so. Moreover, this research finds no impact of gender on e-services satisfaction, attitude and intention in regard to the study. One of the main contributions of this study is raising attention to the decreasing intentions to keep using e-services among users above 35 as their age increases, addressing this weakness is very important to involve older generations in future digitizing-projects and successful e-government implementation.

Keywords: e-services; satisfaction; attitude; intention; COVID-19; Central Europe; Visegrád Group (V4)



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1. Introduction

As the COVID-19 pandemic started and governments set precautionary measures, these restrictions have been a sudden force to avoid physical contact among people, so many entities tried to shift toward online solutions to retain their services, customers and avoid having to exit the market [1]. Hence, after the COVID-19 precautionary measures were lifted, many organizations wanted to get back to the traditional way of working, whereas an increasing number of organizations wanted to maintain the working from home concept or working in a hybrid mode by enabling office work in some main locations and home work in most other locations as a solution for crowded offices, in addition to welcomed cost-cutting [2]. In this regard, Kröll and Nüesch reported a positive impact on productivity that the flexibility of working from home can provide [3].

On the other side of business, consumers had to adapt to the new conditions related to COVID-19 restrictions, especially in addressing their financial issues and purchasing online, which caused a profound effect on consumer shopping habits, and, in turn, the urgency for retailers to boost their digital presence increased [4], and organizations have had to adopt new graceful practices, modify their business model to meet expectations,

increase satisfaction of customers and create repurchase intentions and attitudes toward the organization's e-services. These ideas have been discussed recently by researchers such as Miller et al., [5], Wang et al. [6], Bough et al. [7] and Nguyen et al. [8], whereas no studies concentrate on the impact of COVID-19 precautionary measures that pushed customers, employees and businesses to shift to e-services, especially in Central European countries, and on future attitudes and intentions to keep dealing with e-services as a primary channel to meet their needs. This gap appears more clearly in regard to e-services users' changes in intentions and attitudes regarding age and gender.

From this point of view, this article concerns outlining the attitudes and intentions of Visegrád Group (V4) countries' residents, as an example of Central European countries, toward continuing to utilize e-services after the COVID-19 pandemic precautionary measures being lifted, taking satisfaction, gender and age into consideration as this subject has not been discussed thoroughly in the literature during the COVID-19 period, so this study is trying to fill this gap by studying respondents' satisfaction, intentions and attitudes relating e-services usage in the context of their age and gender.

In other words, the objective of this study is to analyze the effect of the COVID-19 pandemic restrictions period on e-services users' satisfaction during that period and its consequences on users' future attitudes toward and intention to keep using e-services after COVID-19 restrictions are over regarding users' age and gender. These results would be important for e-services providers for future planning to retain their customers by mapping users' age and gender, and these results would be helpful for the aspects of future transformation toward e-government by leaving fewer gaps in regard to age and gender.

2. Literature Review

2.1. Users' Satisfaction with Using E-Services

Kondou described customers' satisfaction as a positive emotional reflection of the subjective estimation of a situation [9], whereas Oliver considered it as consumers' fulfillment response [10].

Fornell et al. argued that raising customers' satisfaction in an organization would boost the positive behavioral intention of a customer toward dealing with this organization [11]; in more detailed words, raising satisfaction increases positive word of mouth [12], repurchase intentions [13] and loyalty [14]; moreover, it decreases customer renunciation [15], marketing and spending levels [16] and client retention costs [17]. Gaining those aspects of satisfaction properly provides the organization a competitive advantage in the long-term [18,19]. Moreover, Nemati et al. argued that poor service badly impacts loyalty and satisfaction [20].

From another point of view, Mano and Oliver asserted the importance of emotional aspects of customers' satisfaction, such as pleasure, entertainment, interests, pleasing surprises and joy [21]. In this regard, Oh and Kim [22] and Susskind et al. [23] outlined the service quality as an influential factor of customer satisfaction, whereas Parasuraman et al. defined service quality as customers' overall attitude and satisfaction or judgment of service quality [24].

From the contemporary marketing theory and practices point of view, Fujimura considered satisfaction one foundation of service marketing concerns in satisfying customers to obtain satisfying profits [25]; the ideas of Fujimura reassured Churchill [26] and Oliver's [27] ideas, which considered customers' satisfaction the center of marketing as it has a direct relationship with business profits [28].

Prior to mentioning the Parasuraman et al. definition, Grönroos provided one of the famous approaches of customer satisfaction as it is a result of the gap between expectations and the real delivered service [29]. Zeithaml et al. conducted exploratory research and denoted this presence of gaps in companies that interact via the Internet with their customers, and they affirmed that fulfillment in gaps on the customer side will result in increasing perceived e-service quality, value and repurchases behavior (e-Loyalty) eventually; this will lead to a higher level of perceived e-satisfaction [30], which has been defined

by Anderson and Srinivasan as “the contentment of the customer with respect to her or his prior purchasing experience with a given electronic commerce firm” [31] (p. 125).

Lindgaard and Dudek characterized forming of users’ satisfaction on technology as the gained experience of users’ interaction with technology [32]. In the case of online interaction, Teo defined some of the factors affecting this interaction in online learning as system design, two end users (teachers and learners), technology itself and environment [33]; moreover, Elsharnouby and Mahrous concluded that efficiency and correct technical functioning of the website system have a major effect on customers’ satisfaction and repurchase intention [34]. In regard to e-services, Raza et al. found that web design affects customers’ satisfaction directly, besides the efficiency of websites as well as customers’ assurance and other aspects of online banking service quality [35].

Many studies have revealed a positive direct impact of perceived privacy and security on customers’ e-satisfaction, which, in turn, has a significant positive influence on e-loyalty [36]; moreover, we can find results of the positive relation between e-services quality and e-customer satisfaction in the Akinyele and Olorunleke study about electronic banking services in Nigeria [37].

According to Vos et al., one of the key factors affecting e-satisfaction is e-quality, and, to increase e-retail viability and profitability, online retailers have to increase customers’ e-satisfaction and e-trust [38]; moreover, this study found a cause–effect relationship between customers’ e-satisfaction, e-trust and e-loyalty of purchasing online and the quality of shopping websites.

Depending on means–ends-chain theory, which describes customers’ evaluation of his or her consumption experiences from particular means to more extracted ends [39], Blut et al. conducted an empirical study using meta-analytic techniques to test e-quality measures and indicated a significant effect of studied e-service quality dimensions (website design, fulfilment, customer service security) on customer e-satisfaction and repurchase intentions [40].

Rao et al. [41] shed light on e-services satisfaction differences in the COVID-19 period, which this research is directly concerned with; they distinguished between shopping from direct and indirect online shops and concluded that the customer satisfaction is much higher when they purchased from direct online shops as their actual experience meets their perceptions, while shopping from indirect shops was dissatisfying as those shops make false promises, which make the products and services differ from customers’ perceptions.

Moreover, Muharam et al. [42] found that customers’ trust in e-services websites positively affects customers’ satisfaction. The Muharam et al. study was conducted between October and December 2020 during the COVID-19 pandemic lockdown, and, in the same context, trust was confirmed as a vital factor of retaining rural e-health care services during the COVID-19 period [43].

Finally, due to the importance of e-customer satisfaction, it is considered, with e-services quality, among the most vital factors of e-business worldwide [44], and, regardless of the factor affecting e-services’ satisfaction, this study will evaluate the e-customer satisfaction during the COVID-19 pandemic precautionary measures regarding age and gender and their relationship with attitude toward e-services and intention to keep using e-services after the COVID-19 pandemic precautionary measures end.

H1.1: *In V4 countries, there are differences among generations’ satisfaction of e-services during compulsory shifting to use e-services during COVID-19 pandemic restrictions.*

H1.2: *In V4 countries, there are differences between genders’ satisfaction of e-services during compulsory shifting to use e-services during COVID-19 pandemic restrictions.*

2.2. Attitude toward E-Services

Attitude toward information systems is a sequel of positive or negative feeling that shapes desire to use this information system [45].

One of the important studies that dealt with attitudes and intentions toward technology is Davis's [46]. It stated that persons' tendency and decisions regarding using a new information system technology basically depend on their attitude toward the system, and the relative helpful/useful and easy technologies have a positive impact on users' attitude and intention to use them. Moreover, Davis designed the technology acceptance model (TAM) to anticipate information systems (IS) usage, in the same regard attitude was confirmed as a critical determinant in social psychology theory proposed by Ajzen and Fishbein [47] concerning predicting behavioral reaction toward using (IS), called the theory of reasoned action (TRA), which extended, in 1991, the theory of planned behavior (TPB). Ajzen [48], related to the last two mentioned theories of attitude, considered many factors affecting this attitude, such as the outcome of a user's evaluation and beliefs, whilst TAM framed attitude as a result of perceived utility, ease of use and beliefs.

Nguyen et al. used an extended TAM approach to investigate consumers' attitudes and intentions in the food e-purchasing sector, and they noted perceived ease of use as the factor that most affects attitude [8]. Depending on TAM, TPB and decomposed TPB, Hung et al. developed a model to assess users' e-government acceptance by using an online tax filing and payment system in Taiwan, and, as a result, e-government services acceptance was formed by behavioral determinates, subjective standards and attitudes [49].

Users who have a negative attitude toward e-government services and prefer traditional channels were deemed as an obstacle to e-government implementation [50,51].

Regarding the many studies involved in studying e-attitudes, such as Carlson and O'Cass [52], Adesina and Ayo [53] argued that customers' attitudes to use online services/e-banking are controlled by beliefs, past experience and self-perceived weighing of relative advantage, service quality, service potentials, ease of use, privacy, security and risk, appeal of the visual system and delivery of the service. In contrast, Folorunso et al. found that relative advantage has no positive effect on users' attitude [54].

Furthermore, Lassar et al. suggested personal characteristics and consumer innovativeness as two main influential factors affecting customers' online banking adoption [55], while Hanudin investigated e-banking acceptance among students in Malaysia and found that self-efficacy and perceived credibility have a positive relation with attitude [56]. Moreover, Toots noted that people's attitude to adopt virtual government services is affected by self-efficacy and skills, the possibility of reaching technology and expertise of using the Internet [57].

More studies concerning e-government adoption describe that level of education, literacy/knowledge, individual ability to adapt with new technologies and beliefs are the main factors that formulate individual intention and attitude to utilize e-services [58,59].

Considering all the literature discussed above, this study assesses the importance of customer attitude toward e-services and tries to evaluate the impact of the 'compulsory' shift to use e-services during the COVID-19 pandemic precautionary measures on attitude toward e-services after these measures end, taking users' age and gender into consideration.

H2.1: *In V4 countries, there are differences among generations' attitude toward using e-services after compulsory shifting to use e-services after COVID-19 pandemic restrictions end.*

H2.2: *In V4 countries, there are differences between gender's attitude toward using e-services after compulsory shifting to use e-services after COVID-19 pandemic restrictions end.*

2.3. Intention to Keep Using E-services (Future Willingness to Use Eservices)

As mentioned earlier in the attitude paragraph about the technology acceptance model (TAM) declaring that the relative helpful/useful and easy technologies have a positive impact on a user's attitude and intention to use them [46], this intention due to the theory of reasoned action is influenced by subjective norms and personal attitude [47].

In this context, Oliver considered repurchasing intention as one component of key loyalty factors [60]. Kang et al., in their study about service quality and its effect on hotel

customers' satisfaction and customer behavioral intentions in Japan, argued that higher overall satisfaction is correlated positively with repurchasing intentions aspects [61].

Furthermore, online trust and attitude directly and positively impact customers' intentions to purchase food online [8].

Moreover, Zheng reported that the tendency of people to participate in e-services is derived directly from abilities and intentions [62]. This intention/willingness cannot be initiated without forming trust in the online-system, taking into consideration that trust was noted as a key factor in setting up e-government [63]; meanwhile, Gilbert et al. reported e-transaction security, saving time, minimizing costs, quality of e-content and e-service delivery as vital impact factors on willingness/intention to use online electronic government. On the other hand [64], Gilbert also observed that ease of use and some of the perceived usefulness aspects are not important for willingness to use e-government services [64].

Meanwhile, Macintosh (2004) and Bryson et al. (2013) noticed in the literature a high positive correlation between intention to use e-services of government and personal involvement and collaboration [65,66].

A study concerning Indonesian e-transportation services executed by Santoso and Aprianingsih argued that customers' repurchasing intention is a foundation of sustainable business and found that customers' satisfaction, perceived quality of e-services and perceived service are affecting factors on customers' repurchasing intention in a facility of e-transportation services [67].

In a more recent and relevant study held during the COVID-19 pandemic era, Prahawan et al. investigated the effect of e-trust, online word of mouth and e-satisfaction on online customers' repurchasing intention; the result was that only e-trust had a significant positive impact on repurchasing intentions [68]. Wang et al. achieved a similar result during studying shopping online using Facebook. They assumed a positive relationship between e-trust and users' intentions to use Facebook commerce and also noticed that females have more tendency to develop their intentions to conduct online shopping using Facebook [6].

While Alassaf et al. assessed the respondents' differences in reaction to the increased online protection regulations and their intention to use e-services, taking age as a moderator factor, they found 60% of users aged 40 to 55 do not prefer to execute their transactions online due to increased complexity of the security protection mechanism [69].

Taking a look at European countries, since this study concerned Central European countries, Millard, J surveyed policies that encouraged future users' utilization of e-government and found that the intentions to utilize e-government in EU new member states are less than the intentions in older members; for example, Hungary has the lowest e-government usage intention at 33 percent, while Denmark has the highest at 63 percent. Moreover, Millard revealed in this study that the simplest services, such as checking information, have a higher anticipated future demand than more complicated services, such as those needing an electronic signature [70].

Browsing the literature discussed in this Section 2.3, which focused on the importance of users' intention in regard to e-services, has urged this research to test and evaluate the impact of the 'compulsory' shift to use e-services during the COVID-19 pandemic precautionary measures on future intention to use e-services after these measures end in light of users' age and gender.

H3.1: *In V4 countries, there are differences among generations' future intention to keep using e-services after compulsory shifting to use e-services after COVID-19 pandemic restrictions end.*

H3.2: *In V4 countries, there are differences between gender's intention to keep using e-services after compulsory shifting to use e-services after COVID-19 pandemic restrictions end.*

A glance at the literature discussed in the literature review portion draws attention to the importance of satisfaction, attitude and intention in shaping the future of e-services.

Nevertheless, this study conducted further browsing of literature and found a research gap regarding e-services and users' satisfaction, attitude and future intention regarding

users' age and gender, especially in Central European countries, which motivated this research to take the initiative to fill this gap and discuss those variables during and after the COVID-19 precautionary measures period in terms of age and gender and the relation between those variables in V4 countries as an example of Central European countries.

H4: *In V4 countries, there is significant relation between e-services users' satisfaction of e-services during compulsory shifting to use e-services during COVID-19 pandemic restrictions and their attitude toward using e-services after these restrictions end.*

H5: *In V4 countries, there is significant relation between e-services users' satisfaction of e-services during compulsory shifting to use e-services during COVID-19 pandemic restrictions and their intention to keep using e-services after these restrictions end.*

3. Materials and Methods

3.1. Sample and Procedures

As this research concerns V4 countries as an example of Central Europe countries, all items were translated into four languages of V4 countries (Czech, Hungarian, Slovakian and Polish) and distributed in those four countries; the targeted population is the residents of V4 countries between 18 and 65 years old.

A single cross-sectional survey design with a convenience sample was conducted by distributing 377 questionnaires (129 in Hungary, 90 in Poland, 80 in Slovakia and 78 in Czech); 22 responses were rejected (7 in Hungary, 8 in Poland, 2 in Slovakia and 5 in Czech).

The study gained 354 valid questionnaires for analyzing (122 responses in Hungary, 82 in Poland, 78 in Slovakia and 72 in Czech).

This study grouped respondents in 5 categories, and it had requested respondents to identify their age exactly for making it possible to apply more statistical analysis regarding correlation between each of satisfaction, attitude, intention from one side and respondents' age from another side.

3.2. Control Variables

This study suggested age as control variable depending on results of many studies finding correlation of costumer's age with his or her purchasing intention, satisfaction and attitude, such as Spector's findings about the positive correlation between age, job satisfaction and e-purchase behavior [71]; moreover, attitude and age were discussed by Sorce et al. study, who reported that age explained more variance in purchasing intentions and attitude when consumers have pre-searched the products on Internet [72], whereas Slabá focused on age as a vital factor affecting consumers' buying behavior and attitudes to prices [73]; meanwhile, San-Martín et al., in their analyzing of age impact on generation satisfaction, recorded no difference in satisfaction between age groups that have mobile purchasing experiences [74].

Nevertheless, Alassaf et al. discussed the increasing complexity of online security protection impact on users' intentions to use e-services regarding their age and confirmed age relation with intentions to use e-services [69].

Moreover, this research considers gender as a control variable due to Jain et al. findings about the differences between females and males in satisfaction with electronic logistics service [75]; in the same context, Marinković et al. found a significant difference between genders in user attitudes, intentions and satisfaction regarding mobile commerce [76]. The importance of gender influence during COVID-19 restriction measures on satisfaction of online dealing was confirmed by Rožman et al. [77] and Feng and Savani [78] in their studies about job satisfaction, efficiency, productivity and job engagement during COVID-19 period.

3.3. Measures

3.3.1. Measuring Users' Satisfaction with E-Services during COVID-19 Pandemic Precautionary Measures Period

Satisfaction scale used in this study consists of 18 items derived from the scale developed by Alassaf and Szalay to measure students' satisfaction with online courses "during sudden shift to use e learning when COVID-19 pandemic precautionary measures have been exerted in Central European countries" [79]; this scale was originally developed from Gunawardena and Zittle's, Esterhuyse et al. and Morton's scales [80–82] as e-learning due to those studies is considered one of important applications of e-services.

This study reused mentioned Alassaf and Szalay original scale with modifications of original phrases to comply with the context of the study, and then factor analysis conducted, which confirmed the 18 items of the scale; Cronbach's alpha test applied to confirm reliability, which reported 0.92 [79].

3.3.2. Measuring Intentions to Keep Using E-Services after the 'Compulsory' Use Experience after COVID-19 Pandemic Precautionary Measures End

To evaluate intention toward reusing e-services after COVID-19 pandemic precautionary measures end, this study depends on Chatzoglou et al. [83] model redeveloped by Esterhuyse et al. [81], who elaborated new scale by using the model and reviewing literature. They used this scale to assess satisfaction and intentions in corporations, and they provided an intention scale that consists of 4 items. Reliability of this scale examined by Cronbach's alpha coefficient reported 0.92.

Furthermore, Alassaf and Szalay reused this scale in their study to measure students' intentions to reuse e-learning after COVID-19 pandemic measures end and revalidate the scale as Cronbach's alpha coefficient reported 0.87 [79].

Moreover, this study took into regard building intention scale, the scales used by Gefen and Straub [84] and Pavlou [85] in their studies about consumers' adoption of IS and e-commerce.

Finally, the final intention scale proposed by this study composed of 5 items.

Cronbach's alpha test applied to confirm reliability and reported 0.82.

3.3.3. Measuring Attitude to use E-Services after the 'Compulsory' Use Experience after COVID-19 Pandemic Precautionary Measures Period Ends

This research in accordance to measure attitude toward using e-services after COVID-19 pandemic precautionary measures end derived a scale adapted from Alomari et al. study that concerns measuring the impact of social factors on Jordanian citizens' acceptance of e-government [86]. Alomari et al. study elaborated its scale of 7 items measuring attitude and beliefs basically from Vassilakis et al. [51], Jarvenpaa et al. [87] and by authors themselves after reviewing literature.

After reviewing literature, this study excluded the item related to religious belief toward dealing with e-government because it was not mentioned by most of the literature regarding e-attitudes and it is inconsistent with the purpose of the study and targeted test sample (V4 countries' population).

The final scale consists of 6 items. Cronbach's alpha test applied to confirm reliability and reported 0.85.

3.4. Validity and Reliability

The minimum Cronbach's alpha coefficient value accepted by Nunnally to confirm validity of a scale is 0.7 [88]. This reference validates the scales of satisfaction, attitude and intention used in this research as Cronbach's alpha coefficient reported 0.92, 0.82 and 0.85, respectively.

3.5. Research Instrument

For the research instrument, we used a questionnaire (closed type). 18 items for e-services users' satisfaction were adapted from Alassaf and Szalay original scale [79], as mentioned in Section 3.3.1. 5 items for e-services users' intention to keep using e-services were adapted from Chatzoglou et al. [83], as mentioned in Section 3.3.2. 6 items for e-services users' attitude toward e-services were adapted from Alomari et al. scale [86], as mentioned in Section 3.3.3.

5-point Likert-type scale used to indicate respondents' agreement to the questionnaires' statements from completely disagree (1) to completely agree (5). This research used single cross-sectional survey design with a convenience sample in distributing the questionnaire. The field work of this survey took place between October 2021 and April 2022.

4. Results and Discussion

4.1. Sample Background Analyses

Fifty-four percent of the respondents are females, 45% are males, while 0.85% (only three respondents) answered this question as "other" (see Figure 1).



Figure 1. Gender distribution.

Further, 34.5% were Hungarian citizens (122 respondents), 20% Czech (72 respondents), 23% Polish (82 respondents) and 22% Slovakian (78 respondents; Figure 1).

The following table illustrates a sample age distribution (Table 1); the majority of respondents are between 26 and 55 years old, with 26% for the 26–35 group, 28.5% for the 36–45 group and 25.4% for the 46–55 group, whereas the youngest and oldest groups represent only 11.6% and 8.5%, respectively.

Table 1. Sample age distribution.

Age Group	Nr. of Respondents	Czech	Hungarian	Polish	Slovakian	Age Group Percentage of the Total Respondents
18–25	41	8	14	10	9	11.6%
26–35	92	19	32	21	20	26%
36–45	101	21	35	23	22	28.5%
46–55	90	18	31	21	20	25.4%
56–65	30	6	10	7	7	8.5%

4.2. Statistical Data Analysis

This study took the mean of all the items' answers of each scale for each respondent; the result was new variables to be used in analysis, and the new variables are overall e-services satisfaction during COVID-19 precautionary measures, overall attitude toward e-services and overall intention to keep using e-services after COVID-19 precautionary restrictions end. The SPSS program was used to perform statistical analyses.

Beginning by simple analysis, frequencies of answers that exceed the middle of the scale were used to calculate, for each age group, the percentages of e-services users who were satisfied with e-services during COVID-19 pandemic precautionary measures, percentages of users who have an attitude toward e-services and percentages of users who have an intention to use e-services after COVID-19 pandemic precautionary measures end.

From Table 2, we find that most users in all age groups were satisfied with the e-services in the targeted period, but this percentage recognizably declines in the older generation groups to reach 53.3% of the respondents in the oldest group between 56 and 65 years old.

Table 2. E-services users' satisfaction, attitude and future use intention during and after COVID-19 restriction period regarding their age.

Age Group	Satisfied with e-Services during COVID-19 Pandemic Precautionary Measures	Have the Attitude Toward e-Services after COVID-19 Pandemic Precautionary Measures End	Have the Intention to Use e-Services in Future after COVID-19 Pandemic Precautionary Measures End
18–35 years old	84.2%	81.2%	79.7%
18–25 years old	80.5%	78%	75.6%
26–35 years old	85.9%	82.6%	81.5%
36–45 years old	85.1%	82.2%	78.2%
46–55 years old	68.9%	65.5%	44.5%
56–65 years old	53.3%	33.3%	16.6%
46–65 years old	65%	57.5%	37.5%

Taking a further look at these percentages regarding attitude toward e-services after COVID-19 experience, we find that only 33.3% of the oldest age group respondents have this attitude, while most of the other generation groups have an attitude toward e-services; this means that, in V4 countries, most e-services users above 55 years old do not have the attitude toward e-services after the experience of compulsory shift to use e-services during the COVID-19 restriction period.

On the other hand, the situation looks different in regard to users' intentions to keep using e-services after COVID-19 pandemic precautionary measures end as we can see in Table 2 that most of the V4 countries' e-services users over 45 years do not intend to keep using e-services after COVID-19 pandemic precautionary measures end, noting that the percentage of respondents who have the intention to keep using e-services declines sharply, with 44.5% in the 46–55 age group but only 16.6% in the 56–65 age group.

The above results mean that the older generations were less satisfied and have less attitude and intention to reuse e-services than the younger generations besides that the older generation groups (46–55, 56–65) have more differences between satisfaction and attitude from one side and intention to keep using e-services, which means that the intention of the oldest generation groups to keep using e-services decreases more than their satisfaction and attitude do.

Staying in the same discussion to confirm the previous results, Table 3 demonstrates a sharp decrease in overall intention mean in the oldest age group (56–65), which is $1.9 < 3$ (middle of the scale); this result explicitly declares that users between 56 and 65 years old do not tend to keep using e-services after COVID-19 pandemic precautionary measures

end even when they have a nearly neutral overall satisfaction (mean = 2.9) and neutral overall attitude toward e-services (mean = 3).

Table 3. Mean answer of e-services users' overall satisfaction during COVID-19 pandemic precautionary measures, overall attitude toward e-services and overall intention to use e-services after COVID-19 pandemic precautionary measures end, distributed by age group.

Age Group	N	Overall Satisfaction		Overall Attitude		Overall Intention	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
18–25	41	3.7317	0.94933	3.6585	0.93834	3.4146	1.16137
26–35	92	4.0217	0.79805	4.0870	0.83406	3.6522	0.95428
36–45	101	3.9505	0.89862	4.0891	0.80124	3.6139	1.09517
46–55	90	3.5000	1.11426	3.5889	0.93490	2.9111	1.11823
56–65	30	2.9000	1.24152	3.0333	1.12903	1.9000	1.09387
Total	354	3.7401	1.02115	3.8220	0.94582	3.2768	1.18641

Furthermore, this study conducted a paired sample *t*-test among the dependent variables to be sure of meaningful differences among e-services users' satisfaction, attitude and intention.

By looking at Table 4, we can conclude that users' satisfaction regarding e-services during COVID-19 pandemic precautions meaningfully differs from each of attitude toward and intention to keep using e-services after COVID-19 pandemic precautions end; moreover, the users' attitude meaningfully differs from their intention to keep using e-services; all pairs have a *p* value < 0.05.

Table 4. Paired samples test among dependent variables.

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. De- viation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Overall Satisfaction—Overall Attitude	−0.08192	0.71532	0.03802	−0.15669	−0.00715	−2.155	353	0.032
Overall Satisfaction—Overall Intention	0.46328	0.90015	0.04784	0.36919	0.55737	9.683	353	0.000
Overall Attitude—Overall Intention	0.54520	0.75605	0.04018	0.46617	0.62423	13.568	353	0.000

Regarding the results discussed above, hypotheses H1.1, H2.1 and H3.1 were confirmed:

H1.1: In V4 countries, there are differences among generations' satisfaction of e-services during compulsory shifting to use e-services after COVID-19 pandemic restrictions.

H2.1: In V4 countries, there are differences among generations' attitude toward using e-services after compulsory shifting to use e-services after COVID-19 pandemic restrictions end.

H3.1: In V4 countries, there are differences among generations' intention to keep using e-services after compulsory shifting to use e-services after COVID-19 pandemic restrictions end.

4.2.1. Testing the Relation between Each of Dependent Variables and Age

To investigate the relation between each of satisfaction, attitude and intention from one side and age from another, a correlation test was conducted between them as every respondent had identified his or her age in the questionnaire.

By looking back at Table 3, we can notice that each mean of overall satisfaction, overall attitude and overall intention increases in younger age groups when moving from the

18–25 group to the 26–35 years old one, and then they remain the same in the next older age group of 36–45 (a very slight decrease from the 26–35 group), but, in the older age groups, 46–55 and 56–65, they decrease; depending on that, this study splits the sample into two groups to test the correlation between dependent variables (satisfaction, attitude and intention) and independent variable (age): younger age group (18–35) and older age group (36–65):

- Younger age group (18–35): a weak to medium positive correlation was noticed between the age from one side and each of satisfaction, attitude and intention from the other as Pearson correlation coefficients between age and dependent variables are 0.284, 0.41 and 0.29, respectively (Table 5). In other words, the overall satisfaction of e-services users between 18 and 35 years old in V4 countries during COVID-19 pandemic precautionary measures, overall attitude toward e-services and overall intention to use e-services after COVID-19 pandemic precautionary measures end increased as users' ages increased.

Table 5. Correlations among e-services users' overall satisfaction during COVID-19 pandemic precautions, overall attitude toward, overall intention to use e-services after COVID-19 pandemic precautions end and age for users between 18 and 35 years old.

Correlations (Age Group 18–35)					
		Age	Overall Satisfaction	Overall Attitude	Overall Intention
Age (18–35)	Pearson Correlation	1	0.284 **	0.410 **	0.290 **
	Sig. (2-tailed)		0.001	0.000	0.001
	N		133	133	133
Overall Satisfaction	Pearson Correlation		1	0.666 **	0.729 **
	Sig. (2-tailed)			0.000	0.000
	N			133	133
Overall Attitude	Pearson Correlation			1	0.797 **
	Sig. (2-tailed)				0.000
	N				133

**. Correlation is significant at the 0.01 level (2-tailed).

Moreover, in this age group, we can notice a strong positive correlation (Pearson correlation coefficients > 0.6) between satisfaction from one side and each of attitude and intention on the other side, which means, in the age group 18–35 years old, when e-services users' overall satisfaction increased during COVID-19 pandemic precautionary measures, their overall attitude toward and overall intention to use e-services after COVID-19 pandemic precautionary measures end increased too.

- Older age group (36–65): a medium negative relation ($-0.4 >$ Pearson correlation coefficients > -0.6) was noticed between the age from one side and each of satisfaction, attitude and intention from the other (see Table 6).

In other words, in V4 countries, the overall satisfaction of e-services users between 36 and 65 years old during COVID-19 pandemic precautionary measures, overall attitude toward e-services and overall intention to use e-services after COVID-19 pandemic precautionary measures end decreased as users' ages increased.

Furthermore, there is a strong positive correlation between satisfaction from one side and each of attitude and intention on the other side; this result is compatible with common results found in many studies of the positive correlation among customers' satisfaction, attitude and intention.

Table 6. Correlations among e-services users' overall satisfaction during COVID-19 pandemic precautions, overall attitude toward, overall intention to use e-services after COVID-19 pandemic precautions end and age for users between 36 and 65 years old.

Correlations (Age Group 36–65)					
		Age	Overall Satisfaction	Overall Attitude	Overall Intention
Age (36–65)	Pearson Correlation	1	−0.400 **	−0.439 **	−0.491 **
	Sig. (2-tailed)		0.000	0.000	0.000
	N		221	221	221
Overall Satisfaction	Pearson Correlation		1	0.766 **	0.645 **
	Sig. (2-tailed)			0.000	0.000
	N			221	221
Overall Attitude	Pearson Correlation			1	0.758 **
	Sig. (2-tailed)				0.000
	N				221

** . Correlation is significant at the 0.01 level (2-tailed).

Regarding the two age groups above and the analyzed results, hypotheses H4 and H5 were confirmed:

H4: *In V4 countries, there is significant relation between e-services users' satisfaction of e-services during compulsory shifting to use e-services during COVID-19 pandemic restrictions and their attitude toward using e-services after these restrictions end.*

H5: *In V4 countries, there is significant relation between e-services users' satisfaction of e-services during compulsory shifting to use e-services during COVID-19 pandemic restrictions and their intention to keep using e-services after these restrictions end.*

This study evaluated the relations' strengths depending on the guide Evans suggested for the r value (Pearson's correlation coefficient) [89].

These results mean that, under 35 years old, the dependent variables are increasing slightly by age until 35 years old, and then they decrease more sharply as age rises.

4.2.2. Testing the Relation between Each Dependent Variable and Gender

The other control variable with which this study evaluates its impact on the dependent variables (satisfaction, attitude and intention) is gender. A one-way ANOVA test was conducted to explore if there are meaningful differences between gender in satisfaction with e-services during the COVID-19 pandemic precautions, attitude toward e-services and intention to reuse e-services after the COVID-19 pandemic precautionary measures are over (see Table 7).

Table 7 clearly indicates that there are no meaningful differences between females and males regarding the study's dependent variables as all the p values accompanied F statistic > 0.05 .

Furthermore, a one-way ANOVA test conducted for each age group between gender and dependent variables indicated that the result was the same, with no meaningful differences between females and males regarding the dependent variables in all generation groups, and hypotheses H1.2, H2.2 and H3.2 were rejected.

In other words:

- In V4 countries, there is no difference between females and males in satisfaction with e-services during COVID-19 pandemic precautionary measures.
- In V4 countries, there is no difference between females and males in their attitude toward e-services after COVID-19 pandemic precautionary measures are over.
- In V4 countries, there is no difference between females and males in their intention to reuse e-services after COVID-19 precautionary measures are over.

Table 7. One-way ANOVA test. Testing meaningful differences between gender in satisfaction with e-services during COVID-19 pandemic precautionary measures, attitude toward e-services and intention to reuse e-services after COVID-19 pandemic precautionary measures are over.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Overall Satisfaction	Between Groups	0.850	2	0.425	0.406	0.667
	Within Groups	367.241	351	1.046		
	Total	368.090	353			
Overall Attitude	Between Groups	0.156	2	0.078	0.087	0.917
	Within Groups	315.632	351	0.899		
	Total	315.788	353			
Overall Intention	Between Groups	0.264	2	0.132	0.093	0.911
	Within Groups	496.606	351	1.415		
	Total	496.870	353			

5. Conclusions

Regarding the results and discussion, this study finds that satisfaction of e-services' users during the COVID-19 precautionary measures has a positive impact on users' attitude toward e-services and intention to reuse e-services after the COVID-19 pandemic precautionary measures are over.

This study distinguished differences among the respondents regarding the dependent variables due to e-services users' age levels: while the younger generation (18–35 years old) has a positive correlation with the dependent variables, the older generation (36–65 years old) has a negative one. This result leads to concluding that:

As e-services users' age between 18 and 35 years old in Central European countries increased, they had an increased satisfaction with e-services during the COVID-19 pandemic precautionary measures, an increased attitude toward e-services and an increased intention to reuse e-services after the COVID-19 pandemic precautionary measures are over.

In contrast, as e-services users' age between 36 and 65 years old in Central European countries increased, they had a decreased satisfaction with e-services during the COVID-19 pandemic precautionary measures, a decreased attitude toward e-services and a decreased intention to reuse e-services after the COVID-19 pandemic precautionary measures are over.

Meanwhile, in spite of the oldest users (56–65 years old) having a neutral satisfaction of e-services during the COVID-19 pandemic precautionary measures and a neutral attitude toward e-services after the COVID-19 pandemic precautionary measures, they did not tend to keep using e-services after the COVID-19 pandemic precautionary measures. This provides an important conclusion that people over 56 years old in Central Europe do not tend to keep using e-services.

In other words, in V4 countries, most e-services users above 55 years old do not have an attitude toward using e-services and do not have the intention to keep using e-services after the experience of the compulsory shift to use e-services during the COVID-19 restriction period.

6. Implications and Future Research Directions

Due to the importance of the generation that is 46–65 years old, for that generation, especially for the next 10 years as e-services will be dominating and one of the main—if not the main—channels that provide services considering that digitized technology is the essential base for development in all perspectives of life [90], it is important to raise the intention to keep using e-services. This study suggests conducting comprehensive research regarding finding solutions to increase older generations' intention to use e-services, taking into account that the increased complications related to privacy and security of e-services are some of the main obstacles for the older generation to be involved in e-services interactions [69].

The sample used in this study covers four countries, representing a case study of Central European countries; this makes the sample number rather small for each country to make conclusions for each country separately even as it complies to minimum sample numbers accepted in statistical analysis. It would be beneficial to conduct future research (not related to the COVID-19 era) for each country independently with expanded samples due to the differences between those countries regarding e-services and their infrastructure to evaluate e-services' future intention and attitude depending on e-services' satisfaction experience regarding the age distribution.

Moreover, it would be useful to repeat this research in each of the V4 countries individually with a well-balanced sample in regard to population distribution in cities and rural regions, which would enable more reliable generalizations.

The authors of this study have the intention to repeat a similar evaluation of e-services satisfaction, intention and attitude during and after the COVID-19 period of e-services channels but in the context of working from home considering the differences between citizens and resident foreign workers.

As COVID-19 is considered as an example of externalities that have positive and/or negative impacts, Lim [91] suggested a conditional research approach to take advantage of the positive impacts and mitigate the negative ones of externalities. Depending on Lim's study, this research encourages future research using a conditional approach to predict the sequences of any similar lockdown in the future.

7. Limitation

The findings of this study are based on data collected at a single point in time, which might be subjected to CMB (common method biases) [92]. Future research can collect data at different points in time to validate the findings and generalization of this research.

The sample as a whole is enough (354 respondents) to apply statistical analysis as it is more than the minimum number (25–30) [93], but, looking at the sample of each V4 country, it was, at minimum, 72 respondents in Czech Republic and, at maximum, 122 from Hungary. Although they comply with the Hogg et al. [93] recommendation of the minimum sufficient sample for statistical analysis, it would be better to enlarge the samples in each of the V4 countries to generalize the results more reliably.

Most of the questionnaires were distributed in the main cities, which may expose the results to biases.

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