Decision Making: Applications in Management and Engineering
Vol. 6, Issue 2, 2023, pp. 975-993.
ISSN: 2560-6018
eISSN: 2620-0104
DOI: https://doi.org/10.31181/dmame622023940

CHARACTERISTICS OF CONSUMER SEGMENTS BASED ON PERCEPTIONS OF THE IMPACT OF DIGITALISATION

Mónika Garai-Fodor[1*], László Vasa[2] and Katalin Jäckel[3]

[1] Óbuda University, Keleti Károly Faculty of Business and Management, Hungary
[2]Széchenyi István University Faculty of Economics, Hungary
[3] Faculty of International Management and Business, Budapest Business School, Hungary

Received: 29 July 2023;
Accepted: 11 September 2023;
Available online: 27 September 2023.

Original scientific paper

Abstract: *The focus of our research was to examine consumer perceptions of attitudes towards digitalisation. The perception of digitalisation was also analysed from a generation-specific perspective, given that the difference in values between generations is reflected in the perception of consumer trends, including the trend towards digitalisation. The primary data presented in this study are the results of a quantitative data collection was carried out among Hungarian consumers using an arbitrary sampling procedure. A pre-tested, standardised online questionnaire survey was used, which resulted in 3,515 evaluable questionnaires. Descriptive statistics, bivariate and multivariate analyses were used to process the quantitative results and test the hypotheses. As a result of the study, we were able to characterise three significantly distinguishable target groups using a K-means clustering procedure: the group of "consumers sceptical about digitalisation", the segment of "Accepting consumers who feel the differentiating effects of digitalisation", and The 'positive digital consumer'. We have been able to demonstrate that the perception of digitalisation can be used as a segmentation criterion, and we can also statistically demonstrate that the segments according to the perception of digitalisation carry generation-specific elements. In our opinion the results may help to increase consumer acceptance of digitalisation processes and related technologies. A limitation of the research is that, the results are valid for the population under consideration, cannot be considered representative. We believe that characterising the individual segments can help to differentiate the education process according to the awareness and attitudes of each consumer.*

Key words: *Factor analysis, cluster analysis, digitalization.*

* Corresponding author.
E-mail addresses: fodor.monika@kgk.uni-obuda.hu (M. Fodor), laszlo.vasa@hiia.hu (L. Vasa), jaeckel.katalin@uni-bge.hu (K. Jäckel).

1. Theoretical overview

Nowadays, digitalisation is one of the most popular topics, enthusiastically supported by the majority, cautiously and sometimes negatively treated by others, and on which the European Union, national governments, businesses and consumers themselves are spending huge sums of money. CISCO predicts (2021) that by 2023 there will be 5.3 billion internet users in the world (66% of the world's population), a 36% increase from 3.9 billion in 2018 (CISCO, 2020).

The vital importance of digitalisation in almost all areas of society and the economy is indisputable. But do we understand exactly what digitalisation means, or does everyone understand the term in the same way? To this end, we must first clarify the difference between digitalisation and automation (Bezpartochnyi, 2023).

Automation is a process of phases. It is a process of continuously fine-tuning and improving rules without human intervention through machine learning (Szathmáry, 2022). Digitalisation provides an opportunity to monitor production processes using information extracted from collected data, which can be used to make well-informed decisions on the direction of future activities (Csiszárik-Kocsir, 2021, 2022; Erős, 2019)

For companies, it has become vital to become more digital, as they need to keep up with the rapid pace of innovation if they want to stay competitive. While digital transformation brings many benefits, it also requires a significant investment in terms of costs. This raises the fundamental question of how effectively digital technologies are being adopted by the industry and how well developers are keeping pace with the development needs of the digital economy.

Digitalisation is primarily a way for businesses to increase their competitive advantage by offering additional services through virtual channels and by improving the efficiency of their business management. According to experts, digital technologies, automation and artificial intelligence could trigger a new wave of emerging businesses, a phenomenon that will be worth studying in the future (Reis et al., 2020).

Below we highlight the key indicators that characterise the digital environment conditions in our own research.

Every year the European Commission monitors the progress of the digital economy in the Member States and publishes indicators measuring the development of the digital economy and society (https://digital-strategy.ec.europa.eu/en/policies/countries-digitisation-performance)

The Digital Economy and Society Index (DESI, 2022) ranks Hungary 22nd out of 27 EU Member States (Figure 1).

In terms of human capital, the country is ranked 23rd, with a score of 38 compared to the EU average of 46 (Table 1).

Table 1. Human capital endowment, ranking, 2022

Human capital	Hungary		EU
	ranking	result	result
DESI 2022	23	34.4	45.7

Source: (DESI, 2022) Hungary

49% of people have at least basic digital skills, well below the EU average of 54%. 3.1% of graduates have completed an ICT-related study (EU average 3.9%) and the share of ICT professionals is still relatively low at 3.9%, compared to 4.5% in the EU.

Hungary performs well in broadband internet access (Table 2).

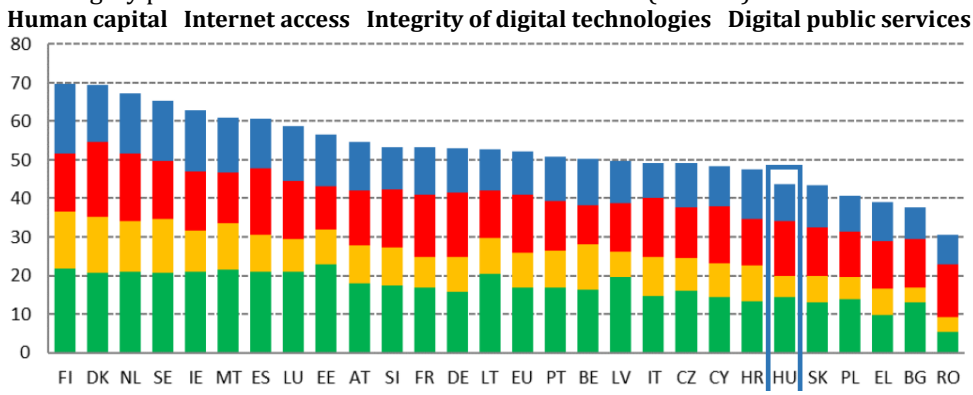

Figure 1. Digital Economy and Society Index (DESI) ranking, 2022
Source: (DESI, 2022) Hungary

Table 2. Internet access, ranking, 2022

Internet access	Hungary		EU
	ranking	result	result
DESI 2022	13	57.6	59.9

Source: (DESI, 2022) Hungary

Most Hungarian businesses are not yet exploiting the potential of digital technologies (Table 3).

Table 3. Integrity of digital technologies, ranking, 2022

Integrity of digital technologies	Hungary		EU
	ranking	result	result
DESI 2022	25	21,6	36,1

Source: (DESI, 2022) Hungary

21% of companies use enterprise resource planning software to share information electronically (EU average: 38%), and 13% use social media tools (EU average: 29%) or e-invoicing (EU average: 32%). The situation is similar for advanced technologies such as artificial intelligence, cloud services and big data. The usage of these services ranged between 3% and 21%, compared to the target of 75% for the Digital Decade in 2030.

The digitisation of public services in Hungary shows a mixed picture (Table 4). The country ranks 21st in the DESI for this dimension. The number of eGovernment users has increased significantly (from 64% in 2019 to 81% in 2021), exceeding the EU average of 65%.

Table 4. Digital public services, ranking 2022

Digital public services	Hungary		EU
	ranking	result	result
DESI 2022	21	57.4	67.3

Source: (DESI, 2022) Hungary

McKinsey & Company's Global Artificial Intelligence Report 2021 examines the widespread adoption and rapid development of AI. The report points out that AI is already having a significant impact on business processes, and the amount of investment in AI will continue to grow in the future. According to the report, the global market for AI was worth around $40 billion in 2020, and the industry expects this figure to reach $110 billion by 2026. In addition to the general application of AI, the report pays particular attention to sectors that are particularly affected by AI. The healthcare sector, for example, is one of the most promising areas for AI, and the report predicts that the application of AI in the healthcare sector could be worth more than $300 billion by 2026. Similar growth can be expected in education, entertainment, finance, manufacturing, logistics, etc.(McKinsey & Company, 2020)

1.1 Characteristics of the digitalisation trend

The strategic planning process of marketing should not only be based on what is currently typical for consumers but should also be prepared for the challenges of the future and consider the opportunities that changes and trends may bring.

Trends are processes that are noticeable in the present, but which are expected to continue and increase in the future (Horx, 2005). Trend research is the search for patterns of change that are noticeable in the present and will increase in the future, and which can be used to identify expected trends and provide a basis for strategy, product and service development. Trend research is an excellent way to identify new phenomena in consumer behaviour and to identify new consumer groups and habits (Kren et al., 2022; Törőcsik, 2017).

The theoretical basis of the present study is the trend of digitalisation, a trend that has a significant and complex impact on consumer society. In the 2000s, digitisation gained momentum in end-user and consumer markets, and then became more and more widespread, leading to the emergence of concepts such as Industry 4.0, HR 4.0, Agriculture 4.0 and many other areas and segments of industry and manufacturing where the advance of digitisation processes can be observed (Szűts, 2022).

The impact of digitalisation is complex: it is driving significant changes in banking, health, education, transport and administration. (Añón Higón et al., 2017; Karácsony, 2021; Reddy et al., 2020; Town, 2003).

Digitalisation is a generator of complex changes. The information society, the trend of digitalisation, is influencing and reshaping our everyday lives in many aspects: be it in the way we work, the way we learn, the way we shop, or even the way we interact with people (Bettis & Hitt, 1995; Haluza & Jungwirth, 2018; Kurtz & Peled, 2016; Sharma, 2019)

Digitalisation will continue to evolve in the future, with some of the areas in which digital technologies are expected to evolve further by 2030 (https ://en.unesco.org/artificial-intelligence), (https://www.unesco.org/en/digital-education/artificial-intelligence)

- Smart cities: energy management, transport, parking, water supply and many other areas can be managed more efficiently.
- Automated transport: can make transport more efficient, reduce accidents and improve the use of transport infrastructure.
- Virtual Reality and Augmented Reality applications: VR and AR technologies are expanding into other applications such as healthcare, education, entertainment, etc. VR and AR devices can further integrate into our lives and enhance the user experience.

- Smart robotics:. enable more efficient use of human labour, reduce errors and accidents and improve productivity.
- Integration of humans and technology: the boundary between humans and technology will gradually blur. Technology built into the human body can help people improve physical function, enhance brain capacity and improve performance.
- A sustainable digital economy: The digital economy is moving towards sustainability, and new technologies can help use resources more efficiently, reduce carbon emissions and improve environmental impacts. Smart cities and the widespread use of sustainable energy sources contribute to a sustainable future.
- Artificial intelligence and machine learning. AI and machine learning will enable better analysis of data, optimisation of decision-making and delivery of personalised services.
- Further development of blockchain technology applications: data protection, financial sector, supply chain management, healthcare, smart contracts, more transparent elections.

As already mentioned above, digital technologies are having a huge impact on almost all areas of business, and can be a source of major change, bringing about revolutionary trends that were previously considered science fiction. One of these emerging iconic sectors of the market is artificial intelligence (AI), which enables automation of processes, provides predictions and suggests products and services that are likely to attract the interest of target audiences.

AI offers a solution to perform high-cost tasks more cost-effectively, freeing up resources. The technology also helps to interpret data more accurately, making a major contribution to successful decisions. An example of a focus area is the launch of digital transformation to increase the economic potential of domestic agri-food businesses. The development of interaction tools and the introduction of customer-centric strategies will ensure the survival of economic operators in a highly competitive market. It is not only in the corporate sector that AI is important; in the healthcare sector, AI is used to save lives and diagnose diseases, and in education, virtual learning environments and distance learning have made programmes accessible to disadvantaged students. Public services are also becoming more accessible and accountable through blockchain-based systems, and less bureaucratic with AI. (https://www.un.org/en/un75/impact-digital-technologies) Part of the transition agenda includes the implementation of forward-thinking technologies, the Internet of Things and predictive analytics, which together will enable a shift to efficient production models and improve the asset base of the enterprise (Bezpartochnyi, 2023; Research and Markets, 2020).

The development of a corporate innovation culture must take into account both the existing organisational culture and the generational differences that make up this culture. Recognising these factors will help to create a corporate environment that synergistically fits the uniqueness of the organisation as a coherent system (Pakhnenko et al., 2021).

It is important to recognise that generational differences have a significant impact on corporate culture, working environment, working relationships and innovation processes. It is clear that different generations have different approaches to working individually and collaboratively or to generating ideas. The different generations in an organisation today cover a time span of almost 50 years (Stanleigh, 2006). Most working communities today are made up of representatives of 4 generations: the baby

boomers (1946-1964), Generation X (1965-1980), Generation Y (1980-1998) and last but not least Generation Z (Sager, 2023). A study in Romania has also shown that some social groups are more "digitally vulnerable" than others and that some countries have populations that are more afraid of digital change. In the case of Hungary, Greece, Romania and Bulgaria, people over 55 years of age, with low educational attainment or low living standards (mainly manual workers) are the most vulnerable category in the age of digitalisation (Vasilescu et al., 2020).

Digitalisation brings many benefits, but the risks should not be ignored. It is also necessary to pay attention to the risks of digitalisation that have a negative impact on the consolidation of urban dwellers, such as digital inequality, blurring of identity boundaries, multiplication of social ranks, technostress, surveillance of citizens' privacy, and the spread of manipulative communication (misinformation, dissemination of fake news, half-truths). (Babintsev et al., 2022; Cunningham, 2019).

Some important digital risks and their countertrends to mitigate risks (https ://en.unesco.org/artificial-intelligence), (https://www.unesco.org/en/digital-education/artificial-intelligence)

Data security risks: the digitization of data increases the risk of data theft, hacking and other crimes.

- Replacement risks: as digitization progresses, many jobs will be automated and eliminated. The countertrend to this is the need for digital education, digital skills and innovative solutions to enable workers to become more flexible and adapt to the changing work environment.
- Communication risks: online communication and interactions often remove the experience of human contact. The counter-trend is that people still need personal contact and social experiences, which can be facilitated by online communication and digital tools.
- Risk of digital exclusion: people who do not have equal access to digital tools and online information may be at a disadvantage compared to those in the digital age. The counter-trend to this is to work to make online services and information available to those who have limited access to the internet.
- Risk of technology dependency: people living in the online world are often over-dependent on digital devices, which can have detrimental effects on health and personal relationships. The counter-trend to this is the need for education and awareness so that people use digital tools effectively and in moderation.
- Artificial Intelligence (AI) risks: AI enables automation and the replacement of humans. As a result, AI systems may cause errors or biases due to lack of human intervention. The counter-trend to this is that the development and use of AI systems should be based on ethical principles and that humans should have a role in the monitoring and supervision of such systems.
- Digital identity risks: the rise of online identity theft and online fraud poses additional security risks. The counter-trend to this is the need for strong passwords, two-factor authentication, security software and online privacy rights to protect online identities.

- The information overload of digital media often overwhelms people, and it can be difficult to know which information is reliable. The counter-trend to this is the need for education and awareness so that people can critically evaluate information and check its reliability.

1.2 The impact of digitalisation on communication

Nor should we forget that digitalisation has essentially revolutionised many areas of communication. McKinsey and Company (2020) research shows in great detail how the lockdowns and quarantine restrictions caused by the COVID-19 pandemic have accelerated the spread of digital technologies and their long-term adoption (McKinsey & Company, 2020). It is safe to say that the pandemic has not only brought the digital transformation of the economy to the forefront but has also given a boost to digitalisation developments. At the same time, there is a gap between individuals and populations with and without access to these technologies, which has led to social exclusion. Moreover, the COVID-19 pandemic has aggravated the effects of this inequality (Hoyos Muñoz & Cardona Valencia, 2023; Jackson & Szombathelyi, 2022).

In the last few years, new forms of communication have become, and are becoming, commonplace in the lives of businesses. Home office, teleworking, Zoom, MS Teams, Webex or Skype meetings have become accepted and trendy. The importance of digital communication in the corporate world is growing, with new tools providing increasingly diverse solutions to ensure accessibility in changing work locations.

Although the use of digital communication within the company has many advantages, it is also necessary to mention the disadvantages that arise as a consequence of the "great freedom" in organisational structures and in the adaptation of workplace processes. A recent German study on the type, frequency and motivation for digital communication found that flexibility and autonomy are more important factors for German office workers than digital process support. The differences in responses in that survey also revealed a wide variation in respondents' location and motivation (Dziubek et al., 2022), which may suggest the need for deeper segmentation of research.

The target group of minors requires a specific approach in the study of the impact of digitalisation. Evidence suggests that certain technologies can severely impair communication and socialisation skills in children and adolescents, as these devices are used to avoid face-to-face contact necessary for healthy and normal development (Fodeman, 2020).

Communication habits, media use and media preferences, as well as information gathering practices, regularly reflect the effects and influences of digitalisation (Vieru et al., 2015). In Hungary, the combination of high internet penetration, which is also remarkable by European standards, and the increasing availability of IT tools means that the effects of digitalisation are reaching the most diverse segments of society.

At the same time, we are witnessing the emergence of user-generated content and user-generated marketing. This is because we are spending more and more time on the internet, in digital reality, and technological advances are giving an unprecedented boost to this form of communication based on instant feedback (Fehér, 2017).

The majority of consumers no longer make their decisions at the point and moment of purchase, but rather before the purchase, based on the information available in the online space. However, most of the information available in the online space is not driven by brand/product owners, but by consumer opinion and experience. Another factor contributing to the spread of CGM is that this content is often more credible to

shoppers and consumers, who trust the opinions of people like them more than paid advertisements and traditional advertising (Zsuzsa et al., 2019).

In terms of communication trends, it should also be seen that the expansion of virtual reality, i.e., augmented reality, has led to a number of convenient solutions that facilitate consumer choice: think of virtual fitting rooms and similar social selling solutions. These are often mechanisms to facilitate consumer choice, which will help social media platforms to gain further ground.

These technological developments are also leading to the rise of customised, personalised content. And this is something that consumers today increasingly expect and prefer, due to the rise of individualism, which can also be defined as a consumer trend.

The pandemic has undeniably had an accelerating effect on the process of digitalisation, extending it to areas where there was little or no presence before. And in the aftermath of the pandemic, the imprint of digitalisation has remained in many forms, such as hybrid solutions, which have irreversibly influenced and continue to influence our daily lives. The pandemic has clearly drawn our attention to the need for digital solutions, but also for adaptability, flexibility and the ability to react quickly. Our lives and the economic and natural processes around us have become much more unpredictable, which has led to a greater emphasis on security and sustainability. Digitalisation has and can play a significant role in supporting these two values, which will, in our view, further strengthen the digitalisation process and the importance of digitalisation in a number of areas (Bawden, 2001; Skov, 2016).

An important ingredient for the success of modern business management may be the qualities that are able to select and appropriately apply and coordinate the forward-looking digitalisation achievements that are often differentiated by segment and are necessary to effectively reach the target consumer segments. Successful targeting requires management to have a better understanding of the attitudes, experiences, opinions and suggestions of individuals categorised as segments.

Information and communication technology has undergone a significant transformation, requiring new skills and competences in the use of digital technologies, in the production, dissemination, collection and management of information. Modern technologies play an important role in improving the quality of life, be it for leisure or for work. (Eshet, 2004; Pow & Jun, 2012; Siriwatchana et al., 2018; Smolin & Lawless, 2003).

The research findings summarised in this paper aim to provide decision-makers with guidance on how to approach digital consumer segments to increase consumer acceptance of digitalisation processes and technologies.

2. Material and method

Our primary research was conducted in two phases. The first phase was a qualitative, preliminary research, the second a quantitative data collection.

The qualitative method was used as a pre-study to test and refine the research tool for quantitative data collection.

The first phase of the qualitative procedure was a consumer round of mini focus group studies. Our main objective was to understand consumers' perceptions of digitisation and their experiences of using digital and online content.

A total of twenty mini focus group interviews, each with four participants, were conducted. Subjects were selected using an arbitrary method. Each group was

homogeneous in terms of age of the consumers (Baby Boomers, Generation X, Y and Z), but heterogeneous in terms of gender, education and occupation.

A semi-structured interview guide was used as a research tool, with the main topics of communication habits and preferences, knowledge of digitalisation as a trend and its impact on everyday life, the impact of digitalisation on communication habits and human relations, and the challenges generated by digitalisation.

In the qualitative process, the results were evaluated using a traditional content analysis method.

In this paper, we aim to present the results of the quantitative research part, based on the conclusions of the qualitative phase, without going into details of the underlying research findings.

In the second phase, quantitative data collection was carried out among Hungarian consumers using an arbitrary sampling procedure. A pre-tested, standardised online questionnaire survey was used, which resulted in 3,515 evaluable questionnaires.

One of the topics covered by the questionnaire was the perception of the impact of digitalisation and its impact on communication, human relations and everyday life. In addition, the questionnaire also included - through an omnibus survey - other issues not covered in this study. For the digitalisation-related questions of the questionnaire, the conclusions of the qualitative phases were used to finalise the answer alternatives, in addition to the relevant literature.

The questionnaire typically used closed questions, with three open questions in the form of free association. Among the closed questions, both nominal (single- and multiple-choice selective, dichotomous questions) and metric level questions (Likert and semantic differential scales) were used.

Scale questions were asked on a scale of 1 to 4. One reason for this is the individual scale preference of Hungarian respondents: due to the school grading system, our Hungarian respondents are most stable in interpreting the scale up to five grades as opposed to scales 1-7, 1-9 or 1-10. The even scale was chosen because the middle value (3) for the odd (1-5) scale is an escape route for respondents and the presence and possible overrepresentation of "indifferent" consumers choosing the middle value complicates the segmentation process from both a statistical and a professional point of view. Therefore, we opted for the even scale, which, by excluding the middle value, leads the respondent to take a more stringent stance, thus contributing more to the successful conduct of segmentation (Malhotra & Simon, 2017).

Descriptive statistics, bivariate and multivariate analyses were used to process the quantitative results and test the hypotheses using SPSS 26.0 software. In the first step of segmentation by job choice preference, factor analysis was performed on the elements of the preference system, in which the final factor structure was decided on the basis of KMO value, total variance value and occupational explicability. The procedure involved Principal Component Analysis and varimax rotation.

For segmentation, we used K-means clustering procedure, which is a statistically appropriate method due to the sample size of more than 1,000 sample items.

In the present study, in addition to the results of factor and cluster analysis, Pearson's Khi-square significance values were used to establish statistical correlations for the characterization of segments, where for nominal measurement levels, Pearson's Khi-square significance values were used, while absolute values of Adjusted Standardized Residuals (Adj.R) were used to establish and analyse internal correlations.

To examine the correlation between the nominal and metric scale scores, the analysis of variance method was used, including the one-way ANOVA method for comparing multiple sample means. The mean of a metric dependent variable was

compared between more than two groups. The post-hoc test was used to determine which pairs of groups were significantly different. In doing so, significance values were used to determine the existence of correlations (sig<= 0.05). Internal correlations were analysed along the comparison of group means using the F-statistic, i.e., the coefficient of variance of the means within samples (Sajtos & Mitev, 2007).

In this study, we focus on the results of the quantitative phase in order to test the following research hypotheses:

H1: The perception of digitalization can be used as a segmentation criterion

H2: Segments according to the perception of digitalisation carry generation-specific elements.

To formulate the hypotheses, we have drawn on studies and research focusing on the impact of digitalisation on individuals, as well as studies that emphasise the crucial role of generational differences in attitudes towards digitalisation (Dobos et al., 2022; Machová et al., 2020; Ritter & Pedersen, 2020; Tick, 2023).

According to the main socio-demographic characteristics of the sample, 60% of the respondents were female and 40% were male. In terms of age, 16-20 year olds were the largest proportion of respondents (31.1%), followed by young people aged 21-25 (24.5%). This means that more than half of the sample (55.5%) were respondents younger than 25 years old, i.e., Generation Z. Unsurprisingly, given the age, 42% of respondents were single and 54% were married or in a civil partnership. 42% of the respondents live in the capital, 38% live in a city and only 20% live in a village. In terms of educational attainment, those with secondary education were absolutely over-represented (70%).

3. Findings

When analysing the general perception of digitalisation, respondents mostly agreed (on average) that digitalisation is useful and makes their lives easier. Being digitally literate is seen by respondents as a distinctive advantage in the world of work, but also as a factor that exacerbates generational differences (Table 5).

Table 5. Perception of digitalisation in the sample

Digital communication habits (average)		
Statements about digital communication	Mean	Std. Deviation
Digitalisation is useful because it makes our lives easier	3.24	0.850
Digital content is more interesting and fun for me than traditional communication	2.41	0.940
When I start working, I would like to work in a place where I can do my work from home	2.95	0.977
I would be happy if digital content and communication were to disappear because it harms human relationships	2.25	0.961
I would give more space to digital learning materials in education, because they are easier to learn	2.73	0.939

Digital communication habits (average)		
Statements about digital communication	Mean	Std. Deviation
I enjoy online education	2.53	1.036
Digital content makes people dumb	2.36	0.930
People who are comfortable in the digital space are more likely to find a well-paid job	3.03	0.857
Older people are less comfortable with digital tools	3.11	0.891
Older people are less likely to consume digital content	2.83	0.914
I am often more confident online than in real life	2.40	0.982
I can more easily achieve my dreams in the online space	2.20	0.974

Source: authors' own research, N=3515; mean, where 1= strongly disagree, 4 = strongly agree

In order to provide a more nuanced analysis of perceptions of digitisation, the possibility of using perceptions of digitisation as a segmentation criterion was explored for the first time. As a first step in the segmentation process, a factor analysis was conducted on the list of digitalisation-related statements, which showed which factors are linked in consumers' perceptions of digital content, digitalisation and the online world.

The three-factor test resulted in the most professionally and statistically explainable solution (Table 6).

The "Acceptance" factor included statements that emphasise the benefits of online content and the online world. This is the group of statements that emphasise the online content in education and in the workplace and the more entertaining nature of the online world.

The "Differentiating effect" factor highlights the differences caused by digitalisation, such as generational differences in the consumption of digital content, or the differentiating role of digital literacy in exploiting a better job opportunity.

The "Scepticism factor" emphasises the negative effects of digitalisation, such as the alienation of human relationships, the reduction of communication interactions or the negative impact of the digital world on classical human values.

Table 6. Factors based on the perception on digitalization

	Factors based on the perception on digitalisation		
Perceptions on digitalisation	Factor of Acceptance	Factor of Differentiating Effect	Factor of Scepticism
I enjoy online education	0.736	0.038	-0.032
I would give more space to digital learning materials in education because they are easier to learn	0.691	0.228	-0.106

Perceptions on digitalisation	Factors based on the perception on digitalisation		
	Factor of Acceptance	Factor of Differentiating Effect	Factor of Scepticism
The online space makes it easier to achieve my dreams	0.677	-0.067	0.438
Digital content is more interesting and fun for me than traditional communication	0.671	0.042	0.182
I am often more confident online than in real life	0.638	0.046	0.253
When I start working, I would like to work in a place where I can work from home	0.620	0.206	-0.138
Older people are less comfortable with digital tools	-0.006	0.841	0.107
Older people are less likely to consume digital content	0.003	0.716	0.327
Digitalisation is useful because it makes our lives easier	0.192	0.548	-0.325
People who are comfortable in the digital space are more likely to find a well-paid job	0.198	0.546	-0.104
I would be happy if digital content and communication were to disappear because it harms human relationships	0.133	0.000	0.775
Digital content makes people dumb	-0.005	0.135	0.711

Source: authors' own research, 2022 N=3515 Extraction method: principal component analysis. Rotation method: Varimax with Kaiser normalisation. KMO=0.783, total variance=56.3% Rotation converged with 9 iterations, communalities: 29.8%-56.3%

Subsequently, a K-means clustering procedure was implemented for the factor groups by interpreting the distance of the cluster centroids from the factor scores (Table 7). As a result, three significantly (sig=0.000) distinct target groups could be identified (H1 confirmed).

Table 7. Clusters of consumers based on their perception of digitalization

Factors based on perception of digitalisation	Clusters of consumers based on their perception of digitalisation		
	Consumer sceptical of digitalisation N=992	Consumer accepting and feeling the differentiating effects of digitalisation N=1250	Consumer believing in the positive effects of digitalisation N=1273
Factor of acceptance	-0.32091	0.16356	0.08947
Factor of differentiating effect	-1.16822	0.40276	0.51487
Factor of scepticism	0.04367	0.91169	-0.92925

Source: authors' own research, 2022 N=3515, K-means clustering procedure

The "digital sceptical consumers" are one of the segments that feel the negative effects of digitalisation are most relevant. They are consumers who believe that digitalisation is dumbing people down and negatively affecting their relationships with people and would prefer to see digital content and communication options disappear.

Consumers who are "accepting and feeling the differentiating effects of digitalisation" say that digital content is more fun, they themselves like to live, work and learn in the digital space. At the same time, they also see digitalisation as dividing people: those who are comfortable in the digital space have an easier and more comfortable life and are more likely to get better paying jobs.

"Consumers believing in the positive effects of digitalisation" are those who are truly engaged and at home in the digital space, in everyday life, at work and in education. For them, this world represents security, comfort and a pathway to personal development and fulfilment.

Each cluster was also characterised in socio-demographic terms. In terms of gender, there was no significant relationship between cluster membership and consumer gender (sig=0.214).

However, a significant relationship was found between cluster membership and generational characteristics (Pearson's Chi-square sig = 0.000; H2 confirmed).

Characterising the internal correlations (based on Adj.R values), it can be said that in the segment "Consumers sceptical about digitalisation", members of the older, Baby Boomer generation are represented in a higher proportion than expected, while in this segment, members of the youngest, Generation Z, are represented in a lower proportion than expected (Table 8).

The reverse is the case for "Consumers who believe in the impact of digitalisation in amplifying differences", with a higher proportion of Generation Z and a lower proportion of older Baby Boomers than expected.

Table 8. Age-specific characteristics of the segments based on perceptions of digitalization

		Generations				
		Generation BB	Generation X	Generation Y	Generation Z	Total
Consumers sceptical of digitalisation	Count	59	196	213	524	992
	% within Cluster Number of Case	5.9%	19.8%	21.5%	52.8%	100.0 %
	Adjusted Residual	2.8	1.5	1.1	-3.3	
Consumers accepting and believing in the differentiating effects of digitalisation	Count	37	206	233	774	1250
	% within Cluster Number of Case	3.0%	16.5%	18.6%	61.9%	100.0 %
	Adjusted Residual	-3.1	-1.9	-1.8	4.2	
Consumers believing in the positive effects of digitalisation	Count	58	237	267	711	1273
	% within Cluster Number of Case	4.6%	18.6%	21.0%	55.9%	100.0 %
	Adjusted Residual	0.4	0.5	0.8	-1.2	

Source: authors' own research, N= 3515, 2022, Pearson's Chi-square sig=0,000

4. Conclusion

The theoretical background of this study is the trend of digitalisation, a trend that has a significant and pervasive impact on consumer society. The trend of digitalisation has been analysed in our study, referring to its complex, macro- and micro-level effects on a theoretical level. Digitalisation presents a number of benefits but also challenges

at both individual and corporate level; two dimensions that are interrelated and have an impact on each other.

The focus of our research has been to analyse the impact of digitalisation on individuals, focusing on the use of general perceptions of digitalisation as a segmentation criterion in the consumer market.

As part of our primary research, we used a pre-tested, standardised online survey with an arbitrary sampling procedure, which resulted in 3,515 evaluable questionnaires.

In order to provide a more nuanced analysis of the perception of digitisation, the possibility of using opinions on digitisation as a segmentation criterion was investigated. As a result, we were able to characterise three significantly distinguishable target groups using a K-means clustering procedure.

The group of "consumers sceptical about digitalisation", who perceive the negative effects of digitalisation as most relevant.

The segment of "Accepting consumers who feel the differentiating effects of digitalisation", who like living, working and learning in the digital space, but who also see digitalisation as dividing people.

The 'positive digital consumer', who is comfortable in the digital space, for whom it is a world of security, convenience and a pathway to personal development and fulfilment.

Each segment was also characterised in socio-demographic terms. Among "Consumers sceptical of digitalisation", the older generation is represented, while among "Consumers accepting and believing in the differential effects of digitalisation", the younger Generation Z is more represented.

We believe that in order to validate the positive effects of digitalisation, it is necessary to know where consumers are in the process of digitalisation awareness education.

We believe that characterising the individual segments can help to differentiate this education process according to the awareness and attitudes of each consumer. This will help us, once the segments have been created, to develop more personalised, persona-based messages and to identify key points for the design of digital awareness campaigns.

A limitation of the research is that, despite the large sample size, the results cannot be considered representative. Based on the conclusions of the research, we believe that it is worthwhile to further refine the analysis of digital awareness by including additional dimensions and phases (affective and conative).

In the continuation of the research, we intend to analyse consumer perceptions of digitalisation from the perspective of consumer awareness, thus gaining a more nuanced picture of digitalisation awareness, which we believe can contribute greatly to the positive development of digitalisation-related opinions and knowledge in the future.

Author Contributions: Conceptualization, M.G.F.,K.J and L.V; methodology M.G.F., K.J.; software, L.V and M.G.F.; validation, K.J.,M.G.F and L.V.; formal analysis, M.G.F. and K.J.; investigation, L.V., M.G.F. and K.J.; writing—original draft preparation, G.F.M and J.K.; writing—review and editing, M.G.F. and L.V.; visualization, L. V.; supervision, M.G.F. ; project administration, M.G.F. and L.V; funding acquisition, M.G.F. All authors have read and agreed to the published version of the manuscript.

Funding*:* This research received no external funding.

Data Availability Statement*:* The related resources are addressed in the references.

Conflicts of Interest*:* The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Añón Higón, D., Gholami, R., & Shirazi, F. (2017). ICT and environmental sustainability: A global perspective. *Telematics and Informatics*, *34*(4), 85–95. https://doi.org/10.1016/j.tele.2017.01.001

Babintsev, V., Khripkov, K., Khripkova, D., Gaidukova, G., & Shapoval, Z. (2022). Negative consequences of risks of digitalisation for consolidation of urban communities. E3S Web of Conferences, 363, 04064. https://doi.org/10.1051/e3sconf/202236304064

Bawden, D. (2001). Information and digital literacies: a review of concepts. Journal of Documentation, 57(2), 218–259.

Bettis, R. A., & Hitt, M. A. (1995). The new competitive landscape. Strategic Management Journal, 16(1), 7–19.

CISCO (2020). *Cisco Annual Internet Report (2018–2023) White Paper*. Https://Www.Cisco.Com/c/En/Us/Solutions/Collateral/Executive-Perspectives/Annual-Internet-Report/White-Paper-C11-741490.Html.

Csiszárik-Kocsir, Á. (2021). Customer Preferences in Bank Selection before and after the Pandemic in the Light of Financial Culture and Awareness. Acta Polytechnica Hungarica, 18(11), 151–169.

Csiszárik-Kocsir, Á. (2022). The Present and Future of Banking and New Financial Players in the Digital Space of the 21st Century. Acta Polytechnica Hungarica, 19(8), 143–160.

Cunningham, M. (2019). Economic inequality: Differences in developed and developing nations. Population and the environment. Environmental Science, 101, 43-57.

DESI (2022). *Digital Economy and Society Development Index* . Https://Digital-Strategy.Ec.Europa.Eu/En/Policies/Countries-Digitisation-Performance .

Dobos, O., Tóth, I. M., Csiszárik-Kocsir, Á., Garai-Fodor, M., & Kremmer, L. (2022). How Generation Z managers think about the agility in a world of digitalization. EEE 20th Jubilee World Symposium on Applied Machine Intelligence and Informatics, 207–212.

Fodeman, D. (2020). The Impact of Technology on Socialization and Communication Skills. Https://Brookwood.Edu/the-Impact-of-Technology-on-Socialization-and-Communication-Skills/.

Erős A. (2019). Mi is az a digitalizáció. Https://Www.Nak.Hu/Tajekoztatasi-Szolgaltatas/Fiatal-Gazdalkodo/99798-Mi-Is-Az-a-Digitalizacio.

Eshet, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. Journal of educational multimedia and hypermedia, 13(1), 93-106.

Fehér, K. (2017). Digitalizáció és új média. Trendek. Starégiák. Illusztrációk. Akadémiai Kiadó.

Haluza, D., & Jungwirth, D. (2018). ICT and the future of healthcare: Aspects of pervasive health monitoring. Informatics for Health and Social Care, 43(1), 1–11. https://doi.org/10.1080/17538157.2016.1255215

Kren, H., Sellei, B., & Molnar, G. (2022). Leader of Digital Cooperation?-Scientific Mapping Engaging Leadership. Acta Polytechnica Hungarica, 19(11), 207-227.

Horx, M. (2005). Der Selfness Trend: was kommt nach Wellness. Zukunftsinstitut .

Hoyos Muñoz, J. A., & Cardona Valencia, D. (2023). Trends and challenges of digital divide and digital inclusion: A bibliometric analysis. Journal of Information Science, 016555152211483. https://doi.org/10.1177/01655515221148366

Sager, J. (2023). What Generation Am I? Find Your Generation's Name & Years. Https://Parade.Com/1113130/Jessicasager/Generation-Names-and-Years/.

Karácsony, P. (2021). Impact of teleworking on job satisfaction among Slovakian employees in the era of COVID-19. *Problems and Perspectives in Management*, *19*(3), 1–9. https://doi.org/10.21511/ppm.19(3).2021.01

Jackson, K. M., & Szombathelyi, M. K. (2022). Holistic Online Learning, in a Post COVID-19 World. Acta Polytechnica Hungarica, 19(11). 125–144

Kurtz, G., & Peled, Y. (2016). Digital Learning Literacies – A Validation Study. 910. https://doi.org/10.28945/3480

Machová, R., Zsigmond, T., Lazányi, K., & Krepszová, V. (2020). Generations and Emotional Intelligence A Pilot Study. Acta Polytechnica Hungarica, 17(5), 229–247. https://doi.org/10.12700/APH.17.5.2020.5.12

Bezpartochnyi, M. (2023). Modern trends in digital transformation of marketing & management. Vysoká škola bezpečnostného manažérstva v Košiciach

Malhotra, N. K., & Simon J. (2017). Marketing research. Akadémiai Kiadó.

McKinsey & Company (2020). Covid-19 digital transformation & technology. Https://Www.Mckinsey.Com/Capabilities/Strategy-and-Corporate-Finance/Our-Insights/How-Covid-19-Has-Pushed-Companies-over-the-Technology-Tipping-Point-and-Transformed-Business-Forever

Stanleigh, M. (2006). The Impact of Generational Differences on Innovation. Https://Bia.ca/the-Impact-of-Generational-Differences-on-Innovation/#:~:Text=Generational%20differences%20affect%20our%20culture%2C%20our%20work%20environment%2C,Collaboratively%2C%20how%20they%20generate%20ideas%20and%20so%20on.

Dziubek, S., Fuchs, O., & Schwarz, S. (2022). Effects of Workplace Digitalisation on the Motivation of German Office Employees. International Journal of Business and Management, 6(6), 39-48.

Pakhnenko, O., Rubanov, P., Hacar, D., Yatsenko, V., & Vida, I. (2021). Digitalization of financial services in European countries: Evaluation and comparative analysis. Journal of International Studies, 14(2), 267–282. https://doi.org/10.14254/2071-8330.2021/14-2/17

Pow, J., & Jun, F. U. (2012). Developing digital literacy through collaborative inquiry learning in the web 2.0 environment–An exploration of implementing strategy. Journal of Information Technology Education: Research, 11(1), 287-299. https://doi.org/10.28945/1737

Reddy, P., Sharma, B., & Chaudhary, K. (2020). Digital Literacy. International Journal of Technoethics, *11*(2), 65–94. https://doi.org/10.4018/IJT.20200701.oa1

Reis, J., Amorim, M., Melão, N., Cohen, Y., & Rodrigues, M. (2020). Digitalization: A Literature Review and Research Agenda (pp. 443–456). https://doi.org/10.1007/978-3-030-43616-2_47

Research and Markets (2020). The World's Digital Transformation Industry 2020-2025: Trends, Opportunities and Competitive Landscape. Https://Www.Globenewswire.Com/News-Release/2020/08/14/2078517/0/En/The-World-s-Digital-Transformation-Industry-2020-2025-Trends-Opportunities-and-Competitive-Landscape.Html.

Ritter, T., & Pedersen, C. L. (2020). Digitization capability and the digitalization of business models in business-to-business firms: Past, present, and future. Industrial Marketing Management, 86, 180–190. https://doi.org/10.1016/j.indmarman.2019.11.019

Sajtos, L., & Mitev, A. (2007). SPSS kutatási és adatelemzési kézikönyv. Alinea Kiadó.

Zsuzsa, S., Anetta, A. M., & Rebeka-Anna, P.O.P. (2019). A marketingkompetenciák evolúciója a digitalizáció korában. In Forum on Economics & Business/Közgazdász Fórum, 22(138), 3–21.

Sharma, V. K. (2019). Importance of having computer skills in today's world. Http://Www.Klientsolutech.Com/Importance-of-Having-Computer-Skills-in-Todays-World/.

Siriwatchana K., Jaitip N.S, & Prachyanun N. (2018). How to Enhance Digital Literacy Skills among Information Sciences Students. . International Journal of Information and Education Technology, 8(4).

Skov, A. (2016). What is Digital Competence? Https://Digital-Competence.Eu/Front/What-Is-Digital-Competence.

Smolin, L. I., & Lawless, K. A. (2003). Becoming literate in the technological age: New responsibilities and tools for teachers. The Reading Teacher, 56(6), 570-577.

Szathmáry A. (2022). *Az IT működést is elérte az automatizáció*. https://www.jovogyara.hu/az-it-mukodest-is-elerte-az-automatizacio.html.

Szűts, Z. (2022). A digitalizáció és különösen a social media a tanulási, tanítási, illetve a munka világában zajló folyamatokra gyakorolt hatása. Opus et educatio: Munka és nevelés, 9(1), 82-91.

Tick, A. (2023). Industry 4.0 Narratives through the Eyes of SMEs in V4 Countries, Serbia and Bulgaria. Acta Polytechnica Hungarica, 20(2), 84–104.

Törőcsik, M. (2017). Self-marketing. Akadémia Kiadó .

Town, S. (2003). Information Literacy: definition, measurement, impact. In Information and IT literacy:enabling learning in the 21st Century (pp. 53–65). Academic Press.

Vasilescu, M. D., Serban, A. C., Dimian, G. C., Aceleanu, M. I., & Picatoste, X. (2020). Digital divide, skills and perceptions on digitalisation in the European Union—Towards a smart labour market. *PLOS ONE*, *15*(4), e0232032. https://doi.org/10.1371/journal.pone.0232032

Vieru, D., Bourdeau, S., Bernier, A., & Yapo, S. (2015). Digital Competence: A Multi-dimensional Conceptualization and a Typology in an SME Context. 2015 48th Hawaii International Conference on System Sciences, 4681–4690. https://doi.org/10.1109/HICSS.2015.557

© 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).