YOUTH CLUSTERS IN THE FIELD OF DIGITALIZATION

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Abstract This paper focuses on the new values of the digital age which impact the decisions of customers and influence attitudes towards technology and products. The research aimed to identify some typical groups among millennials. The research was carried out in Hungary and in Poland. We generalized the results based on their attitudes, feelings and behavior. According to the responses of more than 2000 young people this study presents the different clusters of the Y generation in their purchasing behavior and preferred digital values. We categorized them based on their opinions and profiled them using other demographic features. Environmental protection, health and safety were proven values and therefore important; digital solutions or the new products of industry 4.0 are examined in more in detail. With these clusters the economic role-players can gain insight into the differences between each consumer group and how to fulfil their needs regarding sustainable services and goods.

Keywords:
Y generation, digital values, sustainable services, Industry 4.0, smart products

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1 Introduction

In the era of a changing environment, e-commerce, digitization and automation in line with Industry 4.0, it is important to learn about the expectations and approaches of the young generation. The new industry paradigm focuses on changing existing business models, company strategies, supply and value chains, business organizations, products and required skills. There is talk about the expected competences of managers and about combining technical knowledge with soft skills (Culot, et. al., 2020; Buchi, et. al., 2020; Santos, et. al., 2021). However, it is worth knowing the opinion of the young generation on available technologies and their approach to current solutions.

In recent years, great interest has been shown in achieving the Sustainable Development Goals and all the efforts made by NGOs, businesses and governments to reach these aims. The challenge is to create a comprehensive system in which all countries work together towards a sustainable world, which will allow economic development and solve social problems (Du Vall, 2019). The idea of Society 5.0 first emerged in Japan. This concept of a modern, future-oriented and human-centered society assumes, using the latest technologies, the integration of cyberspace and the real world. The idea of Society 5.0 is to help achieve the 17 Sustainable Development Goals (CAO, 2016). The purpose of the article is to verify the approach of young people to current technologies. It is acknowledged that people born before 1980 are classified as generation X, people born between 1980 and 1990 are classified as generation Y, while people born after 1990 are generation Z. The Pew Research Center report states that the Millennial generation (Y, Z) has a positive attitude towards all technological devices, while generation X does not (Ersöz and Askeroğlu, 2020). We can analyze in several areas whether we are looking at the digitization of political elections (Nemeslaki et. al., 2016), job searches (Bührer, 2017), or even booking leisure programs (Ehm et. al., 2022). Based on the results, the use of digital solutions has increased among young people - i.e., more and more people use them. Therefore, in this study the viewpoint of companies was our starting point in determining whether the development of sustainable digitalization can create value for the youth.

Our chosen research countries, Poland and Hungary, are European countries with many similarities. They both became parliamentary democratic states after 1989 (Sroka, 1995). Both countries are members of NATO and the European Union, and also members of the Visegrad Group. Political events in Hungary are often preceded by similar events in Poland. Likewise, they are both considering the introduction of the Euro currency, but still stick with their own (Kovács, 2005). The research was therefore conducted on a group of people who theoretically come from similar Central European countries. Based on this, it is confirmed that digital solutions represent value. We determined these digital values from the elements of Industry 4.0, which are supported by the use of smart devices and technology. In our research, we also asked about classic values as a reference, such as environmental protection, safety and reliability, which were proven to be valued almost regardless of age group.

2 Theoretical Background - The values of Industry 4.0

First of all, Industry 4.0 (I4.0) and electronic commerce should be defined as these two terms have the most direct relationship if we are analyzing the acceptance of the values of digitalization. I4.0 is the source of radical change, covering a wide range of innovative technologies, and all sectors and the value-creating activities that create value for young consumers are an intrinsic element of this.

The term Industry 4.0 first appeared in 2011 at the Hannover Messe fair (Geissbauer, et. al., 2016). It refers to cyber-physical systems, smart industry, Internet of Things (IoT), Big Data and hyper connectivity. Electronic commerce means managing the processes of buying, marketing, selling, distributing products and services over the Internet, and seeking to complete all transactions by digital means (Hitpass and Astudillo, 2019). Adopting technological trends influences the development of e-commerce at a significant pace (Baskaran & Rajavelu, 2020).

Industry 4.0 (Figure 1), often referred to as the "fourth industrial revolution" (Zhong, et. al., 2017), is an extremely complicated process and requires knowledge and determination to implement it (Woźniak, et. al., 2018). The fourth industrial revolution offers a great opportunity to build a competitive advantage for the entire European Union and its individual countries. The leading country in this respect is Germany (Stadnicka, et. al., 2017). The introduction of Industry 4.0 is supported at

a governmental level (Boyes, et. al., 2018) along with the recommendations given (Kagermann, 2015).

Additionally, it is believed that it is possible to talk about the next revolution, which is Industry 5.0. This focuses on using the creativity of human experts in cooperation with intelligent, efficient and accurate machines to achieve cost-effective production solutions compared to Industry 4.0 (Maddikunta, et. al., 2021). In addition to automation and digitization, Industry 5.0 focuses more on humans (Saniuk & Grabowska, 2022). This highlights one of the main aims of this paper, namely the need to draw attention to the attitudes of young people towards current solutions.

In Figure 1 we summarize our own views on traditional and digital values.

Traditional (classic) values	Digital values
• after sales services • the information about products available on the Internet • brand reliability • high quality assurance • environmental protection • quality standards • exemption from animal testing • use of recycled materials • own mobile application	• application of intelligent systems • the company communicates as an interactive system • the manufacturing company operates as a smart factory • automated warranty processes • application of modern technologies during production • innovative, developing company • only robots work in the company

Figure 1: Comparison of the traditional and digital values
Source: Authors' compilation.

Based on the above theoretical foundations, in the next chapter we summarize the results of our empirical work.

3 Empirical Research

The aim of our research was related to the above-mentioned values. Regarding the theoretical background we can deduce that we have both traditional and digital values. It was our aim to find ways to define the major groups, distinguish them and

profile them. Accordingly, the objective was to segment the Polish and Hungarian respondents based on our scale and explore the relations between segments, examining the effect of nationality and gender. The following research hypotheses were set:

- Respondents can be segmented based on their opinion relating to digital values, robotics and environmental issues
- There are differences between segments based on nationality
- There are differences between segments based on gender

3.1 Methodology

According to the literature review it is our assumption that people can be classified into homogeneous groups based on their opinion. We believe that there are statistically significant differences between groups based on gender and nationality. Thus, we tested the following theoretical hypotheses derived from our research questions:

H1: Respondents can be distinguished and grouped based on their digital related (and so on) opinion.
H2: There is a relationship between cluster membership and nationality.
H3: The gender and the cluster membership can be associated with each other.

To check the differences, we conducted a cluster analysis mentioned below, and to prove the distances between subsamples we used ANOVA. In every single case we found statistically significant differences.

3.2 Measurement and specification of scales and sampling

In our primary research we developed our own scale related to the previously mentioned values of digitalization. After some modification (one item was excluded in order to increase the Cronbach alpha value) we had 12 items, measured on a four pointed Likert scale, where 1 is totally disagree and 4 totally agree. Gender and nationality was measured on a nominal, non-metric scale.

We did a multi cross sectional research design. The empirical research was conducted in October 2019. We used the self-reported online questionnaire with convenient sampling method. All in all, we had 2966 respondents, and the ratios regarding the main variables were: 61.3% female and 38.3 male, 71.2% Hungarian and 28.8% Polish respondents. Our sample was not representative, but in this phase our aim was to explore the main phenomenon and gain some insight into this field. All of our recommendations and findings are true only in this sample, and we have discovered our limitations related to the response bias as well.

4 Results of the Cluster Analysis

As previously stated our aim was to segment our respondents based on their opinions. The advantage of this is that using or just knowing these groupings means we can handle them with different strategies. Our scale items are: (1) I look for the latest technology when buying new products. (2) I look for communication technology when buying new products. (3) When buying a car, I find it important for it to be equipped with different sensors (e.g., a parking radar system) because it increases my personal safety and I would pay more for it. (4) I am willing to pay more for antivirus software if it provides better protection than a free one. (5) I would support more robots being used in health care (for example, robots who help make appointments, arrange affairs or even perform surgery). (6) I would rather buy a product made by machines or robots rather than a human workforce. (7) I find e-books readers more practical so I use them instead of the traditional printed versions. (8) Self-driving vehicles and smart cars use technology to make driving easier and more convenient. For me this is a value that is worth paying more money for. (9) If I would use public transport with a card system that I could also use for other devices and services (e.g., public transport + bike sharing services) I would rather choose public transport. (10) I am willing to pay more for a product or a service if I am sure that the company makes an effort to be environmentally conscious. (11) I would rather buy a product if its packaging is environmentally friendly. (12) Electric and hybrid cars produce less harmful emissions. If I could choose, I would buy one of these due to environmental considerations.

To check the reliability of our multi-item scale we conducted the related analysis. The Cronbach alpha value was 0.637, which is acceptable. We conducted a factor analysis in order to define the main dimensions. (KMO: 0.682, Bartlett's test of

Spericity's sig: 0.000; extraction method: principal component analysis; rotation method Varimax with Kaiser). So our factors were: **novelty**, where we can find the variables number 1 to 4, **robotics and digitalization** (variable No. 5-9) and finally **environmental awareness** with the rest of the variables. However, no emphasis will be placed on this in the article, only on the cluster itself.

We use the factors to understand and profile the clusters, but additionally we checked the mean values of the original variables as well. Figure 2 shows the average values of our variables.

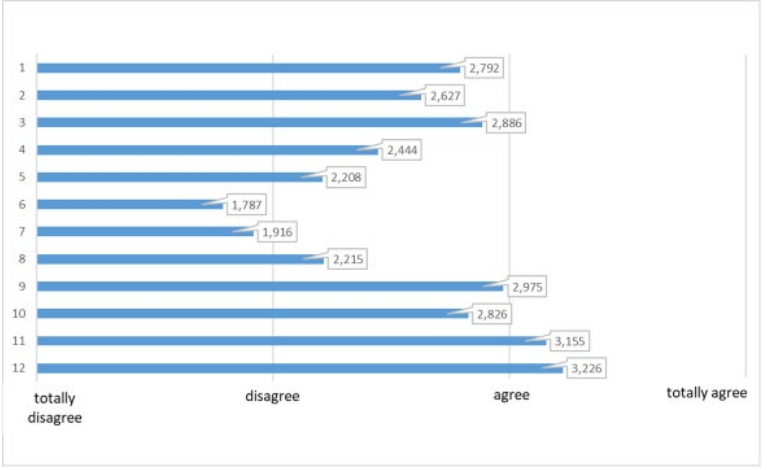

Figure 2: Average values of the variables
Source: Authors' compilation.

The highest agreement among the respondents seems to be regarding environmental awareness, then next regarding innovative technological solutions and the novelty of these concepts, whereas they express some doubts about robotics and digitalization. There is an exception in this last group where we focused on the considerations of the convenience of using the improved technology (Variable No. 9) as well as an agreement.

However, it is more interesting to examine in more depth and try to focus on the differences. So we conducted a cluster analysis (hierarchical, agglomerative cluster method, Ward linkage, with Squared Euclidien Distance used); and attempted to

profile them based on the mean values. We distinguished four different clusters, see Figure 3. To check the differences, we conducted ANOVA to analyze them. All of them are statistically significant.

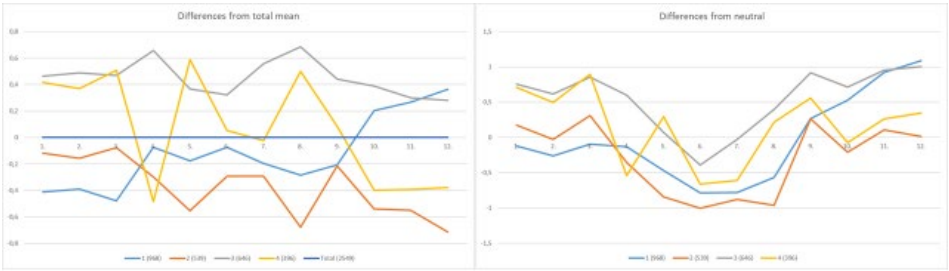

Figure 3: Differences from mean and neutral values
Source: Authors' compilation.

The first segment is the larger one, it contains more than one-third of the sample (37.98%, 968 people). Compared to the mean in respect of novelty, robotics and digitalization we have lower values but in relation to environmental awareness they are higher. Compared to the neutral status the product's novelty is less neutral; they disagreed with digitalization in its entirety, but their behavior related to environmental consciousness is supportive. We have named this group **Flower-Power**. Mostly Hungarians and female respondents can be found in this segment. We have statistically significant values in relation to nationality and gender associated with the cluster membership in every below mentioned case. The chi2 values are 48.343, sig.: 0.000 and 44.628, sig.: 0.000 and the contingency coefficients are accordingly 0.136 and 0.131, which is somewhat weak, but significant.

21.15% (539 people) of the sample belong to the second cluster. Compared to the mean they have lower values, and the biggest difference can be found in the case of car-related variables. Being environmental consciousness is less important for them; they have neutral opinions in almost in all cases. We call them the **Neutrals**. Mostly Hungarian male respondents can be found here.

More than quarter of the sample can be found in the third cluster. It is exactly 25.34%, 646 people. They are the opposites of the previous ones. Their values exceed the average; only in the case of human workforce vs. robots related variable

did they state a statistically neutral opinion. Everything which is digital or makes our life more comfortable is highly welcomed. We call them the **Digital Omnivores**. We can find mostly Polish and male respondents in this group.

The last and fourth group consists of 15.54% (396 people) of the sample. For them environmental awareness and security is less important, but regarding the digital offered comfort they have emergent values compared to the other groups. Accordingly, they are called the **Leisure-loving Digitals**. Again we can find Polish and male predominance here.

5 Discussion and Conclusions

Based on the results of our empirical research all of our previously mentioned hypotheses can be rejected, so

- we can distinguish consumer groups based on their opinion and attitude concerning the digital values,
- there are statistically significant differences between the clusters based on nationality,
- and gender.

According to the results we can handle the different groups in the correct way. As we can see we can find similarities and dissimilarities among the respondents related to digitalization. We have to recognize that not everyone is open-minded; indeed some are critical, and have crucial opinions about development.

Although our focus was on the young generations, surprisingly, we encountered young people who have almost the same values or attitudes as the older generations. Therefore, we can conclude that there are some traditional values that are deep-rooted and perpetual. Based on our empirical research the Polish youth are more open minded towards digital values, while the Hungarians still prefer the traditional ones. Although the two countries are similar, Generation Y in Poland is more focused on digitization and a conscious approach for the sake of the environment.

All in all, we distinguished those customer groups who can be targeted in a more specific way due to the information we revealed. To use a better segmentation strategy, we need to use a strong data-based system Specifically we profiled those groups where these digital values (as the result of digitalization in the field of Industry 4.0) are crucial. Thus, based on this, companies should consider using this insight in their product- or process development.

In our research we were faced with several problems and limitations. Although it was a multi-cross sectional study, we placed less emphasis on the Polish part. In addition, systematic response error can be mentioned as another limitation, due to the collection of data using a self-descriptive questionnaire. It is our assumption that, due to the pandemic, people nowadays possess more developed digital skills; therefore, attitudes must also have changed. On the other hand, our research is rather pioneering in its nature as no other studies as yet focus on digital and traditional values in quite this way.

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