Social Impacts of Digitalisation Through the Lens of Hungarian Experts

Nóra Obermayer, Tivadar Máhr and Zsuzsanna Banász
University of Pannonia, Faculty of Business and Economics, Veszprém, Hungary

obermayer.nora@gtk.uni-pannon.hu
mahr.tivadar@gtk.uni-pannon.hu
banasz.zsuzsanna@gtk.uni-pannon.hu

Abstract: Nowadays, we live in the fourth industrial revolution (the so-called digital revolution), which is fundamentally reshaping industry and business as well as the economy and civil society. Within the research activities of the National Laboratory for Social Innovation project, a research plan has been drawn up taking into account the quadruple helix model. The aim of this research is to map the social impacts of digitalisation based on the perspective of Hungarian experts. The research aims to map the social impact of digitalisation, whether the perception of the impact of digitalisation on society depends on the individual perceptions of the experts involved in the research (age, education) or organisational (sector of the organisation represented). The research seeks to answer the following research questions: Q1. How can the social impact of digitalisation be described? Q2. Do individual (age, education) or organisational (sector of the organisation represented) characteristics influence the experts' opinion? Q3. Are there any significant relationships between experts' responses to questions on the social impact of digitalisation and, if so, how strong are they? The data analysed are the results of a qualitative and quantitative, empirical survey carried out in 2021 with experts from academia, government, business and civil society. The former was conducted in the form of focus group interviews with invited experts (n=9) and the latter, in the form of an online questionnaire survey (n=78) using descriptive statistics and relationship analysis methods (Cramer's V and Kendall's Tau). The results show that the majority of experts consider the social impact of digitalisation to be rather positive, highlighting for example more efficient problem solving. It can be shown that the development of digitalisation requires a well thought-out but not over-regulated framework. As the transfer of knowledge improves, the opportunities for those who use digital technologies increase, but so does awareness of its harmful effects. The results can guide digital policy makers in identifying key areas for intervention.

Keywords: Digitalisation, Society, Experts, Focus Group, Questionnaire

1. Introduction

Throughout history, innovation has mostly taken the form of major industrial revolutions (Kagermann et al., 2013), aiming to both facilitate everyday life and increase the efficiency of production systems through new technologies (Horvath & Szabo, 2019). In the first three industrial revolutions, productivity growth was realised, driven by mechanisation, electricity and information technology (Kagermann et al, 2013). Nowadays, the fourth industrial revolution (also known as Industry 4.0) is considered to be the digital revolution, which is fundamentally transforming all aspects of life (Horvath & Szabo, 2019). Digitalisation has positive impacts on both society and economic development. Research shows that the spread of digitalization stimulates growth (Myovella et al., 2020), reduces income inequality and supports financial development (Ha, 2022). Thanks to the increasing use of the Internet and mobile phones, people around the world can connect with each other faster and more cost-effectively. Consequently, a new economic structure based on the use of information and communication technology (ICT) is of utmost importance (Lapatinas, 2019), especially for faster development (Donou-Adonsou, 2019). Digital technologies have become indispensable for a wide range of human, social and economic activities (Visser, 2019). The social distance constraints caused by the COVID-19 pandemic have inevitably increased the use of digital technology among the population (De, et al., 2020). A major consequence of the emergence of the viral pandemic is the rise of contactless technologies, which increasingly require people and technologies to interact (Manimuthu et al., 2021). Social actors have opened up to innovations that would not have been accepted in the ordinary circumstances before the epidemic. While its importance is unquestionable, few studies have examined the impact of digitalisation on society, and those that have, have tended to measure the environmental impact (Liu et al., 2019). An international survey examined whether digitalisation has an impact on the sustainable development of society. The results showed that the social components of the countries studied are positively affected by the process of digitalisation (Jovanović et al., 2018).

A national survey analysed the social impact of 21st century innovations in terms of generations. These impacts were examined from the perspective of older age groups in an ageing Hungarian society. It was found that the supportive power of the community and the efforts against loneliness are at the core of the social relevance of innovative solutions (Bene et al., 2020).

2. Theoretical Background

Some believe that robots may take over human work in the future. This belief is unfounded, seeing that robots are already carrying out tasks which human resources do not, or do not fully have the required capacities for. They are not taking over work done by people, but rather facilitate, accelerate problem solving. No jobs were lost to the emergence of the computer, the product of the third industrial revolution. It only created new ones, and the same future is expected from the fourth industrial revolution. However, this age will bring new challenges for both enterprises and employees (Kaasinen et al., 2020). Controlling new technologies requires new skills and competencies and a more flexible business environment, as corporate performance is still hugely impacted by the capability and dedication of managers and employees (Stachová et al., 2019). The human factor must be an integral part of the fourth industrial revolution. The future must be shaped so as to emphasize people, as the most dehumanized form of the fourth industrial revolution does “robotize” human beings. The impact of digitalization, the speed and scale of current changes, and the emergence of digital technologies have led to a radical transformation of workplaces and daily life, with a decreasing demand for workers performing routine, manual tasks (Bertani et al., 2020), while the demand for digitally skilled workers is steadily increasing (Kozanoglu & Abedin, 2020).

From a societal perspective, three other important factors can be identified: demographic change (the emergence of new generations), increasing virtual work (the impact of COVID-19), and increasing process complexity. The terms digital divide or digital inequality are used to illustrate the differences between social groups. These gaps can be demographic (age) (older generation lagging behind), geographical (lagging regions) or social (people living on the periphery). The state has a key role to play in closing the digital divide and in creating equal opportunities. The development of specific programmes should focus on developing the digital competence of disadvantaged people (Vinnai, 2020).

An adequate level of digital competence in the use of digital technologies is a key competence that all citizens need. Digital competence is *"the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation, safety, intellectual property related questions, problem solving and critical thinking."* (European Commission, 2019:10). The DESI (Digital Economy and Society Index) measures the development of the digital economy and society. In 2022, 54% of Europeans had at least basic digital skills and less than a third had more advanced digital skills (26%), meaning that a large proportion of the EU population still lacks the digital skills required by most companies and positions. Hungary ranks 22nd and only around half of the population has at least basic digital skills (49%) (EC, 2022). The expected impacts of digitalisation have been investigated by national (Horváth & Szabó, 2019; Makó et al., 2018) and international research (Frey & Osborne, 2017; Li et al., 2019). In addition to academic research, consultancies have also addressed the issue (Bughin et al., 2018), but none of the studies have examined the social impacts.

3. Research Framework

The aim of this study is to explore the social impacts of digitalisation based on the opinion of national experts, and to answer the following three research questions:

- Q1. How can the social impact of digitalisation be described?
- Q2. Does the expert's opinion depend on individual (age, education) or organisational (sector of the organisation represented) characteristics?
- Q3 Are there significant relationships between the experts' answers to each question on the social impact of digitalisation and, if so, how strong are they?

3.1 Data collection - Quantitative

Before the quantitative research a qualitative survey was conducted to assess the social impact of digitalisation, using a focus group interview. The interviews were carried out by a research team within the framework of the research activities of the National Laboratory for Social Innovation (TINLAB). The research plan has been drawn up taking into account the quadruple helix model. This model is a further development of the triple helix model, where the fourth helix is the civil society, thus including the civil and public sectors in the university-industry-government nexus (Birkner & Máhr, 2016). The semi-structured interviews took place online on 26 March 2021 with 9 invited experts representing academia-government-business-civil society. Based on the results of the focus group interviews a questionnaire was compiled. This study is only focusing on the results of the

quantitative research. The online survey was carried out anonymously in compliance with GDPR rules. In line with the four-helix model, 80 professionals from the academic-government-business-civil sector were invited to complete the questionnaire. The invited respondents were well-known Hungarian actors in these fields, experts working as social innovators or in potential social innovation organisations, whose activities are related to digitisation with a social impact. The selection was based on the TINLAB network's connectivity and database. The full questionnaire survey used in the research consisted of 11 sets of questions. The present study examined demographic characteristics and the impact of digitalisation on society, as well as the influence of social media presence on individuals' social interactions. The research team chose to analyse these issues because the experts' opinions were the most divergent during the interviews.

Descriptive statistics and relationship analysis are used as research methods. The former is used to answer research question Q1, the latter for questions Q2, Q3. A total of (3·10=) 30 relationship tests are analysed between the answers to the 3 independent (X) and 10 dependent (Y) questions. The level at which the questions are measured determines the indicator used to quantify the relationship between them. All variables considered as dependent (Y) are measured on an ordinal scale. Two of the independent variables (X) (X1. age: 1: 30-49 years, 2: 50-64 years, 3: 65 years and over; X2. highest level of education: 1: secondary education, 2: higher education (university, college)) are measured on ordinal scale, and their relationship with the variables to be explained can therefore be explored using the Kendall tau (τ) indicator, which quantifies the rank correlation and ranges in the interval [-1, 1]. The questionnaire respondent's sector (X3: academic degree) can only be measured at the lowest level, the nominal scale. The Cramer indicator (V), which can take a value in the interval [0, 1], is used to determine the relationship of this sector with the variables to be explained (Y). All relationship tests are interpreted at 5% significance level using SPSS software. If the p-value for the test is < 0.05, then a significant relationship exists between the two criteria being tested. In the case of significant relationships, the absolute value of the indicator indicates the strength of the relationship (Sajtos & Mitev, 2007): below 0.2 is considered a weak relationship, from 0.7 a strong relationship, and between these two numbers a moderately strong relationship. The Cramer indicator can only take a positive value, so the sign of the indicator cannot be interpreted here. Since the indicator τ can be both positive and negative, the sign of this indicator, which indicates the direction of the relationship, is also interpreted here. A negative (positive) τ means that the higher the ranking of one variable, the more likely it is that the other variable will have a lower (higher) ranking.

4. The Results of the Questionnaire Survey

The questionnaire was completed by 78 of the 80 experts invited to participate. In terms of age, there were exactly half and half of respondents under 50 (39) and 50 and over (39). The majority (57) had the highest level of education (university or college), 14 also had a degree and 7 only a school leaving certificate. In terms of field of work, 36 people belong to the business sector, 17 to the academic sector, 15 to the civil or media sector and 10 to the public sector.

4.1 Descriptive Statistics (Q1)

Y1 asked respondents to choose between statements 'a' and 'b' on the societal impact of digitalisation, indicating negative or positive attitudes. On a scale of 1 to 4, 1 and 2 represent negative attitudes (a) and 3 and 4 represent positive attitudes (b). Experts agree most with the statement where the mode, the mean, is highest and, in addition, the relative dispersion of responses is low. The distribution of responses (%) between the 1-4 response options is shown in Figure 1. The black rectangles indicate the proportion of non-responders, for the other colours the darker colour indicates the proportion of more positive experts (agreeing with response option ‘b').

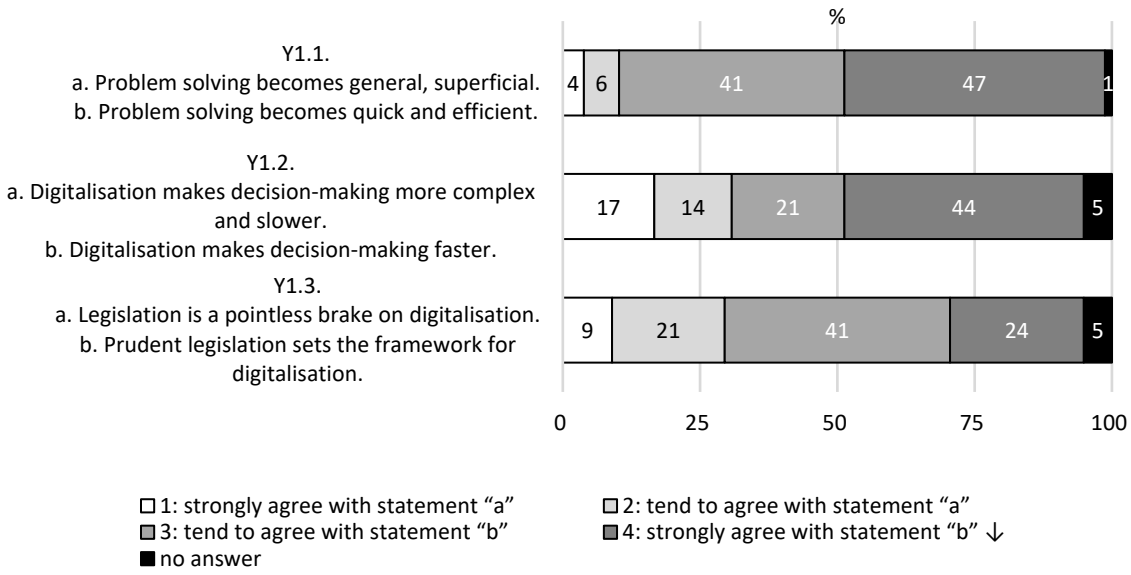


Figure 1: Y1. Which statement do you think is most representative of the social impact of digitalisation? (%)

88% think that problem solving is becoming faster and more efficient rather than generic and superficial (Y1.1). Apine and co-authors' (2020) research aimed to explore how leadership practices are changing in the digital age. Similar to the results of our research, they also concluded that digitalisation provides better, faster, simpler tools and channels for organising information and problem solving. 65% believe that digitalisation makes decision-making faster rather than more complex and slower (Y1.2). In his research, Hoßfeld (2017) investigated whether digitalisation will be a relevant topic to improve decision making. His results are in line with our findings that digitalisation (especially smart technology) speeds up decision-making. The use of smart technologies to speed up decision-making is becoming more and more common for companies. On the one hand, it can reduce human error and can therefore be important for decisions that rely heavily on data, and on the other hand, it can help automate certain decision-making situations.

65% believe that well-considered legislation provides a framework for digitalisation rather than pointlessly curbing it (Y1.3). The digital revolution is challenging traditional legislation, as legislation cannot keep pace with rapidly changing technologies (e.g. self-driving cars, drones, digital contracts), as the environment to be regulated is dynamically evolving (Kardos, 2020).

In question Y2, respondents had to decide how much they agreed with 7 statements. The statement where experts agree the most is the one with the highest mode, the mean, and also where the relative dispersion of responses is low. The responses are shown in more detail in Figure 2, which shows the distribution of responses (%) between the 1-4 response options. The order of the statements reflects the preference of the respondents.

98% of the participants thought that it is important to regulate the new world order created by digitalisation processes and the ethical issues that arise (Y2.1). This issue has been addressed by several researchers at the international level, for example Roša (2021) explores the role of ethics in the context of digital technologies through a systematic literature review. Among others, he finds that research such as Baldini et al (2018) argue that the legal framework alone cannot fully cover all privacy risks and that a model that addresses ethical issues is needed.

A new and previously untested finding is that 78% of respondents believe that the development of digitalisation has improved the transfer of knowledge between generations (Y2.2).

88% of the experts claim that larger companies can take advantage of the opportunities of digitalisation (Y2.3), and 62% also agree that smaller companies can also take advantage of the opportunities of digitalisation (Y2.4). A survey by Csizmadia and co-authors (2022) also found that the larger the size of the company, the higher the adoption of digital technologies, as highlighted by an international survey (Savastano, Amendola, Bellini, & Ascenzo, 2019). The OECD report also confirms that large companies are at the forefront of business digitalisation, and in Hungary this is mostly the case for foreign-owned subsidiaries (Éltető & Sass, 2021).

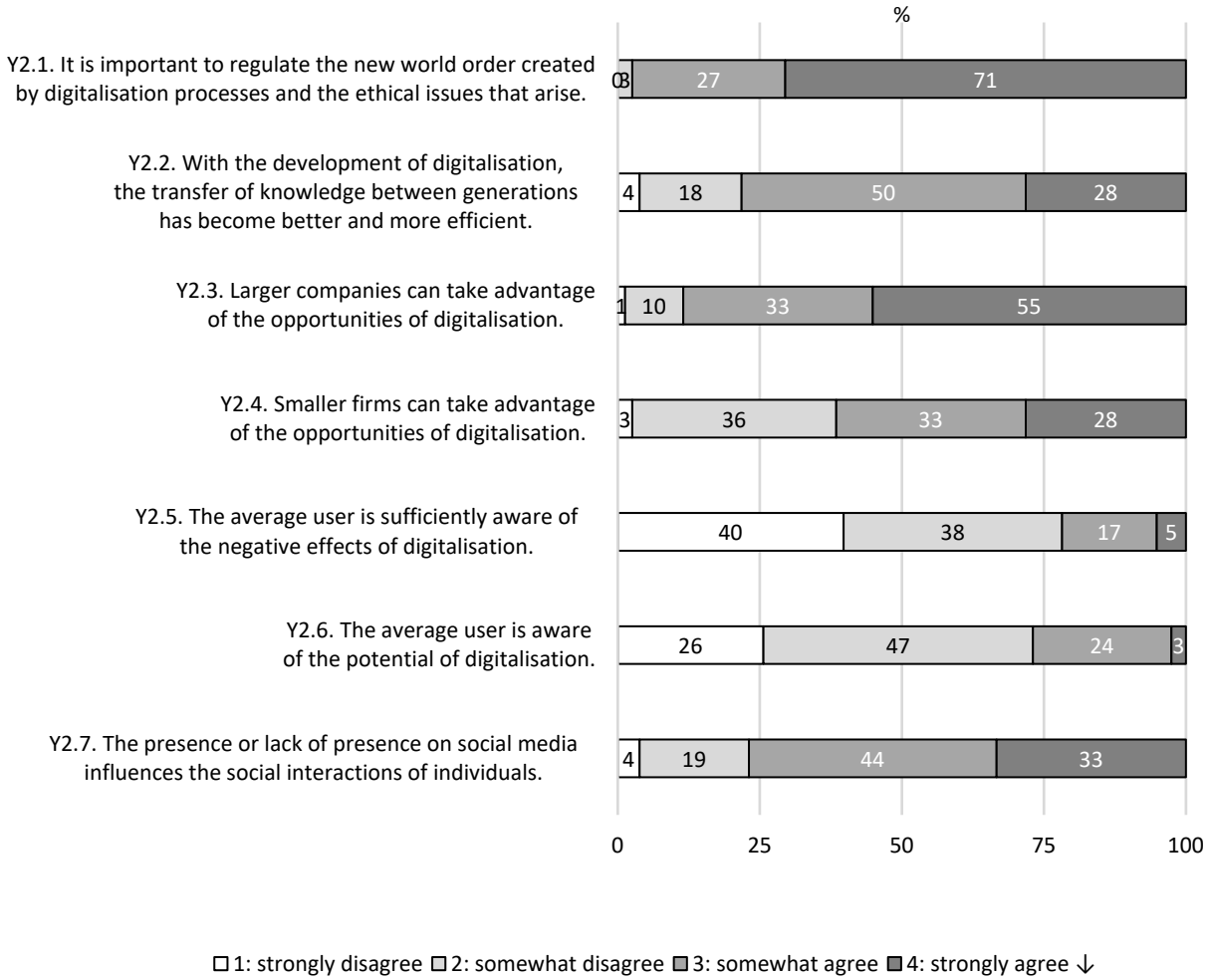


Figure 2: Y2. How much do you agree with the following statements? (%)

78% disagree that the average user is sufficiently aware of the negative effects of digitalisation (Y2.5) and 73% disagree that the average user is aware of the potential of digitalisation (Y2.6). The results were supported by Meggyesfalvi's (2021) research, as it is a serious problem that digitalisation and new algorithms increase the risk of exposure to harmful content, especially for younger generations.

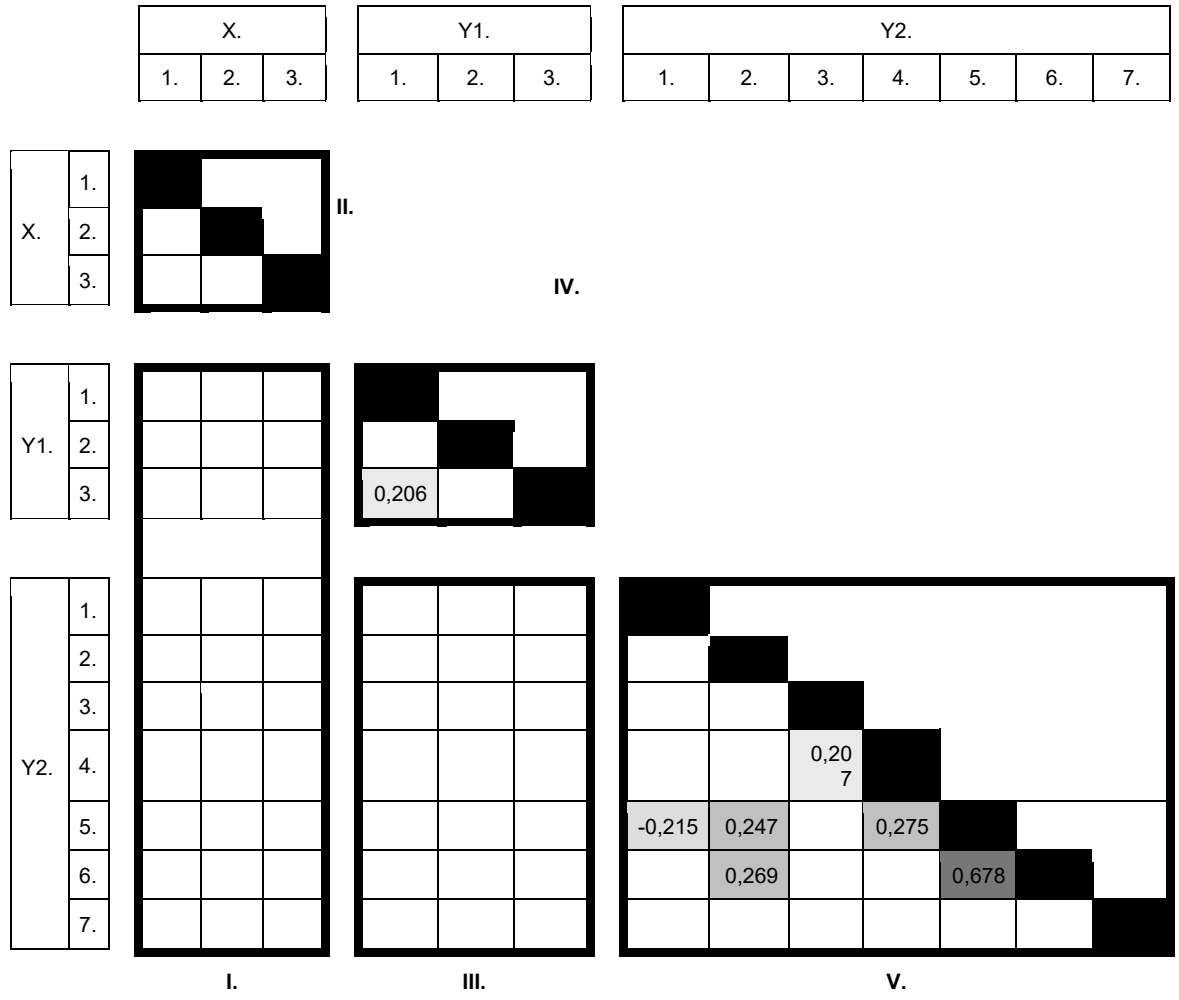
More than two thirds (77%) believe that the presence or absence of social media influences one's social interactions (Y2.7). Social media helps communication between generations, allowing people who are geographically distant from each other but have similar interests to find a way to connect. However, excessive use of social media has negative effects, for example, users often want to present a perfect image of themselves, or excessive use can take valuable time away from other activities.

4.2 Relationship Analyses: (Q2, Q3)

In the following, we move from descriptive statistics to relationship analyses in order to answer the second and third research questions mentioned in the introduction (Q2, Q3). The significant results of the relationship analyses are summarised in the relationship matrix in Table 1.

In the diagonal of the correlation matrix, cells with a black background indicate the relationship of each indicator to itself, on which diagonal the results are symmetrically duplicated, so only the part of the matrix below the black diagonal is examined.

Table 1: Significant results of relationships



The background colour of the cells indicates the strength of significant relationships: weaker stronger relationship

4.2.1 Relationship Analyses: Demographics and Digitalisation (Q2)

Q2 asked whether the experts' opinion on the social impact of digitalisation depends on the individual (age, education) or organisational (sector of the organisation represented) characteristics of the expert making the statement. The relevant relationship analyses aim to identify significant relationships between the answers (Y) to the questions on the social impact of digitalisation and the experts' characteristics (X) as potential explanatory variables. This section is shown in sub-matrix I of Table 1, which however does not contain any significant relationship. This means that our hypothesis that the individual and organisational characteristics of experts (age, education, sector) influence their opinions has to be rejected.

This result is interesting because it implies that the experts' opinion on the social impact of digitalisation does not depend on the age of the expert, the highest level of education or the sector in which the expert is classified as an expert. The analysis shows that the social impact of digitalisation is a phenomenon experienced by all adults in the same way, regardless of their level of education and employment. This leads to the conclusion that if the social impact of digitalisation is to be communicated to experts, it is not necessary to use segmented communication elements, as the demographic characteristics of these groups can be interpreted as a single target group. This is also true for marketing, social or corporate communication.

Part II shows the relationships between the characteristics (Xs) of the experts, where there is also no significant correlation. This is not surprising, because it means that the age of the expert does not affect his/her education or sector, nor does education affect the sector in which he/she works.

4.2.2 Relationship Analysis: Digitalisation (Q3)

More interesting, however, are the relationships between the variables (Y's) to be explained (Part III-V), which answer the third research question (Q3), whether and how strong significant relationships can be detected between experts' responses to questions on the social impact of digitalisation. For the answers to questions Y1 and Y2 (Part III), we also find that there are no significant relationships, thus the experts think similarly. There was a significant relationship ($\tau = 0.206$) between the responses to the Y1 questions (Part IV), which was moderately strong and positive. This can be interpreted as the more experts agree that the societal impact of digitalisation is to make problem solving faster and more efficient (rather than general or superficial) (Y1.1), the more they agree that legislation should frame (rather than constrain) digitisation (Y1.3). The results of the relationship analysis therefore suggest that the faster and more efficient solution to a problem requires, according to respondents, a careful legislative process. This may be related to the fact that the rapid and rapid development of digitalisation - to the benefit of society - can only be envisaged within a well thought-out but not over-regulated - legal - framework.

The most significant relationships were found between the answers to the Y2 questions (Part V): 6 out of the 21 relationships concerned. All of these relationships are moderately strong. The direction of the relationships is positive in five cases and negative in one case. The almost strong relationship ($\tau = 0.678$) relates to the experts' opinion of the average user. The more they believe they are sufficiently aware of the harmful effects of digitalisation (Y2.5), the more they believe they are aware of the opportunities of digitalisation (Y2.6). Experts believe that as users perceive the opportunities of digitalisation to increase, they also recognise its harmful effects. This may be related to the fact that experts, who have more and deeper professional knowledge, think the same about the average user.

Four of the other five medium-strong relationships can be linked to one of the responses to these two statements. The more the expert agrees that the average user is aware of the opportunities of digitalisation (Y2.6), the more the development of digitalisation has improved the transfer of knowledge between generations (Y2.2) ($\tau = 0.269$). The experts' opinion shows that the increase in opportunities for digitalisation also increases the opportunities for knowledge transfer. This may be related to the fact that experts, who are more aware of the potential of digitalisation, are better able to use its achievements in knowledge transfer and feel the same about ordinary users.

The more the expert agrees that the average user is sufficiently aware of the harmful effects of digitalisation (Y2.5),

- the less they agree that it is important to regulate the new world order created by digitalisation processes and the ethical issues that arise (Y2.1) ($\tau = -0.215$),
- on the one hand, the more he agrees that the development of digitalisation has made the transfer of knowledge between generations better and more efficient (Y2.2) ($\tau = 0.247$),
- on the other hand, that smaller firms can take advantage of the opportunities offered by digitalisation (Y2.4) ($\tau = 0.275$).

The experts argue that the average user who understands the adverse effects of digitalisation - but also its potential - does not need to be constrained by over-regulated processes, as the world has become faster, we communicate more efficiently, we share knowledge more quickly. The same is true of the business opportunities for small businesses, which are typically fast, change-ready and dynamic, and can take advantage of the rapid opportunities offered by the digital world.

The last almost weak relationship ($\tau = 0.207$) can be interpreted as the experts who agreed more that larger firms can take advantage of digitalisation (Y2.3), had similar views about smaller firms (Y2.4). This correlation shows that the flexibility and speed of small firms helps them in the field of digitalisation: the success of larger firms in exploiting the opportunities of digitalisation naturally goes hand in hand with the success of smaller firms in exploiting the opportunities of digitalisation.

5. Discussion

Based on our research, we found that the majority of experts consider the social impact of digitalisation to be positive rather than negative. Several factors of this positive impact are worth highlighting: problem solving has become more efficient, which needs to be further strengthened, as users are not sufficiently aware of the potential of digitalisation. Contrary to our assumption, the experts' opinion on the social impact of digitalisation is not significantly influenced by their age, education or the sector in which they work. On the one hand, this

implies that there is convergence among experts, they are well prepared, and regardless of their demographic characteristics, it is safe to use their opinions in decision-making. On the other hand, communication to them on the social impact of digitalisation can be uniform, there is no need to use different communication methods and channels, no need to define specific target groups.

Finally, there were only a few significant relationships between the answers to the questions on the social impact of digitalisation, but it should be pointed out that the development of digitalisation requires a well thought out, but not over-regulated framework. As the transfer of knowledge improves, so the opportunities for those using digitalisation increase, but so does awareness of its harmful effects. The success of businesses through digitalisation is primarily a credit to small businesses, but it also has an impact on larger firms.

5.1 Practical Implications

Businesses are able to take advantage of the opportunities offered by digitalisation, but as digitalisation processes evolve, the ethical issues that arise need to be regulated, and this is also true of social media: the presence or lack of presence on social media has an impact on the user, which ultimately has an impact on socio-economic processes. These processes have brought cybercrime to the forefront and this social problem needs to be addressed, as users are not sufficiently aware of the harmful effects of digitalisation. It is worthwhile to raise the awareness of the average user through training and better information transfer, as they are the main victims of the negative effects of digitalisation, while businesses, the media, academia and NGOs can be the shapers of these effects. It is worthwhile to launch practical programmes and developments to address these issues in the future. Our results can provide food for thought for decision-makers on where to allocate resources and where to develop reinforcement/prevention programmes when allocating scarce resources. EU countries, including our own, already have frameworks in place that can be used effectively to improve digital inequalities in society, both for the population and for workers. The digital divide can be tackled through training and development. In addition to developing the digital competences of the younger generations in a school setting, there is a need to provide free educational opportunities for adults to develop the digital competences that are increasingly essential in the labour market.

5.2 Limitations and Future Research

One of the limitations of our research is that the surveys were only conducted in Hungary. We consider it worthwhile to repeat both the qualitative and the quantitative survey in English in the near future, with foreign professionals working in Hungary. In this research, we asked experts to assess the social impact of digitalisation. It would also be interesting to examine the views of average users, not experts, and compare the results with those presented here.

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