The Value Chains in Smart Regions – The Role of ICT Through the Eyes of Consumers

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Abstract. The aim of this paper is to examine the role of the use of ICT in raising own and general awareness and their impact on value chain and business transparency across the EU. An overview of the personal attitudes and preferences of 987 Slovak respondents by the statistical analyzing their answers to the questions of a questionnaire survey on the issue of dual quality of daily consumption products sold in the European Union are used. The measure of influence of socio-demographic and socio-economic determinants on the preference for the use of ICT and ways of accessing open data in the process of raising own awareness will be examined by verifying the truthfulness of the stated hypotheses. In order to verify the relationships between the dependent and independent variables we use the regression and correlation analyzes supported by SPSS program.

Raising awareness and transparency of relations can increase the pressure to increase the volume of purchases of such healthy foods or other commodities, where, in addition to quality, emphasis is placed on ensuring that fundamental human rights, health or safety are not violated at all stages of their life cycles. In addition, also participation in public dialogue related to the other adverse effects that could have a harmful impact on society or the environment should not be suppressed. Therefore, in conclusion we summarize the recommendations on how to increase the transparency of mutual dialogues, which can enhance the unique domestic production of smart regions in sustainable ways.

Keywords: Smart cities · Participation · Value chains · ICT · Consumers

1 Introduction

Current COVID-19 crisis has shown both organizations and individual consumers the need for ICT to conduct their everyday activities. Therefore, this crisis broadened the horizons of our understanding of access to information and connection to public and private institutions, acting not only in the states themselves in the EU but also abroad. ICT had provided various opportunities to use technology to make people's lives easier even before the pandemic [1–5].

An interesting and unique way to apply smart technologies is their application in value chains, as their transparency and general knowledge awareness increase and thus

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the natural environment for innovation created is. The need to develop various research or testing capacities and promoting the exchange of best practices between the actors involved, cannot be done without financial support, necessary legislation changes or legalization of forms of cooperation. These processes are strongly dependent on the cooperation and participation of different consumer organizations, public and non-governmental organizations, often operating also in different EU Member States or abroad. It is also confirmed in [6], where the authors say that the application of smart technologies can increase the sustainability of business activities, but it is effective only with active support by coherent regional policies. The authors in [7] explored the challenges of process of innovation in specific regions in Europe stressing out the finding of lack of digitalization as main barrier of progress. On the other hand, authors in [8] and [9] emphasize the role of people as consumers in regional development and the consequent need for their access to digital technologies.

It is clear that the current pool of knowledge lacks the evidence of connection between role of ICT and consumer engagement in regional affairs. This paper provides an innovative perspective on ICT application in smart regions using the opinions of consumers as baseline. The main aim was to explore to perception of connection between ICT and smart regions though the opinions of consumers. Partial goals were:

- to describe the connection between ICT, consumers and smart regions;
- to examine the impact of socio-demographic and socio-economic characteristics of consumers on value perception;
- to describe the level of participation of marginal groups on regional or global problem-solving activities;
- to develop guidelines for higher participations of marginal groups and increase their trust in regional or global governments (SR or EU) using the higher digitalization as a preferred tool.

2 Literature Review

Food safety is considered a part of public wellbeing, and any form of mismanagement by its producer can cause serious harm to all those involved in the supply chain, adversely affecting public health [10]. This area is also invoked by manufacturers who argue that they comply with certain rules and regulations in the production of products, given at national or international level, so as not to violate them. This is not always the case and therefore attention needs to be paid to this issue.

2.1 The Current Views on the Issue of Dual Quality of Goods and Possibilities for Participation

In the past, several tests have been performed to confirm the existence of dual quality in several countries [11], but a uniform testing methodology was lacking. Already in 2017, at the initiative of the Minister of Agriculture of the Slovak Republic at the Council of the EU, the fight for consumer rights began, which resulted in the inclusion of the dual quality of foods in the list of Unfair Commercial Practices. The European Commission's

Joint Research Centre (JRC) developed an identical methodology for comparing product quality and composition and launched its dual-quality testing in 2018 to analyze 1380 food products in 19 EU countries (also mentioned by [12]). Subsequently, in 2019 also testing of other products, not only food, was launched. The directive on identical methodology was issued in 04/2019 by the European Commission and individual member states began to apply it to their legislation.The European Parliament responded to this situation approving the Directive (EU) 2019/2161 on better enforcement and modernization of Union consumer protection rules as a part of the "New Deal for Consumers". The aim was to ensure legal clarity in the assessment of possible cases of dual quality, to strengthen the powers of consumer protection authorities and also the possibility of imposing sanctions on producers (up to 4% of turnover) [13].

According to the European Commission, products may have different consistencies in different countries if manufacturers state this in the formulation on the product. Thus, it is not a legislative problem, but an ethical problem, because if consumers buy the same product in different places, they assume that it is the same [14]. As stated in [15], the issue of dual food quality has three planes. The first level is product safety. Although the composition of products in some countries is different in its components, it does not matter, because the products are still safe and are made from raw materials that are allowed in that country. If different raw materials are allowed in different countries, manufacturers will adapt to this regulation and choose the most advantageous option for them (often cheap, but less tasty, etc.). At the same time, manufacturers state that they provide all the information on the packaging, thus also complying with all regulations.

In the context of food safety in the EU, there is a Rapid Alert System (RAS), focusing on, for example, the presence of foreign objects in food or the concentration of food supplements. The feeling of Central and Eastern European consumers that they are a "rubbish bin" is therefore partly justified (as a 2017 survey on a sample of 1 446 samples showed, most of the contaminated food registered in the RAS system came from Eastern Europe [11]).

If we examine what legislation or measures define the transparent behaviour of companies, it can be said that in food safety measures, the basic management tool for monitoring compliance and gaining customer confidence is the introduction of a food safety management system (FSMS) according to the international standard ISO 22000: 2018, valid after 29.06.2021 [16]. This International Standard specifies the requirements for a structured food safety management system by integrating the principles of the Hazard Analysis Critical Control Points (HACCP) system and its application steps, developed by the Codex Alimentary Commission, with the system of prerequisite programs (PRPs). Adherence to it supports more effective control of processes, employees, suppliers, raw materials, as well as final products. The external benefits are gaining consumer confidence in food safety, improving the company's image in the eyes of the consumer and control authorities.

In Slovakia, the State Veterinary and Food Administration of the Slovak Republic and its regional authorities (RVPS) are responsible for food quality and safety control. They carry out supervision and inspections, about which they report regularly (monthly and random). They also have the power to receive suggestions, complaints or petitions from various bodies, as well as to provide information. Their admission is organized in

the form of a web interface with the possibility of any form of submission, written, oral (documented in writing), but also through the electronic filing office - portal www.slovensko.sk, and in the case of suggestions also in the form of an electronic form [17]. They are the basis by which the right to punish either sellers or manufacturers is enforced. The solution of these issues is also focused on the participation of citizens, who as consumers have the opportunity to address the responsible authorities. The degree of participation depends on their willingness to engage, but also on their ability to use electronic forms of communication and personal verification.

However, in addition to legislation and ethics, dual quality also has an economic dimension, which is not given the necessary attention in tests, as price comparison is usually not the primary goal of testing [11]. According to several tests, goods purchased in Western European countries not only had a healthier composition, they were still cheaper in the same package at the same weight (or were at the same price but with a higher weight) [17]. Therefore, we decided to pay attention to the issue of prices and costs. We will examine the preferences of the respondents, but they cannot be generalized. The existing pay gap in Central and Eastern Europe in comparing to Western Europe and such information create an unfair sense of their position in the EU single market.

2.2 The Ways of Supporting the Sustainable Development of Regions

Extending the participation of the widest possible range of stakeholders in solving a certain problem depends on their degree of willingness and interest to participate in solving related problems, whether on the part of a certain system or on the part of managed entities, all the more in the case of living systems, where the transparency and smart technologies have their place.

The state strives to develop wider public participation in public policy-making, with mutual interactions to be built on a platform for the strategic use of information and communication infrastructure and services. In Slovakia, the national projects Participation 1 and 2 address this issue [18]. The aim is to eliminate barriers - to explore the possibilities of open dialogue and to network experts in order to create a conceptual framework to support the creation of participatory public dialogue partnerships. Partnerships are to develop both towards state administration, towards regional territorial self-government, as well as in the field of mutual information, learning and cognition, and in the field of building mutual trust, in strengthening the perception of the role of various institutions and the public. An example of support for citizens is the portal www.slovensko.sk and their electronic identity that give possibility to connect with local, regional state or non-profit organizations with the aim to solve various things or other problems. Barriers of non-use of these tools may be related to their lower level of practical and digital skills, as well as their ignorance of forms of participation and the creation of conditions to increase comprehensive participation of stakeholders (city, region or state) [18]. This portal is also used as a tool for communication in matters such as food or goods security.

Part of the project is also to develop Knowledge Strategies - combining academic knowledge by linking national project and teaching, dedicated to participation and participatory public policy making. Creating a unified environment for KS increases the pressure to grow the need for innovation named as open innovations [19].

The Smart Cities Action Plan is a concept and its task was to follow up on the Action Plan of the Intelligent Industry of the Slovak Republic, which is covered by the Ministry of Economy of the Slovak Republic with the aim of supporting smart ecosystems as a whole with preconditions for developing the market of intelligent and innovative solutions. The primary goals are to improve the quality of life of citizens or to increase the quality and efficiency of public services provided by public administration. At the same time, it is an effort to support the emergence of Slovak innovative solutions and new companies [20, 21].

The "open innovation" concept is described as [22]:

– a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model [23];
– moreover, the use of internal sources of knowledge and skills to generate new ideas.

The National Project Support for the Development of the Creative Industry in Slovakia, which is financed from the European Regional Development Fund through the Operational Program Research and Innovation, also presents an opportunity to support innovation. The focus of projects is also the issue of healthy food and the environment, population health and digitization [24]. Local, regional and national public authorities, organizations governed by public law, international organizations and private organizations, including private enterprises with legal personality, are eligible for funding.

The success rate of each concept depends largely on both the ICT skills of the individuals and the degree and willingness of stakeholder and city participation.

2.3 Strategies to Support the Expansion of Digitalization in the Slovak Republic and Sources of Their Financing

In the development of conditions for wider use of ICT, it is important to get the support of the state, which seeks to increase the quality and development of digital services and infrastructure of the new generation access network and make them accessible to a wide range of interested parties. Individual EU countries can draw support for digitization from Eurofunds.

The Digital Transformation Strategy of Slovakia 2030 is a framework supra-ministerial government strategy that defines the policy and specific priorities of Slovakia in the context of innovative technologies and global mega-trends of the digital age (Artificial Intelligence, IoT, 5G technology). It is formed as the vision, where the aim is to develop a functioning information society and an innovative digital economy in which businesses can innovate and create sustainable jobs that can fill a high-quality, retrained workforce with advanced digital skills. The Ministry of Investment, Regional Development and Informatization of the Slovak Republic (MIRRI), as the manager of Eurofunds in the Slovak Republic, is preparing a long-term EU budget, named the Multi-annual Financial Framework 2021–2027 [25]. These are the Partnership Agreement and the Slovakia Operational Program, where a broadly participatory approach is applied in the preparation of the new Slovakia Program (PSK). The Partnership for Cohesion

Policy 2020 + working group is working on its preparation, where a wide range of socio-economic partners is involved in the discussion in the workshops. After incorporating the comments of the European Commission in April 2022, the formal approval of the PSK is expected in the first half of 2022. The first calls from the new Slovakia Program should be announced in the second half of 2022.

As a support of global digitization, innovation and education there was also formed the Digital Europe Programme that will address complement the funding available through other EU programmes, such as the Horizon Europe programme for research and innovation and the Connecting Europe Facility for digital infrastructure, the Recovery and Resilience Facility and the Structural funds, etc. It is a part of the next long-term EU budget, the Multiannual Financial Framework 2021–2027.

The acquisition of finances from EU funds is conditioned by the declaration of an overview of the situation in the area of their development, while it is necessary to have an overview of the fulfilment of ex ante conditionality as a tool to assess the readiness of Member States to implement selected investment priorities.

The Ministry of Finance of the Slovak Republic based the elaboration of the document for monitoring the development of the digital society and economy 2014–2020 on the national Strategic Document for the growth of digital services and the infrastructure of the new generation access network (2014–2020) [26]. This document points to the need to meet the two ex ante conditionalities defined under thematic objective 2: "Improving access to information and communication technologies as well as their use and quality". The document defines the Digital Economy and Society Index (DESI), which maps the level of internet connection (broadband penetration, speed and affordability), internet skills, online activities from news tracking to shopping, as well as the degree of development of key digital technologies (electronic invoices, cloud services, e-commerce, etc.). This composite indicator is a combination of more than 30 indicators, the composition and selection of which the European Commission can change over the years. For this reason, the target values are not set for the index, as was the case, i.e., in the Digital Agenda for Europe [27].

Based on the result of the DESI index for 2018, we can assess that at least the basic level of digital skills is reached by 59% of Slovaks, which is above the EU average (57%). At the same time, however, it is necessary to create conditions for digitization. As follows from various surveys and comparisons with the situation abroad, in the Slovak Republic, the inhabitants of disadvantaged groups are at risk of digital poverty, which makes them marginalized groups. In this regard, the Slovak government is trying to minimize such segregation, for example, projects that are aimed at improving the digital skills of seniors and disadvantaged groups in public administration (worth almost 990,000 Euros). The plan for the spread of the Internet is also part of the broadband plan until 2030, where the state strives to have all Slovak households connected to ultra-fast broadband internet [25].

According to Eurostat, the percentage of the population with insufficient ICT skills for the labour market was also expected to fall from 24.7% in 2011 to 10% in the case of specific outcome indicators for eInclusion support.

The effective use of electronic support for information, business and commerce, the use of open data, cloud capabilities, as well as support, will enable them to perform intelligent analyzes in modelling systems in a virtual environment [27]. For some indicators, it will not be possible to deduct the full achievement of the target until 2023, as the eligibility of expenditure for the European Structural and Investment Funds, which are the most important instrument for financing information activities, is set at 31.12.2023 (so-called rule n + 3) [26].

Effective digitization of business and work with information increase the turnover of SMEs, and determine their interest in innovation and willingness to invest in the integration of technology and education, in research and development [29]. The strong positive correlation between competitiveness and the existence of specialized R&D departments leads to a higher willingness to invest in ICT. Nevertheless, in Slovak Republic, support for innovation is beginning to develop very slowly.

Making assumptions requires knowledge of the requirements and preferences of the population, as well as their interest in expanding their knowledge potential. The ways to increase their confidence in responsible organizations, how to stimulate their interest in participating in solving problems is the digitization with the aim to create environment for knowledge sharing and dissemination.

3 Methodology

To obtain the main aim of that article we explored the basic assumptions how the degree of digitization influences the participatory government in smart regions and also on how the government regulates the conditions of financing from EU funds in relation to SMEs and smart solutions in conditions SR.

Data was collected through survey during the period of December 2018 and April 2019 on a sample of 987 buyers (in the age range of 16 to 75 and over - with about 85 respondents over 75, by gender: female: 65.7%, male: 34.3%) of daily consumption products in Slovak republic. Sample file consisted of buyers who differed in their age, gender, household income and living locations throughout the country. The only condition was that they were the ones who purchase daily consumption goods for themselves or their household. The survey was conducted through a questionnaire method collected personally, and by e-mail. The representativeness of selected sample file was verified through the Chi-square test according to the criteria of customers' gender. The base file consisted of all people living in SR. The data concerning the base file was obtained from the Statistical Office of the Slovak republic.

We set the hypotheses with the aim to exam the extent to which selected factors affect and who opinion increases the degree of transparency of relationships and what role the general level of information and the degree of digitization play in this process. To perform both the model's variables preliminary analyzis, and to verify the validity of hypotheses we used the tools of SPSS software and Power BI tools. The multiple regression analyzes will make it possible to assess statistically significant and statistically less significant variables and the strength of the relationships between them. In this way, it is possible to determine which of these variables have the strongest relation to the dependent variable (participation or the need to clarify business transparency).

We established the following hypotheses:

H1: Individual variables (e.g. socio-demographic, socio-economic, degree of education, etc.) will be important predictors for all types of participation.
H1a: Age and education as socio-demographic factors are decisive factors that increase the level of interest in information and trust in the responsible authorities.
H1b: The amount of income as a socio-economic factor is a decisive factor that increases the level of interest in information and trust in the responsible authorities.
H1c: The amount of income is a decisive socio-economic factor that increases the level of interest in the quality of purchased products.
H2: the level of knowledge of the issue is an important predictor of participation in the solution of the issue.
H3: Confidence towards other people and between groups will be an important predictor that will influence the ways of informing each other and the level of shopping behavior and involvement in the issue.
H4: Belief in the effectiveness of citizen participation will be a significant predictor of participation.
H4a: The level of knowledge of unfair practices has a decisive influence on the perception of the importance of the dual quality problem.
H4b: Knowledge of assessing the nature of the problem decisively affects confidence in the effectiveness of participation.
H5: Trust resp. distrust in the institution will be a significant predictor of willingness to participate - willingness to inform/be informed.
H6: The region and its support for digitization is a decisive factor that increases the level of interest in information and trust in the responsible authorities.

The results of such research have fundamental implications for public dialogue, as they will make it possible to identify barriers to the use of ICT to spread awareness of the problem and also to reveal and compare the strength of the relationship of individual variables to participation in solving the problem.

4 Results and Discussion

It was discovered that more than 15% of respondents had all the necessary information, 69% of mayors had partial information, and the remaining almost 16% of respondents said they had no information at all on this agenda. The analyzes of the results were processed as a basis for further work within the national ZMOS project entitled Modernization of Local Territorial Self-Government within the Operational Program Effective Public Administration from the ESF [30].

At the same time, we were looking for certain connections in our survey on the problem of dual quality of goods of the same brand in individual EU countries. By analyzing the respondents' answers to selected questions, we tried to find out various aspects concerning the preference of methods of finding information and knowledge sharing about the given issue with regard to socio-demographic or socio-economic impacts. We examine their impact within all hypotheses.

According to the statistical evaluation of the number of answers to question 4, more than 89% of respondents heard about the problem of 2-quality food (where mean = 0.89 with st. dev. 0.31). People in productive age (from 26 to 45, that was 395 respondents) or people in older productive age (from 46–65, 278 respondents) were informed well than other (Phi = 0.212). The H1a hypothesis was partially confirmed.

We further examined how often respondents search for this information or what information they follow. There is a slight dependence between the frequency of information retrieval by reading the information on the packaging to control food quality (Phi = 0.229, but with a high degree of significance, at 0.01). The average value of information reached 1.36, which means that they find out information in a cursory rather than a thorough manner, and if they check the quality, they do so occasionally or consistently than always (mean = 2.55 with st. dev 0.301). Addiction is linear. About 12.77% of respondents do not follow this information at all. Based on the results of the regression analysis, it can be argued that if the respondents heard about the dual quality problem in the EU (mean of the awareness rate is 0.89, where 1 means yes, 0 no), they consider the dual quality problem to be moderate (with mean = 0.83).

The relationship between perceptions and the importance of the dual quality problem in the EU is moderate (Phi = 0.524), which means that if they routinely monitor quality, they attach average importance to threats to life safety. Hypothesis H2 is verified as true. We found that this information is most frequently viewed by people of working age (26 to 45) or people of advanced working age (46 to 65) (socio-demographic characteristics). From the point of view of education, this issue is of interest to more university-educated people than medium school-educated people, who either do not follow it at all or follow it occasionally. Hypothesis H1b is verified as true.

From the point of view of monitoring the type of criterion that has an impact on shopping behaviour, depending on the income categories, we found that this issue is sometimes monitored more by people with higher incomes (1001–1200) or with incomes from 801–1000. Of the available criteria, respondents will be most affected by price and quality (both with mean 0.79, where quality was a little more preferable (st. dev. 0.405 with Phi = 0.250) as in opposite to price (where st. dev. is 0.407) which a lesser extent (Phi = 0.117) influences purchasing decisions. Another criterion of interest to respondents incomes is product experience (mean is 0.6 with st. dev. 0.490, Phi = 0.172) to a lesser extent (Phi = 0.117) influences purchasing decisions. The risk to health also affects the choice when buying, although with a low degree of preference for this criterion (mean = 0.20 with st. dev. 0.404, Phi = 0.224).

If we evaluate the dependence of the criteria on each other, the highest - medium indirect dependence is between the experience with the product and the risk to health (Phi = 0.297), which can be interpreted that the higher the experience with the product, the less fears the risk of endangering the health or unavailability of the store (Phi = −0.225) or the product (Phi = −0.197). On the other hand, the less experience the consumer has, the greater the emphasis on the risk to health. There is also a significant indirect dependence between the quality and availability of the store (Phi = −0.200) or product (Phi = −0.194). The H1c hypothesis was confirmed.

About the problem of dual quality of goods, respondents learned mostly from the media (mean = 0.72, st. dev. = 0.014). The evaluation of the dependencies using the

correlation table of relations shows that if they have personal experience, they search less for the media (Phi = −0.113), but rather rely on the experience of a friend (0.123). Personal experiences (Phi = 0.213), as friend's experiences (Phi = 0.143), or media knowledge (Phi = 0.078) have a higher weight in assessing the importance of health risks. The H3 hypothesis was confirmed.

Next we examined the respondents' opinion on whether they were hindered by unfair practices of manufacturers, we found a slight direct dependence between the salary groups of the respondents (0.158, at p = 0.003 < 0.005). Such practices hinder the third salary group the most - from € 1200–1600, (mean 1.52, st. dev. 0.772). In the group from € 800–1200, where (mean = 1.71 with st. dev = 0.762) such practices are not decisive. It means the socio-economical criterion has a positive impact on the interest in solving quality issues. Participation efficiency is influenced by income as a socio-economic factor, which is also confirms the H1 hypothesis.

About 81.1% of respondents are very obstructing (45.8%) or obstructing (37.7%) by such practices of manufacturers (mean = 1.54 with st. dev. 0.663) and attach much more importance to this problem than to who do not attach importance to (mean = 1.96 with st. dev. 0.998). There is a medium dependence (Phi = 0.442), which was also confirmed by the Independent Samples T tests (Levene's Test for Equality of Variances). Hypothesis H4a is verified as true.

Of the practices, they are most hampered by different component ratios (mean = 0.84 with st. dev. 0.368), different substitute quality (mean = 0.64 with st. dev. 0.480), or different raw material ratio (mean = 0.32 with st. dev. 0.468). The strongest indirect slight dependence of dissatisfaction was manifested by the different ratio of raw materials and poor quality of ingredients (Phi = −0.229), or product quality and substitute quality (Phi = −0.216). Dissatisfaction with the proportion of raw materials is directly caused by both factors (quality of substitution or ratio of raw materials).

According to the age or income, statistically significant is the obstacle ratio of components depending on age, where by p = 0.023 < 0.05 is Phi = 0.068), where this criterion is most observed by people of working age (from 26–65). If the manufacturer uses a better replacement, they are less bothered by the poor quality of processing (where for p = 0.027 < 0.05 with st. dev. 0.096). That confirm the Hypothesis H1 and H2.

People over 75-aged are most bothered by the quality of the replacement, the ratio of ingredients and the weight of the products. Preference for monitoring the composition of goods in working age and in older age categories may be related to a healthy lifestyle, where if the goods have a different composition, it may contain more allergens that can endanger human health. These criteria are crucial and need to be addressed.

Next, only in the case of the quality of compensation we found a statistically significant relationship with a weak dependency (Phi = 0.106) to income groups (where p = 0.011 < 0.05). The most significant differences in preferences were in groups with income from € 800–1200 and over € 1600 and more, and subsequently in € 1200–1600. Other criteria (where p > 0.05) do not statistically significantly affect respondents' dissatisfaction depending on income groups. The quality of compensation for age groups shows a higher dependence (Phi = 0.068).

To summarize the overall validity of hypothesis H1, people of working age are more active, interested in quality (especially in the age range of 25–45). In the case of the

criterion relating to producers' practices, H1 was only partially confirmed, with signs of age dependence being significant in particular for the ratio of ingredients (Phi = 0.068) or the quality of the ingredients (Phi = 0.096). Depending on the income, the H2 hypothesis was only confirmed in the case of the quality of the replacement (Phi = 0.106).

They consider the problem of dual quality (question 12) to be a significant ethical-legislative problem (46.15%) (depending on the income categories the perception is weakly statistically significant, p = 0.011 with Phi = 0.022). If it is an economic problem (19.13%), then it is only an ethical problem (14.05%). About 9.79% cannot distinguish what the problem is, where we found a statistically significant relationship between age and ignorance to assess the form of the problem (25–45 with p = 0.04 with Phi = 0.09). If we evaluate the relationship between the nature of the problem, we found a moderate indirect dependence between ethical-legislative and ethical nature (Phi = −0.412). It follows that if such cases occur, the less they are dealt with legislatively, the more they perceive them as a breach of ethics, and customers perceive this as a frivolous supplier, who should be subject to legislative sanctions. There is less indirect dependence on the economic nature (Phi = −0.286) and on the purely legislative nature of the problem (Phi = −0.241). The economic problem related to the occurrence of cases where they perceive the efforts of producers to reduce their costs at the expense of the quality of goods, especially in the eastern EU countries [28]. Hypothesis H4b has been confirmed.

In answer to question 13, who should solve the problem of dual quality of goods on behalf of consumers, respondents do not prefer the solution by government measures. The difference in opinion of age categories is weakly significant (especially at 26–45 years, where p = 0.0499 < 0.05 with Phi = 0.115). Thus, national institutions (e.g. the Slovak Trade Inspection Authority, the National Testing Institutions, and universities) should solve the problem rather, where in total up to 43.56% of respondents prefer these options. In contrast, 37.2% of respondents think that the European Commission should address this issue (age: p = 0.026 < 0.05, with Phi = 0.097). Customers themselves (by boycotting brands, reporting them to SOI, etc.) are not very willing to take on their responsibilities (only 9.02% prefer it). We did not notice the effect of income differences. Hypotheses 3 and 5 have been confirmed, where the predominant socio-demographic impact prevails.

We further examined the degree of need for interest in the problem of dual quality goods. In this case, all respondents said they wanted to be informed (mean = 0.9, st. dev. 0.295). In this case, age shows a weak dependence on the expression of interest, where again for people of working age information is the most preferred (24–45 with Phi = 0.029). People who make purchases want to be more informed (p < 0.01 with Phi = 0.132). As a source of information, they would prefer the following options: media coverage in dailies or weeklies (mean = 0.47 with st. dev. 0.499), a transnational internet portal (page) (mean = 0.20 with st. dev. 0.399), together with Phi = −0.279, and 14.83% would prefer current information of the Slovak Trade Inspection Authority, 14.08% would like information on these cases to be provided in the form of a regular report by the Prime Minister and also the Ministry of Agriculture and Rural Development of the Slovak Republic (Phi = 0,304). Only 10.73% of respondents would welcome a regular report from the European Commission.H2 and H4 were confirmed.

The respondents surveyed consider their own experience to be the most credible sources of information (mean = 0.78, st. dev. 0.413), and it is verified both in the family (Phi = 0.169) or in acquaintances (Phi = 0.078). This choice being most often preferred by up to 32.68% of respondents with incomes from € 801–1000, as well as from € 1001–1200, which do not prefer acquaintances knowledge ($p = 0.048 < 0.05$ with Phi = 0.089). By age category (from 26–45 years old) more trust their own experience (Phi = 0.132). Media preference is also age-dependent ($p = 0.011 < 0.05$, with Phi = 0.107). The environment will affect those who make purchases ($p = 0.045 < 0.05$ with Phi = 0.064).

Young people prefer more information from acquaintances (48.85%) than the results of scientific research (45.37% in total). As the results of our research show, the media and results of scientific research are most believed by people with a medium school education, followed by high university-educated respondents and university students in their bachelor studies (Phi = 0.107). These results are moderately less affected than information from acquaintances or family (Phi = −0.330). AlsoH3 and H4 were confirmed.

If the respondents were to inform themselves about the problem of dual quality of goods, 82.37% would be willing to inform (mean = 0.83, st. dev. 0.38), especially medium schools and university-educated people and those who make purchases. Other would not be willing to inform at all. Women (mean = 0.91, st. dev 0.72) are more willing to inform than men (mean = 0.82, st. dev 0.77). From the point of view of the size of the seat, the inhabitants of smaller settlements in the Prešov Region (seat up to 5,000 or up to 10,000 inhabitants) are willing to inform, and then from larger settlements (seat from 20,000 to 50,000 inhabitants in the BB Region).

As a tool with which they would like to inform, respondents most often chose a specialized website (after registration the possibility to directly insert information, photos, etc.), (mean = 0.34, st. dev. 0.475), sharing via social networks - on a specialized profile (mean = 0.22, st. dev. 0.41), and information via the mobile application (mean = 0.14, st. dev. 0.345). They also trust the Slovak Trade Inspection Authority (mean = 0.17, st. dev.0.377). As a result, they are open to the digitization and use of ICT and the tools they support and they consider the available means of transmitting information to be credible and easily accessible. Hypothesis 6 was partially confirmed.

The specialized site is most preferred by residents of up to 10,000 inhabitants, and then by up to 5,000 inhabitants, followed by respondents from larger settlements. In small settlements, the situation is almost the same, which means that the size of the settlement does not significantly affect the willingness to use different forms of electronic communication. The lowest income groups prefer social networks (Phi = 0.062), a specialized portal or state control institution, followed by mobile applications. Their use has a significant impact on dual quality control at the time of purchase (Phi = 0.092). This confirmed hypothesis H5, but hypothesis H6 in the section on the impact of differences in digitization of regions was not confirmed.

We further examined the preferences of respondents in the area of measures proposed by them, where respondents propose to distinguish goods with different quality by different packaging and different price (mean = 0.77, st. dev. 0.422), or to provide information on the packaging and differentiate by price (Phi = −0.354), or differentiate

different packaging, while the price may remain the same (Phi = −0.328). Only 1.32% of respondents prefer to search information only on the Internet.

The number of respondents whose dual quality problems have affected is dependent on income categories ($p = 0.04 < 0.05$, Phi = 0.117) where more well informed are people in (€ 800–1200 or in € 1400 and more). The impact of age categories was not significant. The impact of education manifested itself, both among medium school and university-educated respondents. If the respondents were influenced by the information, they are also willing to provide this information (Phi = 0.334) and they attach importance to the problem (Phi = 0.289) and they want to be informed (Phi = 0.339). This confirmed the validity of hypothesis H5.

5 Conclusion

Despite the helplessness within the situation around double quality of foods in 2017–2018, the assumption that the increase in information leads to an increase in the respondents' interest in dealing with this issue, has been confirmed. It was reflected in the need to address the issue at both national and EU level. We found that the difference in the quality of goods in the EU greatly hinder or hinder to customers (81.1%), and they consider this problem to be both ethical, legislative (46.15%) and economic (19.13%). An example is our own and global awareness of double quality in the field of food quality control, where based on customer suggestions, authorities at national levels, as well as the EC, which were trusted by respondents in our survey (25.56% in total), encouraged steps to address this issue. Media coverage has led to an increase in information awareness, which has led to a solution to the problem both by countries and by EU, which has manifested itself in the creation of sets of measures and changes of directives. As we can see in [13], the JRC created he unified testing methodology and extend the testing not only foodstuffs but also other categories of goods [31].

In 2022 the permanent monitoring centre was formed. The evaluation of the means of regular collection of comparative information, whether at global or regional level, is carried out. In Slovakia, the State Veterinary and Food Administration of the Slovak Republic and its regional authorities (RVPS) are responsible for food quality and safety control. To strengthen the participation there are formed the branches of organizations in the regions, such as the departments of food hygiene, food safety and cosmetics, while they work within the advisory centre for health protection and support at the RÚVZ (RIPH) based in the cities of regions. They also carry out surveillance and inspections and regularly publish reports (monthly and random).

Such institutions also have the power to receive suggestions, complaints or petitions from various subjects, as well as to provide information. In this example, we see how participation in problem solving is developed. Submission of complaints is organized in the form of a web interface with the possibility of any form of submission, written, oral (also documented in writing), but also through an electronic filing system - portal www.slovensko.sk, and in the case of complaints also in the form of an electronic form [17]. However, the degree of participation depends on their willingness to engage, but also on their ability to use electronic forms of communication and personal verification. As we further deduced that if people do not follow the information on the packaging,

they will obtain information from other sources. This is also confirmed by the degree of preferences of the media (mean = 0.72, st. dev. 0.014), social networks or websites as sources of our own and shared information.

Based on the personal experience of the respondents, we state that even though a citizen is the owner of an eID Card, if he does not need to communicate with the public administration often, his digital soft skills are weak, which weakens his communication opportunity. Another problem is its connectivity to the Internet, where user verification sometimes takes a long time or does not work correctly. The solution here is broadband internet as part of a digitization policy, especially for marginalized groups. Since young people and older categories observe the behaviour of family, surroundings and acquaintances, they often follow them on social media; it is assumed that they are interested in this issue and that they will address it.

In our opinion, the values of digital society indicators related to skills as well as the level of Internet use will be exceeded (countdown in 2023). It is due to the situation with the measures of the Government of the Slovak Republic in connection with the COVID 19 pandemic, where purchases and provision of services as well as other communication activities are increasingly moving into the field of e-space, forcing the population to learn to use e-connectivity, which is confirmed by the perception of the low impact of the digital divide by region or settlement size.

Reports and other activities of control institutions are the basis to strengthen the powers of consumer protection authorities and the possibility of imposing sanctions on producers. Media coverage contributes to the detection of unfair practices and to the resolution of cases in public [32], thus creating an opportunity for the transparency of chains and raising awareness of unfair practices. Targeted teaching or labelling of goods and advertising can also help. We want to address these issues in our further research, as it is a way of preconditions for developing the sustainable development of the regions, by raising awareness of the possibilities of exploiting the potential of the regions.

The EC has also proposed measures to strengthen and improve the existing system of production and sale [24]:

- greater sustainability by enabling manufacturers to assess their social, environmental and economic sustainability measures in product specifications;
- increased protection of IPOs on the Internet, in particular as regards sales through online platforms,
- strengthening the role of producer groups so that they can manage, promote and develop their PPPs by having access to anti-counterfeiting and customs authorities in all EU countries;

The shortened and simplified registration procedure combines both different technical and procedural rules, leading to a uniform GI registration procedure for EU or non-EU applicants. The Commission proposal is the result of an extensive consultation process. We can see that successful implementation is heavily dependent on a mutual public dialogue with the all of stakeholders.

- Voluntary certification schemes at national level or run by private operators can also help consumers to be sure of the quality of the products they buy.

– In addition to EU schemes, there are a large number of private and national food quality schemes or logos that cover a range of initiatives and are used between businesses or between businesses and consumers.

These measures also help to reduce the pressure of control authorities due to raising the quality and safety standard, supports the easier introduction and promotion of new products on the market, as well as easier and more effective company's marketing position in the segment.

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