

DOMINIKA KACZOROWSKA-
 SPYCHALSKA

**Digital Technologies in
 the Process
 of Virtualization
 of Consumer Behaviour
 – Awareness of New
 Technologies**

1. Introduction

Digital technologies transform our life at a tremendous pace evoking our fascination and delight with opportunities that were unavailable before. This is not a science-fiction scenario but a real image of the world in which a human becomes an integral part of created technologies (techno-humanism). We are entering a new era when science fiction is becoming science fact (Borek, J.Reinold 2016, p. 5). As a result, the reality becomes an example of how translation of thousands of lines of a symbolic code works in the creation of the world, which enables to gain deeper and absorbing experiences of presence while becoming a space for a new dimension of subjectivity and interaction (Przegalińska 2016, p. 32). At the same time the technology determines their attitudes, preferences and decisions as a member of a given community (smart society), a man as an individual (smart human) and a consumer (smart consumer), becoming a kind of natural trajectory of the evolution of these notions. Virtualization concerns also consumption as a manifestation

Dominika Kaczorowska-Spychalska, Ph.D.
 University of Lodz
 Faculty of Management
 Department of Marketing
 Poland

of social behaviour as well as individual consumption conditioned by awareness of existence of a given technology, a degree of its acceptance and openness to functionality that it entails. As a result, digital technologies are, on the one hand, a consequence of digitization processes, on the other one, its powerful driving force. This is determined by dualism of approach to digital technologies (IT approach versus humanistic approach) and evaluation of their potential benefits and threats.

The aim of the paper is to identify a way and assessment of differences in the perception and acceptance of devices and equipment based on digital technologies, in particular the Internet of Things (IoT) and Artificial Intelligence (AI) in particular, which according to Gartner's Hype Cycle for Emerging Technologies 2017, are one of the key technologies of the coming years. Part One presents – based on the economic literature – the essence of digital technologies with particular focus on the IoT and AI. Special attention was paid to the premises of their development and impact on intensification of virtualization processes of individual attitudes and behaviour including a consumer perspective. The further part presents the results of own studies concerning the discussed problems. They are an introductory element of a broader research project whose aim is to analyze the impact of digital technologies (the Internet of Things and Artificial Intelligence) on the directions and dynamics of Digital Society (in its specific dimensions – a multi-paradigm model of interaction between a human and technology together with their autopoiesis).

2. Consumer in a digital space

Technology today is ubiquitous in numerous forms and shapes. It is getting closer to a human, by both reducing a distance between a user as well as by increasingly imitating human forms of organisation of life. Contemporary technologies by designing and developing newer and newer tools facilitate our everyday activities in real, physical market space, at the same time move its limits and create a new dimension. As a result, our surrounding space is becoming increasingly hybrid as it is hard to imagine life without computers, the Internet and everything that is a manifestation of digital revolution – new technologies. In the 21st century we will create even greater „fictions” than in any of the previous epochs. By means of computer algorithms we will be able not only to control our existence but also shape our bodies, brains and minds as well as to create virtual worlds. Therefore, it will be increasingly harder to distinguish reality from fiction and also more and more indispensable that ever before (Harari 2015,

p.226). Access to this world will be possible thanks to advanced tools that enable Human - to - Machine (H2M), Machine - to - Human (M2H) and Machine to Machine (M2M) interactions while moving current paradigms, models and patterns into digital reality at the same time designing the new ones that can completely change our point of view. Does it mean that we are heading towards the R. Kurzweil's epoch of specific peculiarity in which a pace of technological changes will be so fast and its impact so deep that a human life will change in an irreversible way while transforming the notions as we know them today so that our existence could gain a new meaning, starting from business models to a human life cycle? (Kurzweil2005, p.23)

It was about one hundred thousand years ago that a human mind achieved its current size and shape perfectly adjusting to needs connected with life in the society in a specific surrounding. It allowed to introduce a man into a new world, in which life is not limited only to ensure survival but creates numerous new possibilities while transforming them towards modernity (Pradeep 2010, p.30). Originally, a man was a primitive hunter, then became a farmer and finally evolved towards a level of physical worker relying on strength of their muscles and turned into a white-collar worker relying on abilities of their left hemisphere so that later could become an artist using their right hemisphere. The driving force in each case is the technology (Kotler et al. 2010, p. 34) that currently caused the synergy of human existence in interaction with bots, androids, robots or humanoids. Computers make decisions for us and solve complicated problems. They can also think, albeit only in a limited way, but they do think. It cannot be denied that modern computers increasingly fast approach a level of human intelligence. They accurately perform specialized, routine and predictable tasks, in which they will probably soon overtake people (Ford 2016, p. 84). However, building a quasi-human is still a superhuman challenge although works on that proceed. Scientific, philosophical and ultimately, mass interest in a machine and a possibility to understand a human mind by capturing and formalizing basic mechanisms of so-called intelligent behaviour has a very long tradition – it was already Descartes who presented a vision of an imperfect machine as such – a distorted mirror of a human mind (Przegalińska 2016, p. 27).

We definitely live in extraordinary times. It does not often happen that as a result of combination of scientific achievements and supporting technology with real problems we can observe the revolution and a significant expansion of horizons (Pradeep 2010, p. 15). It has an enormous impact on a way how a human brain processes sensory stimuli, including some that are a result of experiences with digital technology, a level of its acceptance and a degree of absorption. The

brain enters into interactions with the surrounding social and physical world. By means of stimuli it receives information about them, generates chemical and psychic reactions, growing emotions and thoughts, attitudes towards them (emotions stimulate the brain 3000 times faster than rational thoughts). The external world shapes thoughts, possibilities and reactions, moreover, reactions between the brain and the environment comprise also the feedback that strengthens or weakens human behavior (Zaltman 2008, pp. 62-65). Technology in such an approach leads to a specific integration between a man (techno-humanism), enabling to improve our brain and providing access to unknown and new states of consciousness. As a result, the brain reacts to what it experiences while forcing adjustment of activities undertaken by a man with reference to various socio-cultural dimensions. Thus, we have opportunities to design the world in our minds and to put that into life while combining capabilities of rational and abstract thinking, creating sophisticated forms of intelligence. The manifestation of this is e.g. the provision that was added in 2017 to the Resolution of the European Parliament concerning civil law regulations in the area of robotics: „we should explore, analyse and consider the implications of all possible legal solutions, such as creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently“(European Parliament resolution of 16 February 2017, p. 15).

According to Gartner's Hype Cycle (including also practical solutions – allocation of specific digital technologies such as connected cars or connected home), particular attention should be paid to the Internet of Things and Artificial Intelligence which according to experts will exert a significant impact on our economic, social and cultural development:

1. IoT describes the many uses and processes that result from giving a network address to a thing and fitting it with sensors. It is also about how those things gain new skills that are expressed in new forms of our lives (Bunz, Meikle 2018, p. 1). Having been incorporated into the global network devices become intelligent. Their intelligence is due to opportunities to communicate with other objects as well as to collect and analyse data provided by them and then, on that basis to make analytical and business decisions (Adamczyk 2015, p. 4). Instead of connecting people to other people, as does the current Internet, the new Internet of Things connects things to things. It is also about autonomous

operation - things that can operate pretty much on their own, without a lot of human interaction (Miller 2015, p. 2).

2. AI is the branch of engineering employed for the creation of computers that possess some form of intelligence and can be used to solve real world problems and function in many domains. It is concerned with intelligent behavior in artifacts and it is an art of creating machines that perform functions that require intelligence when performed by people (Kumar 2015, pp. 5-6).

As the Internet of Things (IoT) techniques mature and become ubiquitous, emphasis is put upon approaches that allow things to become smarter, more reliable and more autonomous (Kyriazis, Varvarigou 2013, pp. 442 - 448). For this reason future of the IoT is AI. Artificial Intelligence will be playing a starring role in the IoT because of its ability to quickly wring insights from data. It creates an opportunity to develop the ecosystem of innovative technologies for an enterprises - Smart Business Intelligence (SBI), in which the main pillar is the web and devices and smart systems based on it (Sułkowski, Kaczorowska-Spychalska 2016, p. 190). A dogma of functionality of smart business based on the one hand, on its isomorphism and on the other, on its constant dynamics and diversification leads to increasingly bigger metamorphosis of business models in which individual elements interact (Sułkowski, Kaczorowska-Spychalska 2018, pp. 307-318). Kevin Ashton believes the "things" aspect of the way we interact and live within the physical world that surrounds us needs serious reconsideration, due to advances in computing, Internet, data generation ware by smart devices (Buya, Dastjerdi 2016, p. 5). As a result, we can spur new business models because it offers exponentially expanding opportunities for new functionality, far greater reliability, much higher product utilization and capabilities that cut across and transcend traditional business boundaries (Porter, Heppelmann 2014, <https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition>). Customers and the market - not the factory or the product - now stand at the core of the business. This new center of gravity demands a rethink of some long-standing pillars of strategy (Dawar 2013, p. 103), especially in the future marketing. As human beings, we are all consumers. We all buy things and use them to help us live our lives. We want the buying and consuming process to be easy and affordable. Now we have some series of new technological moments that creates other new technology, technology that creates the need for other new technology that then includes customers as a part of it (Wuebben 2017, pp. 85-93). As a result, consumer value is increasingly often perceived as consumer value for business, which means that they have to adjust to changes in the market and new technologies disturbing their status quo of technologies

and /or become their creator – majority of them is at the same time excited about opportunities and worried about potential threats (Kotler et al. 2017, p. 56). They concern mainly aspects related to safety, including a possibility of obtaining information about activity of users of individual devices as well as access to information that can infringe their privacy. There are also worries concerning potential access to management systems and users' panels of individual devices based on the IoT and AI, which enables to change a device's parameters in order to take control over them (cyber-attacks). Decisions undertaken on that basis can represent a threat for safety of clients of many sectors and trades. What also raises concerns is an ethical aspect related mostly to the process of business dehumanization and Human-to-Human interactions (H2H) whose elements are already visible today in case of increasingly common applications of chatbots in interactions with consumers. Smart machines are revolutionizing the way of interacting and engaging with the customers. The key is to understand how the customer would like to interact with the company and its products and services. It means that consumer behaviour in the space of new technologies, including the IoT and AI should be a result of consistent and complex process of gradual evolution of a human and its projection towards technologies (their creator), on the one hand, and the one directly shaped by them on the other one (their recipient). We can observe certain patterns of how complex transformations based on new digital technologies can work, but success requires much more than just the technological side of it (Borek, Reinold 2016, pp. 99-122). As we are turning to the economy 4.0 and society 4.0, marketing should increasingly often refer to the human-centered idea. Let us imagine the world, in which artificial intelligence and related robotics are elements of everyday life. We could see in our imagination automated factories, autonomous cars, voice-operated household robots as well as robots-doctors, lawyers and robot workers. In such a surrounding consumers subconsciously looking for their identity will more and more frequently ask a question what it is like to be a man and a consumer in the digital world (Kotler et al. 2017, p. 120). Therefore, the attitude to virtualization of consumer behaviour requires cooperation between many interdisciplinary areas of science and disciplines because humans and machines need not only to coexist but also to collaborate. The results of studies analyzed in the subsequent part of the paper concentrate on consumer behaviour in the space of digital technologies, with special attention to their marketing activity as a result of diverse mental human aspects (psychological, philosophical approach, etc.).

It is extremely hard to resist a seductive charm of digital technologies while often giving them tasks that require a specific wisdom and intelligence. How sad

it would be if we had to uncritically accept the fact that „a human element” went out of fashion and we can easily get rid of it (Carr 2013, p. 272).

3. Impact of digital technologies on consumer behaviour and decisions in the light of own studies

The inspiration for conducted research was a dynamic development of digital technologies that are one of the main pillars of virtualization of market space. However, due to the fact that both, the economic literature and practice indicate that digital evolution will move towards building an intelligent ecosystem of connected digital technologies, in which Artificial Intelligence will be a natural continuation of the IoT, an operating system for devices and equipment based on the concept of the Internet of Things, the research comprised also aspects concerning these issues. Obtained results are the outcome of the first stage of studies (a pilot study of a survey instrument) conducted within the framework of the scientific project financed by the National Science Centre within the Miniature 1 competition „The Internet of Things in the Process of Virtualization of Consumer Behaviour”. The main objective of conducted studies was to identify a way and assessment of differences in the perception and acceptance of devices and equipment based on digital technologies (the IoT and AI). Particular attention was paid:

- to identify a degree of awareness (spontaneous and supported) of the notions of the IoT and AI, their role and features,
- to recognize the main areas in which intelligent technologies will be of crucial importance for the potential users in the coming years,
- to identify factors that determine willingness to accept and/or to buy this type of devices and equipment,
- to indicate and describe attributes of the IoT and AI that can influence consumer behaviour, attitudes and decisions.

Adopted assumptions determined a selection of sample which was of purposeful nature. The pilot study was conducted by means of a direct questionnaire in the period between May-June 2018 among the 1st year students of the 1st cycle studies (Z generation representatives) and 2nd year of the 2nd cycle studies (Y generation representatives) who studied in full-time and extramural mode of studies. The selection of that research method was influenced by two main conditions:

- a sample character (big size, dispersion – various courses, mode of studies),
- a relatively low cost of research.

The pilot study was conducted among students of some management courses at the University of Łódź. The studies will be continued according to the assumptions of the project among the students of courses that reflect different areas of science: humanities, social sciences, science, nature sciences, medical sciences, technical and arts. As a result, the research will be of interdisciplinary nature attempting to determine various typology of behavior of a new consumer (in a demographic and behavioral perspective) – homo cyber oeconomicus in the space of smart technologies. They will be also supplemented by qualitative studies, including in particular, expert interviews with enterprises as well as with experts on digital technologies and studies in the area of social hearing – phenomenological approach and market experiments.

A survey instrument was a questionnaire that consisted of 27 questions where 7 were demographic questions that in the process of analysis were explanatory (independent) variables. They concerned: gender, age, place of permanent residence, year, mode and course of current studies and the university.

The pilot studies enabled to verify the adopted research methodology within the framework of NCN project, the appropriateness of a research instrument as well as allowed to identify aspects that primarily were not included in the study. However, due to the fact that the sample concerned a limited group of students and their local context, obtained results present are only informative value.

The study comprised 394 students but there were 378 correctly filled questionnaires that were qualified for further analysis. In that group Z generation representatives (students below the age of 20) accounted for 88.4% of the surveyed (334 respondents)¹. Due to a small proportion of respondents taking part in the pilot study who belong to Y generation as well as the fact that Z generation is the group that in the coming years will become a growing group of consumers, in case of whom it is hard to unequivocally classify attitudes, preferences and purchasing behaviour, including those determined

1 *Generation Y, which is also known as the Millennials or Gen Y, is the generation after Generation X. Most scholars refer to a time period ranging from early 1980s to early 2000s. For instance, P. Sullivan and J. Heitmeyer (2008) defined this demographic cohort as born between 1977 and 1994 while J. Bergh and M. Behrer (2011) as 1980 and 1996. There are also papers in which the epoch of Gen Y ends in the year 2000 (R. Zemke) or even in 2004 (W. Strauss and N. Howe). It means that Generation Z (Generation of Post-Millennials) is a generation of people born after 1996, 1997 or 2000. In the modern life, Gen Y and Gen Z cooperate together closely, which makes it difficult to set an explicit border between them. For the sake of the studies (after analyzing the literature, including studies comprising description of features and behaviour that are characteristic for representatives of a specific generation as well as potential similarities and differences between them) it was assumed that Generation Z will include people below the age of 20.*

by digital technology, the analysis was limited only to this particular group of respondents.

Nearly 70% of the surveyed were women (compared to 32% of the surveyed men). All respondents studied at the 1st year of the 1st cycle studies of full-time studies of management studies at the University of Łódź: Management (25.3%), Logistics (20%), Human Resources Management (14.7%), Business Analytics (10.5%), Public Management (8.7%), Entrepreneurship and Innovation Management (7.5%) and Finance and Accounting (.9%). The group of remaining courses (6.4%) included Marketing and Finance and Investment. 97% of the surveyed were Polish, 3% were foreign students studying in Poland (from Ukraine, Belarus, China, Iraq and Afghanistan). One in two surveyed had permanent residence in towns of above 30 thousand residents, e.g. Łódź, and 1/3 of respondents were registered in towns of below 5 thousand residents – so-called Łódź satellite towns.

The analysis of the level of spontaneous awareness of notions connected with digital technologies indicated that slightly above 23% of the respondents associated the notion of the Internet of Things. It was frequently defined by respondents as:

- “the net of connection between things, I think that when devices exchange information via the Internet without human intervention”,
- „mutual communication and cooperation of objects”,
- „a network of connected devices within one system so that their functioning could be improved, e.g. everyday objects connected with the Internet”,
- „actions directed at continuous and autonomous collection and processing of data in order to use it e.g. in business”.
- Unfortunately, the respondents also associated the notion of the IoT with:
 - „crypto-currency such as bitcoin”,
 - „various kinds of multimedia platforms by means of which one can make a purchase”,
 - as well as „the fact that you can find everything and about every subject on the net”.

The situation looked much better in case of the notion of Artificial Intelligence – awareness was declared by slightly above 85% of respondents. It can be assumed that a high degree of spontaneous awareness resulted from the fact that it is gaining increasing popularity and a growing number of publications and programmes concerning the issue, including the online ones. In practice, yet, respondents limited the analysed notion mainly to innovative technology, robotics and robots as well as algorithms imitating human intelligence:

- „hyper technology that resembles a human thought pattern“,
- „intelligence that can support or even replace a man“,
- „intelligent robots that can think independently and make decisions“,
- „machines that are programmed so that they could make decisions in performing tasks based on data“,
- „robots programmed so that they could think as humans and learn on their mistakes but they are emotionless“.

The group of respondents who declared awareness of such notions as the Internet of Things and Artificial Intelligence encountered them in Poland although some of them declared that it happened also during foreign trips. They mentioned such countries as the USA, China, Germany and the Netherlands. They also noted that both technologies can lead in future to creating „a better version of a man“, „greater autonomy of machines“ and „growth of their intelligence although that intelligence will be only apparent“ in their opinion.

In the subsequent part of the study all students got acquainted with a real definitional treatment of both notions so that differences in their perception could be eliminated, which was a starting point for further exploration of the analysed problems.

Respondents noticed a possibility of using solutions based on the IoT and AI in particular in case of household appliances, which was indicated by slightly over 72% of respondents, in marketing e.g. in empathic advertising that enables to adjust contents to a specific place, consumer profile and their attitude to displayed message (51.5%) as well as in banking due to a possibility of automation of many routine activities (almost 49%). Respondents noticed the potential of discussed technologies also in motor industry, transport, industry, medicine and in managerial processes implemented in broadly understood market entities. The slightest possibilities of using both technologies, in respondents' opinion, were noticed in case of environmental protection and agriculture, which was indicated by nearly 9% of respondents.

About 44% of the surveyed were convinced that artificial intelligence is a way to increase the potential of solutions based on the Internet of Things, so they should be considered as one common eco-system. The prevailing group expressing this opinion included men (47.2% of the surveyed against 39.9% in a group of women) as well as people who earlier encountered the notion of the IoT (55.1% against 45.8% of the respondents who encountered the notion of AI before). The opposite opinion was expressed by almost 13% of respondents but at the same time, slightly above 43% of respondents could not make an unequivocal decision in that area.

Respondents admitted that they would be interested in buying some of already available solutions based on the IoT and/or AI technologies. They frequently indicated smart everyday appliances (slightly above 60% of respondents), devices increasing safety of their users (55.1% of respondents) as well as connected cars that intuitively react to various road situations without a driver's intervention, which was pointed by one in two respondents. The least popular objects among the respondents were smart clothes that enable to analyse life parameters or geo-localization, which was indicated by nearly 16% of respondents. What is interesting here is the fact that respondents at the same time declared that they already possess some of these things:

- wearables (e.g. "smart watch", "fitness tracker"),
- smart household appliances („vacuum cleaner", „radio and television that can recognize brightness of lighting in a room", „smart oven - it weighs a dish and adjusts a program", „a dishwasher"),
- solutions from the smart home area („smartphone operated roller shutters")
- „connected cars - a car that reads signs and distance from other users of the road".

None of the surveyed was disappointed with these objects. Respondents generally agreed that they meet their requirements and utility and functional values as well as image values, connected with a possibility of being a kind of trendsetter in one's reference group.

When asked about potential benefits of dissemination of solutions based on the IoT and AI respondents indicated that they see differences between benefits that enterprises could have (Industry 4.0), and what the society could gain, including consumers (society 4.0 and consumer 4.0). From enterprises' perspective a key benefit that the surveyed mentioned was better adjustment of products to consumers' needs, which was indicated by almost 60% of respondents, increase of competitiveness of companies and brands already connected to new technologies and their offers (46.4% of respondents), increase in a number of start-ups directed at digital technologies (44.6%) as well as a growing level of automation of implemented processes e.g. production, customer service, etc. (42.2%). Slightly above 41.3% of respondents noticed an increase in digital competences of employees as well as related development of new professions. The least important factor was a possibility of creating new business models such as anything-as-a-service or power-by-the-hour (16.8%). Such variables as gender, place of permanent residence or a fact that a respondent encountered these issues before did not significantly differentiate the layout of responses.

The greatest benefits achieved in a consumer/social dimension that were mentioned by respondents included increased convenience (66.2% of respondents), a shorter time of individual activities (59.9% of respondents), increased sense of control over efficiency of devices and equipment (47.3% of respondents) as well as entertainment (44.6%). What was also important for almost 40% of respondents was a possibility of increased control over performed tasks and increased usefulness of devices and equipment, and one in three respondents indicated benefits in acquisition of new skills and lower costs of using possessed equipment.

Respondents were the most fearful of losing their data (personal data and confidential information), which was indicated by 78.7% of respondents, losing privacy (constant monitoring of attitudes and behaviour) – almost 64% and increased sense of threat resulting from the fact that various devices and equipment communicate with each other, think, make decisions without human intervention (55.7% of respondents). Greater concerns were expressed by people who encountered the notion of the IoT and/or AI before, which may be connected with their knowledge and potential experiences with digital technologies. Respondents also noticed a risk of „restricting their access only to contents and offers in line with their previous behaviour“, „decrease in people’s intellectual level“, „growth of laziness of people whose activities are always replaced by robots“, „lack of ethics in the process of data processing by companies that are not authorized as a result of open access solutions“ and „a lack of possibility of reacting in case of potential failures – we are not able to do anything on our own“. In case of business sector the surveyed mentioned also too exorbitant price of these solutions, too excessive expenditure, especially on research and development that enterprises would have to incur as well as reluctance to such a type of solutions resulting from a lack of awareness of potential benefits. What seems important in that case can be „reluctance of some people who are not very well acquainted with technology – X generation or Baby Boomers who will not be interested in buying this type of devices“.

For 62.6% of respondents it was important that objects and devices can communicate and make autonomous decisions without human intervention. A relatively bigger group was among men (66% against 59.2% of women), moreover, this conviction was growing together with a size of town respondents came from. Unfortunately, at the same time for 12% of respondents it did not matter at all and one in four had no opinion on that issue.

Nearly 63% of respondents were convinced that introduction of such solutions is justified and almost 70% noticed usefulness of devices, equipment and solutions

based on the concept of the Internet of Things and/or Artificial Intelligence. That opinion was expressed by men in particular (73% against 65% of women) and residents of towns of above 30 thousand (69% of respondents). Nearly 13% did not see such needs and 18.5% did not have any opinion on that issue. Almost 73% of respondents thought that the IoT and AI can influence a change in their consumer behaviour. What seems interesting here is the fact that gender in that case did not have any impact (both in case of women and men the value was at the level of 71%). The place of permanent residence also did not matter. Yet, a slight influence on the layout of responses was observed in the fact that respondents had some contacts with each of the discussed technologies before – the greater conviction was among respondents for whom the concepts of the IoT and AI were previously known. However, almost 27% of respondents could not relate to that issue and slightly above 11% of respondents were against.

Respondents admitted that in the next three years one can expect a rise in using the IoT technology, which was indicated by 73.6% (where „definitely yes” was indicated by 27.5% of respondents). At the same time, the opposite response was indicated by 6.9% („definitely no” was indicated only 1.2% of respondents). Unfortunately, almost 20% of respondents had no opinion on the issue. In case of Artificial Intelligence 81.1% of respondents were convinced that its role will increase in the next three years („definitely yes” was indicated by 48% of respondents). The opposite opinion was expressed by 5.7% of respondents („definitely no” was indicated by only 1.5% of respondents), and 13.2% of respondents had no opinion on that issue. Among the supporters of the development of both technologies a dominant group comprised people who encountered both concepts before. It seem justified due to the fact that such people have broader knowledge and potential experiences in that area, so are able to notice real attributes of these technologies and their functionality. At the same time only 13.5% admitted that the most developed robots should be given in the long-term a special legal status of “an electronic person ” responsible for making decisions and interactions with third parties. Opposite opinion was expressed by almost 62% of respondents, and one in four was not able to offer an unambiguous assessment.

Respondents were certain that in the coming years both the IoT and AI will be used mainly in business area (the IoT – 49.7% of respondents, AI – 52.1% of respondents). Slightly above 37% of respondents expressed an opinion that these technologies will matter in consumer dimension, whereas only one in ten respondents noted their potential in the public sphere (e.g. smart city, smart administration, smart governance). What will decide on the dynamics

and directions of development of both technologies to the greatest extent, in respondents' opinion, were actions implemented in that area in the world, which was indicated by slightly above 55% of respondents as well as increased consumers' knowledge on new technologies, which will influence a change in their attitudes and preferences (47.3%) as well as needs and expectations of enterprises (e.g. willingness to be innovative, minimization of costs resulting from automation, etc. - 46.4%). What seems interesting here is that only 23% of respondents admitted that it will be also influenced by actions undertaken by government institutions that popularize the concept of the Internet of Things and Artificial Intelligence.

4. Conclusions

Digital technologies entered a human life for good influencing various areas of human activities and a role fulfilled in the society. It is often the case that a man does not even realize their presence, cannot identify them or even call. What causes some uncertainty is the dynamics with which further changes will appear while leading to virtualization of behaviour, attitudes and decisions, including those concerning consumer space. What guides consumers are various reasons and ambitions in perceiving new technologies and their role in life. Entering in a more or less conscious way interactions with them consumers can receive stimuli with fascination as well as remain totally indifferent or represent a negative attitude. It is important that we are aware of potential paths of development of a digital era so that we do not become a kind of Homo Primitivus towards the potential and challenges of these technologies while borrowing our understanding of the world from and by means of computers, robots or bots and equating our human intelligence with artificial intelligence (Carr 2013, p. 273).

Conducted studies constitute only a preliminary stage of a broader research project. As a result, presented findings are of information nature due to restrictions indicated in the text (sample size, sample selection - its local context as well as a test method - the first stage of quantitative study - declarative material), which enables to formulate far-reaching conclusions. Yet, they offer a beginning and a perspective for further studies and analyses, which will definitely require not only a declarative approach, but also methods based on market experiments. It will enable to collect a multidimensional spectrum of attributes and qualities characteristic for the concept of the Internet of Things and Artificial Intelligence in heterogeneous consumer dimension (based on comparative, confirmatory,

hermeneutical and eidetic analysis). As a result, it will enable to conduct identification of key areas in the process of acceptance of solutions based on such a concept and their impact on evolution of consumer behaviour, with special attention to iteration of causes and consequences resulting from upgrading of digital technologies.

We are not at the brink of the digital technological revolution, we are in the centre of this revolution. Today is the day to begin preparing for this digital future (Borek, Reinold 2016, p. 158).

Summary

Digital Technologies in the Process of Virtualization of Consumer Behaviour

Digital resolution is currently one of the most important forces determining changes and their dynamics in the social, cultural and economic dimension. Digital technologies such as the Internet of Things and Artificial Intelligence will, according to Gartner's Hype Cycle for Emerging Technologies 2017, play an increasingly important role while creating a new quality of the market space. Yet, these are multidimensional issues whose potential should be considered both, from the perspective of enterprises that create and/or adapt such technologies in their production, logistics or sale processes as well as in consumer perspective taking into account a degree of awareness, interest and fascination of potential buyers, users with such devices and solutions. This is determined by dualism of approach to digital technologies (economic approach vs. humanistic approach) and evaluation of their potential benefits and threats. It seems, however, that virtualization of consumer behaviour as a consequence of impact of technologies such as the Internet of Things and Artificial Intelligence, can at the same time be a significant driving force of further processes of digitalization, its dimensions and dynamics.

The article attempts to identify the impact of digital technologies (IoT and AI) on attitudes, preferences and decisions of consumers and presented discussion was based on the results of own studies in the analysed area.

Keywords: *Digital Technologies, Internet of Things, Artificial Intelligence, Consumer Behaviour.*

Streszczenie

Technologie cyfrowe w procesie wirtualizacji zachowań konsumentów

Rewolucja cyfrowa jest obecnie jedną z najważniejszych sił determinujących zmiany i ich dynamikę w wymiarze społecznym, kulturowym i ekonomicznym. Technologie cyfrowe, jak Internet of Things i Artificial Intelligence będą, zgodnie z Gartner's Hype Cycle for Emerging Technologies 2017, odgrywały w najbliższych latach znaczącą rolę, kreując nową jakościowo przestrzeń rynku. To jednak pojęcia wielowymiarowe, których potencjał należy rozpatrywać zarówno z punktu widzenia przedsiębiorstw kreujących i/lub adaptujących te technologie w swoich procesach produkcyjnych, logistycznych czy sprzedażowych, ale także w ujęciu konsumenckim, uwzględniając stopień świadomości, zainteresowania i fascynacji potencjalnych nabywców, użytkowników tego typu urządzeniami i rozwiązaniami. Determinuje to dualizm podejścia do technologii cyfrowych (ujęcie ekonomiczne versus ujęcie humanistyczne) i ocenę ich potencjalnych korzyści i zagrożeń. Wydaje się jednak, że wirtualizacja zachowań konsumentów, jako następstwo wpływu technologii takich jak: Internet of Things i Artificial Intelligence, może być jednocześnie znaczącą siłą sprawczą dalszych procesów cyfryzacji, jej kierunków i dynamiki. W artykule podjęto próbę zidentyfikowania wpływu technologii cyfrowych (IoT i AI) na postawy, preferencje i decyzje konsumentów, a prowadzone rozważania zostały poparte wynikami badań własnych w omawianym zakresie.

Słowa

kluczowe: *Digital Technologies, Internet of Things, Artificial Intelligence, Consumer Behaviour.*

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Classification: M31

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