Social aspects of innovation management in digital sector

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Abstract. Innovation management in the digital sector requires taking into account the institutional, socio-structural and socio-cultural context. The article discusses the thesis about unevenness of digitalization in different spheres of society and for different social groups. The actual implementation and use of innovations in everyday life depends not only on development of infrastructure and digital literacy, but also on emerging social norms, including associated with peculiarities of culture of society, belonging to the "artificial" or "natural" type. Artificial intelligence and digital innovations affect the field of health, human corporeality, bioethics, biosociality, etc. There are new sociological approaches which make it possible to study the management of innovations, for example, atypical sociology, augmented reality, concept of posthumanism, etc. An information policy is needed that allows representatives of social groups to perceive innovations more adequately.

1 Introduction

Innovations in the digital sector affect different spheres of life of modern peoples and are associated with the formation of new social norms and practices at the individual, group, national and global levels. In this regard, in order to manage innovations in the digital sphere, it is necessary to study their institutional, socio-structural and socio-cultural context.

Institutional goals and norms that stimulate and regulate the digitalization process in Russia are defined in the national program "Digital Economy of the Russian Federation" for the period of 2018-2024. The criterion for the digitalization of society (digital transformation) is the level of use of digital technologies in business, activities of government agencies and everyday practices [1].

The socio-structural context of the introduction of new digital technologies involves the identification of social groups that have more or less resources for development and use of these technologies.

Three levels of the digital divide in modern society can be distinguished: the infrastructure that provides access to information and communication technologies, the skills to use modern technologies, as well as life chances, defined as opportunities or advantages of using technologies [2]. Some social groups, such as the elderly, persons with low incomes and low levels of education, certain ethnic groups, turn out to be the least involved in the digitalization processes in all the indicated parameters.

2 Materials and methods

Digital literacy is not just the ability to use software or digital equipment (devices), it includes the more complex cognitive, emotional and social skills required to function effectively in a digital environment. As shown in a study conducted in Indonesia's telecommunications industry, digital literacy of company employees affects the effectiveness of introduced innovations: digital literacy significantly moderated the relationship between innovative work behavior and employee performance [3]. It is natural to assume that digital literacy of the population is also a resource for effective digitalization of society as a whole.

In Russia, an annual survey is being conducted to analyze the digital literacy of the population. At the same time, the European Commission DigComp 2.0 methodology is used, according to which the analysis of digital competencies is carried out according to 5 main parameters: information literacy, communication literacy, digital content creation, digital security and problem solving skills in the digital environment.

According to the results of a survey in January 2020 (a representative sample of the Russian population, N = 1300 respondents), the digital literacy index of Russians was 58 percentage points on a scale from 0 to 100. With the highest values obtained for the parameter "communicative literacy" (the ability of Russians to use various types of online services and electronic devices for communication on the network) it was 62 percentage points. The lowest values were obtained for the parameter "digital content creation" (human competence in creating and editing digital content, skills in working with copyright on the network) - 53 percentage points. Only 27% of Russians have a high level of digital

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literacy and key competencies of the digital economy (this share remained practically unchanged from 2018 to early 2020) [4].

The digital literacy of Russians is largely determined by the region of residence. The residents of the South and North Caucasian Federal Districts have the lowest rates of digital literacy, the highest are the residents of the Northwestern Federal District. Also, the level of digital literacy is higher in the largest settlements, and the lowest in rural areas. There are no significant differences in the values of digital literacy between men and women. To the greatest extent, the level of digital literacy is associated with age characteristics: the lowest values of digital literacy are among Russians over the age of 55, especially non-working pensioners. Professional activity affects the level of digital literacy, and this indicator is higher among working students as compared with other groups [4].

Differences in the level of digitalization depending on age are also noted in other studies: "different generations live in different virtual realities", i.e. "Analog" (mainly watching TV) and "digital" (active use of gadgets) [5, p. 49]. Representatives of the older generation themselves assess their digital competencies at a low level (see Figure 1): if among young people aged 18-24, 82% of respondents are satisfied with the existing level of digital competencies, and only 17% are not satisfied, then among those aged 60 years and older 42% believe that they do not have enough computer, laptop and telephone skills [6].
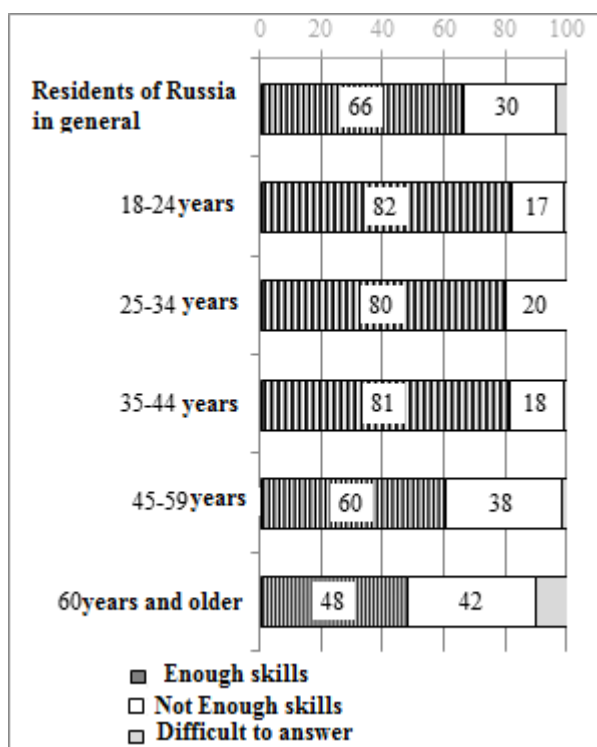

Figure 1. Self-assessment of computer, laptop, telephone skills in different age groups, in % (WCIOM survey data, N = 1600 respondents, April 2020 [6])

In a study by PwC (USA, 2017), groups of business managers, millennials, and consumers (N = 2500 respondents) were identified [7, p. 12]. 72% of business execs, 53% of millennials, 42% of consumers already

have been using digital assistants. Moreover, half of managers noted that the free time allows them to immerse themselves in a deeper study of any area or in creativity. Over 40% of consumers believe AI will expand access to financial, medical, legal, and transportation services to those with lower incomes [7, p. 6]. 80% of consumers answered that it is more important for them to have access to legal advice than to keep the lawyer's job due to the use of robots.

According to the index of readiness for the future [8, p. 5, 30] in the "Technologies" section, we used such criteria as the number of mobile subscriptions per 100 inhabitants, the volume of venture capital, the level of innovation, the level of technological complexity of production. Russia ranks 12th (Table 1), the final index for all spheres was 0.38.

Table 1. Technologies Integrated index [8]

Country	Index
Japan	1,0
USA	0,94
Germany	0,89
Republic of Korea	0,85
United Kingdom	0,76
China	0,71
EU	0,55
France	0,52
Canada	0,51
Italy	0,43
Australia	0,42
Russia	0,36
Indonesia	0,15
India	0,15
South Africa	0,11
Saudi Arabia	0,11
Turkey	0,07
Mexico	0,07
Argentina	0,06
Brazil	0,00

3 Results and discussion

The socio-cultural context - the ideas, values, norms and symbolic values that have developed in society - requires special consideration in the process of digitalization of society. A number of sociological studies are devoted to the analysis of the perception of technological (digital) innovations in different cultures.

The data of the World Economic Forum (2019) and the model of national culture by G. Hofstede (2020) make it possible to single out such indicators of artificial sociality as the use of ICT (information and communication technologies) in the country and the digital skills of the active population [9, p. 52]. Such indicators of culture according to G. Hofstede, as Power Distance Index (PDI), Uncertainty Avoidance Index (UAI), Individualism versus Collectivism (IDV), Long Term Orientation versus Short Term Normative Orientation (LTO), (especially the last two), were important for assessing the potential of human-machine interaction. For example, short Power Distance is characteristic of Austria, Denmark, a large one - Russia,

the Philippines, Individualism - the USA, Australia, Collectivism - Venezuela, Indonesia [9, p. 61]. Conditionally "artificial" cultures include countries with short Power Distance, values of Individualism, Acceptance of Uncertainty, Long-Term Orientation. Conditionally "natural" cultures include countries with long Power Distance, values of Collectivism, Avoidance of Uncertainty, Short-Term Orientation. Denmark was among the leaders of the "artificial" culture, and Venezuela was among the "natural" ones.

Sociology also examines attitudes towards specific types of innovation. In 2017, a study was conducted of the attitude of Russians (a voluntary response sample of active Internet users, N = 2314 respondents) to the introduction of robots in medicine, genetic modification, cyborgization and unmanned vehicles, as well as the influence of the information factor on social attitudes (obtaining additional information about the essence and value of technology). According to the data obtained, the overwhelming majority of respondents (95.5%) have a positive and rather positive attitude to the use of robotics in medicine and even express their readiness, in case of medical indications, to undergo surgery with a robotic surgeon (78.7%). 17.0% of respondents expressed their disinclination (unwillingness) to undergo surgery with a robotic surgeon. Every fourth respondent (26.1%) expressed a negative attitude towards the possibility of changing the human genome. The introduction of unmanned vehicles is positively or rather positively assessed by 89.4% of the respondents, negative - only 7.2% of the respondents. At the same time, they are completely unprepared or rather unprepared to use an unmanned vehicle themselves - 17.7% of respondents.

Thus, even among persons who are more familiar with new technologies, there is a negative or wary attitude towards the introduction of these technologies into their lives. The authors of the study conclude that it is necessary to systematically prepare society for the introduction of a new technology, to pursue an appropriate information policy, otherwise new technologies can become not only a source of new conveniences, but also a potential determinant of the growth of anxiety in society [10].

In 2018, an assessment was made of possible scenarios for using AI / robots in different spheres of life, according to representatives of different social groups (N = 211 respondents). In general, respondents in Russia are the most supportive of the transfer of functions from humans to artificial intelligence and robots in areas such as driving, disaster prevention and military activities, and the least supportive in areas such as childcare, personal assistant for making important decisions and creative activity [11]. Thus, robotization is largely supported by the public in those areas that are more formalized, algorithmic and not associated with interpersonal, emotionally colored relationships. Similar results were obtained in a survey in Japan in 2015, although there were also reduced assessments of the possibility of robotization (complete replacement of human labor) in the healthcare sector [12].

As of 2020, Russians are ready to use the achievements of AI, first of all, in obtaining public services, in solving everyday problems, leisure and healthcare [1, p. 30], which indicates that everyday consumer practices and the speed of settling related problems are important, as well as culture (rather, with a predominance of hedonistic values) and physicality, bordering on the medical sphere. So, among the main achievements of the XXI century, according to the respondents, bionic prostheses of arms and legs came out on top [1, p. 7].

Particularly acute are such dilemmas as human / subhuman (embryos, genetic "design"), living / nonliving, life extension / death (euthanasia, care for the elderly), physical / non-physical, etc. The unifying factor is ethical issues, which equally relate to both the AI and biomedical (bioethics, which overlap with artificial biosociality), as well as the development of telemedicine.

If we assume that the practice of caring for family members (medical and ethical) in the future will become the sphere of robots (in countries such as Japan, they have already begun), then the attitude of the population to special, sometimes taboo topics (euthanasia, IVF procedures, egg freezing, abortion, some diseases, disability, etc.) is needed to be revealed now. So, on the question of whether it is worth allowing euthanasia in the event of a serious illness that brings suffering, Russian society is split by half - 50% for, 40% against, and 10% found it difficult to answer (2020). To the question "Is it permissible to have a baby with IVF?" - "rather acceptable" was answered by 84% of the respondents [13]. Those who disagree have religious, ethical motives (it is better to take children from orphanages).

Bioethics also touches upon the issues of modern burial practices. There are very few such studies in the field of the sociology of death (death studies) in Russia. Sociologists from Voronezh city conducted a survey in 2016. In particular, the question was asked: Would you agree to be cremated after death? (N = 600 respondents, telephone interview). 40% of respondents answered no, 24% -yes. There are more women among those who answered yes. Among those who believe that this issue should be resolved by relatives, but they do not care, men predominate. Among the respondents with incomplete secondary education, nobody would agree with own cremation [14]. Therefore, a special segment of innovation management is making decisions on construction of crematoria as objects of more modern burial practices.

In the process of managing the implementation of innovations, the importance of the emotional component of social behavior increases. Taking into account the type of corporate culture, it is important to monitor subjective well-being, i.e. emotional assessment of satisfaction with life in general [15, p. 42]. According to researchers, subjective well-being is better in innovative companies as compared to ordinary companies (N = 260 people). The class of professions plays a role under the same conditions for the introduction of innovations: women over 55 and men over 60 (in a situation of raising the retirement age), ordinary organizations. Physicians turned out to be more ready to introduce innovations, to

continue working for a five-year period than engineers [15, p. 48]. Perhaps this is due to the fact that Physicians regularly (every 5 years) confirm their qualifications.

Thus, sociological studies reveal the presence of contradictions in the perception of digitalization in the public mind. It is difficult for Russians to decide what AI is, how to make a choice of services and preferences, an emotional attitude is not formed, nevertheless, 1/3 of the respondents have an interest [1, p. 30].

According to the results of an all-Russian survey conducted in January 2020 (a representative sample of the Russian population), the stereotype about the negative impact of artificial intelligence on the labor market is rejected: 68% of the population are not afraid of replacing humans with AI technologies in their profession [16]. When answering an open-ended question (with no answer options) about why the spread of artificial intelligence technologies causes concern, Russians most often talk about a possibility of technical failures: problems in operation of equipment, machines out of control, their unreliability (in total, these problems were indicated by 31% from the number of those who expressed a negative attitude towards AI). Also, the negative attitude is due to the threat to the security of personal data: hacking and theft of personal data, violation of personal space (21%); replacement of live communication between people, personality degradation (16%), lack of understanding of new technologies or lack of trust in them without specifying the reasons (12%).

4 Conclusion

The COVID-19 pandemic and lockdown led to an accelerated and, for the most part, forced digitalization of all spheres of life (consumption, labor, education, leisure, communication, everyday life, etc.), which, on the one hand, increased the digital literacy, on the other hand, it has led to an increase in the level of technophobia and anxiety about the use of digital technologies to spy on humans and manipulate public opinion. In this regard, the implementation of the Digital Economy program, including the National Strategy for the Development of Artificial Intelligence, may require, according to T. Nestik, "significantly more efforts, first of all, a broader public discussion of digital initiatives" [1, p. 22]. Further implementation of digital technologies in the economy and social sphere requires not only the development of appropriate infrastructure, but also the willingness to participate in the digitalization of various social groups, which largely depends on how these groups perceive and evaluate new technologies.

The sociological study of innovation in the digital sector involves development of new theoretical (explanatory) models.

For a long time, social processes taking place in a virtual, digital environment have been explained in sociology in the postmodern paradigm. For example, it was suggested that the formation and spreading of Internet memes as a new cultural product occurs by analogy with simulacra according to the concept of J.

Baudrillard. Now sociologists are increasingly talking about post-globalization, post-virtualization, post-humanization. What is the new modernity?

In the conditions of post-globalization and post-virtualization, the concept of augmented reality has emerged. The old modernist structures do not disappear, but are supplemented by new ones, forming a rich active life in urbanized enclaves. In the periphery, there is a "depleted" sociality ("depleted" modernity), poor in cultural and socio-political events [5, p. 51-52].

Artificial sociality is understood as participation of artificial intelligence agents in social interactions as active mediators or participants in these interactions [17, p. 43]. AI in a certain sense is inherent in humans when humans have to think algorithmically, schematically. The boundaries of natural and artificial sociality can shift. Studying the features of human-robot communication, researchers come to the conclusion that it is possible to teach robots to communicate socially, for example, by avoiding long pauses in conversation. And then it is possible to predict the expansion of the "natural (associative) sociality" of robots. Even R. Collins noted that storing information about previous conversations in the memory of a robot allows accumulating cultural capital [18, p. 589]. In the case of humans, the mechanism of communication appears that corresponds to an artificial or natural sociality (culture).

Despite the fact that many social structures and processes work in the same way as before, perhaps an atypical sociology which gets rid of any typification is needed to explain new phenomena [19, p. 10]. Probably, a new direction is also possible in the mainstream of posthumanism, which manifests itself through a rapid increase in the rate of social processes (transience), metamorphism (constant renewal), "desecuritization", i.e. lack of security and an abundance of risks up to total control using artificial technologies, etc. [20, p. 18-19].

Gadgets, virtual services, online learning, telecommuting, artificial intelligence technologies have already spread enormously. However, the problems of involving different social groups, classes of professions in digitalization, the social consequences of digital technologies and ways to regulate them remain an open question and require further study.

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