Smart Rural Settlement: Digitalizing the Quality of Life

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Abstract. A targeted approach to digitalization of the quality of life in rural settlements is considered. The decline in the rural population is evidence of the continuing lag in the quality of life of the rural population from the urban one. Along with this, new indicators related to digitalization appear, such as the number of computers per household, the availability of mobile communications, and others. The growth of these indicators among the rural population is close to that of the urban population, which allows setting goals and performance criteria to improve the quality of life based on digitalization. The main tool, in this case, can be websites, which we analyzed for all districts of the Novosibirsk region; this procedure does not require large capital investments, but allows solving many problems of a social and public nature.

1. Introduction
By "smart settlement" we mean a territory where, using modern information and communication technologies, resources and services are effectively managed in order to improve the quality of life of the population and ensure their safety [1]. A smart settlement is, first of all, a settlement that is convenient for citizens. Anyone derives satisfaction from a high quality of life, often comparing it to the quality of life in another locality or country.

The main indicators of the quality of life of the population include such as income of the population (the quality of food, home comfort, safety, quality of services and others depend on them), life expectancy, quality of education, health care, culture, and the environment [2, 3].

2. Formulation of the problem. Formation of goals for managing a rural settlement in the digital economy
From the general goal of improving the quality of life of the population, we single out the goals of management from the standpoint of the digital economy, namely the contribution of digitalization to improving the quality of life of the population. At the same time, the goals of managing a rural settlement have something in common with the general goals of managing a city and a country [4, 5]. If the goals of managing a rural settlement include the level of employment, the level of income, ensuring the availability of medical, educational, cultural, entertainment, sports services, then the main goals of management include the average life expectancy of the population, the unemployment rate, the level of income, the share of Internet users, and others [6, 7]. Despite many coincidences, a block of goals stands out separately, providing a vital level in everyday life. These goals include such as the provision of water, sewerage, electricity, cellular communications, the Internet, high quality roads, and
The formation of the goals of managing a rural settlement based on indicators of the quality of life of the population allows us to single out a group of indicators that do not require large capital investments and are determined only by access to mobile technologies (Table 1).

**Table 1.** Formation of goals for the management of rural settlements.

| Strategic goal                                                                 | Long-term and current goals                                                                 | Indicators                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Improving indicators of the quality of life of the population based on the digital economy | 1. Long-term goal of rural settlement management                                             | 1.1. Development of distance education                                                                                                                                                                   |
|                                                                                |                                                                                             | 1.2. Development of remote medical services [8, 9]                                                                                                                                                       |
|                                                                                |                                                                                             | 1.3 Application of consumer cooperation programs of remote access                                                                                                                                       |
|                                                                                |                                                                                             | 1.4. Development of environmental programs                                                                                                                                                           |
|                                                                                |                                                                                             | 1.5. Development of the electronic local government system [10, 11]                                                                                                                                  |
|                                                                                |                                                                                             | 1.6. Development of programs for cooperation in the transport of goods and people                                                                                                                     |
|                                                                                |                                                                                             | 1.7. Development of a system of mutual assistance                                                                                                                                                     |
|                                                                                | 2. The current goal of managing (monitoring) a rural settlement under conditions of the digital economy | 2.1. Provide access to distance education for the rural population up to 100%                                                                                                                           |
|                                                                                |                                                                                             | 2.2 Securing medical staff to improve medical care (in the course of year)                                                                                                                             |
|                                                                                |                                                                                             | 2.3. Improve the provision of goods for consumer cooperation (monthly)                                                                                                                                     |
|                                                                                |                                                                                             | 2.4. Ensure monitoring of environmental indicators (waste collection and recycling) on the site of a rural settlement (monthly)                                                                         |
|                                                                                |                                                                                             | 2.5. Ensure the transition from a centralized management structure to a network (coordination of functions) (in the course of year)                                                                         |
|                                                                                |                                                                                             | 2.6. Increase the client base up to 100% of personal and business vehicles for transport cooperation                                                                                            |
|                                                                                |                                                                                             | 2.7. Increase the number of assistance programs (reaching up to 100% of the population)                                                                                                                   |
|                                                                                |                                                                                             | 2.8. Offer the population different forms of participation in online communities (professional, educational, searching and others)                                                                            |

A survey of the population of the districts of the Novosibirsk region (179 people from 20 to 78 years old) was conducted on the possibility of improving the quality of life through the use of information and communication technologies. Table 2 presents the categories of questions that the
respondents chose as the most significant for improving the quality of life. It should be noted that all the questions that were included in the sample depend on the level of development of information technology. The most popular were the questions about the quality and efficiency of the provision of medical services, the provision of utilities, transport accessibility (mobility of the population), environmental problems.

Table 2. Results of a survey of residents of the Novosibirsk region to identify the most significant issues on the quality of life, determined by information technology.

| Categories of questions as regards to the quality of life                                                                 | Number of respondents persons | % |
|--------------------------------------------------------------------------------------------------------------------------|------------------------------|----|
| Smart economy (growth of incomes of the population, growth of labor productivity, reduction of unemployment level)         | 83                           | 46 |
| Smart management (electronic document flow, no paper certificates, decision-making based on the assessment of the collective opinion of citizens) | 112                          | 63 |
| Smart technologies (in education, medicine, sports)                                                                      | 79                           | 44 |
| Smart infrastructure (smart home)                                                                                        | 43                           | 24 |
| Smart environment (video surveillance and security, environmental monitoring)                                             | 38                           | 21 |
| Smart education (distance, online, electronic libraries)                                                                  | 98                           | 55 |
| Smart transport (ecological and intelligent transport systems)                                                            | 34                           | 19 |
| Smart medicine (quality and efficiency of medical services)                                                               | 46                           | 26 |

So, for example, the main goal, namely, increasing the indicators of the quality of life of the population based on the digital economy, includes constant management based on monitoring. At that, the share of indicators providing the population with digital services, not replacing, but complementing all spheres of the population's life is growing. These include ensuring the rural population the access to distance education, attracting medical personnel to improve remote health care, improving the supply of goods for consumer cooperation, improving environmental performance and logistics of local transportation, etc. All these ensure participation in the management of all rural residents.

3. Research results: digitalization of the quality of life

The Smart Settlement is primarily human-oriented, based on ICT infrastructure and continuous development while constantly taking into account the requirements of environmental and economic sustainability. The approach to defining a “smart settlement” is based on a deep understanding of the role of social connections and human capital. In our understanding, this is a settlement in which local communities are constantly learning, adapting, creating and using innovations. Such indicators of the activity of the population of a “smart settlement” are proposed by the authors in Table 3. The task is to ensure that a variety of residents are to be included in social life and participated in the management of the settlement and its change for the better.

When studying the possibilities for improving the quality of life of rural settlements, which significantly lags behind the urban ones, we proceed from the assumption that both urban and rural populations can access Internet resources of national importance, designed to inform citizens about various spheres of life in Russia, such as the portal of the Gosuslugi (State services) and others [12-14]. In addition, a fairly new direction is successfully developing, namely, the websites of rural settlements, accumulating their own, local characteristics and traditions. They contribute to improving the quality of life of the population of rural settlements.
Table 3. Indicators of the quality of life of the population by the use of ICT (developed by the authors).

| No. | Quality of life indicator | A source of information |
|-----|---------------------------|-------------------------|
| 1   | Share of the population able to maximize the use of computer technology | Expert assessment of specialists |
| 2   | Share of the population trained under the "Russians of the Future" program | Expert assessment and collection of information from websites |
| 3   | Share of population capable of implementing a Smart Settlement system | Statistic data on professional participants and public organizations |
| 4   | Share of "electronic services" in governing bodies | Collection of data on the websites of government bodies (local, district) |
| 5   | Share of the population ready for online education | Collection of data on the websites of educational organizations. Poll, questionnaire survey of the population |
| 6   | Share of the population using the public services portal | Government service websites |
| 7   | Share of the population participating in social activities and self-organization | Population polls, Public organizations statistics |
| 8   | The share of the population participating in the work of projects on the website "Civil Initiative" | Expert assessment of specialists, site visit rates |

Only 585 thousand people live in the countryside of the Novosibirsk region and the number is decreasing every year. Preliminarily, the composition of the districts, the lists of village councils were determined, information on the population size by municipalities and demographic statistics were also collected [15]. The structure of the population has not changed over the past three years. At the same time, the working-age population and the population as a whole are decreasing.

Indicators of provision of the rural population with mobile communications and access to Internet resources are such that they "catch up" the urban population, so the availability of computers per 100 households differs by 15%, and the Internet connection is only 20% [16, 17]. Each rural area has its own website, so all 30 sites were analyzed and assessed (Table 4).

To evaluate the websites of the districts of the Novosibirsk region, criteria were developed such as information about medical services, cultural events, educational services, interaction between business, authorities and the population, the possibility of paying bills, issuing a subsidy, coverage of district news, site usability, accessibility and operability of the search system for site, the frequency of updating information on the site, the frequency of updating information in documents, the operability of an online record.

Grades were given by students of applied science (40 people) in the framework of industrial practice in the range from 1 to 4 points, meaning, from unsatisfactory condition, satisfactory, good to excellent. The final total scores for 30 sites are presented in Table 4. It was found that only the news of the region is well covered in the rural area, which is clearly not enough for the formation of public opinion, involvement and complicity in the management of the population.

Figure 1 shows that the average assessment of the functional of the sites of the districts is 24.25 points out of 40 possible, with the highest rating for the Novosibirsk district - 29 points, the lowest assessment - 21 points is observed in the following districts: Bolotinsky, Dovlensky, Maslyaninsky and Ubinsky.

Based on the data presented in Table 4, it can be concluded that almost all district sites have problems with paying bills, applications for subsidies, search system performance and online registration. The situation is slightly better with the provision of information on health services, but in some areas it is still missing.
Table 4. Rural settlement website evaluation.

| Indicator                                                                 | Grade | Comments                                                                                                                                 |
|---------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------|
| Information about medical services                                       | 1     | There is no information on the site of the district itself, the site redirects to https://www.gosuslugi.ru/                               |
| Information about cultural events                                        | 2     | Culture information can only be found among other news in the News tab. The Culture tab contains only general information about cultural institutions |
| Information about educational services                                    | 1     | Information not presented on the site                                                                                                   |
| Interaction between business, authorities and the population              | 2     | The site contains a list of officials of the District Administration, but for communication you need to make a phone call                |
| The ability to pay bills                                                 | 1     | None                                                                                                                                     |
| Application for subsidies                                                | 1     | The site redirects to https://www.gosuslugi.ru/ and https://www.mfc-nso.ru/                                                              |
| District news coverage                                                   | 4     | News appears on the homepage almost every day                                                                                            |
| Site convenience                                                          | 1     | Information is divided into tabs, and is not easily accessible, many tabs are not filled with information                                |
| The presence and operation of the search system on the site              | 1     | Site search is present, but does not give any results, even if the necessary information is still available on the site                   |
| Frequency of updating information on the site                             | 3     | Information is updated annually                                                                                                         |

Thus, having analyzed the filling of the sites of all districts, we can say that the functionality of the sites of the Novosibirsk region districts requires improvement. At the moment, sites are only good at news functions.

4. Conclusion
The adopted strategy for the development of the digital economy leads to a change in priorities, the system of goals, tasks, methods of solving them, indicators of the completeness of the implementation of goals and the effectiveness of their achievement. In place of the classical economic indicators of efficiency, there are socially oriented indicators characterizing the transition to an information society, where the main attention is paid to the self-realization of the individual.

Summing up, we can say that the population of rural settlements of the Novosibirsk region is provided with mobile communications and access to the Internet space. Consequently, the quality of life of the population can increase on this basis. Modern opportunities allow participants in the Internet space to independently build their rural settlement in almost any locality - using mobile applications in smartphones, websites, the introduction of digital services within their local community. An important role is played by the websites of rural settlements, which improve the quality of life without requiring large capital investments.

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