ENSURING THE COMPETITIVENESS OF AMALGAMATED HROMADAS (TERRITORIAL COMMUNITIES) UNDER CONDITIONS OF DECENTRALIZATION OF POWER USING MODERN INFORMATION TECHNOLOGY

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Abstract. Modern IT today is used in various spheres of public life, including in the management of the amalgamated hromadas, which will ensure the competitiveness of the amalgamated hromadas in the context of decentralized power. The *purpose* of this article is to improve the use of the latest information technology to ensure the competitiveness of amalgamated hromadas in the context of decentralized power. *Methodology*. The article considers the directions of using information technology to strengthen the competitiveness of amalgamated hromadas. Functional features of amalgamated hromadas' attractiveness, which will significantly increase the attractiveness of amalgamated hromadas in comparison with standard sites, are proposed. The authors considered the optimization of the infrastructure of the processes of interaction of government/local government with the residents of the regions, which will solve many significant problems of the development of amalgamated hromadas. The authors proposed an algorithm for the use of IT technologies in the operation of the amalgamated hromadas, which is carried out in 4 stages. The organizational scheme of development of recommendation models based on artificial intelligence, thanks to which it is possible to optimize the work of the management office of the hromada, namely, the formation of its budget is considered. *Results*. It is established that IT directly affect public communications, having a solid managerial potential. It was revealed that the peculiarity of the development of amalgamated hromadas is the need for a comprehensive application of modern forms and methods of information support of their activities. In particular, it is the use of models based on artificial intelligence to ensure the competitiveness of amalgamated hromadas in order to function effectively. Amalgamated hromadas' effectiveness in the decentralization of power depends on the level of interaction with citizens and enterprises, the quality of work of each institution, and the exchange of authorities with each other. The development of an appropriate technical base will not solve all the problems in the system of local government. But it can significantly increase the effectiveness of its work at different levels. *Practical consequences*. The use of recommendation models based on artificial intelligence will allow for more effective budgeting in amalgamated hromadas and ensure a high level of transparency in the work of local authorities. *Value/originality*. Modern IT makes it possible to build a system that would quickly and timely respond to all dangerous events in real time and alert to the likelihood of threatening events in the community.

Key words: information technologies, competitiveness, amalgamated hromada, infrastructure optimization, algorithm.

JEL Classification: L86, O18, O32

1. Introduction

In today's information society, the idea of e-government as a way of organizing government activities through internal and external information networks is rapidly spreading and gaining momentum. The website of the authority is the main communication link that connects it with the recipients of administrative services, i.e., with the community (Bondarenko, 2009).

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Today, with the formation of the information society, modern information technology is required for the functioning of any sphere of activity. Consequently, intelligent technologies are actively used in various spheres of public life. Artificial intelligence is a purposeful organized set of information processes using computer technology that provides high-speed data processing, rapid information retrieval, data dispersion, access to information sources regardless of location. For example, artificial intelligence technologies are used to establish medical diagnoses, drive automated cars, trade financial instruments on exchanges, analyze large amounts of data, recognize and generate images, household chores are created, etc. Investment in the development of artificial intelligence technology is constantly growing, as it creates significant opportunities to improve production efficiency, reduce costs, and improve the quality of goods and services. Furthermore, the use of information systems and artificial intelligence technologies to meet the needs of hromadas meets the demands of the times and can be considered their competitive advantage. Moreover, developed countries actively use the latest technology in the organization of hromadas.

The system of electronic government, first of all, provides openness and transparency of government at all levels, offers productive interaction of all branches of government among themselves and with the society, simplifies procedures for obtaining services (Myna, Baiko, Solomon, 2015).

Given this, the use of information technology in the management of hromadas should be seen as a promising direction for their development, which will improve the efficiency of management, the organization of individual areas of its activities and the safety of the community as a whole.
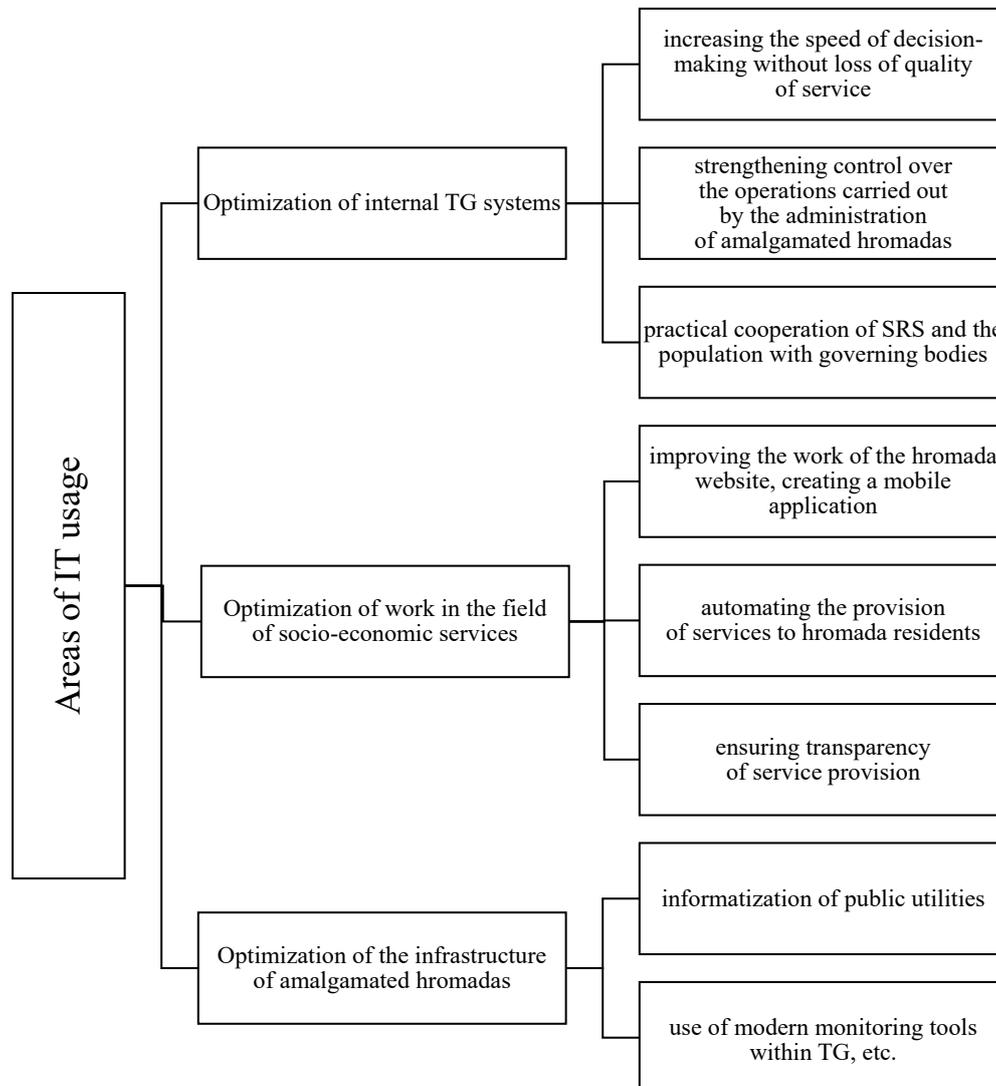

Figure 1. Areas of using IT to strengthen the competitiveness of amalgamated hromadas

Source: author's development

2. Areas for using IT to improve the competitiveness of amalgamated hromadas

Information technology is a fairly broad concept that includes methods, processes and ways of using computers and communication systems to create, collect, transmit, search, process and distribute information. The purpose of the introduction of information technology is to solve specific problems of their development:

– improvement of information and analytical support of territorial management functions;

– reducing the time to obtain the necessary information and summarize it;

– making data more accessible to community residents and external consumers.

Mass types of modern information technology are aimed at accomplishing the following tasks:

– information processing technology;

– management information technology;

– information technology support includes a set of information processes for solving specific problems (Regional Development and Cohesion Policy, 2018; Roll-call voting of Dnipro deputies).

To date, it is necessary to identify specific areas for the use of modern IT-technologies to improve the competitiveness of amalgamated hromadas (Figure 1).

The use of information systems and technologies is an important element in strengthening the competitive advantage and competitiveness of territorial communities (hromadas).

The areas of IT use are interrelated, but the proposed division allows us to identify the main beneficiaries of specific IT tools, taking into account the interests of various actors in hromadas and the goals of achieving the strategic effects of their implementation.

The first direction is the allocation of optimization of amalgamated hromadas' internal systems, that is, improving the processes and procedures of the system of internal support of local government, i.e., the administration. It is obvious that without the use of modern IT technologies, the performance of any functions of the hromada management apparatus (accounting, personnel, land management, utilities, etc.) can be extremely slow or even inefficient.

The main challenges that need to be met when optimizing the management of the amalgamated hromadas using modern IT solutions include the following:

– increase the speed of decision-making without loss of quality of service;

– strengthening control over the operations carried out by the administration of amalgamated hromadas;
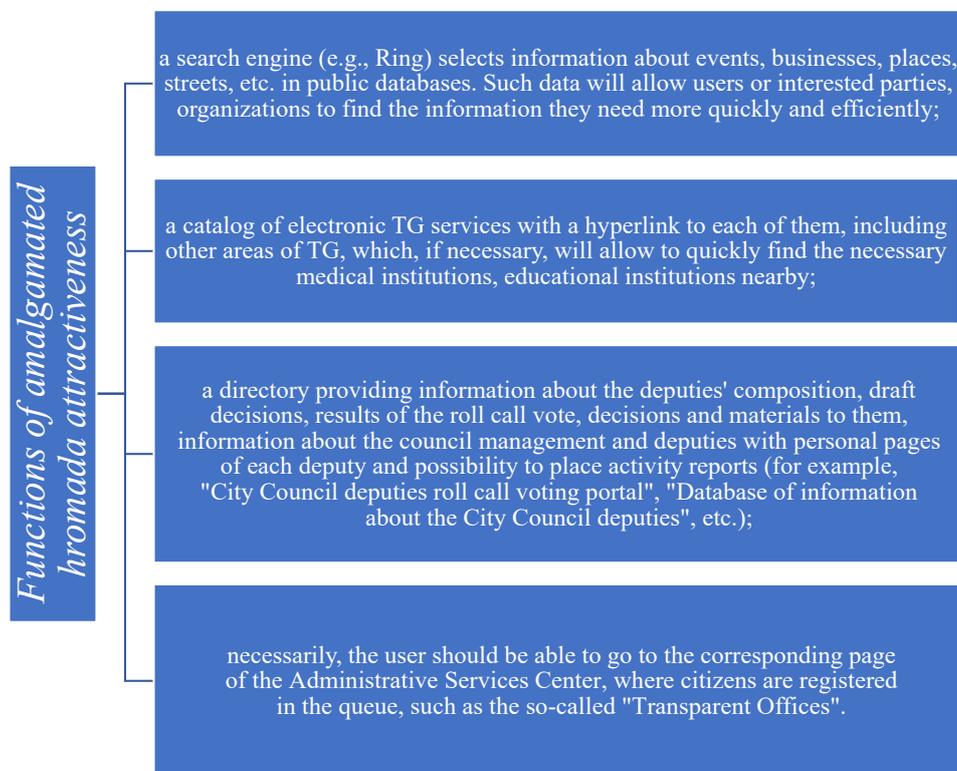

Figure 2. Functions of amalgamated hromada attractiveness

Source: compiled by authors based on (Deputy corps; Roll-call voting of Dnipro deputies; Search in state registers; Transparent office)

– practical cooperation of SRS and the population with governing bodies, etc.

As for the optimization of work in the sphere of socio-economic services, it should be noted that the main tool of interaction between the apparatus of the amalgamated hromada with the population and business is its web-representation, i.e., the website. Note that the common website in today's environment has insufficient functionality, so it is necessary to develop a mobile application with the functionality available on the full version of the website. It is also believed that automated bots will speed up response times for hromada residents, systematize frequently asked questions, and thereby provide insight into critical elements of the hromada's infrastructure.

In addition to the mandatory elements defined by the current rules (e.g., budget, hromada composition, etc.), the main page of the amalgamated hromada should provide additional functionality that would greatly enhance the attractiveness of the amalgamated hromada compared to unified sites. Figure 2 shows the functionality of the amalgamated hromada's attractiveness.

These recommendations broadly coincide with the government's vision for the "state in a smartphone" project. The launched "Diia" app is a fairly effective tool for optimizing the interaction between state/local authorities and regional residents. Along with this, expanding the functionality specific to IT services in a particular merged hromada will allow residents to keep a "finger on the pulse" of events.

Optimization of amalgamated hromadas infrastructure is shown in Figure 3.

1) Informatization of utilities is to make repairs and provide shared services. Therefore, according to the authors, it is necessary to provide specialized equipment with trackers, which will allow online display of information on the availability of special equipment on the infrastructure of emergency amalgamated hromada. Furthermore, information on the number of funds allocated for this repair, displayed on the amalgamated hromada website, will allow public control over its effectiveness.

2) CCTV cameras inamalgamated hromadas are an important tool to improve competitiveness, especially as the structure of local government changes, because it contributes:

- to a higher level of security;
- to the improvement of traffic – detected gridlock can be eliminated by quickly changing the lighting, street equipment, and drivers will determine the optimal route to bypass traffic jams, etc.;
- to the improvement of the environmental situation – objects that significantly pollute the environment will be identified, and the results of the observations can become the basis for a decision in a lawsuit against the polluters;
- to increased social stability, as it will allow continuous monitoring and control of illegal actions of participants or third parties in places of gathering of people, children, etc.

3) Automation of the access regime in administrative offices (with the regular generation of reports on the amalgamated hromada's website) will allow to control the regularity of visits by officials to workplaces.

4) Installation of display boards (information boards), which will display the waiting time of buses and other necessary information for residents, will increase the comfort and attractiveness of the amalgamated hromada in the eyes of residents.

Figure 3. Optimization of amalgamated hromada infrastructure
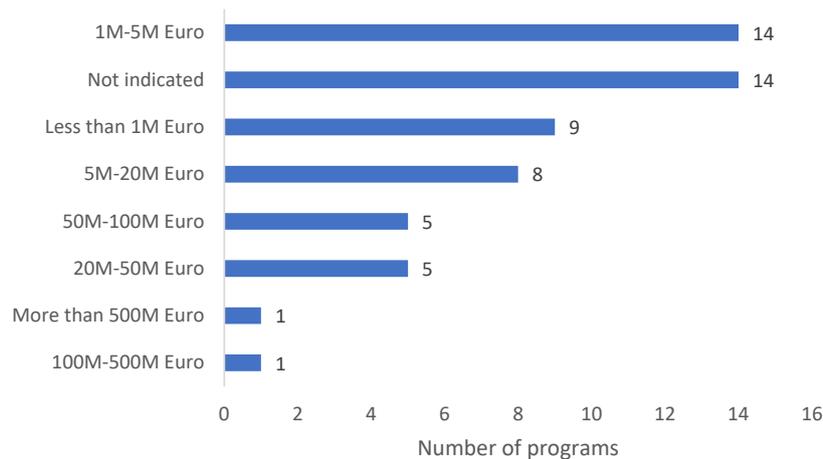
Source: author's development

**Figure 4. Algorithm for the use of IT technologies
in the operation of amalgamated hromada**

Source: author's development

Each of the described uses of information systems and technologies is undoubtedly significant and will solve significant problems in the development of territorial communities. However, the authors note that it is necessary to form an algorithm for the use of IT in the local community and, following it, to choose the areas that need to be improved and optimized.

3. Algorithm of the use of IT-technologies in the functioning of the amalgamated hromada

The implementation of IT-services and assessment of their effectiveness is carried out in 4 stages according to the decision-making algorithm (Figure 4).

The first stage is the planning and analysis of the development strategy of the amalgamated hromada to determine the areas of optimization, calculate the possibility of implementing IT services (financial, human, technical, etc.), and directly determine the technology used to work with. Table 1 suggests a list of technologies that can be implemented in the activities of the amalgamated hromada.

The second stage involves the formation of the necessary budget procedures, procurement and the actual implementation of new technologies in the amalgamated hromada.

The third stage is the implementation of the project, namely the creation of infrastructure for the use of information and analytical data on the development of the amalgamated hromada. In this step, there is a choice of one or more of the above technologies to work with and the optimization process itself.

The fourth stage monitors the implementation of IT services in amalgamated hromada (from the planning stage to project implementation). This stage will allow to rationally assess the capabilities of the local community in working with information technology, to choose the direction of optimization that needs to be updated or to create a competitive advantage for the amalgamated hromada and its residents, as well as to effectively plan the budget.

According to the above algorithm, it is proposed to choose a specific direction of optimization and one of the modern information technologies, namely artificial intelligence, and to show how, using this technology, it is possible to increase the competitiveness of the amalgamated hromada.

Table 1

A list of technologies that can be implemented in the work of the amalgamated hromada

Areas of use of IT technology	Tools
Optimization of amalgamated hromada's internal systems	– web technologies; – search engine technology; – machine learning and artificial intelligence;
Optimization of work in the sphere of socio-economic services	– Internet of Things; – data warehouses;
Optimization of the infrastructure of the amalgamated hromada	– CRM, ERP, HRM systems; – automated bots; – blockchain technology and others.

Source: author's development

4. Systematic operation of AI-based recommendation models

The most important tool of IT technologies are recommendation systems, which work with a certain type of information, a system of filters that recommend items of information that may be of interest to the user. Recommender systems compare data from users and create a list of items that are recommended to the user. This technology allows users to spend minimal time searching for relevant information or making effective decisions.

It is proposed to consider an organizational scheme for the development of recommendation models based on artificial intelligence, with the help of which it is possible to optimize the work of the amalgamated hromada's management apparatus, namely the formation of the community budget. The first stage is the preparation of the information and technical infrastructure for the development of the recommendation model.

It should be noted that the prerequisites for creating a machine learning model already exist, namely, the leading budget indicators and their values in previous periods are freely available (Figure 5). This data is the basis for learning and testing recommendation network models, and the available API protocols provide reliable and up-to-date information in real time.

The next step is to identify the key factors that positively affect the indicators of sustainable development of the amalgamated hromada.

The third stage is to train and verify the quality of artificial intelligence models (Figure 5). Training and test data sets are usually used to train AI models. It is generally accepted that the distribution is assigned to 2/3 of the training set and 1/3 of the test set. The training set is part of the budget data used in the training process of recommendation models. The test set is data that was not used during model training, so checking the results of the recommendation network against this data can serve as an effective tool for assessing the quality of the results.

In the future, it is advisable to cluster the amalgamated hromada according to similarity parameters (similar population, location, availability of certain natural resources, financial indicators, etc.) to provide the most relevant recommendations.

During the formation of the budget of the territorial community, requests are sent to create expenditure headings and receive appropriate recommendations based on data from previous years of similar territorial communities. The following steps are the implementation of the proposed solutions and assessing of the results obtained by implementing the recommended solutions.

The use of recommendation models will allow for a more effective formation of territorial community budgets and ensure a high level of transparency in the work of local self-government bodies.

4. Conclusions

An important use of IT technologies is to create conditions to ensure the safety of communities and their population. In recent years, the number of photo and video sensors used by the amalgamated hromada that capture public safety information has increased significantly. Processing and promptly responding to real-time information is the main task of using AI technologies. These technologies will make it possible
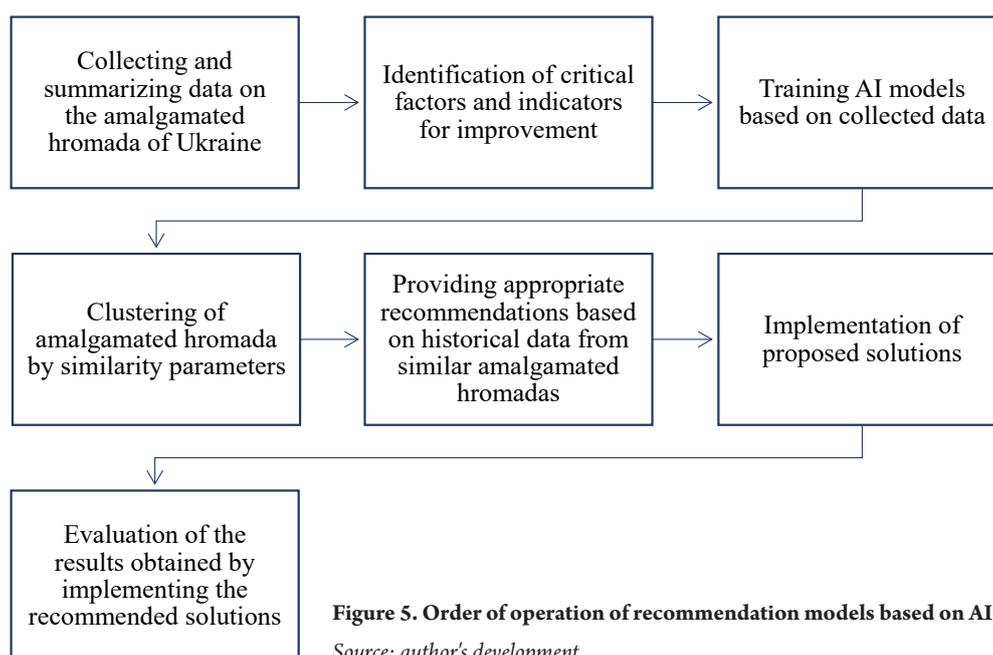
Figure 5. Order of operation of recommendation models based on AI

Source: author's development

to build a system that will quickly and timely respond to all dangerous events in real time and warn of the probability of dangerous events in the community. This requires mass notification systems, which are an effective method of unilaterally distributing or transmitting messages to one or more groups of people to inform them of an existing or potential emergency situation. For example, an amalgamated hromada can use such systems to notify the public of common problems or issues (such as blackouts at certain times), and to inform community residents in case of emergencies (such as a missing child and help in searching, etc.) or industrial and other emergencies.

Therefore, the use of mass notification systems in amalgamated hromada is a critical element in shaping a safe environment, which is one of its competitive advantages.

An important area of application of AI technology is the protection of amalgamated hromada's data and control systems from unauthorized interference. It is worth noting that such a system works on the basis of a database of community residents (their addresses, phone numbers, other data for communication).

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