Modeling marketing communication in a farm plant care information system

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Abstract. The article substantiates the need to use the marketing communication channel in specialised software for agriculture. The purpose of such a channel is to provide information to farmers about the availability of planting material, technical means that ensure the processes of the production cycle, services of specialized contractors, etc. in the market. The content of such a channel in the software should be personalized, i.e., based on the user profile and his activity in the software product. The aim of the research is to create an information model that demonstrates the transformation of software product processes when implementing a marketing communication channel. To realize the goal, all the key objects involved in the mentioned processes are established, all the links between them are established. The obtained results became the basis for using the method of information modeling in order to create a model of the process of interaction between users of the system, its main modules and the module responsible for generating content for marketing communication. The developed model shows the information flows arising between the subjects of interaction during the realization of the functional capabilities of the information system.

1 Introduction

The main vector of agricultural development is the process of digitalization. At the current stage of development of the agricultural industry, information technologies are actively implemented, allowing to reduce manual labor and costs, while increasing productivity and yield [1]. Digital technologies make it possible to control the processes carried out in farms: for example, to measure microclimate indicators in greenhouse complexes, temperature in livestock complexes, to receive real-time audio information about the state of a swarm of bees in an apiary, images about the state of fields, etc. [2]. All these data from sensors, cameras and other equipment are analyzed by specialized software products, which for the farmer allow to adjust the schedule and composition of agricultural work, determine the diseases of crops, etc.

Involvement of farmers and amateur gardeners in the process of active use of specialized digital systems forms the basis for the creation and organization of marketing communications. In addition to the basic functionality provided by such systems, it is...
2 Materials and Methods

3 Results
depending on seasonality, maintenance of tree history. Realization of marketing communication in the system is carried out with the help of the advertising module. Its main task is to provide the user with information about places of purchase of seedlings and seeds, specialized inventory and specialists providing services on sanitary and decorative treatment of trees. At the same time, the general concept of the expert system should be supported: advertising should not be provocative and its content should be meaningfully appropriate to the place and time of its appearance.

In order to create a model according to the described conditions, three key objects performing interactions were identified. These include:

1. User. In realizing the goal in the current study, the user category is irrelevant. Advertising content is selected for all categories of users who are associated with planting, maintenance and cutting operations (farmers, laborers, production engineer, etc.). This is justified by the fact that any of the listed categories of specialists in the expert system has access to the description of plants on the farm and the calendar of planned works. When viewing advertisements, depending on the user category, the demonstrated content can be used in work (for small farms), recommended for purchase for relevant work (by workers in medium-sized farms) or purchased by the manager for workers (in large farms).

2. Information system. Consists of many modules that ensure the full working state of the system. For this purpose, they exchange data among themselves, which for some modules are output data, and for others - input data. Accordingly, to determine the key positions in the advertising module requires the use of a part of such data. This part should characterize the profile, the qualitative and quantitative composition of the plants of his farm and the works carried out. Having the actual state of such data, it is possible to select the most suitable advertisement for the user's activity in a timely manner in the background.

3. Module generating advertisements. It collects in the background user and system metrics for the functioning of algorithms for selection of advertising content. As content is used data that is entered by the administrator or specified resource used as a data source.

Fig. 1 shows the developed model of interaction of the module generating advertising with the main process of the information system.

The presented model demonstrates the data exchange between the advertising module, the user and the rest of the information system. The input data streams of the advertising module are denoted by , and output data by . They are associated with certain sub-processes carried out by the user when using the information system in his activity.

Conventionally, the activity of any user in the information system can be divided into the following stages:

1. Creation of user profile. For the information system it is required to create a user profile, in which his main geoposition (region of location) will be defined. Each user has an opportunity to create a profile of plots where plants are located. In this case, the virtual plot is linked to the real terrain for the system to determine climatic and weather conditions, soil
composition and other parameters affecting the growth and care of plants from external natural conditions. Specifying plant species allows the system to form the nature and schedule of recommended work. For the advertising module such information is fundamental, as it allows to establish and limit the set of services and content by the territorial location of the user and his interest in services, types of products that can be used by him in the process of plant care, as well as to form recommendations for the purchase of additional seeds or seedlings that may be suitable for his farming.

2. Preparing and carrying out plant care work. The user independently or with the help of recommendations of the information system determines the schedule and content of plant maintenance works. At this stage, the advertising module in the background selects and recommends the use of services of specialized contractors located nearby. If the User performs the works independently, this module selects advertising content recommending to purchase the inventory necessary for performing the respective works.

3. Fixing the work performed. Regardless of the performer of the work, the information system requires manual confirmation of the performed works to adjust the subsequent works. If third-party performers of works were involved, the user needs to evaluate their work. On the basis of users' evaluations, the system forms the general rating of the quality of works performed, which is the input data flow for the advertising module. Accordingly, the contractors with a higher rating will have a favorable positioning on the page of recommendations for users of the corresponding region. To evaluate inventory or seeds (seedlings) with a certain periodicity, the advertising module will generate a small questionnaire based on which a rating will be formed to demonstrate those results that have positive user recommendations.

4 Discussion

The tasks set before the current study have been accomplished and a process model has been obtained that meets the requirements of the chosen modeling methodology. The tools and their corresponding modeling algorithms were used in the work performed, as the obtained result in its structure corresponds to the results of other studies using our stated research methods. When creating specialized software products before the development stage, works on the analysis and formalization of objects and processes of the problem domain were carried out [2, 5, 11]. Such an approach was carried out in the current study, which resulted in data suitable for use at the stage of program code creation. In addition, the researchers note that the created formal models allow estimating the composition of transformed processes, the load on the specialists involved in them in order to ensure the efficiency of the whole process [4, 10, 11]. Analyzing the obtained results of modeling, we can conclude that the obtained model corresponds to such a concept. With its help it is possible to determine the load not only on users who will use the functional capabilities of the software product in their activities, but also the load on individual program modules of the system, the number of resources required for their full-fledged work and the duration of work performance.

It should be noted that the obtained results correspond to the concept of practice-oriented training of specialists in the field of software design and development, advertising and public relations, agriculture and management. Researchers in their works note that such models can be used in electronic training aids, digital simulators that realize different training scenarios of changing processes depending on the decision made [12]. With their help it is possible to form student's professional competencies.
5 Conclusions

The digital transformation of agriculture is the main direction of industry development. The transition to the use of digital technologies is conditioned by the need to accelerate decision-making and the efficiency of their execution, improve the quality of products, improve production processes, etc. All this is a key tool to increase the profitability of farms. The software products used are complex solutions that unite farmers, equipment suppliers and service providers, representatives of state regulatory bodies and specialized agencies on their platform.

Any modern software tool, regardless of its functionality, implies the use of an information channel. This channel is used not only for user interaction with the administrative services of the resource, but also for broadcasting content to users in order to promote and popularize brands or manufacturers of products, services, etc. The content of advertising content is determined on the basis of the user's activity in the program, the program profile or agreements concluded between the managers of the digital platform and companies—customers of advertising services. Specialized software products used and developed for agriculture have the groundwork for setting up a marketing communication channel. The use of such a channel allows not only to provide the end-user with information about the novelties of the industry and their availability in the regional market, but also to ensure the development of the agricultural industry. Such development is ensured by point informing the end user by the availability of modern software and hardware of the agricultural industry on the market.

References

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