Digital Workflow as a Driver for the Development of Innovative Systems in a Tiered Economy

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Abstract

The modern environment forces an innovative system of any level to switch to the language of digital interaction and to put into operation demanded Internet services. In-house planning processes are built on digital analytics, covering a solid set of indicators. Actual technologies of big data, Internet of things, business analytics allow making management decisions quickly and flexibly and are able to produce economic effect in the shortest possible time. There is a need to search for digital solutions for the effective functioning and development of innovative systems. The authors made an attempt to substantiate the use of such digital technology as digital workflow in solving the problems of developing innovative systems of different levels, contributing to increasing management efficiency through the integration, analysis and monitoring of various information.

Within the framework of the presented study, the necessity of using digital workflow is substantiated, its fundamentally important properties and mechanism of functioning are shown, which ensure the interaction of participants, actual and potential users in order to create and exchange structured and detailed formalized information. A comparative characteristic of digital and electronic document management is given, their advantages and disadvantages of using at the subjective level are revealed. The main aspects and requirements for the digital workflow process, focused on the effective development of the innovation system at the subjective level, have been formed. A structural and logical model for the implementation of digital document management in the activity of an innovative system is proposed for the purpose of efficient management of corporate content and full-fledged work with documents in digital format.

The practical significance of the presented digital solution lies in increasing the efficiency of automation of key and auxiliary business processes in innovation systems both at the regional and subject levels of the economy.

Keywords: innovative systems, digital solutions, digital document flow, management

1. INTRODUCTION

An important characteristic of the modern external environment is "uncertainty", which is confirmed by the prevailing conditions of the pandemic that have swept over the entire world community. In the scientific literature various abbreviations are used - characteristics of the external environment of the socio-economic system: DUCI (dynamism, uncertainty, complexity, interdependence of factors); VUCA (volatility, uncertainty, complexity, ambiguity); TUNA (turbulence, uncertainty, novelty, ambiguity).

In our opinion, understanding the characteristics of the external environment is a primary task in the process of determining the future for an innovation system of any level. It is necessary to catch the changes in time, try to influence them and adapt to them. Moreover, it is important not to lose control over the present, to be able to anticipate possible options for the future and not to be afraid of uncertainty. Only this approach is objectively necessary for the development of digital workflow processes and increasing the information activity of all participants in the innovation process.

Any innovation system in a generalized form is a set of subjects and objects of innovation, interacting in the process of creating and implementing innovations [1]. The functioning of such a system is based on a clear performance of the coordinating function for the purposes of institutional cooperation, which is undoubtedly associated with the processes of modern communication, distribution and processing of relevant information.

The mechanisms of high-quality document flow, as confirmed by the theory and practice of information processes, are an objective necessity and a mandatory tool in the effective development of innovative systems in a tiered economy. This is due to the fact that today the problems of organizing interaction and effective cooperation of all participants in the innovation process to achieve synergistic and network effects come to the fore.

In this regard, the processes of digital workflow are relevant as a driver of the effective functioning of innovative systems focused on the formation and maintenance of their competitive advantages and unique features in the context of digitalization and organizational
transformations in a tiered economy.

2. RESEARCH METHODOLOGY

An analysis of domestic and foreign sources allows the authors to draw a conclusion about the popularity of the topic under study in modern scientific literature. In addition, the strong interdisciplinary nature of most of the studies can be emphasized.

The main influence on the formation of research on the development of innovation systems was exerted by the theory of entrepreneurship by J. Schumpeter [2] and the concept of open innovation by H. Chesbrough [3]. The theory and methodology of workflow processes in innovative systems of different levels are considered in the works of G. Bowen [4], A. Haug [5], V. Hausmann, S. Williams [6], B. Koch [7], H. Pho, T. Tambo [8], B. Molnár, A. Benčzúr [9]. Among the domestic authors who paid attention to the conceptual issues of documentary interaction and effective cooperation of participants in innovative systems, it should be noted the scientific works of E. Islankina, E. Kutsenko, A. Kindras [10], A. Domrachev, S. Yevtushenko, V. Kupriyanovsky, D. Namiot [11], M. Bobyleva [12], L. Doronina, A. Badina [13].

With all the variety of works devoted to the development of innovation systems, the mechanisms of documentary interaction between participants in the innovation process are not sufficiently developed in the scientific literature. Problems of document circulation in innovative systems, in our opinion, have not been studied sufficiently fully and systematically. There are scattered works on certain areas of the use of digital technologies, among which A. Babkin, I. Gelishkanov, T. Yudina [14], S. Choudary, G. Parker, M. Van Alstyne [15]. Based on this, the methodology of this study is focused on studying the possibilities of using modern digital tools to solve the problems of corporate content management and full-fledged work with documents in digital format in order to effectively develop innovative systems.

In the course of the study, the methods of logical-structural study of the problem, systemic, comparative and cluster analysis, statistical analysis, critical analysis and synthesis, general scientific and expert-analytical methods, as well as graphic description and interpretation of information were used.

3. RESULTS

A review of the scientific literature on the research topic allows us to talk about the structural similarity of innovation systems at different levels: national, regional, sectoral, and subjective. In a universal innovation system, three levels of elements can be distinguished: main activity; maintenance of the main activity; management and regulation [16]. This set of elements is complemented by: indicators of “innovativeness” of each of the elements; characteristics of the internal structure of the elements of the innovation system; levels and nature of interaction between elements; factors of influence on external relations; infrastructure of the innovation system to perform supporting functions in providing innovation processes [17].

Let us formulate principles of functioning and development that are universal for innovative systems of different levels:
- purposefulness (definition of the main goal and the direction of activities to achieve it);
- continuity (discrete mode of functioning of executive bodies and implementation of the innovation process);
- universality (maximum consideration of the universal characteristics of system elements);
- involvement (participation in the innovation process of representatives of all stakeholders);
- consistency (reaching consensus of stakeholders on the issues discussed);
- openness (availability of communication channels with the external environment for the exchange of information);
- professionalism (attracting competent specialists and experts in the field of organizing innovation to participate in the innovation process);
- nonlinearity (the presence of many options, development paths and methods of response to external influences);
- integrity (consideration of the innovation system as an integral organism at a certain level of research in accordance with other levels in the decision-making process);
- reliability (preservation in time and within the established limits of the values of the parameters characterizing the ability to perform the necessary functions in the established mode);
- coordination (the presence of a coordinating structure that has the right to make adjustments to the activities of the innovation system);
- self-organization (a set of processes for maintaining optimal functioning and development of the abilities to improve through self-development and accumulation of past experience);
- self-regulation (independent response to external influences due to an established feedback system);
- efficiency (productivity of the functional purpose of the system, which expresses the ratio of the current results of the system's functioning to its current costs);
- competitiveness (the difference between the process of functioning and development of the system from competitors in terms of the effectiveness of innovation);
- synergy (an increase in the efficiency of the organizational system as a result of the merger of separate parts into a single system due to the systemic effect) [18].

Based on these principles, it is important to form a modern toolkit that contributes to the improvement of the functioning and growth of the innovative activity of innovative systems, as well as the effectiveness of their use, in the role of which are digital solutions. The current direction in the development of digital solutions, ensuring the transition of innovative systems of
the subjective level to more advanced innovative modes of their functioning, is digital workflow, which allows you to manage corporate content and eliminate bottlenecks in business processes in working with documents. Note that currently there is no objective interpretation of the term "digital document flow", and the regulatory aspects of its organization and regulation have uncertainty in their development and do not find proper regulation of the process. In general, the concept of "digital workflow" arose relatively recently in connection with the adoption of the national program "Digital Economy of the Russian Federation" [19], the essence of which, in our opinion, is to automate the entire range of tasks and transfer the main processes for working with documents into digital format, full transition to paperless technologies and presentation of documents only in electronic (digital) form, provision of corporate exchange of electronic documents without the use of paper media and their long-term storage in a single electronic archive. Unlike electronic document circulation, which is a prototype of the traditional creation and movement of documents along a fixed route in the paper version, digital document circulation allows you to completely eliminate the paper form of documents and generate the necessary documentation only in digital format, using digital technologies for instant information transfer.

Digital workflow helps to improve everyday work and increase the manageability of any innovation system at the subjective level by providing fresh and relevant information necessary for making managerial decisions, allowing you to optimize not only the current document flow, but also the processes of managing finance, marketing, investments, personnel and other activities. The benefits of digital workflow are shown in figure 2.

**Figure 1** Comparative characteristics of digital (CD) and electronic document management (ED)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>CD / ED - low / medium</th>
<th>CD / ED - virtual / real and virtual</th>
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<tr>
<td>Duration of document preparation</td>
<td></td>
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<tr>
<td>Dependence on the influence of external factors</td>
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<td>Transparency of operations</td>
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<td>Legal uncertainty</td>
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<td>Environment of the offense</td>
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**Figure 2** Benefits of digital workflow in digital realities

Despite the obvious advantages of digital workflow, a number of disadvantages of its implementation and use should be noted:
- lack of an appropriate regulatory and legislative framework reflecting the organization of digital document management;
- high cost of development, implementation and operation of digital products;
- insufficient provision of confidentiality of information in electronic form, the authenticity of electronic documents does not have clear and accessible mechanisms for its assessment and verification;
- distrust of business in digital workflow and preference for working with traditional paper formats that fully satisfy the current needs of both companies and their counterparties and customers;
- difficulties in mastering the functionality of applied solutions and products.

Based on the advantages and disadvantages of digital workflow, in our opinion, for the development of an innovation system at the subjective level, it must meet the following requirements:
- the presence of only an electronic form, an automated format for routing, categorization and control of documents;
- flexibility and adaptability of document designers that allow building complex business processes, adapting the interface, etc.;
- high speed of information transfer, including to external users and regulatory authorities with the provision...
of widespread and round-the-clock access in the required format;
- recording the movement of the document and the fact of its transmission in metadata, amplified by the time stamp;
- remote access and work in real time;
- cryptographic protection of information and confirmation of the authority of signers;
- processing, storage and transmission of information is carried out in a decentralized control system;
- integration with information systems and sources of acquisition;
- building the functionality of digital document management based on advanced innovative technologies focused on working with document content;
- creation of an ecosystem of a digital organization that ensures interaction of both internal work areas and exchange with external contractors.

The above requirements are recommended to be used for managing corporate content and full-fledged work with documents in digital format within the framework of innovative systems at the subjective level.

At the same time, the main aspects of organizing and maintaining digital workflow at the subjective level should lie in the plane of its three components - business, analytical and legal significance (figure 3).

To fulfill the above requirements and the transition to digital workflow, any innovation system at the subjective level must determine at what stage of digital transformation it is, what are its positions relative to competitors and the industry as a whole, are there any opportunities for improvement, as well as weaknesses and risks. In this regard, we will propose a universal model for the implementation of digital workflow, taking into account the conditions of digital transformation, which will allow timely and high-quality implementation of all business processes typical of innovative structures (figure 4).

When implementing this model in innovative systems at the subjective level, it is important to focus on the processes that will ensure full-fledged work with documents in digital format and maximum return.

4. THE DISCUSSION OF THE RESULTS

Despite the increased emphasis of the state on maintaining digital interaction, modern business shows surprising resilience and unpreparedness for the transition to new digital formats in workflow and documentation support, convincingly proving their unreliability, high implementation costs and difficulties in mastering. Currently, only a small proportion of Russian companies are just starting to digitize processes, gradually reducing the absolute value of documents printed on paper and converting them into digital format. According to statistics, more than 45% of Russian enterprises still prefer to use paper documents and traditional paper formats in their activities as opposed to the possibilities of digital document flow. About 64% of companies, despite the introduction of electronic document management, continue to duplicate documents in printed form. At the same time, 35% of organizations that maintain classical paper workflow have never received requests from counterparties to switch to the electronic format due to their unwillingness to use new digital solutions [20].

Business distrust of the figure is also confirmed by the answers of the respondents who argue the reasons for rejecting digital solutions related to guaranteed reliability of paper media (44%), high costs for payment for electronic document management services (31%) and additional difficulties in mastering software (15%). Only 15% of business entities support the possibilities of digital workflow, thinking about the introduction of digital solutions and the rejection of the use of paper media [20]. The transition to digital workflow also stimulates the "lockdown" mode in the context of the pandemic, which allowed a number of companies that organized the "electronic office" to switch to a remote mode of work for their employees and not interrupt the work process during restrictions.

Based on the study of the existing experience of the functioning and development of innovative systems at the subjective level, at present, digital workflow is becoming increasingly important and has already received practical application in existing companies in the Oryol region, among which we note such as OOO «PK Sirius», OOO "NPO Aurus", ZAO "NPO Armstroymetiz", AO "NPO Ecopromtechnology", which implement not only various activities related to the digitalization of workflow, but also use digital solutions for holding meetings and managing the work of geographically remote employees. The study revealed that the primary and fundamental local document that clearly demonstrates the implementation of digital workflow in these companies is the program for organizing digital workflow in a table format, the mandatory elements of which are the name, purpose and objectives, stages and terms of implementation, program activities, performers, funding sources, expected final results of the program implementation with a logical and consistent description of the listed components.
This program, as a rule, is coordinated with an accountant, manager, IT-specialist and approved by the head of the company, the successful implementation of which can significantly speed up the process of information exchange and reduce the time spent on document operations, significantly improve manageability, quality of customer service, and, ultimately, will increase the level of information potential, develop innovative activity and ensure the continuity of the business entity in the long term.

Thus, in the near future, the transition to digital workflow will continue not only as a condition for the development of the digital economy, but also as a significant opportunity to increase the speed and efficiency of processes in all areas of management of the innovation system at the subjective level. An impeccable knowledge of the issues of modern documentation of management activities will contribute to solving the problems of optimal planning, personnel and information support, financing and lending, accounting and operational management, and will also ensure conflict-free work of the head of the enterprise with subordinates and the state.

5. CONCLUSION

Since every modern organization, for the purposes of its development, must form and develop innovative aspects in its activities, it can be one of the key elements of the innovation system at different levels, be part of the “core” of the innovation system. Consequently, digital solutions for the development of innovative systems need to be studied and implemented, first of all, at the subjective level. Summarizing the results of the study, we note that the introduction of digital workflow in innovative systems at the subjective level cannot be limited only to the formation of organizational mechanisms for managing the documentation process, but also requires the development of many additional, technological solutions, including the choice of a software product and the definition of the functionality of digital workflow, and also building a service model that provides configuration, maintenance and support of the company's IT-infrastructure.

Directions for further research in the field of using digital tools for the development of innovative systems at any level can be associated with the development and implementation of more complex system solutions that affect not just individual business processes, but combine the interaction of
participants in economic relations and information exchange through a single integration platform.

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