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JUSTIFICATION OF THE INNOVATIVE STRATEGY OF INFORMATION TECHNOLOGY IMPLEMENTATION FOR THE IMPLEMENTATION OF MULTIMEDIA PUBLISHING BUSINESS PROJECTS

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A B S T R A C T

The article proposes developing a methodology for forming an innovative strategy for implementing information technologies for implementing business projects of multimedia publishing. The work gives a generalized presentation of the business development process based on introducing progressive information technologies. Based on the analysis of functional interrelationships, the authors formed a basic set of IT components for business projects in the form of appropriate information technology clusters. And with the help of the optimization model of cluster efficiency assessment and the matrix model of determining the need for information technology, they analyze the need to include new technology in the commercial activity of a multimedia publishing house. It is proposed to decide on the inclusion of one of the alternative information technologies based on the use of the connectivity indicator, the time characteristics of the information technology, the financial result of the introduction of the new information technology in the business projects of the multimedia publishing house. In this work, a diffusion model of new information technology diffusion was built using differential equations and a saturation function characterizing the moment of saturation of the need for IT innovation.

1. INTRODUCTION

Information technology (IT) is the most essential component of modern productive forces, which creates added value, and is a reliable foundation for doing business. Therefore, effective management of business development in modern conditions is possible only with the introduction of new IT, which brings a certain specificity to the processes of formation and implementation of an innovative business development strategy, connected with the need to take into account the latest trends of the IT market, changing forms of

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competition, strengthening the influence of end consumers. This specificity should be reflected in the structure of economic and mathematical models describing business development.

A number of researchers raised the problem of modeling an innovative business development strategy in economic and mathematical science. For example, studies by Aralova (2017), Naumenko & Hrabovskyi (2018) and Safonov et al. (2018) analyze the mechanism of innovation formation, provide models of the spread of innovations over time, and identify factors that determine the configuration of the process of innovation activity. Scientific articles by Tolliver-Walker (2015) or Hryshchuk & Molodetska (2017) offer methods for monitoring and evaluating the effectiveness of the development and implementation of web technologies. Yevseiev et al. (2017) or Tronvoll et al. (2019) analyze information security mechanisms of business information support. The specifics of implementing innovative strategies in the conditions of the challenges of the modern environment of the post-industrial society are given in works of Martin (2016), Hrabovskyi et al. or Schön et al. (2017). A general shortcoming of the above-described approaches to innovative modeling development is the lack of consideration of the specifics of multimedia publishing. Therefore, there is a need to develop a system of multimedia publishing business development models based on the introduction of new information technologies.

2. THE AIM OF THE STUDY

The purpose of this article is to develop a methodology for forming an innovative strategy for the implementation of information technologies for the implementation of multimedia publishing business projects.

3. RESEARCH RESULTS

Implementing an innovative multimedia publishing strategy based on introducing new IT must be structured in a certain way for further description using complex economic and mathematical models. A generalized presentation of the process of business development based on the introduction of advanced IT is shown in Figure 1. The diagram in rectangular blocks indicates the main stages of the innovative business development strategy based on new IT. Also, it presents the main divisions of multimedia publishing, which play a significant role in ensuring the implementation of these measures.

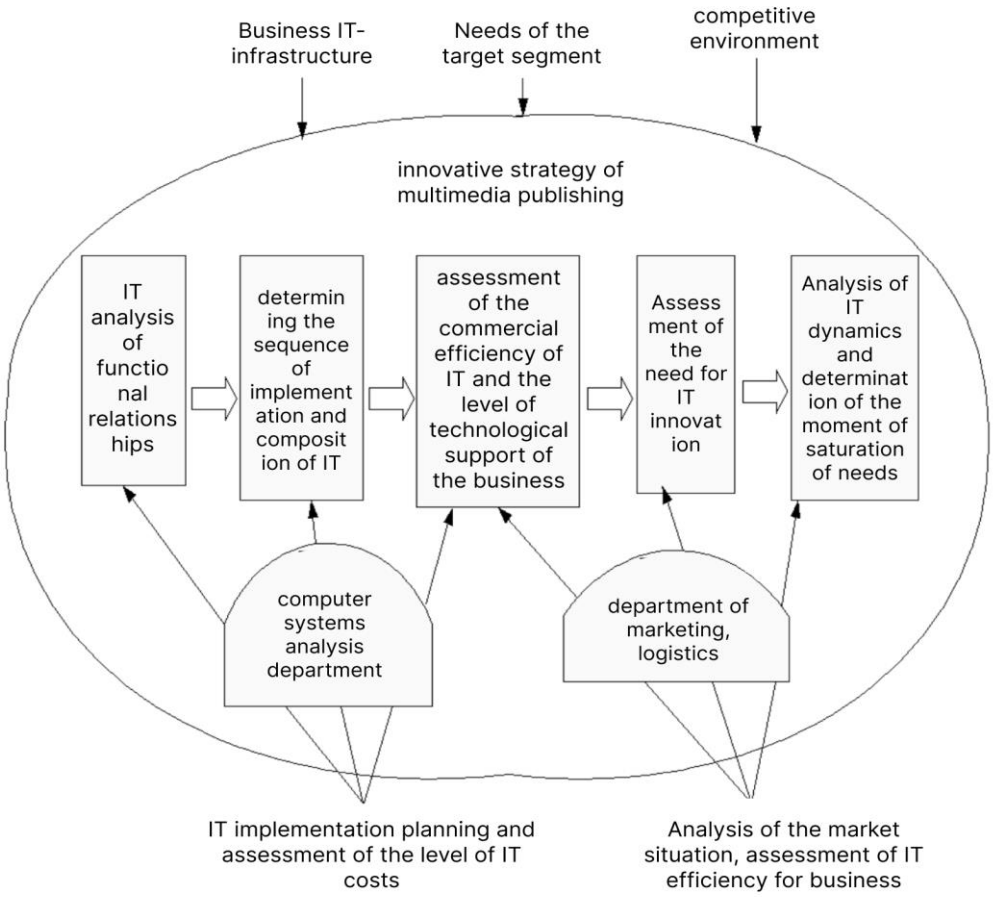

Figure 1. Scheme of forming an innovative strategy of multimedia publishing based on the introduction of new IT

At the initial stage of the process of innovative business development, it is advisable to analyze modern IT to determine the technological platform for the implementation of relevant business projects of multimedia publishing. One should first determine the closeness of connections between IT to determine the optimal composition of the technological platform of multimedia publishing business projects, according to the formula:

$$o_{i,u} = \frac{BP^*}{BP} \quad (1)$$

where BP* is the number of jointly implemented business processes;

BP –number of business processes;

$o_{i,u}$ – coefficients of communication between information technologies i and u.

Information technologies with the highest values of the closeness of connections (>0.5) are proposed to be combined into appropriate groups - clusters. A cluster is a set of interdependent information technologies that, due to the homogeneity of the business processes implemented with their help, can act as a separate link in the technological chain in multimedia publishing. In each cluster, at a particular time, it is possible to single out some core information technology, which is directly or indirectly connected to other information technologies that stimulate the development of the core and, in turn, are stimulated by the core. The emergence of the need to highlight clusters of information technologies when modeling the innovative development of multimedia publishing is determined by the following factors: 1) the need to take into account the interaction of information technologies in the process of business development; 2) the need to identify the limits of distribution and the sphere of influence of technological innovations that are appearing again; 3) selection of generalized structural units, within the framework of each of which forecasts can be made regarding the possibility of the appearance of innovations. The following clusters of information technologies can be distinguished (Table 1).

Table 1. Information technology clusters

Claster's name	**An example of information technologies that can be components of a cluster**	**Business projects**
Information documentation cluster	Graphical interface technology, text editors; technologies of scanning, printing, electronic translation, document search, archiving; organizers	Content projects, electronic catalogs, mini-catalogs, corporate websites
Multimedia cluster	Presentation technology, multimedia, OLE technology, tile rendering, OS emulation	Commercial presentations, brand advertising, video conferences
Cluster of analytical processing of information	Table processor, database technology, encryption, intranet technology, artificial intelligence, neural networks, OLAP and OLTP technologies, DW technology, CASE technology, Spyware technology	Payment systems, consulting and auditing services, various after-sales service projects for consumers
Switching cluster	Broadband data transmission technology, IDS technology, Frame Relay, Ethernet, ATM, X.25 technologies, IP and tag switching, SMART and GPRS technologies, VPStreaming, "client-server"	Online auctions, mobile commerce and inter-corporate business projects, commercial portals and online communities, shareware

In real practice, when external conditions change (for example, the technical equipment of consumers, and the capabilities of commercial partners), the composition of information technology clusters in each specific business project of multimedia publishing can be adjusted. For this, the manager must determine the structure of permissible changes in the IT components of the technological platform of the business project in the form of a matrix DM= $\left\| dm_{iu} \right\|$, where dm_{iu} = 1, if the change of the i-th information technology to the u-th technology is possible; 0 – otherwise. These changes in the components of the technological platform are limited in quantitative and qualitative aspects.

The number of such changes should be limited to the degree of elasticity of the business project to changes in the IT infrastructure, which is calculated according to the formula:

$$\mathrm{EP} = \frac{\Delta \mathrm{OK} \cdot \mathrm{ST}_0}{\Delta \mathrm{ST} \cdot \mathrm{OK}_0}$$

where $\Delta \mathrm{OK}, \Delta \mathrm{ST}$ – change, respectively, of working capital for the maintenance of information technology and the cost of the technological platform in the process of implementing the restoration of the IT infrastructure;

OK_0, ST_0 –respectively, the initial amount of working capital and the cost of the technological platform.

In the qualitative aspect, in addition to the closeness of the connections $o_{i,u}$, an important characteristic when adjusting the composition of clusters is the quadratic coefficient of structural changes of information technologies in a specific multimedia publishing project, which is calculated according to the formula:

$$\delta = \sqrt{\sum_{c} \frac{(OB_{c1} - OB_{c0})^2}{OB_{c0}}} + \sqrt{\sum_{k} \frac{(OM_{k1} - OM_{k0})^2}{OM_{k0}}} + \sqrt{\sum_{c} \frac{(BR_{c1} - BR_{c0})^2}{BR_{c0}}}$$

where OB_{c0}, OM_{k0}, BR_{c0} are, respectively, the initial value of B2C agreements within the c-th consumer segment, the volume of intercorporate transactions with the k-th commercial partner, the cost of business solutions based on the IT platform in the c-th market segment;

OB_{c1}, OM_{k1}, BR_{c1}– forecast values of these indicators after the transition from the i-th to the u-th IT. It is advisable to make decisions regarding the sequence of implementation and the composition of information technologies based on the use of the hierarchies method, the graphic representation of which is shown in Figure 2.

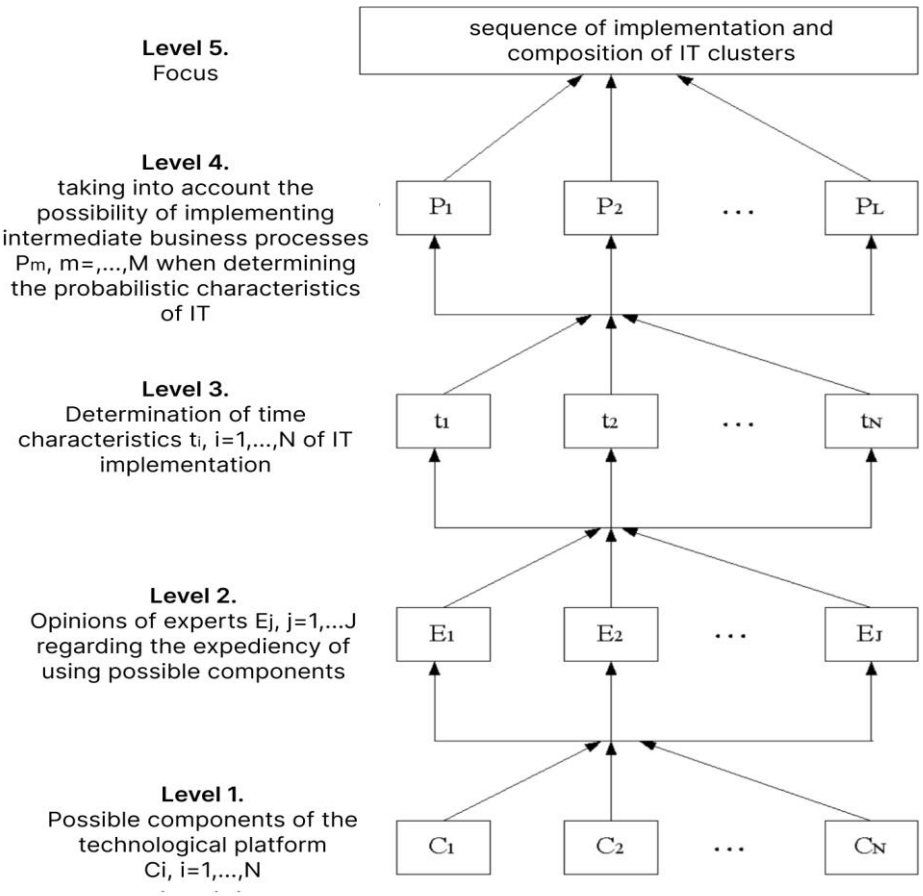

Figure 2. Hierarchical network structure

It is advisable to calculate the time characteristics of the i-th information technology (level 3) according to the formula:

$$t_i = \frac{\sum_{j=1}^{J} t_j \cdot V_j}{\sum_{j=1}^{J} V_j} \quad (2)$$

where t_j is the time of introduction of information technology according to the opinion of the j-th expert;

V_j is the weight of the j-th expert, determined by the level of his competence in system analysis of the innovative market.

Time characteristics for a cluster are defined as follows:

$$\tau = \max\{t_i + t_{0i}\},$$

where τ – the time of implementation of the business project using the i-th information technology of the cluster; t_{0i} is the time set by the expert for support and adaptation of the i-th information technology included in the cluster.

The probability of the implementation of a specific business project of a multimedia publishing house by the time τ (level 4) is determined based on the ratio:

$$P(\tau) = \frac{\sum_{j=1}^{J} \phi_j \prod_{l=1}^{L} P_{jl}(t' - t_l)}{\sum_{j=1}^{J} \phi_j}$$

where $P_{jl}(t')$ – the probability of the implementation of intermediate business development processes included in the business project, using a cluster of information technologies;

t_l – relative estimate of the time of implementation of a commercial project, subject to the performance of the lth business process, which causes this project;

$\phi_j = \varphi_j \cdot \gamma_j$ - forecast weight;

φ_j – assessment of the expert's competence;

γ_j – the degree of confidence in the forecast.

Within some clusters, there are alternative information technologies, which the manager must also decide. The advantages of multimedia publishing when implementing the mechanism can be described in the form of a logical-linguistic model, that is, a scheme of fuzzy reasoning of the type $G \Rightarrow W$, where G – matrix of fuzzy sets of size n$^{\chi}$ v, which corresponds to n values v of linguistic indicators-characteristics of the business project; W=(G_{w1},…,G_{wn}) – is a vector of fuzzy sets characterizing the usefulness of each specific characteristic of the project. Here, the features of business projects can be general (speed, reliability, and ease of working with the server) and specific (operational and authoritative for news sites and Internet consulting, ensuring trust in multimedia publishing).

To ensure decision-making, it is advisable to draw up a matrix of expert evaluations, shown in Figure 3.

	i_1	i_2	…	i_v
g_1	x_{11}	x_{12}	…	x_{1v}
g_2	x_{21}	x_{22}	…	x_{2v}
…	…	…	…	…
g_n	x_{n1}	x_{n2}	…	x_{nv}

Figure 3. Matrix of experimental evaluations of the use of alternative IT

In Figure 3, the following conventional designations are accepted: g_v – general and specific characteristics of the multimedia publishing business project; x_{iv} – experimental evaluations (in points) of the degree of achievement of the character using the i-th IT; i_v – alternative information technologies.

The selection of the most suitable IT for multimedia publishing is carried out according to the criterion of the maximum values of the expression:

$$\sum_j W_j \cdot x_{iv},$$

where W_j – the usefulness of the j-th characteristic for implementing a business project.

The image of a multimedia publishing house, its competitive advantage, and investment attractiveness largely depend on its financial position and the orientation of business projects following the trends of the global IT market, using the latest technologies in providing IT services to clients. Therefore, in the course of developing a multimedia publishing business development strategy (in particular, when analyzing technological chains), it is necessary to estimate the amount of added value created by each IT cluster, as well as the cost of standardized business solutions based on each cluster, using an optimization model with an objective function:

$$z = \frac{DS_r + SS_r}{ST} \to \max_{DS_r, SS_r} \quad (3)$$

subject to restrictions:

$$\begin{cases} SS_r \cdot KP_r \le SC, & (4) \\ \frac{DS_r}{ES} < 1, & (5) \\ \frac{SS_r}{ZI} < 1, & (6) \\ DS_r, SS_r > 0. & (7) \end{cases}$$

Conventional designations in the model are the following:

DS_r is the amount of added value of transactions created by the r-th cluster; SSr – the cost of technological solutions based on the use of the rth cluster; ST – the cost of the technological platform of the web node; KP_r – the number of commercial projects using technological solutions of the r-th cluster; SC – cost of technological platform of consumers; ES – total volume of commercial transactions; ZI – costs for maintenance of information support of the web site.

Using the found values of DS_r and SS_r, it is possible to determine the level of commercial efficiency of clusters EK_r and the level of technological support of multimedia publishing house SF_r according to the formulas:

$$EK_r = \frac{DS_r}{KZ_r}, \quad (8)$$

$$SF_r = \frac{SS_r}{TI_r}, \quad (9)$$

where KZ_r is the amount of transactional commercial costs for deals carried out using the r-th cluster; TIr is the technological costs for servicing the r-th cluster.

After comparing the found indicators, it is possible to make a decision about the need to introduce new IT into the cluster, using the matrix (Table 2.).

Table 2. Matrix for determining the need for new IT

The level of commercial efficiency of clusters		The level of technological support of the business	
		high (>1)	**low ($\leq$ 1)**
	High (>1)	The existing set of IT performs its functions in full. The need for new IT may arise in the case of diversification of multimedia publishing.	There is a real need to implement new IT, because the low level of the technological platform may reduce the commercial efficiency of the multimedia publishing house
	Low (≤1)	It is necessary to reengineer the business processes of multimedia publishing, during the implementation of which the need for new IT may arise	It is necessary to review the strategy of the commercial activity of the multimedia publishing house along with the radical restoration of the technological platform based on the inclusion of innovative IT in its composition

Assessment of the need for new information technology can also be performed on the basis of forecasting the financial result of its implementation in business projects of multimedia publishing.

In e-business development, information technologies as the basis of entrepreneurial activity are constantly being improved, passing through various states.

By the state of IT, we will understand the list of used functional capabilities of information technologies, determined by the specifics of the relevant stage of development of the multimedia publishing business.

To highlight IT states in developing the multimedia publishing business, we will use the coating technique method, which belongs to the class of structural pattern recognition methods of the theory of artificial intelligence.

Let E be the set of stages of multimedia publishing business development, IT be the set of information technologies, and ν be the set of functional capabilities of IT in multimedia publishing. It is necessary to form a training sample $T \subseteq \nu \times E$, which represents the relationship of belonging of functional capabilities of IT to the stages of development of the multimedia publishing business (Table 3).

Table 3. Functional capabilities of IT

Stage of development of multimedia publishing business	**IT functional possibilities**
Previous step	Implementation of business planning
Business projects organisation	Support of marketing experiments on the Internet, reengineering of business processes
Providing an e-business platform	Information protection, technological platform of intermediary activities, support of commercial projects and business solutions as part of ERP, CRM and CSM systems
Stage of positioning of commercial activity	Support of inter-corporate business, B2B settlement processing, information protection
Management and coordination stage	Implementation of an anti-risk mechanism and virtual coordination of B2B transactions, support of after-sales service for consumers, implementation of financial analysis of inter-corporate business
The stage of consolidation and integration	Ensuring the commercial interaction of network community partners, supporting the functioning of corporate portals and trading platforms

The decision rule ψ is the relation $T \subseteq \psi \subseteq IT \times E$

Building a decision rule involves finding a way to attribute IT functionalities that are not specified in the training sample to a certain state. In other words, it determines the method of generalization based on the training set. In structural pattern recognition, generalization is carried out using coverage U'.

As a result of the generalization U', a set of IT states was formed (Table 4), covering a set of functional possibilities ν and having the following properties when

$U \in U'$: 1) $U \cap \upsilon \neq \emptyset$; 2) $\exists e \in E : d \in U \cap \upsilon \Rightarrow (d,e) \in T$.

Table 4. Characteristics of IT states

Stage of development of multimedia publishing business	**State of IT**	**State description**
Previous	IT components of the system architecture of technological development strategy	IT has a set of functions that allow you to plan the implementation of the main business decisions and commercial projects envisaged by the strategy of multimedia publishing.
Organization of business projects	IT tools for business process reengineering	A number of functions are added to IT, allowing to support the reconstruction and improvement of business process models in accordance with the conditions of marketing experiments on the Internet
Providing an e-business platform	IT adapted to the relevant ERP, CRM or CSM system	IT functions are adapted to the specific conditions of commercial activity in the target segments, taking into account the technological equipment of consumers; added functionality for mediation, after-sales customer support, continuous financial analysis and reporting on web pages
Stage of positioning of commercial activity, stage of management and coordination	Flexible systems implementing inter-corporate business support	Network components are added to IT, allowing B2B agreements.
Consolidation and coordination stage	Standardized solutions that are a platform for network synergies	IT is being modernized in order to optimize the commercial activities of partners within network communities. IT functions must take into account the scale of collective services in the community, the possibility of leaving the community and the emergence of new participants in it, the need for sufficient flexibility and transparency so that consumers, partners and staff can actively influence the characteristics of the community for the purpose of continuous optimization.

The transition between IT states is possible due to the implementation of certain strategic and tactical measures of the management of the multimedia publishing house, provided for by the development program with a certain frequency (intensity) of their implementation. At the same time, due to the dynamism of modern business infrastructure and its information support, the intensity of these measures is not constant. In this regard, it is proposed to use a modified Markov model with revenues for systems with non-stationary transition intensities to forecast the financial result of IT implementation. To describe the Markov process with continuous time and income, it is necessary to define the IM matrix of transition intensities and the DR matrix of financial results. The generalized graph of states is presented in Figure 4.

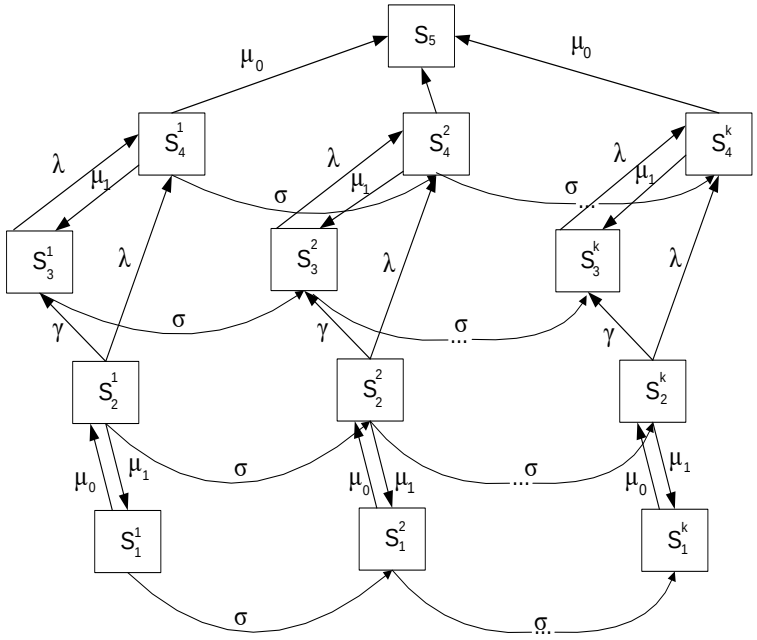

Figure 4. Generalized chart of IT states in the business of multimedia publishing

The intensity matrix of IM transitions has the form:

$$IM = \begin{matrix} \varphi_0 & \mu_0 & 0 & 0 & 0 \\ \mu_1 & \varphi_1 & \gamma & \lambda & 0 \\ 0 & 0 & \varphi_2 & \lambda & \mu_0 \\ 0 & 0 & \mu_1 & \varphi_3 & 0 \\ 0 & 0 & 0 & 0 & \varphi_4 \end{matrix}$$

The elements of the IM matrix are:

μ_1 – the intensity of corrective measures of the corresponding information support of the multimedia publishing house;

μ_0– the intensity of measures to form a fundamentally new technological base of the business system;

λ - intensity of measures to ensure communication mechanisms of inter-firm interaction;

γ - the intensity of measures to increase the internal efficiency of commercial operations and optimize the management of the work process;

$\varphi_0,\ldots,\varphi_4$ are the intensities of measures for IT adaptation of this state in the general structure of the multimedia publishing business system.

In the DR matrix, the off-diagonal elements are the funds needed for the transition of IT from the q-th to the l-th state, and the diagonal elements are the financial resources that ensure the functioning of the q-th state of IT.

Then the expected financial result of IT implementation can be estimated according to the following formula:

$$FR = OS\text{-}IM*DR, \quad (10)$$

In the OS matrix, the diagonal elements are resources due to IT functioning in the q-th state; and the elements outside the main diagonal are defined as $OP_{ql} \cdot \alpha_{ql}$, where OP_{ql} is the expected volume of sales due to the implementation of innovative business projects, which causes the transition of IT from the q-th to the lth state; α_{ql} is a sign of the implementation of the transition from the q-th to the lth state in the development program.

The revolutionary development of IT, consisting in a leap-like increase in their characteristics, causes the modification of the original Markov model to take into account the non-stationarity of the corresponding transitions of the business system.

We will consider the moment of a jump-like change in transition intensities as a random variable distributed according to an exponential law with the parameter σ. The exponential law of distribution was chosen in accordance with the established tradition in economic-mathematical modeling, which represents development processes in the form of a logistic function. Since several turns (stages) of the revolutionary development of IT are possible, the modification of the Markov model is reduced to the k-fold repetition of the original graph. Transitions between copies occur with intensity σ. As a result of the fact that there are ITs of different functional orientation at the vertices of the graph, transitions are possible only between vertices characterizing the same state of the system.

The economic interpretation of the intensities of the transition can be considered the speed of introduction of qualitatively new, revolutionary IT into the everyday commercial activities of a multimedia publishing house, which the formula can determine:

$$\sigma(t) = KR \cdot NP^{-at}.$$

Here $a = KO \cdot (OD - IP \cdot OP)$,

where NP is the number of innovative projects based on the use of new information technology;

KO - coefficient (rate) of growth in the volume of commercial transactions;

OD - volume of demand of the target segment;

IP - the intensity of satisfaction of the need in the calculation per unit of sales volume.

The KR coefficient is defined as the ratio of the number of consumers of the target segment of multimedia publishing representing the "early" market (which are called enthusiasts and romantics in) to the number of mainstream consumers (pragmatists, conservatives, skeptics).

In addition, the need for innovation is largely determined by the dynamics and scope of its distribution (the so-called "diffusion"), because, wanting to maintain a competitive position in the market, the multimedia publishing house is forced to maintain the composition of its technological platform at a modern level. The mathematical model of the diffusion of new IT can be represented by an equation of the form:

$$\frac{dVK}{dt} = \frac{VK}{sv} - K_p \cdot \frac{VK \cdot SO}{gc},$$

where VK – the volume of commercial operations performed using the i-th new IT; sv – innovation implementation speed (days, weeks, months); SO – the cost of resources for the maintenance of the i-th innovative IT; K_p – risk factor; gc is the duration of the life cycle of a new product (service), which is implemented using a new technology (days, weeks, months).

The risk factor in the innovation dynamics analysis model is proposed to be determined by the formula:

$$K_p = -\frac{\frac{\sum_{p=1}^{b} TI_p}{b} - SK}{\frac{\sum_{p=1}^{B-b} TI_p^*}{B-b} - SK},$$

where SK – the value of the multimedia publishing house's equity capital; TI_p, TI_p^* - the amount of transaction costs of the p-th commercial transaction, which respectively exceed and do not exceed the value of SK; b – the total number of commercial transactions; b is the number of commercial transactions at $TI_p<SK$.

When analyzing the dynamics of innovative IT in business, an important criterion for their stability on the market is the level of connectivity with other IT that constitutes the technological platform of multimedia publishing business solutions. It is expedient to determine connectivity using the formula:

$$SI = \sum cn_{i,u} \cdot o_{i,u}, \quad (11)$$

where $cn_{i,u}$ – the number of consumers whose technical equipment allows joint use of the i-th innovative IT with the u-th information technology.

In the case of low connectivity (which does not exceed 50), the further evolution of new IT may be questionable, even if it has high commercial efficiency, because it is not sufficiently compatible with other information technologies and does not correspond to the average level of technical equipment of consumers of the target segment. In the case of high connectivity, the innovation can be implemented into the corresponding business project without much difficulty.

The process of spreading new IT has an upper limit and a moment of saturation of the need. Therefore, within the framework of the study of the technological development of business, it is advisable to investigate the approach of the diffusion process to the end, the formal description of which is possible using the saturation function, which has the following form:

$$H(t) = \frac{dLI}{(LI - AL - CK \cdot ER)dt},$$

where LI - the scope of the offer of electronic services based on innovation; AL - the volume of the offer of electronic transactions based on IT, which are alternatives to this innovation; CK - the cost of the consumer basket; ER - market capacity.

After determining the moment of saturation of the need for IT, the multimedia publisher can again analyze the technological chains of business projects and identify new needs for innovation.

4. EXPERIMENTAL PART

The corporate sales department of the web-studio "Tess Lab" carries out the formation of a technological platform for the implementation of inter-corporate business projects on the Internet. According to the proposed methodology, the basic composition of the technological platform should first be formed, which in this case will include information technologies of the switching cluster (Table 1). Next, it is necessary to evaluate the switching cluster's efficiency based on the optimization model's use. The output data of the model are given in Table 5.

Table 5. The output data of the model

The cost of the technological platform of the web node(ST), $	Number of projects using the cluster(KP), $	The cost of the technological platform of consumers(SC), $	Total volume of transactions(ES), $	Costs for maintenance of the information support of the web site(ZI), $	Transaction costs (KZ), $	Technological costs for cluster maintenance (TI), $
345600	5	25000	175000	58500	4900	6100

As a result of the work of the optimization model, the values of the added value of transactions created by the switching cluster, which is equal to $16,004.27, and the cost of technological solutions based on the switching cluster, which is equal to $5,000, were obtained. Calculation according to formulas (8), (9) showed that the level of commercial efficiency of the switching cluster was 3.27, and the level of technological business support based on the use of this cluster was 0.82. According to the matrix for determining the need for new IT (Table 2), there is a real need to implement new IT, because the low level of the technological platform of the cluster may reduce the commercial efficiency of activities within the project of inter-corporate business on the Internet.

Analysts of the corporate sales department, to increase commercial efficiency and the level of technological support of this project, as well as to implement analytical processing of information in the process of inter-corporate agreements, decided to include in the technological platform one of the following alternative technologies: neural networks, OLAP technology and artificial intelligence.

This problem belongs to the class of multi-criteria decision-making problems. We will use the time characteristics of the i-th IT as alternatives for decision-making; connectivity of i-th IT with other information technologies that make up the technological platform of the cluster; the financial result of the introduction of new IT into commercial activity. We will solve this problem using the hierarchy method, the graphic representation of which is shown in Figure 5.

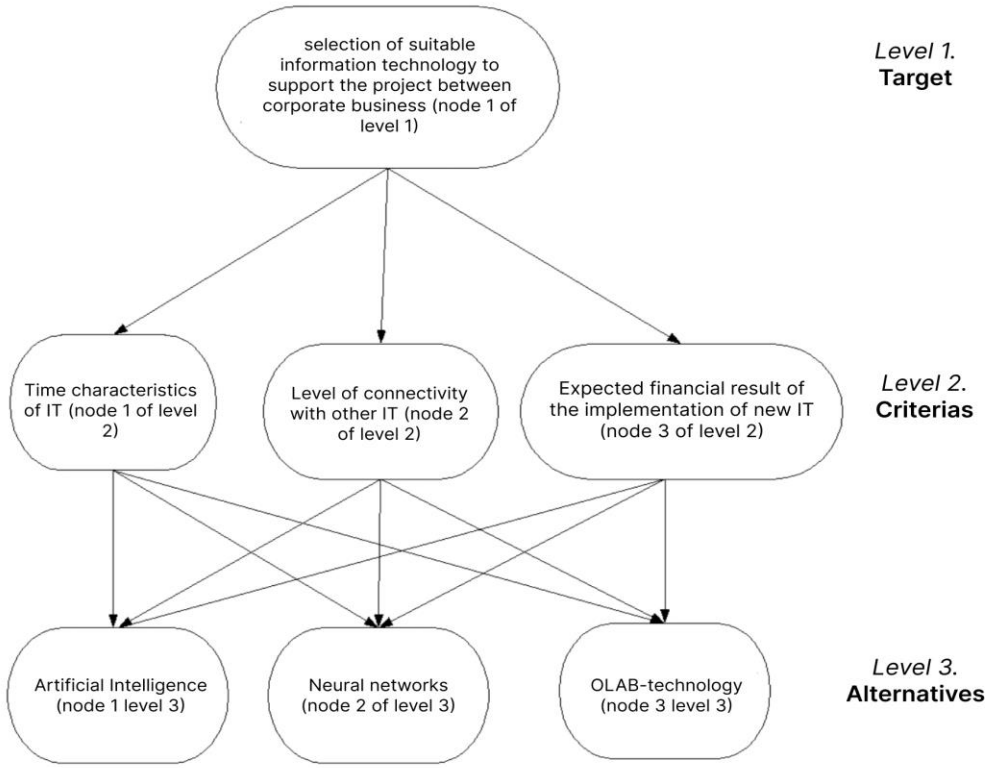

Figure 5. Hierarchy of elements of the task of forming the technological platform of the inter-corporate business project on the Internet, which is solved by the web studio "Tess Lab"

As a result of calculations with the involvement of experts according to formula (2), the following values of time characteristics were obtained:

a) for neural networks:

$$t_1 = \frac{37*0,3+48*0,3+35*0,4}{0,3+0,3+0,4} \text{ =68 hours;}$$

b) for OLAP technology:

$$t_2 = \frac{45*0,3+49*0,3+40*0,4}{0,3+0,3+0,4} \text{ =30 hours;}$$

c) for artificial intelligence:

$$t_3 = \frac{67*0,3+60*0,3+71*0,4}{0,3+0,3+0,4} \text{ =66 hours.}$$

IT data is connected through intermediate connections with Frame Relay, Ethernet, ATM, and X.25 technologies from the entire set of components of the switching cluster. For all technologies, the experts determined a connection density equal to 0.01. Data on the number of consumers whose technical equipment allows joint use of these technologies are given in the Table. 6.

Table 6. Data on the number of consumers

Switching technologies cluster / **New IT alternatives**	**Frame Relay-technology**	**Ethernet-technology**	**ATM-technology**	**X. 25-technology**
Neural networks	15	15	0	0
OLAP-technology	50	100	50	50
Artificial Intelligence	10	90	30	30

The connectivity index determined by formula (1) is: for neural networks 0.3; for OLAP technology 2.5; for artificial intelligence 1.6.

To assess the financial result of the implementation of IT data with the involvement of experts, it is necessary to set:

1) transition intensity matrix, which for all technologies has the form:

$$IM = \begin{pmatrix} 5 & 2 & 0 & 0 & 0 \\ 4 & 2 & 3 & 1 & 0 \\ 0 & 0 & 2 & 5 & 1 \\ 0 & 0 & 4 & 2 & 0 \\ 0 & 0 & 0 & 0 & 3 \end{pmatrix}$$

2) the DR matrix, which has the form:

a) for neural networks:

$$DR_1 = \begin{pmatrix} 1412 & 1820 & 1800 & 1200 & 1200 \\ 718 & 513 & 1000 & 1207 & 1985 \\ 719 & 504 & 1300 & 1280 & 1005 \\ 710 & 612 & 1603 & 998 & 1421 \\ 510 & 569 & 1915 & 110 & 1000 \end{pmatrix};$$

b) for OLAP technology:

$$DR_2 = \begin{pmatrix} 90 & 95 & 355 & 20 & 50 \\ 90 & 51 & 50 & 100 & 100 \\ 100 & 73 & 60 & 20 & 100 \\ 85 & 95 & 90 & 30 & 57 \\ 77 & 82 & 120 & 50 & 85 \end{pmatrix};$$

c) for artificial intelligence:

$$DR_3 = \begin{pmatrix} 80 & 93 & 52 & 53 & 109 \\ 72 & 98 & 97 & 108 & 71 \\ 91 & 76 & 69 & 68 & 107 \\ 69 & 85 & 65 & 61 & 62 \\ 81 & 96 & 182 & 71 & 59 \end{pmatrix}$$

3) the OS matrix, which has the form:

a) for neural networks:

$$OS_1 = \begin{pmatrix} 50 & 10 & 17 & 23 & 20 \\ 30 & 5 & 15 & 12 & 15 \\ 10 & 20 & 12 & 18 & 10 \\ 30 & 10 & 18 & 10 & 11 \\ 15 & 10 & 35 & 20 & 17 \end{pmatrix};$$

b) for OLAP technology:

$$OS_2 = \begin{pmatrix} 86 & 69 & 73 & 85 & 79 \\ 68 & 88 & 87 & 98 & 78 \\ 102 & 78 & 79 & 75 & 72 \\ 79 & 95 & 105 & 71 & 51 \\ 71 & 62 & 91 & 82 & 69 \end{pmatrix};$$

c) for artificial intelligence:

$$OS_3 = \begin{pmatrix} 86 & 87 & 52 & 53 & 109 \\ 72 & 98 & 97 & 108 & 71 \\ 91 & 76 & 69 & 68 & 107 \\ 69 & 85 & 65 & 61 & 62 \\ 81 & 96 & 82 & 71 & 59 \end{pmatrix}.$$

The result of calculations of the financial result of the implementation of IT data according to formula (10) looks like this:

a) for neural networks FR = 580,760 $;

b) for OLAP technology FR = 723,913 $;

c) for artificial intelligence FR = 466,967 $.

Decision-making regarding the most suitable IT support for the project of the inter-corporate business in the Network will be carried out using the Emperor 3.0 program.

In Figure 6 presents the hierarchy of the problem, which is solved by the "Tess Lab" web-studio, built using the tools of this software package.

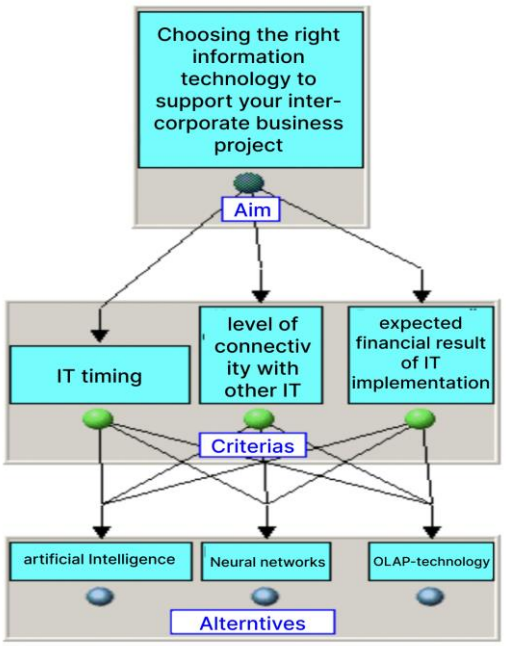

Figure 6. Hierarchy of the task of forming a technological platform of inter-corporate business on the Internet

Next, it is necessary to set priorities according to the criteria specified at the second level of the hierarchy (Figure 7).

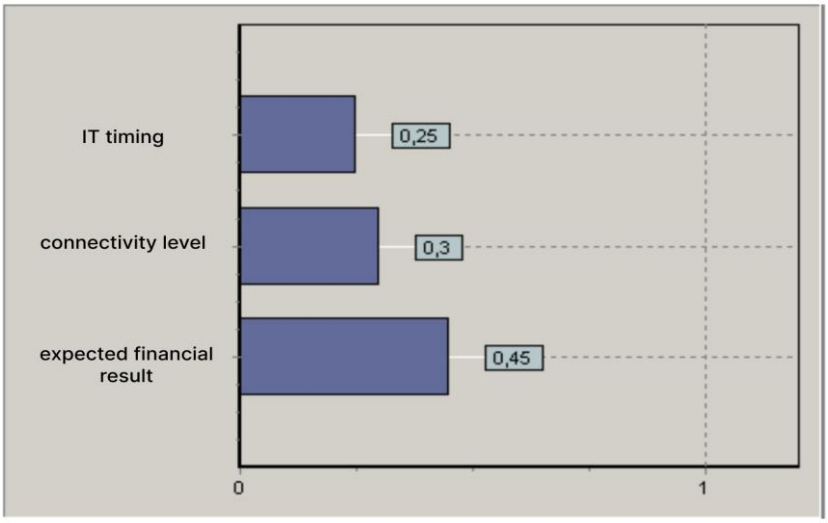

Figure 7. The result of placing priorities by the experts of the web studio "Tess Lab"

Based on the set priorities, Emperor 3.0 generates comparison results according to the criteria presented in Figure 8.

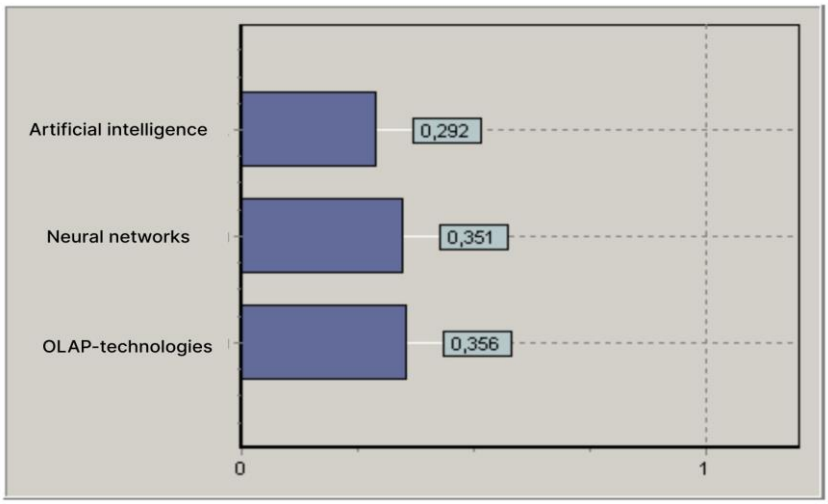

Figure 8. The result of IT comparison by criteria

Thus, OLAP technology will be a new information technology included in the inter-corporate business project of the Tess Lab web studio.

5. CONCLUSION

Thus, the analysis of the specifics of the implementation of information technologies in the commercial activities of organizations made it possible to form a generalized presentation of the innovative strategy of the implementation of information technologies for the implementation of business projects of multimedia publishing. At the initial stage of this process, it is necessary to form the composition of the technological platform. For this purpose, the paper proposes to form a basic set of IT components for business projects in the form of the following information technology clusters based on the analysis of functional relationships. Next, with the help of the optimization model for evaluating the efficiency of clusters and the matrix model for

determining the need for IT, the need to include new IT in the commercial activity of a multimedia publishing house is analyzed. Deciding on the inclusion of one of the alternative information technologies allows you to realize the connectivity indicator, time characteristics of IT, and the financial result of the introduction of new IT in business projects of multimedia publishing. As a result of the fact that the multimedia publishing house is forced to maintain the composition of its technological platform at a modern level, striving to maintain a competitive position in the market, there is a need to analyze the dynamics and scope of the spread of IT innovation. In this work, a diffusion model of new IT is constructed using differential equations and a saturation function

characterizing the moment of saturation of the need for IT innovation.

The proposed approach to managing the business development of a multimedia publishing house based on innovative IT can serve as a strategy tool for planning business projects and a corresponding decision-making mechanism using the results of the functioning of economic and mathematical models.

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