# DIGITAL INNOVATION IN PROCESS MANAGEMENT

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## ABSTRACT

*The logistics management business process of contractual support of a freight transportation service is being developed with options for business development from a basic freight transportation service to an integrated transport and logistics service of the 3PL level and the prospect of transition to a 4PL service. The lack of studies regarding the innovative impact to logistics management defines the research gap. Taking into account the strategic priorities of the target digital models of the transport and logistics business, the logistics management requires innovative solutions in business models regarding the issues of contractual support. The research question could be treated as investigating the innovative changes in business models driven by a smart contracting system in the company as a component of the business information architecture. The article examines the features of business processes in the age of digitalization taking into account the digital transformation of several key aspects of the theory of general economic and functional management. The practical significance of the study is due to the innovational aspects of the modern management procedures using the digitalization tools. The purpose of the article is to create a precedent for justifying a strategic decision to adapt a business to the conditions of digital transformation in the case of Russia. The idea concept and the solutions that implement it are disclosed meaningfully on the example of organizing the transport and logistics business of JSC RZD (Russian Railways), its digital business model. The basis of the system operation is determined by a smart contract, which serves as a digitalization tool for the management business process of contractual support for logistics service. Future research may consider the developing open innovation concept in relation to a smart-contracting system created for the transport and logistics business forms including a precedent for the development of an intelligent management system operating on the principles of self-execution globally and in Russia.*

**Keywords**: Innovation in Management, Digital Business Model, Business Process, Customer-Oriented Approach, Customer Value, Digital Logistics, Smart Contracting System.

## INTRODUCTION

Management, like all forms of economic activity, is subject to innovation. Innovations are typically initiated in the current management system to resolve the internal need for improvements; this is an unhurried, adaptive way of innovative development of management. Its alternative appears to be a transformational path, which is dictated by external influences and becomes radical if changes result in total consequences from the standpoint of the economy and society.

Currently, innovative impacts come from the information challenges of the Industrial Revolution 4.0, information and communication technologies that are being developed in a digital format radically changing the concept of management (Liao et al., 2018; Silkina,

2017; Zemtsov, Barinova, & Semenova, 2019). The latter, in turn, challenges its methodology.

Some methodological issues could arise regarding the nature of business processes from the open innovation theory point of view. Christensen et al. (Christensen, Olesen, & Kjær, 2005) address how the open innovation concept can be analyzed from an industrial dynamics perspective, considering the specific measures that different companies take to manage open innovation from the standpoint of their differential position within the innovation system in question, the nature and stage of maturity of the technological regime, and the particular value proposition pursued by companies focusing closely on the complex interplay between technology entrepreneurs and incumbents. A concept model of open innovation built up in (Yun, Kim, & Yan, 2020) is intended for exploring the existing open innovation channels, which can be useful to motivate engineering research increasing the development of open innovation and new open business models. In his article Chesbrough notes that the key trends in the development of open innovation are related to the field of digital transformation (Bogers et al., 2019). It is very interesting to study how business process could be organized while open innovations creating ecosystem for interacting people and organizations. It involves business models—the logic of creating and capturing value—that dynamically transcend organizational boundaries within that innovation ecosystem (Bogers, Chesbrough, & Moedas, 2018). The development of digital technologies allowed small organizations to rapidly increase their influence in the market. Such innovations were defined by Clayton M. Christensen as disruptive. With his term - disruptive innovation, Clayton M. Christensen reflected the complexity and inconsistency of innovation in General (Christensen et al., 2018).

The history of the study of the considered aspect of management, which is innovative in the context of setting and solving problems of the development of economic systems, is multifaceted in terms of its content and organization. In practical terms, history shapes the evolution of the application of scientific approaches in their complementarity, including administrative, situational, behavioral, reproductive, functional, integration, dynamic, etc.

An empirical approach is seen as a special area of research development against the background of general evolutionary dynamics. It is he who determines the innovative shifts in the formulation of management tasks during the transition from object management to process management, generalized in a business organization by the concepts of a business model and a business process.

The degree of elaboration of the problem under study is determined by the degree of its novelty, that is, the connection to the digital environment of business organization, which is in a state of formation under the influence of breakthrough innovations of Industry 4.0.

The purpose of the article is to create a precedent for justifying a strategic decision to adapt a business to the conditions of digital transformation. The peculiarity of the precedent lies in the fact that the innovative movement arising from the external conditions of business organization, which acquire a total effect, is combined with the formulation of strategic objectives for its development. The precedent is being worked out on the example of the transformation of a transport company providing railway transportation services into an international multimodal transport and logistics company and achieving its differentiated growth by expanding the list and ensuring the complexity of services provided to customers in the Russian and world markets. Thus, the precedent is based on the idea of combining digital transformation and business reorganization with access to the reengineering of business processes in order to achieve their digital maturity. At the same time, the concept of digital maturity used here acquires a contextual meaning that reflects the digital aspects of the basic concept of a business process, bearing in mind that maturity shows its state - how much the activity is defined, managed, controlled and effective.

The authors propose to analyze the process of diffusion of innovative technologies on the basis of dynamic modeling to take into account the multiplicative effect of minor changes in the activities of market participants on the penetration of innovative technologies. The paper also proposes a system of matrices of the impact of costs on the introduction of innovative technologies.

## LITERATURE REVIEW AND METHODOLOGY

### Literature Review

In the modern scientific view, digital logistics could be treated as a result of the innovative impact to management organization in the digital environment based on the optimization of logistics business processes using modern information technologies, including the complementarity of smart contract and block chain technologies, where a smart contract appears as an innovative management tool that provides contractual support transport and logistics activities within the framework of digital law, and a technological tool for self-executing contracts, and block chain is a technology that realizes the potential of a smart contract. The expected results are associated with the fact that smart contracts will help solve the problem of organizing interactions in complex supply chains and transport chains, introduce an adequate system of motivation for high-quality customer service and a system of rewards for law-abidingness and diligence. At the same time, block chain will create an environment of digital trust for participants in cargo transportation.

An integrated transport and logistics services include several elements of the cargo movement process, which form a logistics chain for the delivery of goods with added value, an extended transport chain in terms of logistics. By the nature of the interaction between the client-customer and the contractor, this service belongs to the 3PL level and varies depending on the composition of logistics services: basic 3PL (freight forwarding), complex 3PL, or contract logistics (warehousing, selection of optimal routes, management of supplies and orders, etc.) (Prockl, Pflaum, & Kotzab, 2012). 4PL level services covering integrated logistics on a larger scale determine the prospects for the development of complex solutions (Mehmann & Teuteberg, 2016). Expectations are determined by management services for supply chain design and planning, customer business process management.

Using methods of predictive analytics taking into account the conditions of business globalization and technological trends in logistics allows substantiating the new prospects, such as 5PL software and hardware services (Silkina & Bakanova, 2016; Trappey et al., 2016). This refers to network (virtual) logistics, where the range of services provided is expanded through the potential offered by the global IT space (Haq, GU, & Huo, 2020; Kakhki, Nemati, & Hassanzadeh, 2018).

Continuity lies in the fact that 5PL and 4PL providers should focus on strategic supply chain management, they do not involve tangible assets and, at the same time, are oriented towards the business model of a 'virtual organization'. In the absence of official interpretations, a virtual organization can be understood as an open dynamic business system based on a common information space formed by legally independent business entities in order to share technological resources to fulfill a client's order (Priego-Roche, Front, & Rieu, 2016).

Virtual organization achieves virtual business integration whose infrastructure is provided by platform solutions. An IT logistics platform is a network collaboration space designed to generate customer supply chains through coordinated logistics interactions at a regional, national or international level. A platform means a combination of information, technology, software and hardware (actual hardware, telecommunication lines, peripheral

equipment) that jointly provide customer service and processing of transactions (Rožman et al., 2019). The effect from sharing resources is expressed in improving service and reducing transaction costs.

Within the framework of a general understanding of the content of services in the product line of the transport and logistics business block, services form the business processes of transport and logistics activities.

The concept of identifying a service as a business process (and the identity of these two concepts) is based on the scientific understanding of a service as a special product and the consumer value embedded in it, the process of its creating (business process) and the process of consumption (extraction of utility) completely coincide in time as service process (Wu & Li, 2018). The service is an intangible commodity; it is not held in inventory and could be utilized directly upon creation.

The concept of customer-oriented approach is based on the fact that in modern conditions, service is perceived by the client as an integral feature of the service. This takes into account the peculiarity that the cargo transportation service is a material service, its result is a cargo transported according to the rules of logistics, *i.e.,* delivered to the client safely at the right place, at the right time, at the lowest cost (Giannikas, McFarlane, & Strachan, 2019). As services are provided, customer value is generated by the supplier, partners, and all co-executors of the business process. In turn, the service is consumed by the client who is becoming involved at the stage of service design.

Based on these findings, let us consider the key methodological principles underlying the digital models that can be used to construct the overall architecture of business processes in transport and logistics. The purpose of a business model in management is determined by two approaches: the first focuses on internal processes and is aimed at finding reserves for profit; the second is associated with the external environment, the client and his consumer values. Obviously, in an effective business model, both approaches must be complementary; only in this case, the business model becomes a tactical tool that answers the question of how to achieve the company's strategic goals (Khodaei & Ortt, 2019). Thus, the strategy appears as an ideological platform for modeling, respectively, the business model is the same platform for the design and planning of business processes (Dumas et al., 2013; Klun & Trkman, 2018).

A business process becomes a derivative of a business model, a product of its process decomposition when organizing a business as a whole and implementing each specific business project (Giacosa, Mazzoleni, & Usai, 2018). The main requirement for building business processes is formulated strictly and concisely: to create value for consumers and exclude any unnecessary or obviously needless activities; it applies to each individual business process and to all of their organizational set of processes that form a particular business (Ahmad & Van Looy, 2020; Asim & Sorooshian, 2019; Turetken et al., 2019). The modern methodology of process management is a product of the development of scientific thought in the search for innovative solutions for the process interpretation of the fundamental principles of management - purposefulness of management, hierarchy in the distribution of functions, competence in substantiating and making decisions, responsibility for results and risks, motivation and incentives. The methodology is based on a change of priorities - a movement from the managerial rationalism of the classical schools of management (Fayolle, Weber, Mooney & Reilly, Urvik, Gyulik) towards initiating the search for cognitive solutions for flexible and adaptive business management -processes with elements of artificial intelligence, the use of systems theory, theory of informatics and business informatization in management.

## Methodological Foundations

In the most general view, methodology (Greek μεθοδολογία; formed from: μέθοδος method, way of research, method of cognition; λόγος word, teaching) is a teaching about the organization of theoretical and practical activity. From the user's point of view, it is a scientific approach to solving a particular problem. In solving economic problems, which include the task of management transformation, it is formed by a set of processes, rules, patterns and methods that prescribe how managerial innovation is carried out and, first of all, what aspects of management it affects (Sarpong, Gupta, & Sarkis, 2019).

The radical nature of digitalization, *i.e.*, the transition from analog to digital instruments (Silkina, 2019), gives reason to believe that this innovation affects key aspects of management, such as goal-setting, the object of management and the logic of its decomposition when setting management in a structured economic system (Wolf & Erfurth, 2019).

A business process is an activity localized by goals and objectives (a regulated chain of actions) that leads to a certain result, for example, the sale of services to a client. A business process includes a hierarchy of interrelated actions (tasks) that implement one or more business goals of the company.

The general ideology of business organization, from the point of view of achieving goals, reflects its business model. The business model, with various options for presenting the structure and logic oriented towards the result, provides answers to the main questions: the definition of the end consumer, the value of services from the point of view of the client, the way of earning money and making a profit, economic logic - the mutual relationship of utility for the client and benefits for business owners. Osterwalder's most popular business model has nine main components - customer segments, customer relationships, distribution channels, supply chain, resources, core business, key partners, cost structure, and revenue streams.

When setting up management, the transition from a business model to business processes is updated, inter alia, in connection with the need to implement the key idea of the modern industrial revolution, Industry 4.0, which is the customer focus of business.

Goal-setting is rightly considered an invariant management technique, regardless of the subject specifics of the business, the scale, and many other internal and external factors that determine the goals in managing current activities and development (Vachon & Klassen, 2008). The existing methodological approaches to the implementation of this technique, described in a special section of the theory of management theology, provide a fairly wide choice, with the SMART method being one of the most developed and effective from the standpoint of practical application (Bjerke & Renger, 2017). Smart means "clever" and today, in the era of total digitalization; it meets the conditions for setting management as never before since it answers the very essence of the information challenge it is facing.

The process approach in organizing a business becomes total: business processes become the main object of management, and management itself is organized as a business process, and this is reflected in the applied methods. Management methods serve to solve the problems of implementing the process management methodology, adjusted for the conditions - setting management in a digital environment.

The management process seems to consist of the functions of planning, organization, motivation, control and coordination, which are united by the connecting processes of communication and decision-making in the smart contracting system. The complex of methodological techniques and tools proposed for solving the problems of adaptation of the transport and logistics business of Russian Railways provides for: the selection of business processes according to the proposed classification; building, monitoring and adjusting the

target business model in accordance with the digital business model; implementation of a smart contracting system and a phased transition to management of a transport and logistics business, taking into account the digital maturity of business processes; development of functional requirements and redistribution of management powers in the management system; implementation of the principles of qualitative and quantitative improvement of business processes in accordance with the principles based on the standard MS ISO 9001: 2000.
In order to substantiate the methodology of management, we present a classification for the groups identified based on the proposed factors:

1. Role in the service process: main, auxiliary and managerial business processes.

The main business process in logistics, *i.e.,* cargo transportation, corresponds to its specialization and has the characteristics of a flow process. Different types of the main business processes are described by the diagram (Figure 1, where the shades of grey correspond to organizational and technological complexity of the process).

| | Territorial coverage (cross-border transportation) | | |
|---|---|---|---|
| Transport type | *Internal* | *International* | *Transit* |
| *Unimodal rail transportation* | | | |
| *Multimodal rail transportation* | | | |

**FIGURE** 1
**MAIN BUSINESS PROCESSES OF TRANSPORT AND LOGISTICS OF RUSSIAN RAILWAYS**

Auxiliary processes support the main business process and ensure that goods are delivered in accordance with logistics rules (provision of wagons, infrastructure for storing wagons on public and non-public tracks, provision of equipment and accessories, loading records for goods reloaded at border stations, etc.).

Managerial business processes integrate the main and auxiliary business processes, aiming to make the transport and logistics business customer-oriented. They perform the general management functions (design, planning, organization of services, etc.) and special functions. The formalized notion of identity of a service and a business process with different solutions is described using the example of the main business process 'Cargo transportation' (Table 1);

**Table 1**
**FORMALIZED REPRESENTATION OF SERVICE IN BUSINESS PROCESS CATEGORIES**

| **Service** | **Constituent business processes** |
|---|---|
| Basic service ($S_B$) | $S_B = P_M + \sum_{i=1}^{n} P_{Ai} + \sum_{j=1}^{p} P_{Mgj}$ |
| Complex service ($S_C$) | $S_C = S_B + \sum_{i=1}^{\Delta n} P_{Ai} + \sum_{j=1}^{\Delta p} P_{Mgj}$ |

Note. $P_M$ is the main business process; $P_{Ai}$ is the auxiliary business process; $P_{Mg}$ is the managerial business process; $\Delta n$ and $\Delta p$ are, respectively, the increment in the number of auxiliary and managerial business processes of the relative basic service.

2. Nature of participation in producing the final result (in terms of customer focus, this refers to customer value): external, transfer and internal business processes.
External business processes develop in the interaction of business units of a holding with external business partners and customers. Transfer business processes are processes of intra-holding cooperation of business units. Internal business processes, in terms of the Customer Focus Concept, are the operational processes of transport and logistics that are performed within business units (Green et al., 2019);
3. Nature of regulation: regulated by an agreement with a business partner or customer; determined by state (international) and corporate regulations.
4. Nature of participation in adding value to the final result: regulated (the cost depends on the tariff for the service with options: the tariff is set by the state, Russian Railways, at the road level), unregulated (the cost is stipulated by the contract).
5. Degree of influence on the economic (commercial) result of the transport and logistics business, taking into account the risk factor: controlled by economic sanctions; administratively controlled.
6. Structural characteristics: operational (elementary); with additional elements (complementary). An elementary business process is identified as an operation, a complete action or an operational complex allowing constructing a simple transport chain. A complementary business process is comprised of elementary business processes and allows to construct different types of extended transport chains.
7. Correlation with the service: traditional; innovative business processes.
A traditional business process meets the established practice of customer service, is intended for satisfying the existing demand. An innovative business process is related to innovative services offered.
8. Relationship with the service life cycle: fragmented; complete.
In a general economic sense, a business model describes the process of creating and realizing value for a consumer of a product or service (Euchner, 2016; Haig, 2019; Moazed & Johnson, 2016).

Disclosing the innovative impact on the logistics management the researchers should take into accounts the that an effective business model is targeted in nature and provides answers to several questions that are fundamental for organizing any business:

a) Who is the target client of the company?
b) What problem does the business project solve?
c) What value is created?
d) How to attract and retain customers, how to build relationships with customers?
e) What makes the offered products and services unique?
f) How to get income?
g) What is the structure of income?
h) How profits are generated?

The innovative impact to the logistics management could be explained by disclosing the transition from business models to business process in the digital environment. In this sense, a business model is a logical structure necessary for building a business, and has many variations, among which the “digital business model” corresponds to the topic under

consideration; it focuses on information tools for implementing organizational decisions made in the model (Weill & Woerner, 2018).

## Goal Setting

The abbreviation of the method's name deciphers all the rules prescribed by the method; the goal must be: S (Specific); M (Measurable); A (Achievable); R (Relevant/Realistic), in terms of resource availability and consistency with other goals; "limited in time" T (Time-bound), calculated for a certain time period. The validity of the rules ensures the availability of appropriate instructions (Table 2). However, their implementation involves taking into account the management object, that is, the features of the model that the business structure incorporates, hereinafter referred to as the company's business model.

**Table 2**
**INSTRUCTIONS FOR USING THE SMART METHOD**

| Rules to be Implemented in Goal-Setting | | Questions to be Answered when Implementing the Rules | Features |
|---|---|---|---|
| S | Specific | What results need to be achieved? | Specificity |
| | | What are the qualitative characteristics and indicators of expected results? | |
| M | Measurable | What are the quantitative indicators? | Measurability |
| | | What are their descriptions/dimensions? | |
| | | How can you judge the achievement of the goal? | |
| A | Achievable | What actions need to be taken? | Achievability |
| | | What is the sequence of actions/priorities? | |
| | | What resources will be required to achieve the goal? | |
| R | Relevant | How important is the goal for achieving overall success? | Accessibility |
| | Realistic | Could the executor achieve the goal? | Feasibility |
| T | Time-bound | By what time is it necessary to achieve the goal? | Terms of implementation |

## The Introduction to the Mathematical Task

When implementing innovative solutions in business models for contractual support, it is necessary to take into account several multidirectional criteria. The scale of the economic aspects of the segment of the transport and logistics business of JSC "Russian Railways" is very large. Therefore, along with new technologies, business solutions of the previous generation will be present. In the process of making a decision on the transition to a new commercial information architecture, it is necessary to provide for a combination of technologies in the organization of current work for a long period of time. This is dictated by both adaptive trends in innovative management development and radical transformations.

Particularly acute is the question of innovation rises informational challenges of industrial revolution 4.0. The long life span of two generations of the technology due to the inertia of the office, the need for technical equipment for the entire chain of the performers and the development of technical means of doing the smart contracts.

It is necessary to find an economically sound strategy for implementing innovative solutions in business models on contractual support issues. At the same time, an optimal balance is being sought between reducing the use of the previous technology and increasing the penetration of smart contracts into business processes. Since this process involves significant financial costs, the criterion will be the total profit from the use of both technologies, taking into account the costs incurred.

## The Mathematical Description of the Problem

The formalization of the task will be carried out in three stages:

1. We will create a matrix of interaction between contractors in the segment of the transport and logistics business of JSC "Russian Railways". The matrix elements correspond to the use of contractual support technologies.
2. We will develop a methodology for evaluating the data of the interaction matrix using the theory of statistical analysis.
3. We will evaluate the economic indicators for all options of interaction.

Note that all of these indicators relate to a certain planning period T, after which the assessment of the economic criterion takes place.
The first stage is to determine the criteria by which the statistics of contractual interaction will be processed. We used the following structure:

a) the former, traditional methods of registration and maintenance of contractual obligations are used
b) contracts are transferred to digital SMART platforms
c) enterprises that were unable to restructure the structure of office management and returned to the previous methods of organizing business interaction
d) accounting for counterparties that stopped interacting during the period T
e) contractors, who began the business interaction during the period T

All data in a formalized form can be represented as a matrix (Table 3):

**Table 3**
**INTERACTION MATRIX**

| | **Uses old Technology** | **Uses Digital SMART Contracts** | **Does Not Interact** |
|---|---|---|---|
| Uses old technology | $P_{11}$ | $P_{12}$ | $P_{13}$ |
| Uses digital SMART contracts | $P_{21}$ | $P_{22}$ | $P_{23}$ |
| Does not interact | $P_{31}$ | $P_{32}$ | $P_{33}$ |

At the same time, during the second stage, statistical data will be determined in the form of the ratio of the listed categories to the total pool of counterparties.

Here P11 corresponds to data on the number of enterprises that used the previous technologies during the planning period and continued to use them;
P12 to data on the number of enterprises that use the previous technologies during the planning period and switched to the use of digital SMART contract technologies;

P13 to data on the number of enterprises that used the previous technologies during the planning period and stopped business interaction (excluding enterprises that switched their activities to SMART contract technologies);
P21 to data on the number of enterprises using SMART contract technologies during the planning period and switching to the use of previous technologies;
P22 to data on the number of enterprises using SMART contract technologies during the planning period and continuing to use SMART contract technologies;
P23 to data on the number of enterprises that use SMART contract technologies during the planning period and stop business interaction;
P31 to data on the number of enterprises that started business interaction using previous technologies;
P32 to data on the number of enterprises that have started business interaction using digital technologies of SMART contracts;
P33 to data on the number of enterprises that decided to start a business, but did not conduct transactions during the planned period.

All of the above information can be formalized in the form of an interaction matrix (probability) as follows:

$$P = \begin{vmatrix} p_{11} & p_{12} & p_{13} \\ p_{21} & p_{22} & p_{23} \\ p_{31} & p_{32} & p_{33} \end{vmatrix}$$

The numbers included in the matrix P={pij}, i, j=1, 2, 3, by row, must meet the conditions of the full group of events

$$\sum_j p_{ij} = 1, \ \forall i$$

Thus, the matrix P is, according to the definition, stochastic on the right.

At the second stage of the study, the method of evaluating the data of the interaction matrix using the theory of statistical analysis is used.
These parameters, like any value determined by market trends, have a difficult-to-identify internal structure. For the possibilities of software implementation of their statistical evaluation, we consider a modern algorithm that has the property of scalability and data invariance. In the mathematical modeling of the matrix values, a general representation is used in the form of:

$$p^*(t) = p(t) + \lambda(t)$$

where the component p(t) is a deterministic function that meets the condition:

$$p(t) = p(t + mT) : \forall m = 1, 2, ...$$

in this expression: t is the time; T is the period;

We use the designation λ(t) for the random changes caused by a variety of factors, such as the competitive market environment, changes in the preferences of counterparties, economic and other numerous reasons.

To apply mathematical modeling, it is necessary to process statistical data and estimate the magnitude and values of the T coefficients of the Fourier expansion used A(t), An, θn, for n=1,2,… as elements of vectors

$$\{A_0, A_1, A_2, ...\} \text{ And } \{\theta_1, \theta_2, ...\}$$

To do this, it is necessary to formalize the functions p*(t); p(t); λ(t) over a sufficiently long period of time t ∈ [0,t*].
We introduce additional functions of the form:

$$p^*_k(t) = p^*(t + kT); \ k = 1, 2, ...$$

defined on t ∈ [0,T]; the deviations λ(t) in this case will be centered random fluctuations.
Let us introduce the deviation indicator

$$\Delta(T, p^*) = \Delta(T, p_1^*(t), p_2^*(t),...)$$

and evaluation of the amplitude:

$$\mathrm{H}(T, p^*) = \mathrm{H}(T, M\lceil p^*(t)\rceil)$$

where the mathematical expectation $M\lceil p^*(t)\rceil$ is obtained by calculating the averaged values of the original functional dependencies.
To calculate them, we use expressions for processing statistical series as follows:

$$\Delta(T, p^*) = \int_0^1 \max\{\left|\tilde{p}_i(q) - \tilde{p}_j(q)\right| dq \quad i, j = 1, 2,...$$

where the normalized values are calculated by the formulas:

$$q = t / T \; ; \; \overline{p}^*(q) = M[p^*(t)]$$

$$\mathrm{H}(T, p^*) = \int_0^1 \int_0^1 [\overline{p}^*(q) - \overline{p}^*(r)]^2 dqdr \quad \overline{p}^*(q) = M[p^*(t)]$$

For practical purposes, it is important to get the average estimate of the desired variable:

$$\overline{p}^* = \int_0^1 \overline{p}^*(q) dq$$

and its characteristic allows to observe long-term trends and, in addition, can serve the purposes of predictive planning.

The third stage of the study allows us to obtain specific numerical data for the interaction matrix P and for the vector of economic indicators G that already reflects each of the interaction options in value terms.
The structure of the vector can be represented in the form:

$$G = \{g_F, g_D\}$$

where gF corresponds to the profit from the use of the former (Former) technology, gD corresponds to the profit from the use of digital (Digital) technology of SMART contracts. The corresponding positions contain the results of the calculation of integrated profit indicators, depending on the interaction used.

## The Mathematical Model

The task of the mathematical model is to find an algorithm that allows you to evaluate the cost effectiveness of promoting innovative SMART contract technology and the dynamics of the introduction of a new digital technology over time. This will enable reasonable cost planning for the transition to digitalization in business models on contractual support issues across the entire transport and logistics business of Russian Railways.
We introduce the concept of the business state vector from the point of view of contractual support

$$\overline{C} = \{c_1, c_2, c_3\}$$

The constituent elements reflect the following quantitative indicators:

c1 is the number of enterprises using the old technologies during the planning period;
c2 is the number of enterprises using SMART contract technologies during the planning period;

c3 is the number of enterprises belonging to the group that have stopped business interaction or decided to start it, but did not conduct transactions during the planned period.

This view will allow us to calculate the dynamics of the state of contract interaction of the transport and logistics business of JSC "Russian Railways". First, we need to fix the estimated planning horizon and divide it into accounting periods. In the most general case, a period is taken as a period of time, after which the summary reporting data is provided. Since for an abstract mathematical model, specific values are not essential, then for the certainty of the period, we will take 1 month, and set the entire horizon to be 6 months long. This is due to the fact that over long periods of time, the parameters of business interaction can change significantly, for example, due to the influence of seasonality or other factors that cannot be accurately accounted for.

In this case, with the purpose to calculate the number of enterprises using digital technology in the end of the first month, we need to add the previous number of contractors who continued its use with the number of enterprises which previously used the same technology and went on SMART contracts and the number of enterprises which had no business interactions and started it in the first planning period using digital technologies. Authors can write the following mathematical expressions:

$$c_{11} = c_1 p_{11} + c_2 p_{21} + c_3 p_{31}$$

$$c_{21} = c_1 p_{12} + c_2 p_{22} + c_3 p_{32}$$

$$c_{31} = c_1 p_{13} + c_2 p_{23} + c_3 p_{33}$$

where for cij the first index i=1 means the number of enterprises using the previous technology, similarly, for i=2 it means those using SMART contracts, and for i=3 the new participants in business interaction; the second index indicates the number of the planning period.

Briefly, this can be written as:

$$c_{ij} = \sum_{k=1}^{3} c_k p_{kj} \quad \text{for. } i, j = 1...3$$

Using the rule of multiplying vectors by matrices, we can compactly write this ratio in a vector-matrix form that is convenient for programming algorithms:

$$\overline{C}_1 = \overline{C} * P \text{ Where } \overline{C}_1 = \{c_{11}, c_{21}, c_{31}\}$$

The obtained result reflects the state of contractual interaction of the transport and logistics business of JSC "Russian Railways" in a period, then we calculate it in two periods:

$$\overline{C}_2 = \overline{C} * P^2 \text{Where } \overline{C}_2 = \{c_{12}, c_{22}, c_{32}\}$$

and after M periods:

$$\overline{C}_M = \overline{C} * P^M \text{Where } \overline{C}_M = \{c_{1M}, c_{2M}, c_{3M}\}$$

Thus, the full calculation includes the determination of the degree spectrum P, P2,…,PM of the contact interaction matrix.

Further, multiplying the original vector $\overline{C} = \{c_1, c_2, c_3\}$ sequentially by the degrees of the matrices, we will get the number of counterparties using both SMART contract technologies and previous technologies.

Further, knowing the profit from the use of the previous technology g1 and digital innovation g2, summing up the profit G for all periods in the form of:

$$G = \sum_{k=1}^{M} c_{1k} g_1 + \sum_{k=1}^{M} c_{2k} g_2$$

We will get an economically significant indicator.

## RESULTS: CASE OF RUSSIA

### The Result of the Model

The initial data for the calculation are the current indicators of contract interaction of the Department of Transport and Logistics business of JSC "Russian Railways". From this data, we get the value of the vector $\overline{C} = \{c_1, c_2, c_3\} = \{114, 56, 0\}$. Processing statistics according to the proposed method gives the value of the interaction matrix

$$P = \begin{vmatrix} p_{11} & p_{12} & p_{13} \\ p_{21} & p_{22} & p_{23} \\ p_{31} & p_{32} & p_{33} \end{vmatrix} = \begin{vmatrix} 0.763 & 0.182 & 0.055 \\ 0.232 & 0.588 & 0.18 \\ 0.21 & 0.48 & 0.31 \end{vmatrix}$$

The obtained values reflect the current process of using contact interaction technologies in the absence of investment in the promotion of digital SMART contracts. If plan costs in the amount of Q=21,000 USD to digitalization in the sector of transport and logistics of JSC "Russian Railways" with the goal of expanding the pool of contractors using modern methods such business interactions, the statistical analysis using the presented technique gives a somewhat different picture. In this case, we get new values of the interaction matrix. Let us denote new interaction matrix as P*.

$$P^* = \begin{vmatrix} p^*_{11} & p^*_{12} & p^*_{13} \\ p^*_{21} & p^*_{22} & p^*_{23} \\ p^*_{31} & p^*_{32} & p^*_{33} \end{vmatrix} = \begin{vmatrix} 0.541 & 0.421 & 0.038 \\ 0.2142 & 0.735 & 0.508 \\ 0.3325 & 0.56 & 0.1075 \end{vmatrix}$$

The calculation process for the same initial data for the vector is presented in Table 4. When programming the calculation for 7 planned accounting periods, data for the degrees of the matrices P and P*, which are used in the presented mathematical model, are obtained. From the analysis of the calculated values obtained, we can note a rapid convergence in the limit to the infinitesimal matrix. This result is generally characteristic of regular processes and it is theoretically proved that they converge to a stationary solution. In the case under consideration, an important consequence is a fairly fast convergence. This is typical for such nondegenerate processes and provides a basis for confident application of the proposed methodology for predictive planning.

| Table 4<br>MATRIX OF VALUES OF INTERACTION MATRICES | | | | | |
|---|---|---|---|---|---|
| **Matrix P** | | | **Matrix P*** | | |
| 2nd Exponentiation of a Matrix | | | | | |
| 0.6359 | 0.2723 | 0.0918 | 0.3955 | 0.56 | 0.046 |
| 0.3512 | 0.4744 | 0.1744 | 0.2902 | 0.66 | 0.0509 |
| 0.3367 | 0.4693 | 0.1941 | 0.3356 | 0.61 | 0.0526 |
| 3rd Exponentiation of a Matrix | | | | | |
| 0.5677 | 0.3199 | 0.1124 | 0.3489 | 0.6 | 0.0483 |
| 0.4147 | 0.4266 | 0.1588 | 0.3151 | 0.64 | 0.05 |
| 0.4065 | 0.4303 | 0.1631 | 0.3301 | 0.62 | 0.0495 |
| 4th Exponentiation of a Matrix | | | | | |
| 0.531 | 0.3454 | 0.1237 | 0.3339 | 0.62 | 0.0491 |
| 0.4487 | 0.4025 | 0.1488 | 0.3231 | 0.63 | 0.0496 |
| 0.4443 | 0.4053 | 0.1504 | 0.3279 | 0.62 | 0.0494 |
| 5th Exponentiation of a Matrix | | | | | |
| 0.5112 | 0.3591 | 0.1297 | 0.3291 | 0.62 | 0.0493 |
| 0.467 | 0.3898 | 0.1433 | 0.3256 | 0.62 | 0.0495 |
| 0.4646 | 0.3914 | 0.144 | 0.3272 | 0.62 | 0.0494 |
| 6th Exponentiation of a Matrix | | | | | |
| 0.5006 | 0.3664 | 0.133 | 0.3276 | 0.62 | 0.0494 |
| 0.4768 | 0.3829 | 0.1403 | 0.3265 | 0.62 | 0.0494 |
| 0.4755 | 0.3838 | 0.1406 | 0.327 | 0.62 | 0.0494 |
| 7th Exponentiation of a Matrix | | | | | |
| 0.4949 | 0.3704 | 0.1347 | 0.3271 | 0.62 | 0.0494 |
| 0.4821 | 0.3793 | 0.1386 | 0.3267 | 0.62 | 0.0494 |
| 0.4814 | 0.3797 | 0.1388 | 0.3269 | 0.62 | 0.0494 |

Next, we need to evaluate the profit G in the absence of investment in the promotion of digital SMART contracts G* after spending in the amount Q of digitalization in the segment of the transport and logistics business of JSC "Russian Railways" for all periods.

In particular, if there is a difference in values G* – G > Q, this means that it is advisable to spend money on promoting innovative digital technology.

It is more convenient to present the calculation results in the form of Figure 2 and Figure 3 diagrams. The presented graphs clearly show the significant impact of even small changes in the composition of the matrices P and P*.

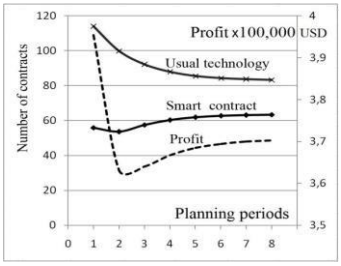


**FIGURE 2**
**SITUATION WHEN RUSSIAN RAILWAYS IS MAKING NO INVESTMENTS**

The chart system (Figure 1) reflects the dynamics of changes in the number of contracts using previous technologies, the number of digital SMART contracts and the projected total profit. The calculation was carried out in the absence of investment in the promotion of digital SMART contracts.

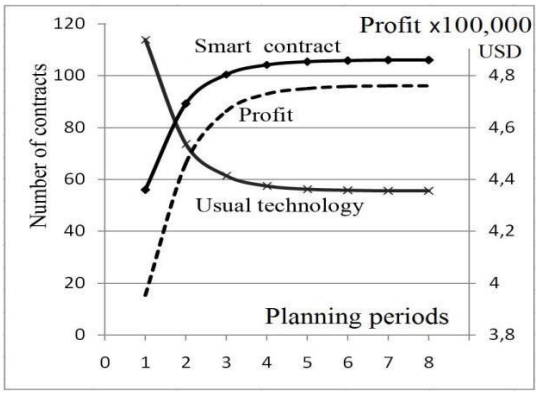


**FIGURE 3**
**SITUATION WHEN RUSSIAN RAILWAYS IS INVESTING IN DIGITALIZATION**

The chart system (Figure 2) reflects the dynamics of changes in the number of contracts using previous technologies, the number of digital SMART contracts and the projected total profit. The calculation was carried out under the conditions of investment costs in the promotion of digital technologies in the segment of the transport and logistics business of JSC "Russian Railways" for all periods.

A number of important conclusions can be drawn from the comparison of the results obtained.

At the cost of Q=21,000 USD promotion, there is a shift in the parameters of the interaction matrix, which, as a result, due to the multiplying effect, gives a steady increase in the number of counterparties using SMART contract technologies. There is also a correlation with the dynamics of the total profit for the studied planning periods.

If we estimate the total profit difference of 105,867 USD, then taking into account the NPV analysis of discounting for 7 planned periods, the costs of promoting digital SMART in the segment of the transport and logistics business of JSC "Russian Railways" Q=21,000 USD correspond to the reduced amount of 84,852 USD, which shows a high degree of return on investment.

## Aspects of Innovative Development of the Logistics Business Process

The empirical approach is an indispensable element of applied, practice-oriented scientific research. In this study, it is carried out by referring to the practice of organizing the transport and logistics business of Russian Railways, a company at the level of the top management of which a strategic decision was made on the digital transformation of the business. Moreover, digitalization has been identified as one of the key long-term priorities for the company's development, along with logistics and increasing customer focus.

The decision being made was dictated by the need, on the one hand, to comply with modern trends in economic development, and on the other, to take an active position in this process, acting as the creator of trends, the conductor of the ideas of the modern industrial revolution. An active creative position in the digital transformation of the industry is due to the

membership of Russian Railways in the Digital Transport and Logistics Association as a center of competence for the departmental project of the same name, in particular, work in such areas as the optimization of freight traffic, cross-border interaction and others with a stake on logistics in its digital format.

The digitalization of freight transport logistics is a complex area of innovative development due to the need for a radical revision and modernization of the existing logistics system. The need is formed on the basis of the fact that the process of delivery of goods includes many complexly coordinated and controlled interactions using traditional management tools, and this naturally manifests itself in the formation of the company's image, ensuring customer satisfaction with transport and logistics services.

Theoretical propositions regarding the target and object orientation of management confirm their effectiveness in their specific application. Consider the business of the JSC RZD and, specifically, transport and logistics business as an illustrative example from the standpoint of implementing the national program "Digital Economy of the Russian Federation" (approved by the Minutes of the meeting of the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects of 4 June 2019 No. 70), developed in pursuance of the decree of the President of the Russian Federation "On national goals and strategic objectives of the development of the Russian Federation until 2024" dated May 7, 2018 No. 204. Its development is in line with the current focus on achieving "digital maturity" of key sectors of the economy, contained in the decree of the President of the Russian Federation "On the national development goals of the Russian Federation until 2030" dated July 21, 2020 No. 474. According to available open data, the Company is at the forefront of digital transformation. This is evidenced by the current software and strategic decisions: Long-term development program of the JSC RZD until 2025, Digital transformation strategy of the JSC RZD until 2025.

## Experience-Oriented Solutions in the Russian Railways Holding. Target-Oriented Model of Transport and Logistics Business in a Digital Environment

As the parent company of the Russian Railways Holding, JSC RZD implements the target business model adopted by the Development Strategy of the Russian Railways Holding for the period up to 2030 (hereinafter referred to as the Strategy-2030). The target business model is structured in blocks. Transport and logistics activities, which are becoming a priority type of economic activity of the Russian Railways Holding during its transformation from a railway to a Transport and Logistics Company and one of the main profitable components of business in this model, are separated into a business block of the same name. The block accumulates the Holding's competence in the organization of the transportation process and logistics activities, including the organization of cargo flows, a range of services for cargo handling (terminal and warehouse activities, related services) and work with clients. The strategic priority for the development of this business block and the setting up of functional management is the formation of a diversified product basket of the Russian Railways Holding with the transition from providing mainly transportation services to providing cargo owners with comprehensive integrated services on a door-to-door basis, consistently expanding the range from 2PL to 3PL, 4PL services, the formation of global supply chains.

Organizationally, the transport and logistics block is formed by specialized subsidiaries and dependent companies, branches and structural divisions of the JSC RZD, summarized by the concept of a business unit. The functioning of the block is ensured by the Concept for the Development of the Transport and Logistics Business of the Russian Railways Holding, which defines the main directions for the practical implementation of the

Strategy-2030 in terms of the transport and logistics business and is consistent with the Concept of the Holding's customer-oriented approach in the field of freight transportation (hereinafter referred to as the Customer-Oriented Concept).

The target model of the transport and logistics business block assumes the expansion of the business in cargo transportation through the active development of the segment of transport and logistics services, which will allow, according to predictive estimates, to maintain and increase the scopes of cargo transportation in the segment of basic services through direct access to the client. The customer-oriented concept, which is in correspondence with the Concept of development of the transport and logistics business, provides for that, in addition to the basic service for the transportation of goods, some new value-added services based on customer-oriented transportation technologies are to be implemented.

In other words, with the general target orientation of the development of the transport and logistics business towards comprehensive customer service and the planned reduction in the share of rail transportation (according to the Strategy-2030 from 90% to 80%), this service and type of activity (business) integrated with transport logistics is basic for the company; transportation of goods by rail should still retain its importance during the considered planning horizon.

## Transport and Logistics Service and Business Process

The basic service in the transport logistics of JSC RZD is transportation by public railway transport of the cargo received from the consignor from the point of departure to the point of destination, as well as the delivery of the cargo to a person authorized to receive it. In terms of logistics, this is a direct logistics chain for the delivery of goods, or a simple transport chain. The basic service of freight rail transportation can be carried out with additional options: transportation of goods on a schedule with an agreed time of departure and arrival; storing of loaded and empty wagons on public infrastructure (“parking”); transportation of goods on special conditions, etc.

The process of providing a service (creating customer value) is associated with the activities of the supplier and its partners, co-executors of the business process, and consumption with the activities of the client. At the same time, in practice, the client is becoming increasingly involved in the design of the service, which is reflected in orders for complex services. In the transport and logistics activities of the Holding, this is the provision of logistics for supply, sales and intra-plant logistics of industrial enterprises, international multimodal transportation, representation of interests in customs and tax authorities, etc.

The classification of business processes is made according to universal rules developed in accordance with Porter's theory of value chains (Porter & Kramer, 2019). Following these rules and guided by practical needs, which should serve as a created classification in the design of business processes of transport and logistics activities, it seems necessary to resort to multifactor classification (Table 5). In this case, the object of classification is determined based on the general understanding of the process as a sequence of actions leading to a given result. It complies with the ISO 9000 2000 standard and is adjusted depending on input data that is important for the description and formalized representation of business processes in transport and logistics:

a) the process begins with an event and can have several endings;
b) the 'inputs' are converted into the 'outputs' during the process with the resources being spent;
c) the inputs, as a rule, are materials and information, the outputs are tangible or intangible service and information;

d) process resources are assumed to be the personnel directly involved in the service, the equipment, technologies, methods that determine the requirements for the process, the tools and systems for measurements, as well as the production environment;
e) the outputs of one process, as a rule, are the inputs of other processes;
f) the effectiveness of the process depends on the usefulness of the output for the recipient, commensurate with the consumer value provided to the client of the transport and logistics service.

**Table 5**
**CLASSIFICATION OF BUSINESS PROCESSES OF TRANSPORT AND LOGISTICS ACTIVITIES**

| Feature | Business Process Categories |
|---|---|
| Purposes in the process of servicing | Basic (B) |
| | Auxiliary (A) |
| | Managerial (M) |
| Nature of participation in creating final result (customer value) | External |
| | Transfer |
| | Internal |
| Nature of regulation | Regulated by contract |
| | Regulated by state (international) standards |
| | Due to corporate regulations |
| Nature of participation in increment of value of final result | Cost is regulated by tariff |
| | Cost is determined by contract |
| Degree of influence on economic (commercial) result of transport and logistics business taking into account the risk | Controlled by economic sanctions |
| Structural characteristic | Operational (elementary) |
| | With additional elements (complementary) |
| Correlation with service content | Traditional |
| | Innovative |
| Relationship with service life cycle | Fragmented |
| | Door to door |

## Management Business Process of Contractual Support of Cargo Transportation

In the presented classification, the allocated position, from the standpoint of setting functional management, is occupied by managerial business processes. They provide the organizational unity of the main and auxiliary business processes in achieving customer-oriented approach in the transport and logistics business, while implementing general management functions (design, service planning, service organization, etc.) and special functions (traffic management, freight flow management, chain management of customer supplies). Taking into account the specifics of the main business processes (carriage of goods by rail) and auxiliary business processes (provision of wagons, infrastructure for storing wagons on public and non-public tracks, provision of equipment and accessories, loading details when reloading goods at border stations, etc.) their organizational unity ensures the management business process “contractual support of the service”, which is substantively represented by operations for concluding contracts and monitoring their execution.

## The Innovative Approach to the Logistics Management for Developing the Smart Contracting System

The modern reality is that the target business model of the JSC RZD as a whole, and hence its component part, is the target model of the transport and logistics business block, decomposed along the transport and logistics business block to business processes, must acquire digital form in the context of the digital transformation of the economy. The principles of digital business (digital business model) are declared by the Concept for the implementation of an integrated scientific and technical project "Digital Railway":

- Complete consistency: the availability of necessary, reliable and timely information about events and intentions simultaneously for all entities involved in the provision of services, including employees, customers and partners;
- Online business: making well-grounded decisions and taking actions without critical (increasing risks or additional costs, reducing the competitiveness of services) delays;
- Management of services: planning and control of activities in the context of service indicators for clients, which, in turn, are composed of indicators of internal services.

Continuity of the digital business model to the target business model of the Russian Railways Holding and its transport and logistics block is mediated by the construction of a high-level functional model of the Holding with a dedicated functional area "Freight transportation" and its support with a service model, in the structure of which there are blocks "Logistics of transportation" and "Contract". The idea of combining these blocks on a digital basis initiates an innovation to create a smart contracting system for the transport and logistics business with a goal of developing it. Goal-setting, carried out according to the rules of the SMART method, reveals the concept of the proposed logic of innovative approach to the logistics management (Figure 4).

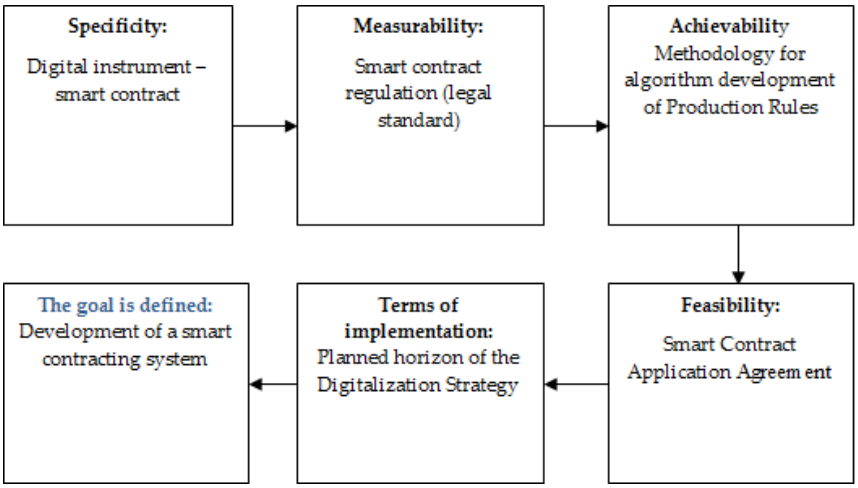


**Figure 4**
**THE LOGIC OF INNOVATIVE APPROACH TO THE LOGISTICS MANAGEMENT FOR DEVELOPING A SMART CONTRACTING SYSTEM (THE CASE OF RUSSIA)**

According to the general rules, the suggested logic of the innovative approach to the logistics management is relevant to the logical structure of business process being determined by the adopted target business model in the conditions for its implementation.

## Digital Tool of a Smart Contracting System

According to the innovative concept, the smart contract is accepted by the digital tool

of the smart contracting system (Clack, Bakshi & Braine, 2016; Macrinici, Cartofeanu & Gao, 2018) and the special features of economics of the digital ecosystems (Barykin et al., 2020b) as well as the network logistics processes (Barykin et al., 2020). The draft Federal Law "On Digital Financial Assets" defines a smart contract as a contract in electronic form, the fulfillment of rights and obligations under which is carried out by automatic execution of digital transactions in a distributed registry in a strictly defined sequence and upon the occurrence of certain circumstances (events). In the transport and logistics business of the JSC RZD, a smart contract must record an agreement between the contracting parties on the provision of a freight transportation service with options for transport and logistics solutions that involve supplementing the main smart contract with a series of smart subcontracts, subject to general regulations defining the system features of smart contracts and determining the structural arrangement of the system.

Self-executing a smart contract implies self-executing a smart contracting system and thus forms a precedent for developing an intelligent management system for the transport and logistics business (Andersen, Fierro, & Culler, 2017). A smart contract assumes a special way of organizing contract practice by introducing several new substantive and procedural characteristics (Huckle et al., 2016):

- A smart contract reflects the business logic of the agreement and is associated with the fulfillment of obligations;
- A smart contract includes products of the "if ... then ..., otherwise ..." type that define the rules for fulfilling obligations;
- Tthe terms of the smart contract cannot be changed after coordination with all parties to the agreement;
- A smart contract is created using software (programming languages and platforms) with certain syntax and semantics, the logic is provided by the program code;
- Execution of the terms of the smart contract is carried out on a distributed registry platform, which provides reliable means of validation;
- A smart contract must be embedded in the legal environment.

The difficulty in using special terminology is that while freight transportation, being a basic service, is considered the simplest in relation to a complex service, it is still rather complicated from the standpoint of the scope of work for providing it. Transportation as a process is accompanied by a set of organizational and technological actions of a supporting nature.

## DISCUSSION

The results of the study form a scientific basis for the development of process management practice based on the decomposition of a business model into a system of business processes carried out using modern information and communication technologies in their digital format. Specifically, they reveal the prospects for creating smart contracting systems in companies as a complex of organizational and technological solutions to ensure the operation of smart contract and block chain technologies using the example of organizing contractual relations for the provision of transport and logistics services in an environment of digital trust. By this, the results of the study determine the necessary conditions for achieving prospects related to the formulation of tasks related to the economy in the field of law – the formation of special legislation in ensuring digital transformation, create a meaningful basis for the development of legislative initiatives based on the interests of business development. In terms of the concept of customer-oriented approach, the service offer consists of a basic service that meets the shipper's need for cargo delivery and additional elements of the basic service that ensure or increase the efficiency of its implementation. In general, an up-to-date view of additional services forms the Unified List of Works and Services Rendered by the JSC RZD in the Organization of Cargo Transportation. Some researchers consider the same approach solving the problem (Barykin et al., 2020a; Bril, Kalinina & Levina, 2018; Bril, Kalinina & Valebnikova, 2016; Schislyaeva et al., 2019; Vilken et al., 2019). In particular, Christensen, et al., address how the open innovation

concept can be analyzed from an industrial dynamics perspective, considering the specific measures that different companies take to manage open innovation from the standpoint of their differential position within the innovation system in question, the nature and stage of maturity of the technological regime, and the particular value proposition pursued by companies focusing closely on the complex interplay between technology entrepreneurs and incumbents. A concept model of open innovation built up by Yun, et al., (2020) aims to explore the existing open innovation channels, and how these channels operate as a knowledge conduit that helps combat the growth limit of capitalism in the 4th industrial revolution.

## CONCLUSIONS

The authors offer an analysis of the process of spreading innovative technologies. The mathematical model is based on such basic formalisms as statistics of the transition of enterprises or any business entities to the use of another technology, the cost of mastering innovations, and the profit from such a transition. In contrast to the simple calculation formulas used in economic analysis, the use of dynamic modeling allowed us to take into account the multiplicative effect of minor changes in the segmentation of market participants in terms of the degree of penetration of innovative technologies. The paper also proposes a system of matrices that take into account the impact of costs on the promotion of innovative technologies. Since the construction of participation matrices in the innovation process is a complex task, we have integrated statistical data processing technology into the overall solution algorithm, which requires more complex tools for processing them. The advantage of the presented mathematical apparatus is the subsystem of analysis and forecasting of economic indicators of innovation development, which is completely ready for integration into digital platforms.

The scientific value of the research is determined by the content of the created precedent using the case of Russia, within the framework and development of which:

1) an evidence base is being formed for the need and feasibility of using the technology of smart contracts based on block chain in the transport and logistics activities of Russian Railways, represented by an analytical study of business logic in the unity of the company's business model, models of the corresponding business block and business processes for providing basic and complex services in light of the strategic priorities of increasing the customer focus of the business;
2) a systematic interpretation of the essential and substantive characteristics of smart contract and blockchain technologies is performed as tools for managing business processes that form the logistics chains for the delivery of goods (transport chains) of Russian Railways, taking into account the prospects for the transition from 2PL customer service to 3PL and 4PL logistics with simultaneous the formation of a multimodal logistics company;
3) the framework conditions for the methodology of scenario justification and decision-making on the use of smart contract technology based on the blockchain with elements of problem-situational analysis of the transport and logistics activities of Russian Railways are determined in justifying the correction of contractual support of services and the subject-event approach in the design of logistics business service processes based on the principles of customer focus.

According to general rules, an information management system acquires the characteristics of an intellectual one, if the use of artificial intelligence methods is envisaged in the implementation of the management business processes which are served by this system. The intelligent management system should provide situational support for making management decisions on the principles of self-learning and self-organization: automate the process of finding solutions based on accumulated knowledge of the subject area, ensure decision-making in conditions of uncertainty.

According to the Unified List, additional elements of the basic service are provided for an additional fee, which is regulated by the state or determined on a contractual basis. Formally, both cost recovery options increase the cost of the basic service, but in practice, value-added services have a different substantive basis: in the Concept of Customer Focus

and the Long-term Development Program of the JSC RZD until 2025, they correlate with innovative shifts in transport and logistics services during the transition from level 2PL to level 3PL and 4PL. And therefore, the need for a deeper understanding of the differences in the content of business processes for the provision of basic and complex services requires that you turn to the appropriate classification.

The fundamental difference between a smart contract and a contract that is its self-execution introduces significant changes to the content of the management business process of contractual support of the service: the main and auxiliary business processes are no longer monitored due to automated control over the fulfillment of obligations of the parties to the contract for the delivery of goods and payments for the provided service. At the same time, a smart contract significantly reduces the labor intensity of the process, freeing up management personnel for more creative, planning and analytical work, goal-setting and setting business projects.

## ACKNOWLEDGEMENTS

The authors would like to thank the anonymous referees for their very useful suggestions.

## CONFLICT OF INTEREST

The authors confirm that there is no conflict of interests to declare for this publication.

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