



*Aseorías y Tutorías para la Investigación Científica en la Educación Puig-Salabarría S.C.  
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RFC: ATI120618V12

**Revista Dilemas Contemporáneos: Educación, Política y Valores.**

<http://www.dilemascontemporaneoseduccionpoliticayvalores.com/>

**Año: VI**

**Número: Edición Especial**

**Artículo no.:73**

**Período: Diciembre 2018.**

**TÍTULO:** Uso de las tecnologías de la información para mejorar los servicios de telecomunicaciones.

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**RESUMEN.** La industria de servicios de telecomunicaciones es uno de los sectores más prometedores y en constante desarrollo de la economía rusa. Al mismo tiempo, el nivel de competencia está creciendo rápidamente en el mercado de las telecomunicaciones. El objetivo de la investigación es el diseño del sistema de información del objeto y el subsistema "Soporte técnico y material", así como el desarrollo de un algoritmo de solución y la implementación de software del complejo de tareas "Contabilización del movimiento MTP en un Almacén", para mejorar las actividades de gestión y aumentar la eficiencia económica de la empresa. El valor práctico de este trabajo es que los resultados se pueden utilizar para la automatización integrada de la gestión empresarial.

**PALABRAS CLAVES:** diseño, servicios de telecomunicación, procesos de negocio, sistema de información, soporte material.

**TITLE:** Use of the Information Technologies in improving Telecommunication Services.

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**ABSTRACT:** Telecommunications services industry is one of the most promising and constantly developing sectors of the Russian economy. At the same time, the level of competition is growing rapidly in the telecommunications market. The objective of the research is the design of the object information system and the subsystem "Technical and material support", as well as the development of a solution algorithm and the software implementation of the task complex "Accounting of the MTP movement in a warehouse", to improve management activities and increase the economic efficiency of the company. The practical value of this work is that the results can be used for the integrated automation of independent business management.

**KEY WORDS:** design, telecommunication services, business process, information system, material support.

**INTRODUCTION.**

Communication is one of the basic branches of the economy. Without the development of communication facilities, progress in most sectors of the economy is impossible. Today we cannot imagine our life without communication. In any field, communication is an integral part of the structure.

Public corporation "Tattelecom" is a stable company that occupies a leading position in the market, and the largest wired telecommunications operator on the territory of the Republic of Tatarstan. "Tattelecom" provides local and zonal telephony services, provides a full range of data transmission

network services, access to the Internet, and a full range of modern telecommunications services (Gareeva G.A., 2017).

To achieve this goal, the following tasks have been accomplished:

First, an analysis of the enterprise's activities was carried out, including: analysis of financial and economic activities, consumed resources (raw materials, energy, etc.), and technical support of the enterprise (specification of the computer network, and characteristics of the current information system).

Secondly, an analysis of the business processes of public corporation Tattelecom was carried out; i.e., the composition of business processes, their tasks, executors, the classification table of tasks by groups, the structure table of information flows of business processes of the enterprise and the scheme of interaction of tasks of business processes are constructed (Posadzki, P., et.al., 2016).

Third, the composition and structure of the information system of the enterprise is defined; i.e., the main subsystems of the enterprise information system, their tasks, the structural table of the links of the tasks of the information system, and the subsystem of material and technical support management are considered in detail (Shakirova A.A, Gareeva G.A, Grigorieva D.R,2016).

Fourthly, the task "Accounting of MTP movement in the warehouse" has been developed, including the organizational and logical nature of the task, input and output information arrays; an algorithm for solving the problem, an information and logical model of the database, a software product and a user's instruction for working with it have been developed (Abboud, K., Omar, H.A., Zhuang, W., 2016).

Fifth, an assessment of the economic and managerial effectiveness of the implementation of the software product.

**DEVELOPMENT.****Methods.**

Communication is one of the branches of social production, the functions of which are to provide consumers with services for the transmission of various kinds of messages: letters, telegrams, telephone conversations, radio and television programs, data, machines and other types of information. Representing all industries and spheres of social production and population services for the collection, processing and transmission of information, communication has all the features inherent in the branches of material production.

The economic sign of communication as an industry of material production is also the fact that in the creation of communication services analogous to industry and other branches of production, labor means, objects of labor and labor of communication workers participate.

The means of labor with which the information transfer process is carried out, include equipment and apparatus, station and linear structures, production buildings, tools, etc., which make up the fixed assets of communication enterprises. The subject of labor in communication is the message, information, which in the process of its transmission is subject to spatial displacement. The impact on the subject of labor through the means of labor is carried out by communication workers, whose activities ultimately create use value.

Subsystems "Sales Management", "Financial Management" and "Logistics Management" are the most important for the enterprise and have many interrelations within themselves, and also most fully reflect the specifics of the enterprise's activities. The interconnection of subsystems is considered as a relationship between the tasks that make up these subsystems. The basis of information links between tasks is information arrays. Any task has input information arrays and resulting output information arrays. In addition, the task can have local information arrays, which

are used only by this task. Output information arrays can be used to solve other problems or to make managerial decisions.

Public corporation Tattelcom uses modern software to speed up the processing of information and automate certain financial and accounting operations.

The tasks of the subsystems "Sales Management", "Logistics Management", "Human Resources Management" and "Accounting Management" are implemented in various components of the "1C: Enterprise" program.

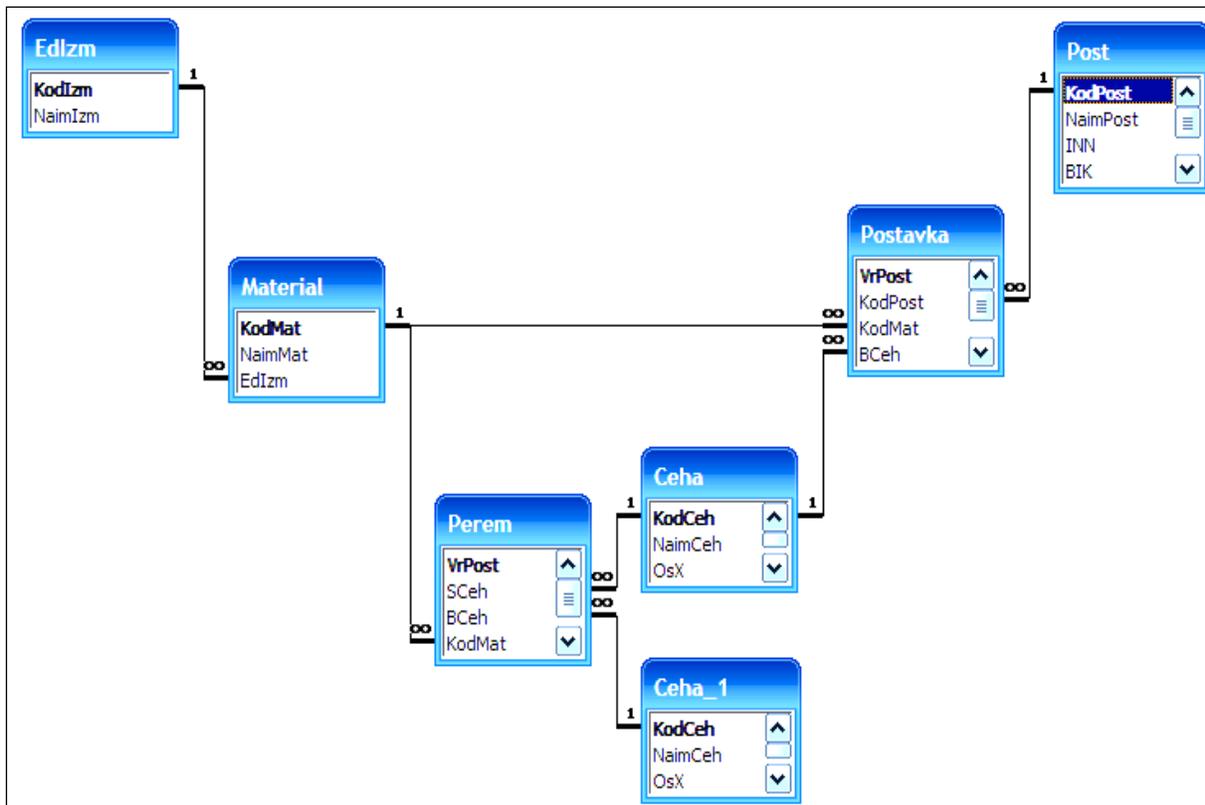
The task "Accounting for MTP movement" consists of works that must be solved consistently, without violating the logical nature of the task. The tasks of the project include: the formation of incoming invoices at MTP; formation of requirements-invoices; formation of order-orders from employees; and formation of expenditure invoices based on orders received.

**Primary input and output documents of the task: nomenclature, incoming invoices, demand-waybill, expense invoices, and statement of movement of MTP in the warehouse at the end of the month.**

The input information is formalized by the company's charter according to the standard and is divided into the account-permanent and operational-accounting.

The output information array of the complex of tasks "Accounting for the movement of MTP in the warehouse" is: a cash invoice, a statement of movement MTR in a warehouse.

**Figure 1. Information-logical model of the database.**



### Results and Discussion.

The amount of investment for the development of the task amounted to 39,834.42 rubles. The cost structure using the software is reflected in Table 1.

**Table 1. Structure of cost changes using software.**

	Cost budget without software	Cost budget using software	Structure of cost changes using software, rub.	Structure of the change in costs from the use of software, %
<b>Material costs</b>	2772	1584	1188	75,00%
<b>Labor costs</b>	17030,26	9088,056	7942,2	87,39%
<b>Depreciation of fixed assets</b>	3885	4860,608	-975,61	-20,07%
<b>Other costs</b>	2761,26	2572,896	188,37	7,32%
<b>Business products</b>	8400	8400	0	0,00%
<b>Total</b>	<b>32658,80</b>	<b>28404,32</b>	<b>4254,48</b>	<b>13,03%</b>

The cost of solving a business problem without using an information system per month is 32,658.80 rubles, and the cost of solving a business problem using an information system per month is 28,404.32 rubles. Consequently, the monthly savings from the use of software amounted to 4,254.48 rubles.

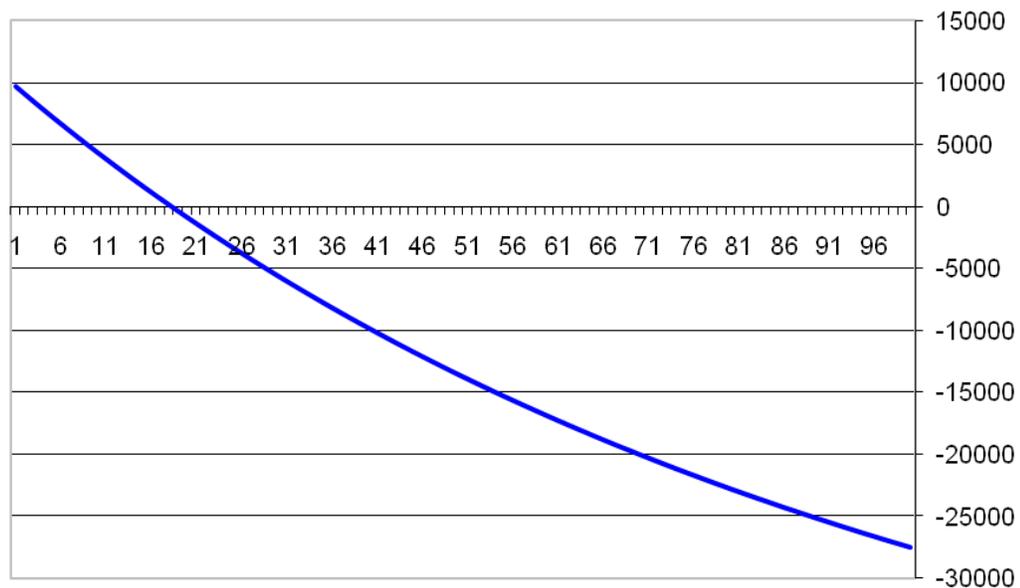
Calculation of the economic efficiency of software development for solving a business problem is based on the "Cash Flow" method using a difference approach.

Key indicators that characterize economic efficiency are:

- The net present value of the project (TTS).
- The internal rate of return of the project (GNI).
- Index of return on investment.
- Payback period of investments (simple and discounted).

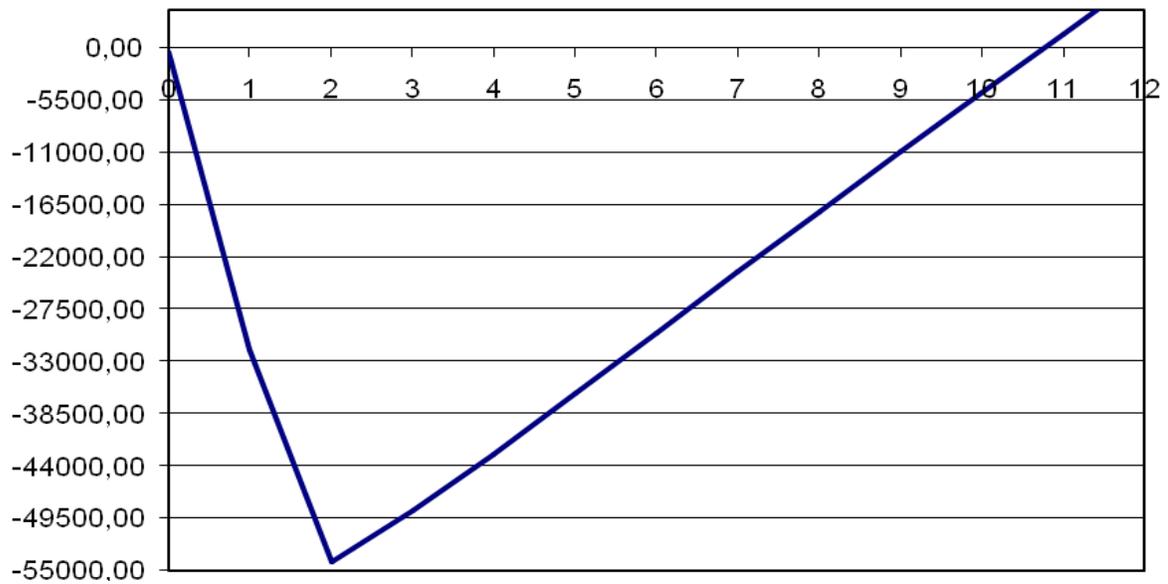
The dependence of the net present value of the project on the discount rate is shown in Figure 2.

**Figure 2. The graph of the net present value of the project versus the discount rate.**



The cumulative net cash flow is shown in Figure 3.

**Figure 3. Financial profile.**



The economic efficiency of investment in the project is provided when the following system of conditions is fulfilled:

$$\begin{cases} TTS \geq 0; \\ IRR \geq R; \\ T_{disc} \leq T_{norm}. \end{cases}$$

The norm of the payback period is established based on the requirements of investors, depending on the volume of investments, the amortization period, etc.

For the project under consideration, this system of conditions is satisfied:

$$\begin{cases} (TTS = 7651,11) \geq 0; \\ (IRR = 18,85\%) \geq (R = 8,0\%); \\ (T_{disk} = 11) \leq (T_{norm.} = 12). \end{cases}$$

Therefore, the considered project from the economic point of view is effective and expedient for realization.

The criterion of managerial efficiency is the reduction of time spent on solving a problem, changing qualitative characteristics, and minimizing labor costs. By reducing the number of employees to solve this problem, it becomes possible to solve additional tasks with free human resources.

Absolute indicator of management effectiveness is:

$$T_{\text{эк}} = T_0 - T_1, \text{ where:}$$

$T_0$  – Labor input for manual processing, person-hour.

$T_1$  – Complexity of work when implementing the task, person-hour.

Before the implementation of the software, two employees of the marketing department worked on the solution of the problem, while spending 6.6 people-hours. ( $T_0$ ). The introduction of software has reduced the complexity - up to 3.5 man-hour ( $T_1$ ).

Thus, to solve the task "Processing and accounting of customer applications", the complexity of work will decrease by 3.1 people-hours.

The relative index of labor productivity is defined as:

$$I_{\text{ИТ}} = \frac{T_1}{T_0} \cdot 100 = 53,03\%$$

Taking into account the received requests of clients in the information system, 47% of the time is required, which is used earlier for manual processing of data.

Relative indicator of saving labor costs:

$$I_{T3} = \left(1 - \frac{I_{\text{ИТ}}}{100}\right) \cdot 100 = 47,03\%$$

Thus, with the automated method of solving the problem, saving labor costs will be 13.03%.

Improving the processing and accounting of orders will directly influence the placement of an order for survey work, the formation of a technical task for production, which in turn will affect the entire production process and the recording of the MTP movement.

The improvement of one task, taking into account synergetic effects, can lead to an improvement in the efficiency of many other tasks. Thus, the improvement of the task of "Accounting for MTP movement in the warehouse" of the business process "Material and technical support" will lead to the improvement of not only this business process, but also the business processes "Management", "Provision of services", and "Finance".

In summary, in the course of the study, problems were identified that are specific to the enterprise, the solution of which is urgent in the near future in order to increase the efficiency of work and improve financial performance.

For this enterprise, the main business processes are identified. For each business process, the tasks corresponding to the specifics of the enterprise's activities are singled out, the organizational and logical essence of solving tasks and performing the work is described. Based on the data on input and output documents, a scheme for interrelating the tasks of business processes is drawn up.

As a result, the project of an information system with application of process-task technology was developed. The information system includes subsystems corresponding to the business processes of the enterprise and reflects the real objectives of the enterprise. The draft of the subsystem "Management of material and technical support" is considered, which presents the organizational and logical essence of the solution of its tasks, internal and external information links.

For the selected task "Accounting for MTP movement in the warehouse" of the subsystem "Material Management", information support was designed, namely: information objects are identified and an information and logical model of the database is created. Next, the description of the solution

algorithm, the problem, the technology of input and accumulation of input information are defined. For the implementation of the task "Accounting for MTP movement in the warehouse", software was developed in the 1C Enterprise environment.

Also, an economic justification for the development and implementation of the task was made. The total cost of development is 39,834.42 rubles and labor saving is 4,254.48 rub. Based on the methodology for estimating the net cash flow, a simple payback period of the project is found – 10.7 months and the discounted payback period of the project is 11 months.

## **CONCLUSIONS.**

In the course of the research, the analysis of business processes of public corporation "Tattelecom" was conducted. As a result, the project of an information system with application of process-task technology was developed.

The draft of the subsystem "Management of material and technical support" is considered, which presents the organizational and logical essence of the solution of its tasks, internal and external information links (Gareeva G.A, Grigorieva D.R, Shakirova A.A., 2017).

In this work, a class of tasks "Accounting for MTP movement in a warehouse" of the subsystem "Material Management" was developed and an economic substantiation of the development and implementation of the task was made. The total cost of development is 39,834.42 rubles and the cost of solving a business problem without using an information system per month is 32,658.80 rubles, and the cost of solving a business problem using an information system per month is 28,404.32 rubles. Consequently, the monthly savings from the use of software amounted to 4,254.48 rubles.

Calculation of the economic efficiency of software development for solving a business problem is based on the "Cash Flow" method using a difference approach.

Based on the methodology for estimating the net cash flow, a simple payback period of the project is found - 10.7 months and the discounted payback period of the project is 11 months.

### **Acknowledgements.**

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

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**RECIBIDO:** 1 de noviembre del 2018.

**APROBADO:** 11 de noviembre del 2018.