

## Article

# Enhancing the Activity of Employees of the Communication Department of an Energy Sector Company

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**Abstract:** Currently, companies in the energy sector are focus on sustainable growth, although they face many challenges, including the peculiarities of their operations. One of the features of companies in the energy sector is the need for effective communication with the media and the public. This is of paramount importance due to the current trends and challenges in the energy sector, the market requirements and the low level of development in such companies. The object of this study involves the employees of the communication departments of energy sector companies, while the subject is the intensification of their activities based on the use of motivational tools. The authors chose the tools of the game theory, which is a game that the company and employees of the project team engage in when implementing information and communication projects. The study developed a method for motivating the employees of communication departments, which based on the game theory, allows the formation of many possible parameters of the optimal structure of fixed and commission remuneration payments for the employees to maximize their utility, depending on the propensity or unwillingness of these employees to take risks, which contributes to the development of staff motivation tools. This method was applied to the activities of several Ukrainian energy companies. The proposed approach differs from the existing ones based on the opportunity to intensify the activity of the employees of the communication departments, taking into account their willingness to take risks in each case, and will increase the interest of such personnel in the effective implementation of each stage of the information and communication project, better meet the needs of the end-users and ultimately affect the sustainable growth of energy companies.

**Keywords:** communications; energy sector; game theory; information and communication project; material reward; motivational technology; sustainable growth



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## 1. Introduction

One of the features of companies in the energy sector is the presence of communication systems designed to manage the processes of transferring information between other systems and to streamline all information moving around the organization so that no data are lost. A company's communication system forms and develops due to human factor influences. The quality, speed, accuracy and efficiency of the management decisions for such system employees cause, to a large extent, the targets to be achieved. Nevertheless, many companies in the energy sector continue not to give due importance to enhancing the activity of the personnel involved in the communication system. This assumes that these employees are not interested in improving this system, rationalizing its structure,

increasing their labor productivity and searching for ways of using the communication system as a source of new competitive advantages in the business environment.

Investigations related to enhancing the activity of communication system employees in Ukrainian energy sector companies indicate that the mentioned problem does not receive sufficient attention. The main obstacles to implementing vigorous actions in the direction of such an activation are the absence of the managers' understanding of the noted procedure's importance; the absence of personnel management strategies considering professional and individual competencies; non-processed issues relating to organizational provisions when applying new approaches to working with personnel, with a focus on the material remuneration package, which is complicated to implement, especially in financial terms; and the needs and aspirations of employees that are not considered.

When considering the peculiarities of communication projects that are being implemented within companies, it is worth mentioning that they are diverse [1–4]. They influence the functional responsibilities of communication system employees. Thus, some of these employees contribute to the communication systems' development and function, while others are responsible for supporting and improving the communication system or work in the sphere of data protection. Some employees realize that this information helps company activities, while others belong to a non-automatized part of the communication system. For every group of such employees, different methods of activity enhancement could be used, including the measures of motivation. It is worth noting that all functional responsibilities of the communication system employees could be conditionally divided into the process and project duties. An example of the first group could involve the informational support of a company's activities or the preservation of confidential information. In turn, many information communication management tasks are of a projective nature; that is, they are new for a company, limited in time and aimed at achieving specific goals. Under the current conditions, project information communication tasks are of primary importance for these companies, which are justified on the one hand by the current requirements, and on the other by their low level of development within organizations. Taking these aspects into account, enhancing the activity of the companies' communication system employees, who implement such projective tasks, is being achieved based on the improvement and reengineering of the motivational technologies. In particular, the purpose of this article is to improve the methodological approach to the motivation of employees based on the use of the game theory toolkit. The object of this study involves the employees of communication departments of energy companies, while the subject is the intensification of their activities based on the use of motivational tools. Thus, the study's central hypothesis is that the game theory tools can be the basis for improving the motivation of the employees of communication departments within energy companies, which will differ depending on their risk appetite and utility function. Such an approach makes it possible to form a set of possible parameters for these employees' fixed and commission payments for implementing the information communication projects, depending on their risk-taking ratio and utility function.

## 2. Literature Review

### 2.1. *Material and Non-Material Incentives for Enhancing the Activities of Communication Department Employees*

It is worth noting that more and more human resource managers (recruiters, HR managers, consultants in personnel technologies) are pointing out that within the list of employee advantages, material incentives surrender the top place to professional development and non-material motivation factors. There is a tendency among HR managers to increase the amount of intangible compensation more than to raise wages to intensify employee activities [5–9].

To successfully operate Ukrainian energy sector companies, material and non-material incentives, most often implemented in the form of various compensation and social packages, are used to enhance the activity of employees in the communication department.

Using such tools, it is possible, on the one hand, to consider incentives that are important for each employee, and on the other to carry out systematic personnel management. It is clear that these complex methods are most effective for enhancing the employees' activities; however, at the same time, they are very costly for the company.

In challenging economic circumstances, Ukrainian energy sector companies do not have an opportunity to use complex methods to enhance the activities of communication-sphere employees and to take full advantage of applying the material approaches for this activation. This is not only a Ukrainian problem, as described in detail in [10–28]. Therefore, in these unstable conditions, energy companies should focus on non-material methods defining the individual development programs for certain groups of communication system employees. These non-material methods that are recommended to be implemented in the energy sector companies should include personnel development programs, differentiated approaches to stimulation, professional training and the promotion of employees. The scientific basis for this is represented in [29–42].

## *2.2. Approaches to the Remuneration of Communication Department Employees*

Today, most energy companies face fierce competition and rapidly changing market conditions. Under such circumstances, an objective need arises in the search for new approaches to improve companies' operations and to stimulate their employees' activities, since the staff are the critical factor that determines the success of any company. It is well-established that professionally competent personnel working with complete dedication is the key to forming competitive advantages and highly profitable intellectual capital in an organization.

Nowadays, communication is a significant component of any company's function, and low efficiency in this area leads to a decrease in financial performance. Any relationship between employees at different management levels is based on communication, which also forms the corresponding socio-psychological climate in the organization. Communication processes are also associated with the company's interactions with the external environment in which its reputation and partner attractiveness are produced. This is not only an indicator of the company's positive image, but it is also projected in a certain way onto its commercial proposals for the market. Thus, the need to thoroughly diagnose the organization's communication system and its employees as critical elements of this system is being updated.

Our study of the theory and practice of reimbursing the employees of communication departments that implement project-related information and communication tasks allowed us to conclude that different approaches are used in this area. Such payments can be made as a fixed amount for the project's implementation, the labor intensity of individual tasks can be considered, or hourly wage forms can be used. In any case, we can single out three generalized scenarios when receiving remuneration as a communication department employee for implementing information communication projects: obtaining the remuneration as a lump sum payment, in the form of commission payments or as a combination of fixed and periodic payments (commission).

The remuneration package for the communication department employees for the implementation of information communication projects depends on several factors, namely the conditions of the employment contract with each employee, the regulatory documents of the company regarding remuneration, the norms in the current legislation, the peculiarities of the information communication project, the propensity for risk for both the employee and the company's management team and the company's wage policy. If the remuneration package for the implementation of such projects is subject to agreement, then provided they are risk-averse, the project group members can select a fixed remuneration package. At the same time, there is a probability of missing out on a portion of the material remuneration package if the effect required for the information communication project is higher than expected; for example, the number of visitors to a newly established website may be higher than forecasted. Given the above, the need to develop a method for

motivating the employees of communication departments during the implementation of information communication projects at companies is apparent, considering the readiness of such workers to take risks.

### 3. Materials and Methods

A study of the theory and practice of communication management allowed us to conclude that information communication projects in business mainly involve some risk. This is, for example, due to the fact that it is almost always challenging to obtain reliable information about the future economic effects of these projects. In addition, each of these projects may have different technological options for its solution.

As the review and generalization of literature sources show, many practical tools for managerial decision-making under risk have been developed [43–46]. Among them, it is suggested to choose the game theory in order to solve the outlined task of creating a method for motivating communication department employees when implementing information communication projects in companies and to consider the willingness of such workers to take risks. In particular, Shyyan [47] (p. 6) notes that game theory is applied “to achieve the harmonization of the interests of the parties”, which in our case are a company and project team workers. The basic concepts with which this theory operates include [47–51] the game, the participants of the game, the players’ strategy and the optimal strategy. The specifics of using the game theory to solve various scientific problems are thoroughly described in [52–67]. In this way, the tools of game theory can best achieve the article’s goal and help solve the outlined problems.

The introduction of game theory by the authors took place in the following stages:

- (1) The identification of options for players’ strategies (alternative options for management decisions);
- (2) The formation of the payment matrix;
- (3) The careful study of the game environment (adjustment of shares and absolute values of fixed and commission payments for project team employees implementing information and communication projects, the identification of the dependence on the material remuneration of project team employees implementing information and communication projects and the level of risk from the structure of such payments, provided by the use of a “mixed” strategy);
- (4) The determination of the criterion for choosing a strategy depending on the characteristics of the environment and the higher conduct of the game;
- (5) The determination of the coefficients of the weight of the criteria for selecting the optimal strategy for the project team employees who implement information and communication projects based on the structure of their remuneration;
- (6) The determination of the parameters of the optimal structure of the material remuneration for the project team employees implementing information and communication projects;
- (7) Approbation.

In our case, the game is between the energy sector company and the employees of the project team, who implement information and communication projects for the company. In the analyzed context, it should be noted that the key players in making management decisions during the implementation of the information and communication projects in companies are the employees of the project team (provided that the wages related to their performance for such projects are subject to agreement between the customer and performer). Under these conditions, the key player can choose one of the possible strategies during the game, i.e., one form of reward or another, to obtain the maximum win (maximize income).

We present in more detail the use of game theory to improve the employees’ motivation.

### 3.1. Stages of Applying the Game Theory during the Improvement of the Method of Motivating the Communication Department Employees under the Conditions of the Information Communication Project's Implementation

A multitude of “pure” strategies for the project team employees implementing the information communication projects, based on the use of the terminology and classical notation of the game theory, can be described as follows:

$$S = (s_1; s_2), \quad (1)$$

where  $S$  represents the options of “pure” strategies of the project group employees implementing the information communication projects;  $s_1$  is a fixed-value reward strategy;  $s_2$  is a strategy for receiving material remuneration via commission payments, depending on the economic effect of the project.

The company involved in the information communication project, the second player, has access to pure strategies:

$$\Theta = (\theta_1; \dots; \theta_n), \quad (2)$$

where  $\Theta$  represents the options for “pure” strategies for the customer of the information communication project;  $\theta_1; \dots; \theta_n$  represents the “pure” strategies of the customer (the economic efficiency of such a project).

Considering that it is usually tricky to clearly and unambiguously understand the magnitude of the economic effect of implementing an information communication project, certain intervals should be considered, which, in particular, are recommended by Syhan [48] (p. 56).

Within the framework of game theory, at the next stage, after identifying players and their “pure” strategies, the probability should be mathematically shown that the company will implement the information communication projects using such strategies:

$$Q = (q_1; \dots; q_n), \sum_{j=1}^n q_j = 1, q_j \geq 0, j = 1, \dots, n, \quad (3)$$

where  $Q$  represents variants of the probability that the company will implement the information communication projects using its “pure” strategies;  $q_1; \dots; q_n$  represents the probability of the company implementing the information communication projects using its “pure” strategies.

Considering the probability of the customer implementing information communication projects using its “pure” strategies, it is reasonable to note that these are the options for the likelihood that this company will receive the expected economic effect as a result of the project. To solve the outlined problem, the economic effects of such information communication projects can be considered, empirical data can be established and long-term forecasting of the business environment can be carried out. The possibility to clearly identify the probability of the expected magnitude of the economic effect resulting from the implementation of the information communication project depends on the type of project, its duration, its complexity and other factors [68].

According to the game theory, the construction of the payoff matrix (that is, the estimation function) is the next stage in developing the method of motivating the employees of the communication departments during the implementation of the information communication project. This matrix is expressed mathematically as follows:

$$F = \begin{pmatrix} f_{11} & \dots & f_{1j} \dots & f_{1n} \\ f_{21} & \dots & f_{2j} \dots & f_{2n} \end{pmatrix}, \quad (4)$$

where  $f_{kj}$  is the efficiency level of the project group employees who implement the information communication projects, using their “pure” strategy when working for the customer on these projects.

In other words,  $f_{kj}$  is the value of the material benefit for the project group employees who perform the information communication projects when applying the  $s_k$  strategy and the economic effect value  $\theta_j$  from implementing such a project for the business period. In this context, the first vector of the payoff matrix  $F(s_1) = (f_{11}; \dots; f_{1n})$  could be interpreted as the vector that enables the determination of the level of impact of the first “pure” strategy used by the project group employees who implement the information communication projects under any value of the economic effect as a result of this project’s implementation. In turn, in similar conditions, the second vector of the payoff matrix indicates the efficiency of another “pure” strategy for the project group employees. Therefore, it is evident that in situations where the  $s_1$  strategy is selected by these employees, their material remuneration for the information communication project’s implementation would not depend on the value of this project’s economic effect:

$$f_{11} = \dots = f_{ij} = \dots = f_{1n} = V = V_o, \quad (5)$$

where  $V$  is the material remuneration for the project group employees, which they expect to receive as a result of the information communication project’s implementation, in monetary units;  $V_o$  is the material remuneration for the project group employees, which they expect to receive as a result of the information communication project’s implementation, in the form of a fixed value in monetary units.

Suppose that the project group employees, who carry out the information communication projects, prefer the other “pure” strategy,  $s_2$ . In that case, the elements of the mentioned payoff matrix will be calculated in the following way:

$$f_{2j} = D \cdot \mathcal{K}, \quad (6)$$

where  $D$  is the coefficient of the material remuneration obtained by the project group employees, who implement the information communication projects, provided they use the “pure” strategy  $s_2$ ;  $\mathcal{K}$  is the information communication project’s economic effect when using the  $j$ -th strategy of the customer.

The next step in developing the method of motivating employees of communication departments in the implementation of information communication projects involves thorough diagnostics of the internal and external environments of the customer companies involved in such projects. As our study of the theory and practice showed, in these conditions, several possible factors should be considered, as follows [69,70] (p. 68; p. 74):

- The well-known precise probability distribution of the magnitude of the economic effect as a result of the information communication project’s implementation;
- The law of the probability distribution of the economic effect resulting from the information communication project’s implementation, along with the accuracy of the unknown parameters;
- The existing significant limitations to identifying the probability of the economic effect resulting from the information communication project’s implementation;
- The probability distribution of the economic effect as a result of the information communication project’s implementation is unknown, and there are no significant conflicts regarding the material remuneration between the customer and the performers (the first player);
- The substantial differences between the customer involved in the information communication project and the project team employees implementing the project;
- The radically opposite differences between the customer involved in the information communication project and the project team employees implementing the project;
- The possibility of establishing a fuzzy set for the economic effect magnitude resulting from the information communication project’s implementation.

Our study of practical experience in implementing various information communication projects allowed us to conclude that energy companies can clearly and objectively distribute the probabilities of the magnitude of the economic effect resulting from such a

project's implementation. In this context, the convenient opinion stated in [51] (p. 56) is that under these conditions, management decision-making can be based on applying the Bayes criterion. In this case, the optimal solution is the one for which "the mathematical expectation of the corresponding estimation vector reaches the highest possible value".

### 3.2. Establishing the Structure of Employees' Material Remuneration for the Information Communication Project's Implementation

To establish the criterion for determining the project team employees' remuneration for implementing the information communication projects, it is pertinent to note that their material remuneration structure (and, accordingly, a strategy) must be optimal for them, which will allow them to receive the most significant material remuneration with a minimum risk level. From a mathematical point of view, the material remuneration can be estimated by calculating the value of the mathematical expectation, and the magnitude of the variance indicates the level of potential risk. Considering this, the specified mathematical expectation ( $m$ ) for the  $k$ -th "pure" strategy of the project team employees who implement the information communication projects and the variance ( $\sigma^2$ ) are calculated using the following formulas:

$$m_k = \sum_{j=1}^n q_j \cdot f_{kj}; \quad (7)$$

$$\sigma_k^2 = \sum_{j=1}^n (q_j (f_{kj} - m_k)^2), \quad (8)$$

where  $m_k$  is the mathematical expectation of the economic effect's magnitude as a result of the information communication project's implementation with the use of the  $k$ -th "pure" strategy;  $\sigma_k^2$  is the variance of the risk level of obtaining the expected magnitude of the economic effect as a result of the information communication project's implementation with the use of the mathematical expectation strategy.

An examination of the theory and practice for the implementation of various information communication projects allowed us to conclude that the relationship between the customer in such projects and the performer can be based, in addition to the "pure" strategies, on "mixed" strategies ( $s_p$ ). Considering this, mathematically the evaluation vector for the project team employees ( $F(s_p)$ ) will be as follows:

$$F(s_p) = p_1 \cdot F(s_1) + p_2 \cdot F(s_2), \quad p_1 + p_2 = 1, \quad p_1 \geq 0, \quad p_2 \geq 0 \quad (9)$$

where  $F(s_p)$  is the evaluation vector of the "mixed" strategy for the project group employees who implement the information communication projects;  $p_1, p_2$  respectively represent the shares of fixed and commission payments for the project team members implementing the information communication projects.

An analysis of Formula (9) allowed us to conclude that it can also be used to present any "pure" strategy for the project team employees implementing the information communication projects. Thus, for these employees' "first" pure strategy, the approval  $p_1 = 1, p_2 = 0$  will be fair. In turn, in the second case, the shares of the fixed and commission payments for the project group employees will be  $p_1 = 0, p_2 = 1$ . Considering this, the optimization of the structure of the material remuneration package for the project group employees implementing the information communication projects can be formalized by searching  $p_1, p_2$  for values for any "mixed" strategy. At the same time, it is appropriate to pay attention to [70] (p. 168) regarding the definition of the mathematical expectation value in the framework of game theory for a "mixed" strategy, which is expressed in the following formulas:

$$m_p = \sum_{k=1}^m \sum_{j=1}^n p_k \cdot q_j \cdot f_{kj}, \quad (10)$$

$$\sigma_p^2 = \sum_{k=1}^m \sum_{l=1}^m p_k \cdot p_l \cdot \sigma_k \cdot \sigma_l \cdot \rho_{kl}, \quad (11)$$

where  $m_p$  is the mathematical expectation for the value of the material remuneration for the project group employees who implement the information communication projects, provided they use the “mixed” strategy;  $\sigma_k^2$  is the variance of the potential risk level of obtaining the expected value of the material remuneration by the project group employees implementing the information communication projects, provided they use the “mixed” strategy;  $m$  is the number of “pure” strategies of the project group employees implementing the information communication projects;  $\sigma_k, \sigma_l$  respectively represent the mean-square deviations relative to the mathematical expectation for the  $m_k$ -th and the  $m_l$ -th elements of the evaluation vector for similar “pure” strategies of the project team employees implementing the information communication projects (the  $k$ -th and the  $l$ -th);  $\rho_{kl}$  represents the correlation coefficient of the elements of the evaluation vectors for the  $k$ -th and the  $l$ -th “pure” strategies of the project group employees implementing the information communication projects.

Formulas (10) and (11), for convenience, can be represented in a slightly different form. First, it is worth noting that the project group employees who implement the information communication projects have two “pure” strategies, so  $m = 2$ . In addition, it is evident that  $m_1 = V$ , where  $V$  is the material remuneration for the project team employees that they expect to receive due to the implementation of the information communication project. In such conditions,  $\sigma_1^2 = 0$ , and since  $\sigma_1^2 = 0$ , then  $\sigma_1 = 0$ , because  $\sigma_k = \sqrt{\sigma_k^2}$ .

It is reasonable to pay attention to the fact that  $\rho_{11} = \rho_{22} = 1$ , a  $p_1 + p_2 = 1$ ,  $p_1 \geq 0$ ,  $p_2 \geq 0$ . In addition, after expressing  $p_1$  through  $x$  and  $p_2 = 1 - x$ , Formulas (10) and (11) will be as follows:

$$m_p = x \cdot V + (1 - x) \cdot \sum_{j=1}^n q_j \cdot f_{2j} = x \cdot V + (1 - x) \cdot m_2, \quad (12)$$

$$\begin{aligned} \sigma_p^2 &= p_{v1} \cdot p_1 \cdot \sigma_1 \cdot \sigma_1 \cdot \rho_{11} + p_{v1} \cdot p_2 \cdot \sigma_1 \cdot \sigma_2 \cdot \rho_{12} + p_{v2} \cdot p_1 \cdot \sigma_2 \cdot \sigma_1 \cdot \rho_{21} + \\ &+ p_{v2} \cdot p_2 \cdot \sigma_2 \cdot \sigma_2 \cdot \rho_{22} = 0 + 0 + 0 + p_2^2 \cdot \sigma_2^2 = p_2^2 \cdot \sigma_2^2 = (1 - x)^2 \cdot \sigma_2^2 \end{aligned} \quad (13)$$

Considering that the project group employees who implement the information communication projects are most of all interested in obtaining the maximum material remuneration at the lowest risk level, this must be taken into account within the “mixed” strategy. Therefore, mathematically this can be expressed as an equation with two parameters:

$$\begin{cases} m_p = x \cdot V + (1 - x) \cdot m_2 \rightarrow \max \\ \sigma_p^2 = (1 - x)^2 \cdot \sigma_2^2 \rightarrow \min \end{cases} \quad (14)$$

It is obvious that in practice, it will be quite difficult to use Formula (14) when choosing a “mixed” strategy for the project team members who implement the information communication projects. This is since such a calculation will have a straightforward solution only if a “pure” strategy is applied when the value  $m_p$  takes on the maximum value. Under other conditions, this unambiguity is impossible, since the improvement of one criterion may, for example, lead to a deterioration in the value of another. Therefore, using different strategies allows us to identify the most effective value for each of the two criteria. In other words, we should find a compromise between the two players: the customer of the information communication project and its performers—the employees of the project group.

From a practical point of view, it is also advisable to establish weight coefficients for both the mathematical expectation and the dispersion of the level of the potential risk of obtaining material remuneration for the project team employees implementing the information communication projects, provided they use a “mixed” strategy. At the same time, the weight coefficient of the dispersion ( $\lambda$ ) should be interpreted as an indicator of the lack of inclination of the project team’s employees to take risks (the smaller the indicator

value, the more the project team's employees are prone to risk, and vice versa). Given this, it is evident that the weight ratio of the mathematical expectation will take on the value  $1 - \lambda$ .

Based on the literature study, we conclude that it is possible to solve the above problem with two unknowns by maximizing the utility function. In this case, we obtain the following formula:

$$U(x) = (1 - \lambda) \cdot m_p - \lambda \cdot \sigma_p^2 = (1 - \lambda)(x \cdot V) + (1 - x)m_2 - \lambda((1 - x)^2 \cdot \sigma_2^2) \rightarrow \max, \quad (15)$$

Considering the assumption that the utility function reaches its maximum at the first derivative of the function  $U(x) = 0$ , and also taking into account the fact that  $x = p_1$ , it can be concluded that the fixed material remuneration for the project group employees who implement the information communication projects is an optimal share subject to (15). Therefore, the optimum quantity for such a fixed share can be calculated by the following formula:

$$V_o^{opt} = x \cdot V, \quad (16)$$

where  $V_o^{opt}$ —is the optimum quantity of the fixed part of the material remuneration for the employees who implement the information communication projects.

It is worth noting that the optimal coefficient for obtaining the expected material remuneration for the project group employees who implement the information communication projects will be determined from the following formula:

$$D^{opt} = (1 - x) \cdot D, \quad (17)$$

where  $D^{opt}$ —is the optimal coefficient for obtaining the expected material remuneration for the project group employees who implement the information communication projects.

The generalized sequence of the above process is presented in Figure 1.

Based on the factors mentioned above, it is noted that the presented approach to the motivation of the employees of a company's communication department in the field of project management can be adjusted in a certain way depending on several circumstances. Thus, certain restrictions or wishes may arise from the side of one player or the other (the customer of the information communication project or its performer). For example, such requests may concern the impossibility of the first to pay a fixed lump sum for the remuneration. In any case, the material incentives for the project team employees who implement the information communication projects involve a complex process of negotiating and reconciling problematic positions between the parties.

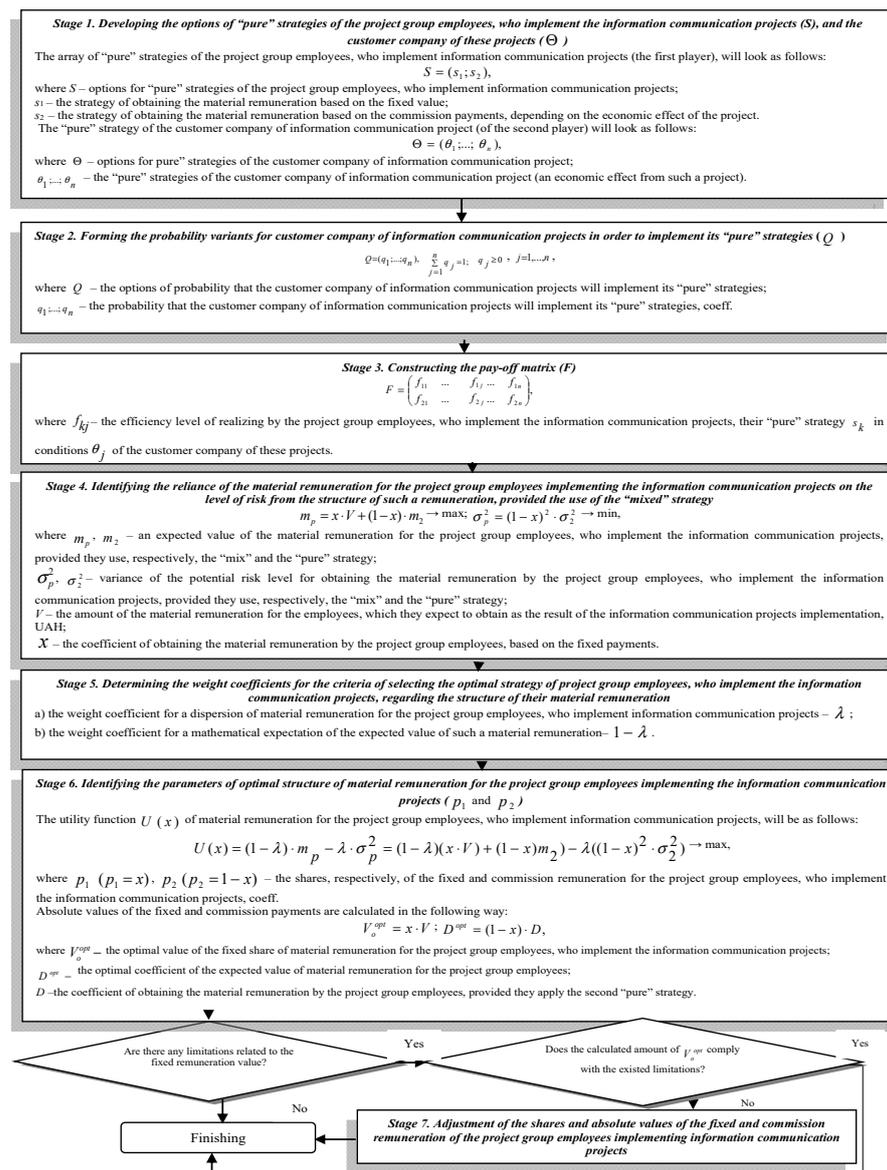


Figure 1. The generalized sequence for motivating the employees of communication departments.

4. Results

The application of the proposed method for motivating the employees of communication departments using game theory is based on several companies in the Kharkiv, Khmelnytsky, Lviv and Odesa regions (Ukraine). For example, one of the projects implemented by Energoatom (National Nuclear Energy-Generating Company of Ukraine) involved the automation of workplaces and the implementation of integrated software solutions for the multimedia center.

The arrangement of the multimedia center at Energoatom included the formation of a project team of employees from the company’s systems integration department (employees of the communication unit). The remuneration package for these workers provided a fixed reward payment for implementing this information communication project.

Considering the input management and accounting information received from the top management team at Energoatom, the generalized sequence for motivating the project group employees from the systems integration department of the company, as represented in Figure 1, was applied to identify the possibility of its practical use. Therefore, the utility functions were calculated for the project group employees from Energoatom (Table 1).

**Table 1.** The utility functions of the project group employees from Energoatom’s systems integration department in terms of their propensity for risk while obtaining the material remuneration.

The Propensity for Risk Ratio, $\lambda$	Utility Functions
0	$-0.63 \cdot x + 3.52$
0.2	$-0.138 \cdot x^2 - 0.103 \cdot x + 2.39$
0.4	$-0.378 \cdot x^2 + 0.428 \cdot x + 1.18$
0.6	$-0.658 \cdot x^2 + 1.211 \cdot x + 1.02$
0.8	$-0.865 \cdot x^2 + 1.432 \cdot x - 0.05$
1	$-1.20 \cdot x^2 + 2.31 \cdot x - 1.18$

Source: calculated by the authors.

As a result, according to the research findings, the parameters of the optimal structure of the fixed and commission-based material remuneration package for the project group employees of Energoatom’s systems integration department were calculated by maximizing their utility function (Table 2). Such parameters are identified in terms of the propensity or lack of propensity of such workers to take risks.

**Table 2.** Parameters of the optimal structure of the fixed and commission-based material remuneration package for the project group employees of Energoatom’s systems integration department obtained by maximizing their utility function.

The Propensity for Risk Ratio, $\lambda$	Parameters of Material Remuneration	
	The Relative Share of the Fixed Payments, $p_1$	The Relative Share of the Commission Payments, $p_2$
0	0	1
0.2	0	1
0.4	0.445	0.555
0.6	0.698	0.302
0.8	0.824	0.176
1	1	0

Source: calculated by authors.

The obtained results allow us to conclude that the developed method can be used to motivate the employees of communication departments to enhance their functional activities. The proposed method was implemented in the activities of several Ukrainian energy sector companies, the information on which is given in Table 3.

The results of the calculations indicate the individual nature of enhancing the employees’ activities in the communication departments of the energy sector companies and their different perceptions of the risk factors involved in obtaining material remuneration for the implementation of the information communication projects. In particular, the employees of “BARVINOK” PJSC EC are the most inclined to take risks in this context (up to a propensity for risk ratio  $\lambda$  of 0.4; these employees would agree to the maximum possible share of commission payments, thereby refusing the fixed remuneration). The employees of “DTEK Zakhidenergo” JSC at  $\lambda = 0.4$  are equally ready to agree to commission payments, choosing the same fixed share simultaneously, while at the European Energy Company LLC, the employees would only do that at  $\lambda = 0.8$ .

The results of the studies allowed us to identify the limitations of the proposed scientific and methodological approach to enhancing the employees’ activities in the communication departments of the companies based on the game theory:

- The need for the clear identification of the communication department employees within the organizational management structure (the results indicate that the above approach should be applied only to this category of employees; for other personnel, the possibility of using this systematic approach requires additional research);
- The possibility of applying this approach only for information communication projects, with a separate approach needed for the motivation of other personnel;

- From a corporate management position, consent must be secured from the communication department employees to obtain their material remuneration based on the proposed scientific and methodological approach (the results of the studies indicate that in practice it is difficult to receive such consent from each employee; thus, the agreement terms should be harmonized for the majority of employees based on open or closed voting);
- The need to document the conditions and processes when using the scientific and methodological approach to enhancing the employees' activities within the company's communication department (in other words, its key provisions should be set out in a company's norms to avoid conflicts, misunderstandings, litigation, etc.);
- The need to establish the expected economic effect from the introduction of information and communication solutions of a project nature (if this is impossible, it will not allow for the calculation of the shares of basic and commission payments);
- The need to establish the period during which the expected economic effect from implementing the information communication project is identified.

**Table 3.** Parameters of the optimal structure of the fixed and commission-based material remuneration package for the communication system employees of certain Ukrainian energy sector companies obtained by maximizing their utility function.

The Propensity to Risk Ratio, $\lambda$	Parameters of Material Remuneration	
	Relative Share of the Fixed Payments, $p_1$	Relative Share of the Commission Payments, $p_2$
<b>Joint Stock Company "DTEK Zakhidenergo"</b>		
0	0	1
0.2	0.362	0.638
0.4	0.499	0.501
0.6	0.627	0.373
0.8	0.787	0.213
1	1	0
<b>Private Joint Stock Company Energy Company "BARVINOK"</b>		
0	0	1
0.2	0	1
0.4	0	1
0.6	0.713	0.287
0.8	0.905	0.095
1	1	0
<b>Limited Liability Company "European Energy Company"</b>		
0	0	1
0.2	0	1
0.4	0.282	0.718
0.6	0.372	0.628
0.8	0.479	0.521
1	1	0

Source: calculated by the authors.

The proposed approach differs from the existing ones due to the opportunity to enhance the activities of the employees of the company's communication department, given their willingness to take risks in each individual case. Thus, one can hope that such personnel will be more interested in the effective implementation of each stage of the information and communication project and will better meet the needs of the end-users. As a result, this will improve the financial and economic indicators of the company's activities.

## 5. Conclusions

In terms of the contributions to the theory, the novelty of the proposed approach lies in expanding the tools used to enhance employees' activities within communication departments, since mainly traditional methods of personnel motivation are applied in this area, such as hourly wages or commission payments and a premium component. This scientific and methodological approach will be helpful not only in increasing the level of employee motivation within the companies' communication departments (to encourage them to work more efficiently, and most importantly with the expected result and the satisfaction of the internal or external customer in mind), but also for the managers and owners of the business entities. The proposed approach contributes to the formation of a positive image of the company in the market, strengthening its competitive position and as a result improving its financial performance and sustainable growth within the energy sector.

In terms of its usefulness to practitioners, the developed method for motivating employees in the communication department of an energy sector company allows managers and experts on benefits and compensation to determine the parameters of the optimal structure of the fixed and commission-based material remuneration package for employees to maximize their utility function, depending on the propensity or lack of propensity of these employees to take risks, contributing to the development of personnel motivation tools in organizations. The implementation of this method involves the following steps: the development of options for "pure" strategies for the project group employees implementing the information communication projects and the customer of such projects; the formation of the probability variants for the customer of the information communication projects to implement its "pure" strategies; the construction of the payoff matrix; the identification of the dependence on the material remuneration of the project group employees and the risk level of the remuneration structure when using a "mixed" strategy; the determination of the weight coefficients of the criteria for choosing the optimal strategy for the project team's employees according to their material remuneration structure; the determination of the parameters of the optimal structure of the material remuneration package for the project group employees; adjustments of the shares and absolute values of the fixed and commission payments for the project group employees.

Regarding the limitations, it should be noted that the presented approach to motivating the employees of the communication departments of energy sector companies in the field of project management can be adjusted in some ways, depending on many circumstances. Thus, certain restrictions or wishes may apply to one or the other player (the customer of the information communication project or its executor). For example, such desires may relate to the inability of the former to pay a one-off fixed amount for the remuneration. The financial incentives for project team members implementing information and communication projects involve a complex process of negotiating and agreeing on problematic positions between the parties.

Further research on the problem should consist of specifying the conditions for the practical application of the proposed scientific and methodological approach to enhancing the activities of employees of communication departments based on the game theory and identifying and evaluating feedforward and feedback loops within these processes. Identifying the possibilities of combining the proposed approach with other activation instruments is equally essential to achieving a synergistic result.

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