

# Chapter 7

## Agency Cost Management in the Digital Economy

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### ABSTRACT

*The purpose of the present study was to find the answer to the following questions: How the growing digitalization will affect agency relations, an important element of corporate governance, and what preventive measures should be taken in this situation? Therefore, the impact of digitalization on opportunistic behavior and agency costs was reviewed. The analysis revealed that digitalization provokes reduction of information asymmetry, leads to a decrease in the initiative of top managers, thereby changing the preconditions of opportunistic behavior. On the basis of the ordinal approach, an original toolkit was developed, which made it possible to model the identified dependencies, transformation of the agents' utility in case the principals' demands altering, and to demonstrate ways to reduce agency costs by proper selection of candidates for top manager positions. In conclusion, by means of the developed toolkit, the methodological recommendations were suggested for selecting the agents during the process of recruitment, taking into account the impact of digitalization.*

### INTRODUCTION

Digital technologies are more and more actively and universally invading the economy and the corporate governance in particular. They expand the capabilities of the existing management tools, update them, new approaches and mechanisms are created on their basis. At the same time, the digitalization of business sets additional managerial tasks, the solution of which will require an adequate methodological tools and algorithmic support. The level and status of corporate management in many respects determine the efficiency of corporations and the perspective for their development. The successful operation of such entities, as a rule these are the largest enterprises, determines the condition of the country's economy in general.

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## ***Agency Cost Management in the Digital Economy***

One of the essential elements of corporate governance is agency relations. By this concept, we understand the relations that arise between the owners of companies (principals) and the top managers (agents) they hire, who are delegated the rights of managing the assets owned by shareholders.

The relationship between the owners of companies and agents hired by them is traditionally characterized by a whole bunch of contradictions. In literature, such contradictions are traditionally called ‘agency problems’. Problems and conflicts of agency relations derive from objectively existing circumstances. First of all, that involves the information asymmetry of the principal and the agent, and the problem of incomplete contracts, as it’s impossible to take into account all the essential job requirements in the contract concluded with the agent. These features of relationships create preconditions for the hired manager to take unilateral egoistic actions, including actions related to behavior called managerial opportunism, i.e. manifestation of the “behavioral” uncertainty of the agent (Williamson, 1985). The owners’ costs for compensation, rectification and insurance against emerging agency problems, compensation for the consequences of such conflicts are called agency costs.

Due to the speedy digitization of the economy, there arises a necessity of studying the way these processes influence corporate governance. Thus, the purpose of this study is to analyze the changes emerging in corporate governance, primarily in the sphere of agency relations; to review the specific features of managing the agency costs in the digital age; and, if such features are found, to assess possible ways to transform corporate governance practices. The object of this paper is agency relations, and the subject is - the peculiarities of implementing such relations in the digital age.

At the beginning of the study, let us briefly outline the features inherent in the digitalization of production and the economy in general. Discussing in this regard the digitalization, it should be noted that this topic is closely intertwined with the concepts of the Fourth Industrial Revolution (or Industry 4.0) and Industrial Internet of Things (Industrial Internet of Things - IIoT). This technology provides transfer to digital platforms, obtaining and transmission of information in any form and volume from anywhere in the company. It consolidates all equipment and workplaces of the enterprise into an information network; integrates powerful intellectual systems of interpreting the received information, making and implementing decisions into a unified software environment; synchronizes work of all departments; adapts chains of business processes to reach a single goal; visualizes information, etc.

Digitalization ensures obtaining information promptly, in real time mode. It reduces time and increases the quality of decision-making, accelerates implementation of the decisions, speeds up changes. The growing information awareness opens up new opportunities as well as creates business risks.

From the point of view of corporate governance, this technology helps to reduce the problem of information asymmetry, thereby helping to alleviate the agency problems and reduce agency costs. Nowadays, a large amount of internal or external data, which was previously difficult to retrieve and / or not stored in the digitized form, becomes available to interested parties, in particular the shareholders of the company. Owing to new methods and tools of data processing, e.g., Big Data technology, such information can now be promptly processed in order for the principal to monitor the activity of the agent, assess the quality of his performances, coordinate actions and decisions.

At the same time, the tendency to increase the availability of data does not completely eliminate the problem of information asymmetry and the associated prerequisites for opportunistic behavior. For example, it is often difficult to formalize and record data based on experience, intuition, and implicit knowledge of managers. The increase in the amount of available information partially reduces the preconditions for opportunistic behavior, however other dangerous tendencies arise, such as the agents’ evading from fulfillment of their obligations.

Further, in this study there will be highlighted two aspects of agency relations, which will be used for analyzing the changes introduced by digital technologies in this area. As the first research field, we will consider the effect of digitalization on opportunistic behavior. The second research field is agency relations, mechanisms for selecting and hiring top managers by the company's principals. Finally, there will be methodological recommendations formulated, which enable to reduce agency costs and improve the company effectiveness.

## **TRANSFORMATION OF OPPORTUNISTIC BEHAVIOR**

### **Initial Preconditions**

The intensive use of modern digital technologies allows to substantially increase the information transparency of the business. The availability of information increases the tendency to shift from rigidly centralized management of business processes to a decentralized model for collecting, processing information and making decisions. At the same time, the availability of diversified digital information permits to strengthen the centralization of management. Now at the head office any information is available on the activities of various structural elements of the company, which was previously hard to attain due to the high costs and difficulties in generating, collecting, processing and storing distributed data.

Since the problem of information asymmetry is of an informational nature, it is logical to assume that now, as part of total digitalization, business owners and the corporate head offices can quickly receive a wide variety of information about the company's activities and thereby alleviate the asymmetry problem and the problem of opportunistic behavior of agents.

It should also be emphasized that the asymmetry of information is not the only reason for opportunistic behavior. Among other reasons are the imperfect mechanisms for coordinating the economic interests of the parties, lack of necessary incentives, which does not at all motivate top managers to high-performance actions.

The concept of opportunism was introduced to economics by Oliver E. Williamson. He identified three variants of egoistic behavior (Williamson, 1985. p. 47): strong form — opportunism, semi-strong form — self-interest seeking (used in the classical economic approach) and weak form — obedience (neglecting one's interests). It is believed that the agents that adhere to a strong form of egoistic behavior, opportunism, have "behavioral" uncertainty, can provide the principal with incomplete or distorted information, can pursue their interests notwithstanding formal and conventional norms, and make profit to the detriment of the owner's interests.

From the point of view of the contractual process, Williamson identified two types of opportunist agent:

- pre-contract opportunism, before the conclusion of the transaction (ex ante), expressed in unfavorable selection and change of plans (adverse selection);
- post-contract opportunism, after the conclusion of the transaction (ex post), manifested in shirking, negligence, the threat of dishonest behavior (moral hazard).

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Later there were proposed other features and variants of opportunism classification. For example, the work (Wathne & Heide, 2000. p. 36-37) identifies active opportunism (this includes lies, theft and fraud) and passive (lack of commitment to achieve the best results); in the article (Jap et al., 2013), opportunism with high (high-stake) and low (low-stake) benefits is highlighted; The work (Wathne & Heide, 2000. p. 41) deals with opportunism in a steady and changing situations. A theoretical analysis of agent problems (peculiarities of agent behavior), which are a precondition of opportunistic behavior, and information asymmetry is presented in the works (Jensen & Mecking, 1976; Aghion et al., 2014).

The practice of opportunistic behavior, when agents use the existing rules and procedures to achieve their goals, to which such norms were not originally oriented, is called «gaming». A theoretical study of this phenomenon is presented in (Pearce & Perry, 1983; Lowe & Wilson, 2015). Z. Radnor showed the influence of the organization's culture on gaming (Radnor, 2008), S. Kerr (Kerr, 1975. p.780) showed that the reason for gaming is the fact that it is easier for the principal to give the agent easy-to-measure reference points than the hard-to-measure ones, which, however, reflect the necessary requirements. The most common form of gaming is goal displacement (Bohte & Meier, 2000) and tunnel vision (Smith, 1995).

Developing further the noted views, A. Jackson (Jackson, 2002) identified three types of organizational gaming:

- determinative (incorrect choice of control criteria, performance indicators);
- digital (insufficient quantitative fixation of target parameters);
- behavioral (inactive behavior of employees).

As we can see, digital gaming is associated with the lack of a full-fledged and accessible information environment, which could allow the principal to timely receive the quantitative data required to control the agent's performance. This circumstance does not let to correctly set the numerical values of the performance indicators, which leads to a shift in goals and makes it possible for the agent to choose those aspects of work that provide him with the most benefit.

Digitalization and the industrial Internet of Things reduce the role of this factor in opportunistic behavior. The task of the correct digital measurement of target (planned) criteria is being solved within Industry 4.0, quantification and data consolidation on all key aspects of the company's activities. Therefore, the preconditions of opportunistic behavior associated with the complexity of the digital measurement of the parameters that define the targets for agents, are eliminated.

At the same time, another kind of organizational gaming, called «behavioral» by Jackson, may, on the contrary, increase due to total control. Informational pressure will inadvertently lead to further decrease in top manager's initiative, an increase in apathy, which will entail exacerbation of this prerequisite for opportunistic behavior.

Let's look at another example related to the features of opportunistic behavior. Consolidating the variants of relations arising between the owners of the company and the hired top managers. the following types of agent behavior can be identified:

- obvious opportunism. This behavior involves illegal alienation or misuse of corporate property; misappropriation of the corporation assets, as well as implementation of discretionary projects in order to strengthen one's position or to obtain additional privileges.
- soft opportunism. It lies in the fact of concealing and distorting information about opportunities and reserves in order to create more comfortable conditions for their work (understating output, overestimating costs, concealing information about reserves, development perspectives, etc.). The consequence of mild opportunism is loss of potential opportunities, loss of earnings due to business decline in comparison with the possible level;
- hidden opportunism (apathy, lack of initiative). In this option, the motivation of the agents to the efficient performance of their duties is significantly reduced. As in the case of mild opportunism, there are also missed opportunities, inefficient use of the agent's abilities and competencies, passivity, lack of action, unwillingness to be proactive, etc. According to the terminology introduced by H. Leibenstein (Leibenstein, 1966), we can say that these circumstances prevent the agent from increasing X-efficiency.

The introduction of digital solutions, Industry 4.0, Big Data technology, as mentioned above, can reduce the problem of information asymmetry. Now the principals and the head corporate office in real time mode are able to track and process information about the current state of the corporation, existing stocks, expenditure of resources, equipment loading, divisions' efficiency, fulfillment of assignments, etc.. In other words, digitalization makes it possible to accomplish the tasks of planning, managing and controlling the usage of various factors of production with minimal human participation.

This circumstance creates opportunities for improving the efficiency of the corporation, moving to new markets, and in the meantime, it forms the illusion of expediency of transition to more rigid, centralized forms of governance. This misconception is based on a simplified interpretation of the principal-agent problem, as well as on the idea that the only factor causing this problem is information asymmetry. Meanwhile, the opportunistic behavior of agents can be caused not only by the information asymmetry, but also by low incentives, which result from the inability to adequately measure the contribution and remuneration of top managers in terms of functional division of labor, and is also attributed to the reduction of the agent's ability to make independent decisions.

## **Solutions and Recommendations**

The analysis makes it possible to conclude that first two types of the opportunistic behavior discussed above, explicit and soft opportunism, can be minimized by applying digitalization capabilities, when prompt provision of diverse management information prevents attempts of unlawful expropriation or unauthorized use of corporate assets.

Moreover, it results in an increase of preconditions for displaying of the third type of opportunistic behavior - apathy (lack of initiative). The more regulated and controlled the agent's operational environment is getting and the less autonomy he has, the more inert he becomes, less focused on self-realization, on disclosure of his creative abilities and, in the long run, on efficient work in the interests of the entire corporation. Excessive management centralization and bureaucracy lead to ossification of the routine, a decrease of incentives for effective work, and growth of monitoring elements, though digitalization creates a necessity for top managers to work in conditions of uncertainty, accomplishing complicated analytical tasks that require improvisation and creativity<sup>1</sup>.

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Exclusion of the executive's proactive creativity from the company's resource potential complicates its development. Up-to-date software tools and all-knowing automatic controllers can find, process, measure and evaluate mostly explicit information, assist in accomplishing routine tasks, while comprehensive assessment of problematic situations, long-term management decisions are based, to a significant extent, on implicit knowledge and on top manager's intuition and initiative.

That brings up another interconnected problem - to what extent the evaluation criteria, built into software algorithms, correlate with the arising nonstandard situations, for example, an ability to correctly predict the consequences of the events that have taken place, to assess the trend of their changes.

Thus, the use of digital technologies provides possibilities to substantially increase the informational transparency of business, which leads to alleviation of information asymmetry. This circumstance affects the peculiar features of the agent's opportunistic behavior. Nowadays there are various approaches for classifying the types of opportunistic behavior. In particular, with the framework of gaming (situations when the agent, adhering to the established rules, seeks self-interest rather than the interests of the principal) the following classification of opportunistic behavior is distinguished: determinative gaming; digital gaming; behavioral gaming.. In regards of another grouping option considered in this review, the following types of such rejecting behavior are noted: obvious opportunism (property misappropriation and implementation of discretionary projects), hidden opportunism (shirking and concealing information) and soft opportunism (apathy).

As the analysis showed, there are the following possible reasons for various types of opportunistic behavior: firstly, the principal's lack of required quantitative data about the situation in the company and, secondly, the inactive behavior of the agent. Digitalization, by reducing the acuity of the information asymmetry, makes it possible to weaken the first group of the identified preconditions (as they are related to the lack of the required quantitative data) and thereby cut down one of the reasons for opportunistic behavior.

Simultaneously, the same process enhances the second group of preconditions; it provokes a decrease in initiative and growth of inaction of the agents. Digitalization, providing extensive informational monitoring, makes principals to increase a comprehensive control over the agents, which leads to a weakening of their initiative and increases the apathy that is the cause of such deviant behavior.

This circumstance should be taken into consideration when analyzing the effects of digitalization. All possible measures should be taken for preserving reasonable freedom for the agents in managerial actions, there should be created opportunities for showing initiative. Moreover, overcoming of the mentioned above negative preconditions will be facilitated by introduction of special incentives for implementing independent actions, or any other additional payments if the agent is proactive in the new digital working conditions.

## **AGENCY COSTS MANAGEMENT**

### **Initial Preconditions**

In this section, we will review another aspect of the digitalization's impact on corporate governance. Let us dwell on the impact of this technology on agency relations and agency costs, and determine how to manage such costs and reduce losses from eliminating the effects of agency conflicts.

There are two main approaches to solving agency problems. The first, most common and studied approach is to set up an organizational tool for monitoring the activities of the agents in order to identify cases of opportunistic behavior. Various methods and tools for controlling the decisions made by agents and evaluating their actions have been formed to achieve this goal. However, the control tools, as well as measures to compensate and remedy the consequences of the violations committed, mean for the company additional agency costs.

The second way to mitigate agency problems, less studied although widespread, is the selection of executives who can be trusted with asset management. That means to attract the agents who are initially loyal to the dominant owner<sup>2</sup>, which will make it possible not to spend money on control over such executives in the future.

As it was noted in the previous section, digitalization allows to provide informational transparency of the company and makes it easier to monitor the agent's activities. It facilitates agency cost reduction providing access to various operational data which the owner uses to control activities of the top-executives. However, it is not possible to set up a comprehensive control over the agents as there always be some information above the corporate control or that cannot be formulated, and this fact does not let to eliminate agency contradictions.

Therefore, in this section we will examine the second of the above mentioned methods for reducing agency costs. The method consists in hiring adequate managers, whose personal features initially allow mitigating agency contradictions rather than setting up various control mechanisms.

Thus, we will formulate the purpose of this section as follows: how to select an agent (candidate) that requires the minimum agency costs and how does digitalization affect this process?

In order to find an answer to this question, the following initial research task has been defined by the author — to establish personal qualities that, from the position of the owner, an “ideal” top executive should possess, i.e. to identify the features on the basis of which the selection of agents takes place in practice. As a result of the conducted research, it was found that when selecting the top executives of Russian corporations, the potential candidate needs to have two of the following main groups of specific features (sets of qualities):

1. Qualifications (knowledge, experience, communication skills, etc.). The requirement for having this quality is quite predictable;
2. Loyalty (reputation, ability to take responsibility, etc.). The requirement of this quality is not announced, but in practice it is widely used.

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Under the two marked generalized characteristics we will understand the following set of personal qualities of the applicant. *Qualification* is the manager's certain specific knowledge and skills, professional efficiency, experience in similar area (industry), the presence of high managerial competencies and business skills. Of course, in assessing the professionalism of executives, such factors as initiative in decision-making, readiness to take responsibility for the consequences of such decisions, leadership qualities, ability to organize work, communication skills, and entrepreneurship are essential. Digitalization highlights the ability to learn, digital literacy, the ability to integrate solutions, proficiency in Agile technologies. As a result, qualification reveals a possibility of the agent to ensure high productivity of the business.

The concept of *loyalty* also includes several aspects, such as experience of liaising, the relationship of trust between the manager and the dominant owner, reputation, honesty, responsibility, membership in the same team, and as an option - "clan" affinity, which is typical, for example, for a family business or a company built on a national basis (community). In other words, everything that allows the principal to believe that the agent will not pursue his interests behind the owner's back. In addition, the readiness to pursue commercial interests is significant, as well as being guided by the owner's opinion, being committed to his goals, in certain cases despite his own understanding of economic expediency, and even with possible damage to personal professional image. Loyalty implies the possibility of reducing agency costs and conflicts due to proven, trusting, "personal" relationships.

Now, having defined the basic requirements for the agent by the owners, we will articulate the goals, which the specified qualities of the top manager help to achieve, answer the question - why are they so important for the principal? Each of the two selected qualities of an agent is focused on achieving the most suitable goal for successful implementation. It can be stated that the usefulness of a top manager for the owner is determined by the ability to fulfill the following categories of tasks:

- increasing the effectiveness of the company, which can be ensured by a high level of the agent's qualification (1st group of qualities);
- reduction of agency problems due to the relationship of trust (2nd group of qualities).

The owner is faced with a permanent task - to ensure that the hired top manager follows not so much the letter (including incomplete contracts), but the spirit of the relationship. This problem is especially relevant in a situation where the value of specific intangible assets (business, lobbying, corruption ties) is increasing - as in countries with emerging economies, including Russia. Therefore, so often there are hired executive officers that are "close" to the owner, including acquaintances with whom a positive work experience has already been formed; relatives; friends; executives recommended by trusted people. At the same time, such restrictions significantly reduce the possibility of hiring highly qualified, but outside specialists who know the specific production.

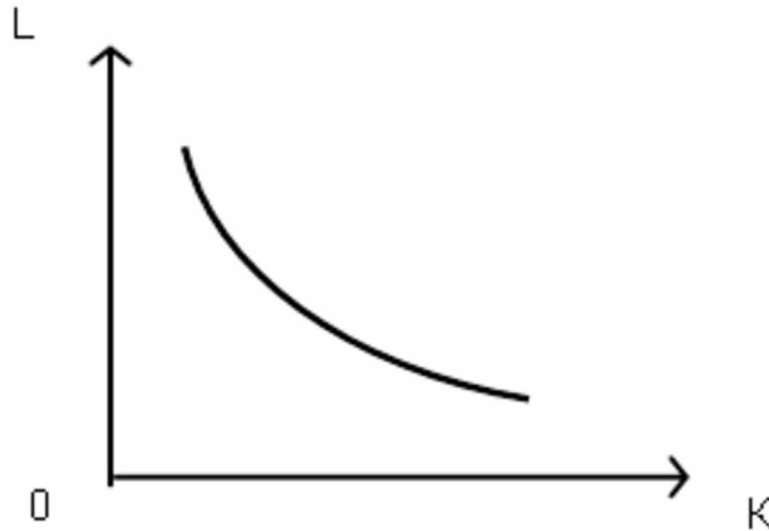
## **Research Tools**

We will use the ordinal approach as a methodological basis for further research on the relationship of professional qualifications and loyalty of top managers, on the one hand, and the effectiveness of their work, on the other hand. The notion of the potential "*utility*" of a top manager for a company will be introduced. It (utility) characterizes such personal features of the agent, that allow to ensure high management efficiency, reduce potential agency problems and increase the value of the business.



Figure 1. The behavior of the isoline of utility, depending on the “loyalty” and “qualifications” of top managers

Source: prepared by the author



Suppose hiring an agent by a principal as a consumer choice (in our case, the dominant owner or top management of a corporation) of a certain product (a top manager in this capacity) with two specified “benefits” - complementary qualities, which determine the agent’s “utility”.

This case can be represented by the *function of utility* of the executive office for a particular company (for its owner). Such utility ( $U$ ) will depend on two main groups of variables: “qualifications” ( $K$ ) and “loyalty” ( $L$ ), as well as other factors ( $p$ ). In turn, each of the groups is formed by a number of components. The components in the “qualification” group are denoted as:  $k_1, k_2, \dots, k_N$ , and the “loyalty” group as  $l_1, l_2, \dots, l_M$ , where  $M$  and  $N$  is the maximum number of elements included in each of the groups. Thus, the function of utility can be represented as follows:

$$U = U [K (k_n), L (l_m), p]$$

Each agent possesses individual combination of these properties, but with different combinations of them, the total “utility” of certain executives can be approximately equal. Hence, a multiplicity of potentially suitable for hiring managers can be reviewed as a set of groups of people distinguished by their “utility”. Thus, within the same group the managers with similar “utility” but with a different combination of certain features will integrate.

Since the manager’s “utility” for the principal depends on two basic complementary and interchangeable qualities (“benefits”), its behavior can be plotted by an isoline in the coordinates of the indicated qualities. At each point of this isometric line the “utility” of top-managers will have the same value. This approach allows to draw a conditional parallel with such a well-known plotting as an *indifference curve*. The line precisely shows a combination of two benefits, provided that their total consumer utility is maintained for the buyer, in our case, the agent’s utility for the principal. The indicated dependence is shown in Figure 1.

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Presented in Figure 1 curve is downward. It will have a concave shape based on the reduction of the marginal rate of substitution, the slope of the curve and the level of its concavity depend on the level of interchangeability of the two parameters under consideration. The marginal rate of substitution demonstrates how one “quality” of a top manager can be replaced by another, and will depend on the location of the point on the chart.

The more the requirements for the top-manager’s “utility” are tightening, the less number of potential employees will meet these requirements, the more difficult it will be to find an appropriate candidate in the market. And on the contrary: if the requirements are not too high, the more applicants can meet these requirements. Hence, the *supply function* of such employees, that is, the change in the number of potential candidates with an increase in the requirements for their “utility,” will have a diminishing character. With a decrease in the “utility” requirements, the number of applicants that meet this not so stringent requirement will grow, and the search for the necessary candidate will be made easier.

It is also worth noting that personal “loyalty” refers to the category of special human capital that is claimed by the owner inside a particular company. In this way, it differs from the “qualification”, which includes both general (versatile) and special human capital demanded in a particular business.

## **Solutions and Recommendations**

The contribution of each of the two indicated “benefits” to the utility of a top manager (comparing their significance) will be assessed further, and based on that assessment there will be recommendations made on the use of the introduced tools for increasing top manager’s efficiency. In order to do this, we will consider the parameters that determine the requirements for the indicated components that make up the “utility” of a top manager, which is reflected in the form of the “utility” isoline. It is influenced by the following groups of factors:

1. principal’s demands to the agent (top manager);
2. specific requirements for the functional position occupied by the agent;
3. level of the company’s digitalization.

Requirements of the principal to the agent (top manager). Depending on the importance of a particular quality of the hired agent to the dominant shareholders, the following group of shareholders can be distinguished:

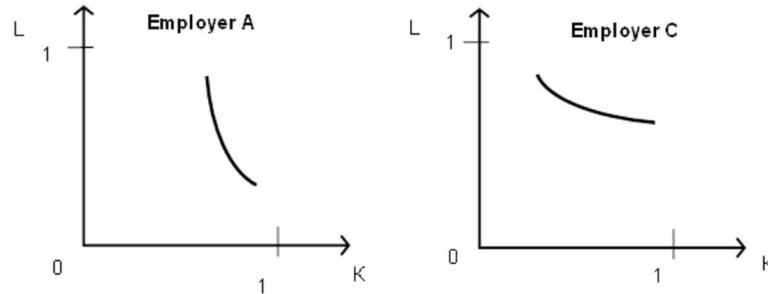
Group A - includes the dominant owners, who foremost value the qualification of the candidate, as he will manage the technologically sophisticated productions, reach challenging objectives, etc. In this case the traditional professional selection takes place, and the loyalty factor is considered to a slight level;

Group B - this type of owner takes into account both the qualification and the loyalty of the top manager;

Group C - the importance of loyalty for these type of shareholders is relatively high, and the requirements for the qualification are in second place. Close attention is paid to loyalty, since trust is important, belonging to a team, strict adherence to agreements, procedures, a “can-do” attitude (it mostly concerns a family business or a commercial business with involvement of local personnel), or in case when a comprehensive control of the top manager is hampered.

Figure 2. Employer's requirements to the proportion of factors composing top manager's "utility" (indifference curve)

Source: prepared by the author



Different groups of employers (different business situations) have a different level of flexibility to the considered qualities - i.e. the possibility of replacing one quality with the other one, the limits of such a substitution. Accordingly, the graphs characterizing the required "utility" of the hired top manager will differ.

Charts (a) and (b) Figure 2 show the relation of such difference to the limits of substitution for two categories of employers: "A" and "C". On Figure 2 both of the analyzed parameters vary in the range from 0 to 1, where 0 corresponds to the minimum value and 1 to the maximum. The expectations of the owner of category "B" correspond to the isoline of utility, shown earlier in Figure 1.

As it can be seen, the graph (a) describing the requirements of employer "A" will have a steeper slope. This is due to the dominance of professional requirements, which in this case must be at a high level. The requirements of employer "C" corresponds to the graph (b), which has a more gentle appearance, which corresponds to the prevalence of the "loyalty" factor.

The categorization of an owner to a certain group depends both on objective and subjective reasons. The first (objective) requirements include the specifics of the company's activities, the level of its digitalization, business conditions, including the prevailing aspects of the director's work, the kind of decisions made, the particular business or administrative situation, the company profile, the stage of business development, etc.

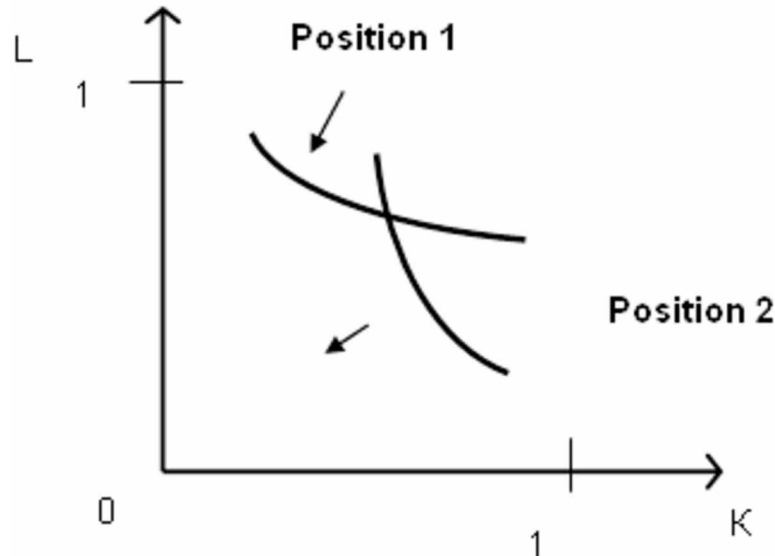
The subjective, individual factors include personal preferences of the dominant owner, the importance for him of certain managerial qualities. Thus, for the principal of category "A" the qualifications of the agent (professionalism, competence) are most important. Owners of category "B" and especially "C" pay special attention to mental, ethical and psychological needs, to comfortable operating conditions, the temper of the hired top manager. The increase in the importance of these factors for the principal enhances attention of the owner to the qualities that make up the loyalty of the agent (his moral, psychological, behavioral characteristics). And, on the contrary, with their decrease, attention to traditional professional criteria grows.

Special requirements for the position occupied by the agent. Various demands to the ratio of these properties of the agent that form the utility may also arise when hiring directors responsible for managing certain functional divisions of the company, for example, financial, commercial, or production. In this case, in the same corporation there may be different demands to the indifference curve of the utility of managers occupying such positions. This fact is illustrated in Figure 3, which depicts the requirements for managers who are in charge of various functional divisions of the company.

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Figure 3. The “utility” isoline of different top managers in the same company

Source: prepared by the author

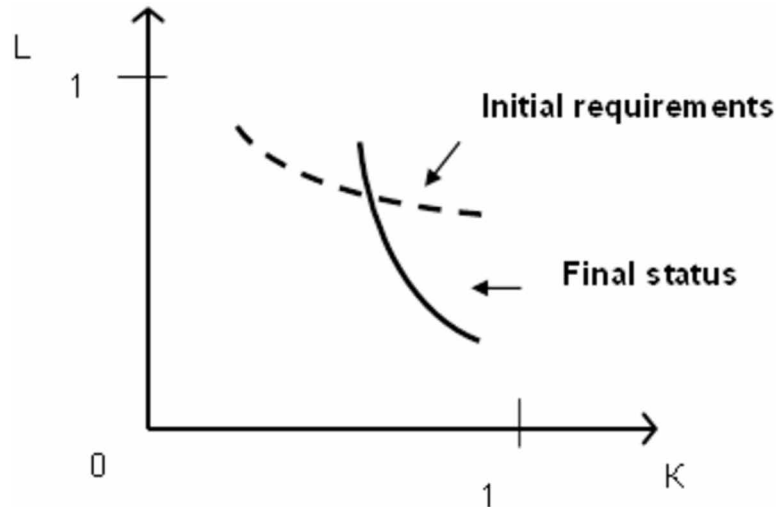


The “Position 1” graph is more likely to meet the requirements for a commercial and/or financial director who controls commercial transactions or cash flows, relationships with stakeholders, where traditionally much attention is paid to loyalty. It could also be relations with the agent, who are required to be promptitude in obeying, rather than proactive, which often takes place in rigidly administrative structures. “Position 2” more relates to the position of technical director, production director or chief engineer, for whom professional competence and personal autonomy are more significant than trustworthy relations with the owner or the first person.

The level of digitalization of the company. Digitalization, as mentioned above, significantly modernizes the company’s activities, the organization of its business processes, the technologies used, the requirements for managers, etc. On the one hand it results in increased demands for the qualifications of top managers, especially for competencies related to the category of “Knowledge” (the ability to work in conditions of vagueness, to perform complicated analytical tasks that require improvisation and creativity). On the other hand, it facilitates monitoring of the top manager though hindering his initiative, and makes it easier to detect the signs of his opportunistic behavior. These circumstances lead to the fact that the agent’s loyalty factor is receding into the background, and more attention is paid to his qualifications.

Digitization also affects two other factors noted above that determine a requirement for the agent’s utility: 1) the preferences of principals and 2) special requirements for the agent’s functional position. The need for the company’s activities to comply with the conditions of a rapidly changing digital environment reinforces the principal’s attention to the agent’s proper qualifications and the presence of cognitive, socio-psychological and digital competences. The same situation is with the special requirements for the position of the top manager. This is due to the fact that the areas of activity where the loyalty factor is particularly important, i.e. finance, commerce, public relations, are primarily affected by digitalization, which makes it necessary to improve digital competencies of the appropriate functional manager. These

Figure 4. Transformation of the “utility” isoline as a result of the influence of digitalization factors  
 Source: prepared by the author



circumstances suggest that the importance of the “qualification” component in the “utility” of the agent in terms of increasing digitalization.

As a result, the “utility” isoline of the hired top manager becomes more sensitive to their qualifications and less to loyalty. Figure 4 illustrates this trend for the case when the principal initially sets the highest standard for the agent’s loyalty.

It is also worth noting that due to digitalization, the number of potential applicants for a vacant position increases, since recruitment services have access to extensive information from various, previously unavailable sources: social networks, various specialized analytical reports, databases.

## METHODICAL RECOMMENDATIONS FOR THE SELECTION OF AGENTS

### Suggested Algorithm of Actions

In conclusion, there will be formulated the guidelines for selection by principals of candidates for a vacant position of top manager, thereby demonstrating the possibilities of practical use of the proposed approach to assessing the effectiveness of senior managers. The task under review arises whenever the owner needs to rank the possible candidates (agents) in order to select the most suitable one for the vacant managerial position. The proposed guidelines do not replace the traditional methods of professional selection, but complement them by including the loyalty factor in the mechanism of such selection and take into account its importance for certain shareholders, kinds of businesses and positions.

The descriptive view used above made it possible to describe the regularities of the selection of the agents by principals, the factors that determine such a choice and its goals. In this section, a practical mechanism for implementing the identified relationships is reviewed. In this regard, we will use not the ordinalist, as before, but the cardinal approach, will introduce the numerical indicators of the dependencies used.

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The procedure of achieving this objective is proposed to divide into the following integrated steps:

**Stage 1:** Pre-selection of candidates in compliance with the general basic requirements for the vacancy.

**Stage 2:** Adjustment of job description and Personal Specification by formulating the requirements for the vacant position, the definition of acceptable limits of qualifications and loyalty.

**Stage 3:** Determine the relative importance of the two parameters under consideration, that is, the form of the utility isoline for the vacant position.

**Stage 4:** Assessment of the qualifications and loyalty of each of the applicants.

**Stage 5:** Definition of the “utility” of candidates and their final ranking.

Suppose it is necessary to select applicants for a vacant position, the requirements for “utility” which are described by isolines in Figure 5. Let us outline the actions that should be taken at each of these stages.

Stage 1. Pre-selection of candidates.

If certain requirements are initially claimed to applicants, such as, previous work experience, additional training, age, gender, etc., a preliminary screening of relevant candidates is carried out at this stage.

Suppose, as a result of the preliminary selection,  $I$  number of candidates were chosen with the necessary work experience,  $i$  is the candidate number,  $i = 1 . . . I$ .

Stage 2. “Position Profile” development

At the second stage, the requirements for the vacant position are finalized, and first of all, the required “qualifications” and “loyalty” are determined. In order to do this, there can be introduced the measurement scale for each of the parameters, for example, assign the maximum possible value to  $N$ , and the minimum to 0, and specify the desired interval for changing the indicated criteria within the introduced scale. If a single scale is used for several managerial positions in the company, then within this scale there can be requirements set for certain managerial vacancies, indicating for each them their own unique range of desired parameters (acceptable minimum and maximum values).

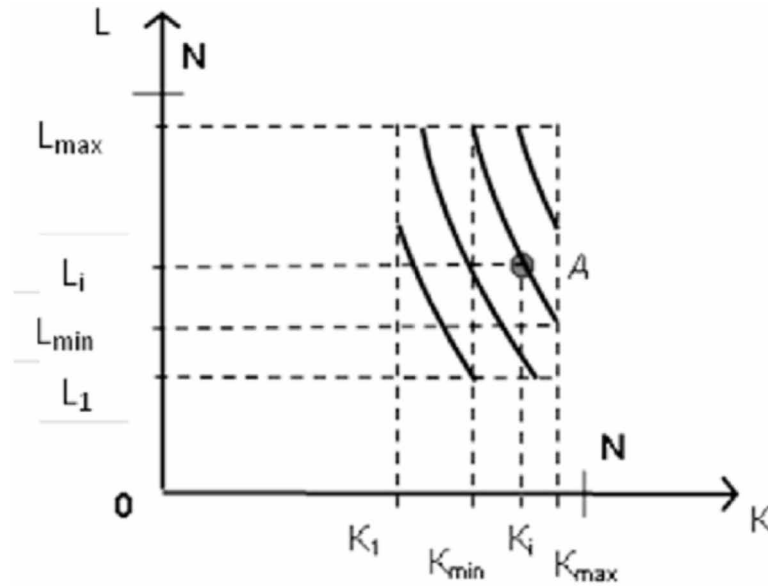
Let’s assume that the profile of the offered job is described by the following requirements:

- Parameter  $L$  must be in the range from  $L_1$  to  $L_{max}$ , where  $L_1$  is the minimum acceptable loyalty level;  $L_{max}$  - the maximum allowable.
- Parameter  $K$  - in the range from  $K_1$  to  $K_{max}$ ,  $K_1$  - the minimum acceptable skill level;  $K_{max}$  - the maximum allowable.

In order to facilitate the formation of the scale of parameters, in addition to numerical indicators there can be used verbal (qualitative) gradation of possible values to assess “qualifications” and “loyalty”. For example, in case of a five-level classification, these will be the following levels: the indicator can be of any value; or its value should start at a level below average; at the average; at above average; or just the highest.

Figure 5. An example of an indifference curve map of a “job profile”

Source: prepared by the author



Stage 3. Determine the relative importance of the parameters, that is, the form of the utility isoline for the vacant position.

Then it is necessary to determine the interdependence of the considered parameters, their comparative weights, or the marginal rate of substitution of one parameter by another. This sets the shape of the indifference curve, i.e. how one of the criteria will change with the dynamics of the other, while preserving the utility of the manager. The variants of the utility isolines are shown in Figure 3. Since the requirements for the isolines' form for different executive positions in the company may differ, this procedure should be carried out for each vacant position.

The set of utility isolines within the two selected coordinates can be represented as a kind of “indifference map” of the utility of managers applying for the vacant position within the allowable interval of parameters' change, which is reflected in Figure 5. The more distant from the origin of coordinates the considered curve is, the more significant its utility. Moreover, as noted before, the higher is the level of loyalty and qualifications that the manager must possess, the fewer people initially meet this requirement (and, accordingly, this contour line).

The form of indifference curves (angle of inclination) are determined by the priority for the position of one or another criterion. For example, Figure 5 presents a map of indifference curves of an imagined technical director.

In our case, the utility isoline (indifference curve) for the offered position is close to linear dependence, i.e. it can be approximated by a linear function without any damage to content, the marginal rate of substitution of one parameter by another one will be constant at any point of such a graph. Let us introduce parameter  $P$ , the correlation coefficient between  $L$  and  $K$  for our indifference curve. It can be calculated as the ratio of the range of “qualification” changes to the range of “loyalty” changes of a

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single isoline of utility. For the situation shown in Figure 4, the eligible qualifications range from  $K_{min}$  to  $K_{max}$ , and loyalty ranges from  $L_{min}$  to  $L_{max}$ , then:

$$P = (L_{max} - L_{min}) / (K_{max} - K_{min}) \quad (1)$$

Stage 4. Assessment of the qualifications and loyalty for each of the applicants.

Considering the introduced scale of measurements, each of the potential candidates is assigned numerical values of his qualifications and loyalty. This procedure can be carried out in various ways. For example, a qualification assessment is usually carried out with the help of special professional tests or personal interviews. The level of the candidate's loyalty can be described in the same way, by testing for "truthfulness", liaise experience at the previous job, evaluating colleagues, etc.). An alternative option of assessment – expert assessment, is used when it's difficult to apply formal criteria.

After that, knowing the requirements for the position, the minimum allowable values of "qualification" and "loyalty" in particular, it is possible to further screen out candidates who do not have these qualities at the required level (who did not get the necessary points).

Let the "qualification" and "loyalty" of applicant  $i$  be evaluated by experts as  $K_i$  and  $L_i$  and exceed the minimum required level of "qualification" and "loyalty". The place of this applicant is indicated as point A on the map of indifference curves of utility.

Stage 5. Determination of the candidates' utility and their final ranking.

At the last stage, the potential utility (efficiency) of managers is calculated. To do this, the points scored by candidates for each of the criteria are summed up taking into account their significance (weight). In conclusion, applicants are ranked based on the accumulated total "points", and the most suitable candidate is determined.

Below is the calculation of  $Q_i$  - the final assessment of the applicant. It is defined as the sum of the individual "loyalty" and "qualifications", adjusted for the significance (weight) of indicators. Then, taking into account the introduced form of the isoline of utility, it can be defined as follows:

$$Q_i = P * K_i + L_i \quad (2)$$

Using formula (1), the final grade can be presented as follows:

$$Q_i = ((L_{max} - L_{min}) / (K_{max} - K_{min})) * K_i + L_i \quad (3)$$

At the end, the applicants are ranked by the received grades ( $Q_i$ ), and the winner who received the highest rating is selected.



*Table 1. Qualifications and loyalty of candidates*

Candidate Number	Candidate's loyalty (%)	Candidate 's qualification (%)
A	60	90
B	80	80
C	90	50
Criteria "weight"	0,66	0,34

Source: prepared by the author

*Table 2. Final assessment of candidates*

Candidate's number	Final grade of the candidate	Candidate's rating
A	69,9	3
B	79,9	1
C	76,6	2

Source: prepared by the author

## **Example of Estimation**

Below is an example of utilizing the proposed toolkit. A number of assumptions have been made, designed to alleviate the practical situation under consideration, while retaining the main points of the introduced approach. It is assumed that there is a possibility to establish the level of competence and loyalty of the agents, in any case, to compare different candidates. The second assumption is that the shape of the isoline of utility can be described using a linear dependence, i.e. the marginal rate of substitution of the two factors considered is constant.

Therefore, suppose that in company X a vacancy of a management position is announced. Requirements for a potential candidate are described by the following parameters: age from 35 to 50, an MBA level, leadership experience in similar positions for at least 10 years. The "qualification" of the applicant should be in the range of 60% to 90% of the maximum possible value, and "loyalty" in the range from 50% to 90%. So, we need to find the most suitable candidate on the market within a limited period of time.

Let the form of the indifference curve of utility for the desired position have the form of a uniformly decreasing linear dependence. The coefficient of interrelation of parameters equals to two, based on the requirements of the shareholder, is equal to two, that means that the applicant, first of all, is required to be highly qualified and such competence will be twice valuable than the importance of loyalty.

Suppose that for this executive position, after the initial dropout, three candidates have applied, whose personal qualities can be described by the parameters given in Table 1. The values of loyalty and qualification are estimated as a percentage of the maximum possible value of the parameter.

All three candidates meet the requirements for the position and can be considered further. With the help of the introduced algorithm, the score of each of the applicants were calculated, the candidates have been rated on this basis, and the results are summarized in Table 2.

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As can be seen from the table, the most useful of the candidates currently on the market is candidate “B”. Although he is slightly less qualified than candidate “A”, his behavior is more predictable for the principal, which allowed him to win this competition. Candidate “C” takes the second place, despite his maximum loyalty, his qualification is significantly lower than the previous candidate’s. Candidate “A” is on the last place. Although he is the most qualified of all, his loyalty to the principal, from the point of view of the latter, is low, while the vacant position requires a certain level of trust.

Since the analysis is made of the activities of top managers who have a free hand in disposing the assigned assets, a certain level of trust in such an agent from the shareholder is required. If, in a particular situation, while selection of the top manager, the question of his loyalty fades into the background, and only professional competencies are important, the situation is simplified and its resolution takes place within the framework of traditional qualification selection, which corresponds to the analysis of only one of the noted factors.

## **CONCLUSION**

The transition to business digitalization sets the task of assessing the impact of these processes on corporate governance, which requires the use of adequate methodological tools and algorithmic support. In this regard, the purpose of the study was to analyze changes in corporate governance and, above all, in the area of agency relations; as well as examination of the peculiarities of agency costs management in the digital age and an assessment of possible ways to adjust corporate governance practices.

The use of modern digital technologies makes it possible to enhance the information transparency of business, which leads to an alleviation of the information asymmetry problem. This circumstance affects the preconditions of opportunistic behavior, helps to mitigate the typical agency problems and reduce agency costs. However, the increase in data does not completely eliminate the problem of information asymmetry and related reasons for opportunistic behavior.

In the presented study, two aspects of agency relations have been highlighted in order to examine the changes introduced by digital technologies in this area. The first one - the influence of digitalization on solving the problem of opportunistic behavior, the second aspect disposes the agency relations, selection and hiring mechanisms of top managers by principals.

As the first example, the preconditions for the manifestation of opportunistic behavior were analyzed and two permanently present groups of reasons were identified. This is, firstly, the principal’s lack of necessary information about the situation in the company and, secondly, inert behavior of agents. When analyzing the impact of digitalization on these causes, it is noted that reducing the severity of information asymmetry allows to weaken the first group of the indicated preconditions (related to the lack of necessary data) and thereby reduce the manifestation of opportunistic behavior.

In the meantime, the same process enhances the second group of preconditions; it contributes to an increase in the lack of initiative and the passivity of agents. Digitalization, providing ubiquitous information monitoring, provokes principals to increase total control over the agents, which leads to a weakening of their initiative and reinforces apathy, which is the cause of such deviant behavior.

It is shown that in order to remedy this situation, it is necessary to take various measures to preserve the agents' reasonable freedom of management actions, a possibility of taking the initiative. The introduction of special incentives for self-directed actions by the manager, additional payments in case they are proactive in the new digital working conditions, will help to overcome these negative preconditions.

Within the second case, the possibility of reducing agency costs through the correct selection of top managers was investigated, which is an obvious and traditional way of reducing such costs. It was noted that the solution of this task is influenced both by objective circumstances, requirements related to the company's activities, as well as subjective ones - preferences of the dominant owners in selecting the top manager most appropriate to their behavioral and psychological needs.

As a result, it was stated that when hiring top managers, the principal actually considers two collective properties of the agent: "qualification" (knowledge, experience, professional competencies) and "loyalty" (proximity to the owner, personal responsibility to him, reputation, belonging to the "team"). At the same time, the importance (weights) of these factors may differ for different operational situations, for example, attention to loyalty is enhanced in companies for which specific intangible assets are important (political, business, lobbyist, and corrupt ties of business owners).

There was introduced the concept of agent's (top manager's) utility for the principal (company), which describes the ability to ensure high efficiency of management, reduce potential agency problems and increase the value of the business due to certain personal qualities of the agent. Based on the ordinal approach, a model toolkit was formed, allowing to evaluate candidates for top positions. The potential effectiveness of managers is presented as a utility function of an agent for a principal, depending on the two key qualities ("benefits") of the top manager, his level of qualification and loyalty.

A multitude of managers suitable for hiring has been presented as a set of groups of employees distinguished by their utility. The consumer utility of each of these groups is interpreted in the coordinates of "loyalty" and "qualification" as an indifference curve for the utility of managers (an isoline), at each point of which the utility will be the same, with a different combination of these qualities ("benefits"). The requirements for the desired manager determine the necessary composition of his qualities, and, accordingly, the type of the isoline of utility, the elasticity of the two properties under consideration (the marginal rate of replacement of one quality by another).

It is shown that the contribution of each of the two marked "benefits" to the utility of a top manager depends on the following groups of factors: 1) the principal's demands to the agent; 2) special requirements for the position occupied by the agent; 3) the level of digitalization of the company.

With the increase in the "*level of digitalization*", the requirements for the "qualification" component in the manager's utility grow, especially in the presence of special digital knowledge, the ability to work under uncertainty, to fulfill complicated analytical tasks that require improvisation and creativity, the presence of cognitive and socio-psychological competencies. Digitalization also affects two other factors noted above that determine a demand for the agents utility: 1) *preferences of principals*, and 2) *special requirements for the functional position*. In this case the demand for digital competencies is also strengthened. In addition, digitalization facilitates control over the top manager, it becomes easier to detect manifestations of his disloyal behavior.

Thus, during the process of digitizing, the agent's "loyalty" factor increasingly fades into the background, and more attention is paid to the "qualification" component of the manager's utility, i.e. the isoline of the utility of the hired top manager becomes more sensitive to his qualifications and less to loyalty.

In conclusion of the current study there were proposed the guidelines for selecting the candidates by the principal for the vacant position of a top manager, based on the introduced theoretical approach. This task arises when the owner needs to rank the possible candidates in order to select the most suitable candidate for the vacant managerial position. The recommendations do not replace traditional methods of professional selection, but complement them, taking into account the loyalty factor, which is important for certain types of business and positions, as well as for addressing the behavioral preferences of owners.

## **FUTURE RESEARCH DIRECTIONS**

The present study demonstrates possibilities to reduce agency costs and reduce the preconditions of opportunistic behavior in view of digitalization. At the same time, the considered problems of opportunistic behavior, in our opinion, cannot be completely solved with the help of digital technologies, even taking into account the fact that such technologies are developing rapidly and, probably, will soon open up new managerial opportunities based, for example, on artificial intelligence or a multiple increase in computational capabilities.

This conclusion is based on several causes. Thus, with the help of digital technologies it is rather difficult to completely remove the problem of information asymmetry, since it is almost impossible to ensure full control of the agent, and not all the required information is submitted to formalizing and can be collected and recorded. At the same time, there are deep-seated contradictions between the principal and the agent due to the difference of their economic interests, which are not eliminated by digitalization, and the fundamental solution of this problem lies in the area of property relations, convergence of interests of the parties within such relations.

The use of the proposed tool for selecting top managers based on the representation of their utility as a function of qualifications and loyalty may be primarily in demand in companies where the factor of loyalty of the manager is initially significant, and where this parameter will be weakened due to digitalization processes. The developed model approach can also be in demand in the case of the emergence of other, besides qualification and loyalty, key features of the agent's utility considered while selecting candidates in digitalization conditions. For example, it is possible to replace the loyalty factor with such a requirement as the presence of digital competencies. However, it will be possible to fully appreciate this opportunity, as well as other indicated trends, when there is enough statistics characterizing the activities of companies in the digital environment.

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## KEY TERMS AND DEFINITIONS

**Agency Costs:** The owners' costs for compensation, rectification, and insurance against emerging agency problems, compensation for the consequences of such conflicts are called agency costs.

**Agency Relations:** Relations that arise between the owners of the companies (principals) and the top managers (agents) they hire, and who are delegated the rights to manage the assets owned by shareholders.

**Agent's Loyalty:** The relationship of trust between the manager and the dominant owner, based on experience working together, being the same team players, clan affinity.

**Agent's Utility:** Personal qualities of the agent, that allow to ensure high management efficiency, reduce potential agency problems and increase the value of the business.

**Gaming:** Practice of opportunistic behavior when the agent uses the established regularities and procedures for seeking self-interest, though initially such norms were not meant for this.

**Incomplete Contract:** Contract, executed between the principal and the agent, which cannot specify all the essential job requirements to assigned work.

**Opportunistic Behavior:** The behavior when the agent can provide the principal with incomplete or distorted information, can pursue self-interests notwithstanding formal and conventional norms, and make profit regardless the owner's interests.

## ENDNOTES

<sup>1</sup> The Boston Consulting Group conducted an assessment of the requirements to personnel in conditions of digitalization (Russia-2015, 2017). The company stated a necessity to replace the top managers with such skills as "Ability" and "Rule" by the top managers with the skill "Knowledge" as this skill implies analytical work, improvisation, creativity, ability to work in situations of uncertainty, autonomy in decision-making.

<sup>2</sup> Research of the shareholding in Russian corporations shows that, as a rule, there is only one or at the most two dominant shareholders in domestic companies. Therefore, speaking about the principals, we will mean the dominant owners.