

# Opportunities and threats of informatization of management of higher education institutions

## Posibles oportunidades y amenazas a la informatización de la gestión de instituciones de educación superior

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#### ABSTRACT:

The article deals with the peculiarities of the influence of informatization on the management of higher education institutions (HEI). The positive effect of applying information technologies in the management of HEI on the process and the development of higher education system is considered. The threats of informatization of the management of HEI and the most common methods of manipulation in the management process are outlined. Methods for preventing the negative impact of information technologies on the management are given.

**Keywords:** informatization of management; management of higher education institutions; management of education; HEI (Higher Educational Institutions) etc.

#### RESUMEN:

Se consideran las peculiaridades del impacto de la informatización en la gestión de las instituciones de la educación superior (IES). Se determina el efecto positivo del uso de las tecnologías de la información y se determina fundamentalmente el soporte de información de la gestión. Se consideran las amenazas a la informatización de la gestión de las IES y los métodos más comunes de manipulación en el proceso de gestión de las IES.

**Palabras clave:** gestión de la información; gestión universitaria; gestión de instituciones de educación superior, tecnología de la información.

## 1. Introduction

### 1.1. Formulation of the problem

The analysis of the Internet materials shows that the basic concept of modern humanity is the concept of "management", which is devoted to more than 19 billion documents. In the second place among the management concepts is the concept of "e-business", more than 16 billion documents are devoted to it. Computerization has covered all spheres of public life including higher education. Information technologies have become an integral part of the educational process and the management of higher education institutions (HEI). This situation is conditioned by several factors: domination of the tendency of informatization of all spheres of people's activity, an increase of the level of democracy, the openness of public life; potential information technology opportunities for management; rapid improvement of the hardware base, which positively influences the development of information

technologies; the level of readiness for use of information technologies by managers, teachers, students and other stakeholders of higher education institutions.

Managing a higher education institution is, in its essence, an information process that can be divided into some parts: receiving information, developing managerial decisions, bringing managerial decisions to executors, and providing organizational support for executing these decisions. Information is the core of all management components. The use of information in the computer and pre-computer age is fundamentally different in terms of how it is received, processed, stored, transmitted. Information technology changes not only management procedures, but also its time dimensions and meaningful characteristics. These technologies have transformed the implementation of content, functions, management methods, eroding the traditional structure of management and specialization of management activities. By its nature, management aims at the development and implementation of management decisions. But the general tendency of modern management is the gap between the plans of work and their implementation. Information technologies allow to overcome such a gap if they provide the creation of an information environment that encourages employees to participate actively in the management process. For example, earlier the development of the plan was a tool of decision-making, now it is a tool of attracting a wide range of employees to management, their motivation, bringing management decisions, the democratization of management. Additionally, informatization blurs the boundaries of the system of subject-object management, thus changing the essence of management, causing the transition to a new management paradigm. Explaining the principles and features of the impact of informatics on the management of higher education institutions is an important scientific and practical task.

## **1.2. Analysis of recent research and publications**

The analysis of recent years' publications on this issue has shown that the focus of foreign researchers is on the use of cloud systems, digital technologies in university management (Safiullin et al., 2019), the implementation of the new programs in e-learning management (Akkucuk, et al. , 2019), university experience of using information systems in management (El Hissi et al., 2018), (Rivera González et al., 2016), use of technological resources for professional development of university lecturers (González-Sanmamed et al., 2020) , analysis of information architect of university websites (Singla et al., 2020), use of information in the interaction of universities and businesses (Santos de Miranda et al., 2020), development and support of the academic information system at the university (Sastry, 2020), mechanisms of university informatization management (Kan Ji et al., 2019) and others.

In Ukraine, the area of work on informatization of management of educational institutions was investigated by Ye. Khrykov in his textbook (Khrykov, 2016); different aspects of the use of information and communication or computer technologies in the management of educational institutions are considered in the studies by A. Guraluk, O. Kulyk, V. Kamyshina, V. Lunyachek, S. Merkulova, G. Sukhovych, J. Senchuk (Sych, 2019). . The main directions of the use of computer programs in the management of educational institutions are defined by L. Zabrodska (Zabrodska, 2003). The problem of the use of information technologies in the activity of some heads of educational institutions is considered by L. Paraschenko and V. Leonsky (Parashchenko et al., 2002). The formation of information culture of the head of a comprehensive educational institution and the problem of informatization of management of educational institutions are considered in the works of L. Kalinina (Kalinina, 2008). In the doctoral research Yu. Atamanchuk describes the essence, specificity and constituents of the process of informatization of educational institution management, defines the structure of preparation of masters in educational institution management for informatization of management in the process of learning (Atamanchuk, 2016). Recent publications have reviewed the experience of using modern information and communication technologies in the management of HEI (Morgulets et al., 2019; Golovko et al., 2019), models of information and educational environment (Buinytska, 2019), training systems using information and electronic technologies - E-learning (Kuchuk et al., 2019) and others. However, such aspects of the problem as potential threats to management informatization and their prevention are practically ignored by researchers. The aim of the article: outline the technologies of prevention of negative influences and ways of optimization of informatization on the management of higher education institutions on the basis of consideration of the principles, positive and negative effects of informatization on the management of higher education institutions.

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## **2. Methodology**

The results of the study presented in the article were obtained using a set of methods. The analysis of the scientific literature was used to reveal the level of research of the problem of informatization of the ZVI management in the world and Ukrainian science. The ethnographic method (Kozinets, 2010) is

for studying the sites of leading universities on the representation of information to the general public and their experience of using information technology in the management process.

On the Delphi method information competencies of the modern HEI leader, opportunities and threats that create information technologies for the management of Ukrainian universities have been determined. In the first stage of using this method a survey of 560 heads of different levels and lecturers of Ukrainian universities was conducted to determine the list of the objects under research. In the second stage, according to the formed lists, the assessment of these objects was carried out on a 10-point scale by a group of experts, which consisted of 45 leaders and experienced teachers of Ukrainian universities. The highest score corresponds to the most significant opportunities, manipulation techniques, managerial information competencies.

The results of the experimental work were confirmed by statistical analysis. During the study the experience of managing 30 Ukrainian and foreign universities was studied. Systematization, generalization and analysis of managerial experience were used to determine the principles of informatization of the management of HEI; measures and technologies for preventing the negative impact of information technologies on the management of HEI; major management problems that need to be addressed by information technology; identification of a range of tasks, the solution of which will help to optimize the use of information technology management ZVI.

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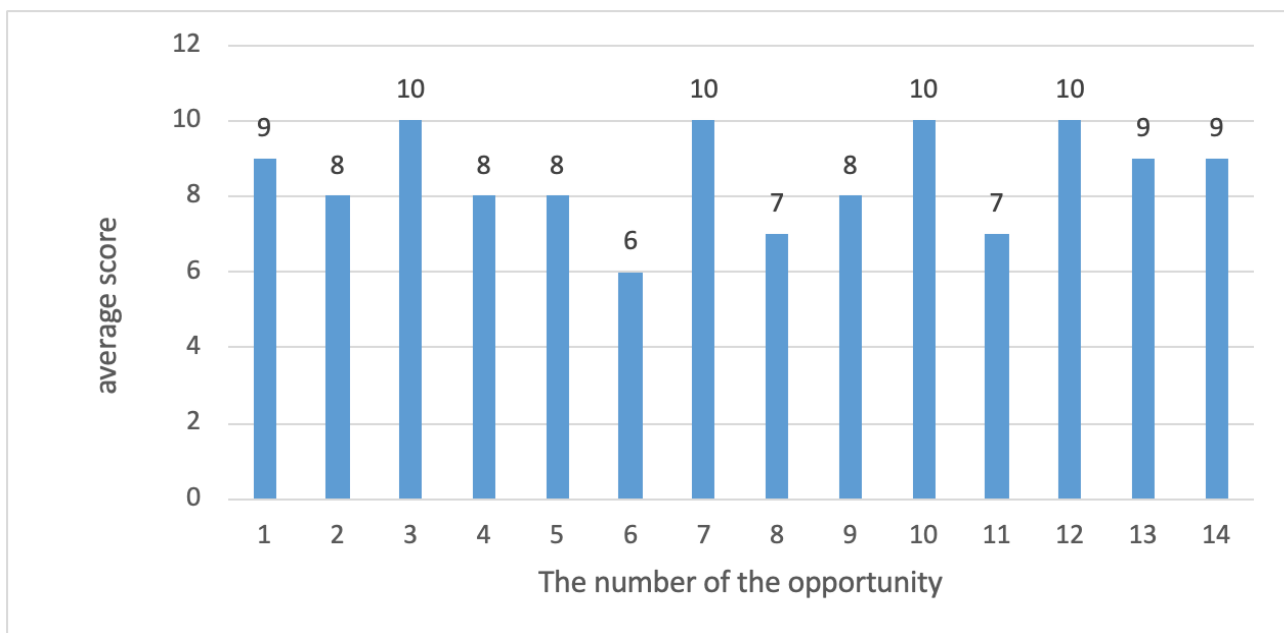
## 3. Results

### 3.1. Positive information technology impact on the management of higher education institutions

The study examined the impact of information technology on the management of Ukrainian universities by the Delphi method. The experiment was conducted in two stages – the first stage conducted a survey of 560 respondents to clarify their views on identifying important opportunities of IT for managing universities in Ukraine. The analysis and systematization of the obtained data, the study of the scientific and pedagogical literature on the subject, our own research allowed us to form a list of twenty possibilities. In the second stage, we formed an expert group, which included the heads of higher education institutions, as well as teachers with significant experience, including in senior positions (45 experts). The experts were tasked with assessing on the 10-point scale the significance of the proposed opportunities. The results of the evaluation revealed 14 most influential opportunities, created with IT, for managing Ukrainian universities. The diagram of fig. 1. presents the review results of the most significant opportunities for managing universities in Ukraine that were created with information technology and averaged expert review (rounded to the whole) on the vertical axis. The horizontal axis numbers correspond to the following: 1 – the involvement of team members in the development of management decisions; 2 – shortening the time period for making managerial decisions through the introduction and operation of information systems for information processing; 3 – ensuring openness of information; 4 – any staff member’s appeal to the Academic Council members, the management staff, the staff of the educational institution with specific proposals, alternative projects, up-to-date information; 5 – conducting a survey of different categories of stakeholders; 6 – the organization of team members training; 7 – the introduction of electronic document circulation and savings for copying documents; 8 – the creation of an open bank of proposals on improvement of educational establishment activity; 9 – the fast communication to the team of the necessary information: management decisions, plans, tasks, etc.; 10 – the creation of a database of regulatory documents, management decisions, plans, protocols, results of internal ratings; 11 – the development of the team members’ activity; 12 – the use of software for management tasks (financial, personnel, information processing); 13 – the implementation of search, dissemination and use of experience of management of educational institutions; 14 – the expansion of the marketing environment of the institution.

**Fig. 1**

The results of the expert evaluation of the important opportunities, created by IT, for the HEI management



The results of the experimental work are confirmed by the statistical analysis. According to the main 14 indicators, we obtained a coefficient of variation not exceeding 0.29, and for insignificant 5 items - from 0.37 to 0.62. This indicates a good relative consensus of experts' opinions on significant opportunities and satisfactory on insignificant ones. The coefficient of concordance, which determines the consistency of experts' opinions in the experiment, is 0.67. This indicates a good degree of consistency of experts' opinions.

According to the data, the greatest importance is given to such opportunities as ensuring openness of information (number 3); introduction of electronic document circulation and saving money on copying of documents (number 7); creation of a database of normative documents, management decisions, plans, protocols, results of internal ratings (number 10); the use of software for management tasks (financial, personnel, information processing) (number 12).

Gibson J. noted that the concept of "opportunity" characterizes both the property of the environment and the property of the subject itself. The more a person uses the opportunities of the environment, the more successful is his/her free and active self-development, activity (Hybson, 1988).

But realizing the potential of information technology to manage a HEI depends on the readiness of the management staff and the whole team to realize this potential. The functioning of higher education depends first and foremost on the value system of employees, students. Most clearly these values are characterized by the managerial decisions made by HEI. In the pre-compute and pre-network era, the traditional approach was to involve a small number of members of the HEI team in management decisions. The decisive influence on the formation of the system of employees' values was exercised by the heads of educational institutions mainly by means of interpersonal communication.

Nowadays the situation has fundamentally changed. The information environments of separate HEIs, regional, national, continental, and world higher education environments coexist and interact in the world. The shared value system of higher education, which is influenced by international documents - the Charter of Universities, UNESCO, UN documents, international ISO standards, educational standards, electronic journals, materials of international conferences, rankings of educational institutions - is becoming increasingly important. Information technologies are the basis for the dissemination of the common values of higher education. If it is still possible to suppress certain information and using of manipulation techniques in the information environment of an educational institution, then at higher levels of such an environment, such opportunities are diminished due to the polysubjectiveness of the formation of such environment and the dominance of natural mechanisms.

Previously, managerial influence has always been targeted - an individual, or a certain group, a team. Nowadays, although they use mechanisms of addressing information, but the availability of information fundamentally changes the managerial situation. Information technology contributes to the formation of "soft management methods" when the person who received certain information is not forced to make certain conclusions and make certain decisions. Man becomes freer to determine the direction of his activity. This situation requires a higher level of management and information culture of the individual, the ability to select, analyze information and make decisions.

Information technology has led to the emergence of another effect in higher education - the grouping of educational institutions into regional, national, continental and world-class institutions. This is evidenced not only by the results of the ratings, but also by the limits of marketing activity, the composition of students, the teachers involved, the mission statement, the strategy, the tasks

declared by the institution, the speech peculiarities of the sites and the organization of the educational process. In fact, information factors have become a powerful factor in the development of both individual institutions and all higher education.

### **3.2. The principles of information support of higher education institutions management**

The analysis of the theoretical principles and practices of information support of HEI management allows us to define its principles.

**The principle of analytic modeling.** Any information environment is aimed at meeting the needs of certain subjects. Therefore, consumers of this information should be taken into account when modeling the HEI information environment. On the one hand, it is necessary to diagnose the information needs of the main subjects: students, teachers, employers, structural units, educational units, and other categories of stakeholders. On the other hand, information needs are in constant development, so the HEI can form those needs that will prevent the further development of the educational institution. This implies that information may be placed around the potential needs of the information environment. These potential needs can be identified by studying the information environment of leading universities, exploring the potential of the latest information technologies, and trends in human development in the modern world. It is very difficult to create the perfect model of the information environment of HEI, so it is advisable to analyze the existing information environment from different points of view. The number of such points of view can be significant: the democratization of management, coverage the management activity, implementation of work plans of the institution, compliance with the requirements of 9000 series standards, international standards of social responsibility, compliance with the tendencies of higher education development, coverage of management decisions, parameters of competitiveness of HEI, results of work of the institution, relationships with other educational institutions, fundraising activities, representation of HEI in the information space, place HEI in the rating, organization of HEI problems discussion, involving university to international academic discourse, graduates' participation in the work of HEI, the implementation of institution development strategy, covering the history of the institution, the personal dimension of the information environment and so on. The more points of view would be used in the analysis, the more justified would be the model for further development of the information environment of the institution. Nowadays, the development of the information environment of the HEI is largely identical to its development.

**The principle of transparency.** Information technology significantly changes the situation with transparency of information. Ukrainian HEIs have a long tradition of ensuring transparency of work. Thus, in the twentieth century, decisions of University Academic Councils were published in special collections (Zelenska, 2011). But paper transparency had limited capabilities. Transparency in the information technology era has almost unlimited potential. The realization of this potential depends on the existence of a valid and implemented model of the information environment of the HEI. Traditionally, the leadership of the educational institution plays a leading role in shaping the information environment of the HEI. But nowadays, the idea of leadership is becoming more widespread, suggesting that everyone in the team can be a leader. Leadership in the implementation of the principle of transparency is to enable every employee, if necessary, to be the subject of an information environment. The principle of transparency implies the diagnosis and implementation of the information needs of stakeholders of the HEI. The implementation of the principle of transparency depends on the internal and external monitoring and correction of the information environment of the HEI. The implementation of the principle can be positively influenced by the study and use of the best world experience. The principle of transparency presupposes the presence in the information environment, first and foremost, of the status, history of ZVI, activities of collegial bodies, structural divisions, management decisions, current events, regulatory documents, etc.

**The principle of involvement.** This principle is related to the previous one. Information technologies, by their intrinsic characteristics, imply a high level of activity both for those who form the information environment of an educational institution and for those who use it to fulfill their information needs. Thus, without engaging in the information technology use with two major entities - its developers and consumers, these technologies do not make sense. The level of implementation of the principle of involvement can be concluded by analyzing the percentage of employees, students and other stakeholders holding the role of the subjects of this process.

**The principle of systematicity.** All other principles define certain features of the use of information technologies in management. And this principle covers all the main content management characteristics. The theory that comprehensively covers the content of management is the theory of creating conditions. This theory assumes that management aims to create 9 groups of conditions: prognostic, pedagogical, psychological, organizational, personnel, legal, logistical and financial, medical, sanitary and hygienic (Khrykov, 2016 a). The use of information technologies to create

predictive conditions is evidenced by the presence in the information environment of a strategic plan, the materials of analysis of macro- and micro-environment of the HEI; pedagogical conditions - availability of educational programs, curricula, characteristics of educational technologies, platforms of distance learning, open courses, information on the organization of scientific work as a component of the educational process; psychological conditions - coverage of employees' motivation system, technologies solution to the conflict, moral and psychological climate; organizational conditions - availability of information about the management structure, the governing body of the HEI, the work of the collegial bodies, norms of the organizational order (regulations, schedules), information on the evaluation of the structural units; personnel conditions - information about teachers, competitions, job responsibilities, system of training, development and evaluation of employees, organization of their scientific work, leisure, open courses for teachers; legal conditions - statutes, licenses, accreditation certificates, various normative documents; logistical and financial conditions - financial plans and reports, plans for the development of the material base, analysis of their implementation, coverage of fundraising activities, prices for educational services; medical conditions - schedules of medical examinations, vaccinations, analysis of the health status of workers and students, health improvement measures; sanitary and hygienic conditions - characterization of sanitary and hygienic requirements to the educational establishment and analysis of their implementation.

**The principle of virtualization management.** Previously, management was predominantly interpersonal, and information technology gave it a virtual character. This feature is changing the nature of management. Management, based largely on real interpersonal communication, operated here and now, was more variable. Virtual management "unreal reality" differs in maintaining the managerial situation in time its extended nature, the ability to capture information. In the creation of a virtual environment of the educational institution its leading role is played by the leading links, but the interactive nature of the formation of this environment creates the opportunity for different categories of stakeholders to influence this process. The main problem of the virtual environment of a higher education institution is its correspondence to the real environment, the real state of affairs. Formation of the virtual environment of the educational institution is influenced by legislative, state and internal normative documents of the HEI. Thus, according to state requirements, HEAs must place strategic plans, annual rectors' reports and numerous other documents on the sites. The additional information posted by the HEI is determined by their regulatory documents, certain traditions and decisions of the heads.

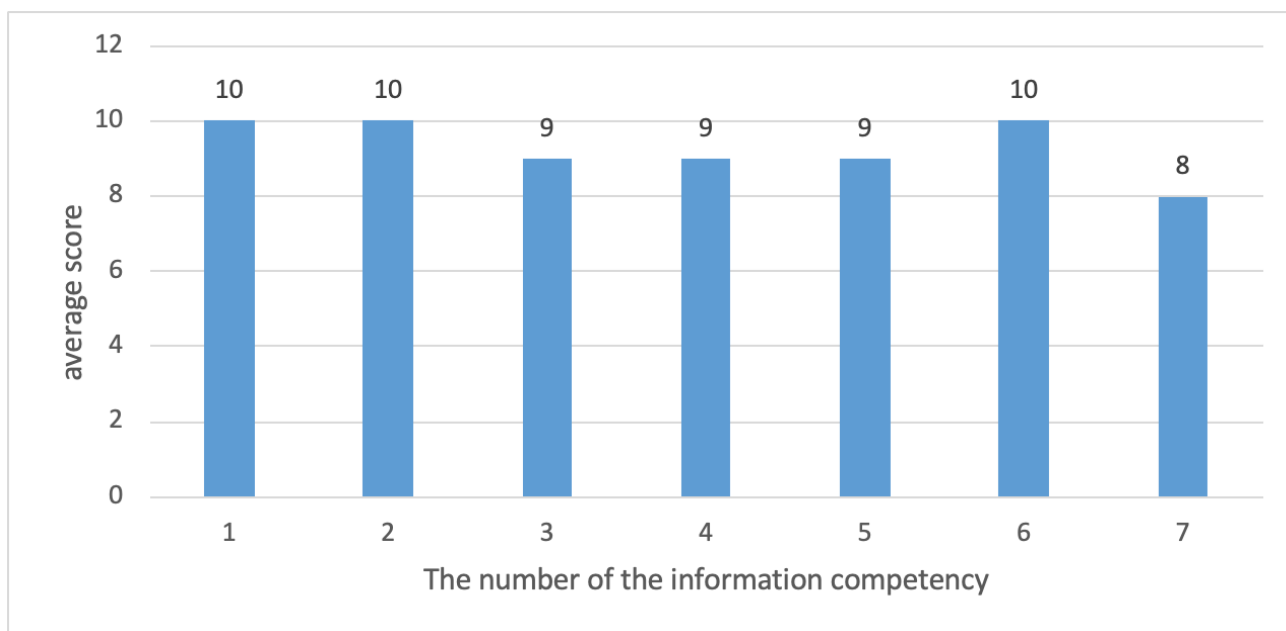
Competitive situation, deterioration of the conditions of work of HVI may lead to the use of manipulation tools, the differences between real and virtual environments. For example, instead of solving a real problem, an educational institution may provide false information or may not provide information on students' accommodation, study, leisure time of students. There are many tools available to ensure the consistency of the real and virtual environments. So, on the University of Oxford's website (<https://www.ox.ac.uk/admissions/undergraduate/colleges/college-virtual-tours?wssl=1>) you can find virtual excursions for 3, 6, 12, 24 hours. Such excursions make it possible to form a closer-to-reality view of most aspects of the university work.

**The principle of information competence.** There are two logics in the use of information technology. The first is to prioritize understanding the essence of management and finding the opportunities of information technology to solve management problems. The second logic is to prioritize understanding of the essence and potential of information technology and to build governance depending on the capabilities of those technologies. The first logic is within the traditional management paradigm, the second logic is within the new paradigm that is rapidly evolving and constantly changing. The older generation of university managers often operate within the traditional management paradigm, which may lead to limited use of information technology capabilities and some management lag behind management best practices.

We also recognized the significant interactions using the Delphi method in two stages. In the first stage, the views of the same 560 respondents were found out regarding the important IT competencies of an educational manager. The compilation of the received data and our studies of literature on the subject let us compile a list of twelve competencies. In the second stage the expert group of the leaders and experienced teachers of HEA assessed the 10 most rated offered competencies. The result of their assessment coincided with our hypothesis. In the diagram of fig. 2, the results of the expert evaluation of the most important information competencies of the modern head of the HEI are presented. Averaged expertise (rounded to the whole) of competencies is located on the vertical axis, the competence number on the horizontal axis, where 1 – the knowledge of the information technology potential for the management of HEI; 2 – the readiness for the information technologies development for the aims of the HEI management, organization of marketing, material and financial, planned, HR work; 3 – the knowledge and the use of communication potential of information technologies; 4 – the possession of the modern methods of obtaining management information; 5 – the understanding what information to collect and in what management situations to use it; 6 – the knowledge of progressive experience in the use of information technology for the

management of HEI; 7 – the understanding that information about HEI, which deliberately and spontaneously enters the information environment, is a means of its positioning.

**Fig. 2**  
The results of the expert evaluation of the important information competencies of the modern head of the HEI



The results of the experimental work are confirmed by statistical analysis. According to the main 7 indicators, we obtained the coefficient of variation not exceeding 0.24, and on the insignificant 5 ones – from 0.39 to 0.61, which indicates a good relative agreement of experts' opinions on significant competencies and satisfactory on insignificant ones. The coefficient of concordance, which determines the consistency of the opinions of experts in the whole experiment, was 0.71, which indicates a successful selection of experts.

From the results showed in figure 2, we can conclude that the most important role is given to such information competencies of the HEI leader as: knowledge of the potential of information technologies for managing higher education institutions (1); readiness for the development of information technologies for the implementation of the tasks of managing higher education institution (2)s, organization of marketing and, logistical and financial, planned, personnel work (6) ; knowledge of progressive experience in the use of information technology for managing higher education institutions.

### **3.3. Optimizing the use of information technologies in the management of higher education institutions and preventing their negative impact**

Heads and staff of educational institutions should be aware that they have not only positive but also negative potential. They make it possible to manipulate people's thoughts and behavior. The use of manipulation tools can be aimed at: changing the interests of society with the interests of the HEI; subordination of the majority to the minority authorities; creating the illusion of democratization of management, using democratic procedures; opposing the position of active critics with critical thinking to the team, suppression of critics; formation of public opinion that supports the leaders; giving legitimacy to management decisions by means of information technologies; redirecting the stakeholders' attention from really relevant issues to minor ones, formation certain settings to the team members and thus taking control on the employees' behavior; creating the idea that the members of the collective make independent decisions, the idea of freedom of choice; making certain management procedures legitimate; getting some benefits for managers, imposing their will, making employees do what is beneficial to managers; creating a context that legitimizes certain procedures, actions; forming a certain attitude, feelings of employees.

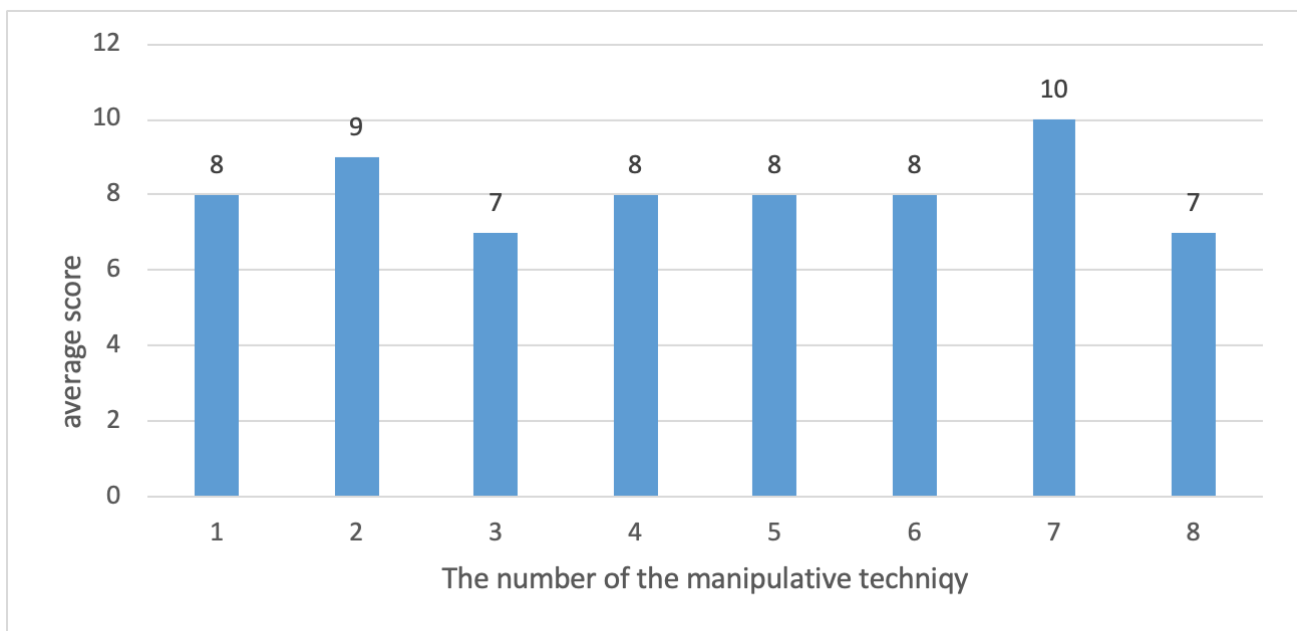
The most common methods of manipulation in the process of HEI management were also revealed by the Delphi method. In the first stage, a list of 12 manipulation techniques in the process of managing the HEI was formed according to the procedure described above, the implementation of which is facilitated by the use of information technologies. In the second stage eight of the most significant techniques were chosen by the group of experts. The diagram of figure 3 shows the results of their

review, where the Y-axis shows the average score (rounded to the whole), on the X-axis the number of the manipulation, namely:

- 1 – creating information noise that does not allow to obtain the necessary information (for instance, the publication of the annual reports of the rectors, which usually contain between 100 and 350 pages of text about the work of the educational institution, but from which it is impossible to understand what the rector did during the year;
- 2 – silence on certain information (for example, a manager in an annual report declares the excellent achievements of an educational institution, but does not state facts about the results of other educational institutions;
- 3 – provision of false information, falsification of facts, misinformation by reporting false information, neglect of the public interest in favor of narrower interests;
- 4 – limited information on the activities of various commissions, collegial bodies, which creates an idea of democratic governance, silence on the fact that these bodies do not have effective powers;
- 5 – formulation and dissemination of the solution in such way, which then allows us to do nothing and complicates the verification of its implementation;
- 6 – activating and maintaining stereotypes: management knows better; why waste the time and discuss the issues in detail at the Academic Council, the group that prepared the decision thought everything through; the main thing are the interests of the educational institution;
- 7 – creating an idea of democratic governance;
- 8 – dissemination of information about the necessity of urgent fulfillment of certain tasks, measures: to prepare a certain report, to prepare certain information, to prepare proposals (for example, when management needs to overcome possible resistance, doubts about the need to carry out these actions, distract from more pressing problems, justify their inaction or untimely decision-making).

**Fig. 3**

The results of the expert evaluation of significant manipulative techniques in the process HEI management, the implementation of which is facilitated by the use of information technologies



Statistical analysis confirmed the validity of the results of the experimental work. The coefficient of variation for the significant 8 indicators does not exceed 0.24, and for the insignificant 4 ones - from 0.42 to 0.47, which indicates a good relative consistency of experts' opinions. The coefficient of concordance (0.74) indicates a good degree of consistency of experts' opinions in the whole experiment.

Let us comment one of the most common means of manipulation in Ukrainian HEI, namely, creating an idea of democratic governance (7). For this purpose, numerous collegial bodies are formed, the staff and certain features of which are covered in the network. But if we analyze the staff of the members of these collegial bodies, the content of their work, the decisions they make, there are several conclusions: The collegial bodies and their staff are formed by orders of the heads, or in accordance with the rules developed by the them; The heads of colleges are determined by the heads of institutions; The content of work and decisions of the collegial bodies are related to minor issues. Thus, an analysis of the sites of even the leading universities in the country shows that the Academic Councils are headed by rectors, the councils consist mainly of representatives of the management of the institution and its structural units. Information about the meeting of Academic Councils indicates



little activity of teachers and students in the discussion of the issues. The latter feature characterizes the lack of motivation, activity of ordinary members of the Academic Councils and, in fact, the demonstrative, formal nature of their activities.

An analysis of UK universities' websites shows that all major management decisions are made by the Academic and Administrative Boards, and the executives of these institutions must ensure their implementation. This is an example of real democratic activity of the collegial bodies, their leading role in the management of the HEI.

The use of the potential of information technology can significantly change the activities of the main collegiate body of universities - the Academic Council. The traditional technology for the development of management decisions by The Academic Council is that, according to the plan of meetings, the heads of the university create commissions to prepare a particular issue, determine the head of the commission and the speaker. One of the pro-rectors is responsible for the work of the commission. The commission gathers necessary information and prepares a draft decision that a pro-rector and then the rector checks and corrects. As a rule, managers leave in the project those issues that satisfy them. The draft decision is sent to the members of the Academic Council and usually does not receive comments or suggestions. With such a technology, there are few people who wish to discuss the project and it is accepted without changes. The quality of such a decision depends on 2 main factors: the professionalism of the team members in preparing the decision and the willingness of the managers to develop the solution that is needed to improve the efficiency of the institution.

Due to traditional technology there is a high probability of a decision to be subjective, such decision does not take into account the position of most team members. In the traditional approach, information technology is one of the auxiliary means of developing a management decision. Turning information technology into the main tool for developing the Academic Council's decision may fundamentally change the situation. The role of the Academic Council meeting preparation group will be quite different. Its main task will be to involve as many members of the team as possible in developing the decision. If this question does not interest the members of the team, then it can be irrelevant. It is better not to limit the time of preparation of the question. Really relevant issues require comprehensive information about the internal state of the problem, its regional, national and international contexts. It is information technologies that allow us to collect such information. Information technologies allow to organize discussion of the problem at the departments, institutes (faculties), to publish and disseminate information to the structural units. The main task of the Academic Council meeting preparation group will be to summarize all the information, create a database of this information, and disseminate summarized information. There may be several cycles of generalization and dissemination of information. Such technology allows to solve administrative tasks more effectively: besides development of management decisions, bringing management decisions to executors and their motivation for further work.

Nowadays, in order to optimize the use of information management technologies, each HEI should solve the following problems: to form a unit for providing the process of informatization of the institution; to study information needs of university stakeholders; to provide feedback to students and lecturers; to identify the required components of the university's and divisions' sites; to determine the information flows of each subsystem and system as a whole; to decide what information is to be collected, who and how are to do it; to ensure the development of a database that will be able to meet the information needs of both the educational establishment's management staff and all participants in the educational process; to decide who will analyze and summarize the information; to develop normative documents defining information activity; to introduce electronic document flow; to develop or purchase software and necessary equipment; to prepare employees to solve information problems.

But the most difficult task nowadays is the development of information technologies to solve the main management problems: information and analytical support for the decision-making process; marketing activities; planning of the work; providing the work of collegial bodies; evaluation of managers', employees', structural units' work; motivation of employees' activity; employees' training; dissemination of necessary information; monitoring of university information environment. For example, the monitoring should be provided by the criteria for assessing the information environment, the methodology for diagnosing the level of satisfaction of stakeholders' information needs, the methodology of comparing the information environment of different universities, the methodology of information analysis of support for the implementation of major management tasks, the methodology for assessing the status of HEI management. The following components of HEI information environment clearly indicate the status of its management: HEI ratings, strategic plans, other work plans, meetings and decisions of collegial bodies, annual reports of rectors, information on marketing activity, information on staffing, meetings of collegial bodies, students' staff, their feedback on the work of the university, news of work etc. Comparison of different types of information allows us to draw objective conclusions about the effectiveness of management. For example, analyzing the annual reports of the rectors of the 53 leading universities in the country shows that there are no real development strategies, internal quality assurance systems, does not allow to form an idea about work

of institution management. The rectors' reports are aimed at covering the work of educational institutions, which does not differentiate the activities of the management. This approach is the basis for the formation of irresponsibility, complicating the assessment of work of the HEI management.

When using the theoretical principles of informatization of HEI management, it is necessary to take into account the warnings of K. Popper that the orientation to the "ideal model" and the attempt to practically implement it leads to an administrative influence on the formation of the environment (Popper, K., 1994). This effect can be prevented by the use of purposeful and spontaneous processes, increasing the number of subjects forming the information environment of the HEI. This approach will allow the realization of I. Prygozhyn's idea of self-organization as the main direction of social development (Prygozhyn, Y. & Steners, Y., 2001).

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## 4. Conclusions

To sum up, information technologies have fundamentally changed the structure of management tasks, content, management methods, limited the level of centralization, personal power of managers, making it multifactorial and multifaceted, transformed the structure of governing bodies. All this has led to changes in the essence of HEI management, which is increasingly becoming an open, democratic, integrated into the world information space, oriented towards the national and global values system. The principles of modeling analyticity, transparency, involvement, systematicity, management virtualization, information competence define the properties of the use of information technologies in the management of higher education institutions and the main substantive characteristics of management based on them. Measures and technologies to prevent the negative impact of information technology on the management of higher education institutions are presented, as well as ways of optimizing the use of information technology in HEI management should be supported by diagnostic and evaluation techniques, which are a direction for further development. Another relevant issue of research is the creation of software tools for analyzing the information environment of individual HEIs, which will allow the use of fundamentally new tools for public management of higher education development.

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