DOI: 10.17747/2618-947X-2020-2-116-131

Management education reform as a prerequisite for stable development of the economy

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ABSTRACT

The article is devoted to priority solutions for launching systemic transformations of managerial education for the technological breakthrough. The basis for the development of such decisions was the scientific direction "Proactive Management in Actively Developing Industries and Economic Sectors", in which the authors work, and the experience in creating educational products that meet the latest trends, including those that have appeared recently.

The research methodology included analysis of scientific literature on the problems of complex systems development, proactive management and anticipatory training, systematization of educational practices for managers in foreign and domestic universities, conducting surveys of experts – heads of Russian large industrial enterprises, professors and students.

The key reasons for the unsatisfactory state of management education are identified and a set of recommendations for its reform has been developed. Changes in organizational models of managerial education are proposed, the principles of implementing fundamental training and enhancing the humanization of education with a simultaneous increase in the level of knowledge of the scientific and technical foundations of production process are formulated. The conditions of increasing the effectiveness of students' practical training are considered, the forms of its implementation are determined to ensure the readiness of graduates to work in managerial positions. The results of long-term studies of anticipatory training, from managers at the lower levels to directors of large companies, are carried out. These results were obtained in the scientific and educational center "INZHEK" of the Ural Federal University and tested at various levels of management education (bachelor's, master's degrees).

The results of the study are of practical interest to managers and professors of universities, business schools and corporate universities, as well as to top managers of business structures involved in improving personnel training.

KEYWORDS:

management, managerial education, reform, digital economy, scientific and technological achievements, systems thinking, interdisciplinarity, proactive management, anticipatory training, fundamental training, humanization.

FOR CITATION:

Gitelman L.D., Isayev A.P., Kozhevnikov M.V. (2020). Management education reform as a prerequisite for stable development of the economy. *Strategic Decisions and Risk Management*, 11(2), 116-131. DOI: 10.17747/2618-947X-2020-2-116-131.

1. INTRODUCTION

New tasks for management are increasingly characterized by nonlinearity, the lack of knowledge for making decisions and the lack of qualified personnel for their execution, and, of course, the unprecedented high uncertainty of results and numerous risks. Today managers are required to have new abilities and competencies: organization of innovative processes, a broad vision and understanding of the global context, its dynamics and driving forces, possession of tools for increasing the intellectual potential of human resources, working with personnel with completely different values and communication models, the ability to quickly implement fundamentally new digital business models [Bratianu et al., 2020].

Innovation and flexibility, the speed of adaptation to new situations are the components of success in the changing world [Dyer et al., 2011]. Foresight and anticipation are becoming the dominant requirements for management: prediction of the future of organization, active influencing of the market environment, the ability to adapt systems to unexpected changes throughout the entire life cycle, management of their sustainability and ensuring of the transformation of organizations into self-learning ones [Prats et al., 2018]. In addition, managers need to solve the most complex issues of coordinating the relationships between changes in different areas of activities, which often go beyond the framework of one industry, ensuring their consistency and functionality. The subject and content of the work of managers is changing: it increasingly contains man-machine procedures (determined by a software product), as well as analytics, algorithms, and huge amounts of data [Andersson et al., 2018]. Managers have to interact with many experts and consultants: knowledge bases, forecasting, information security, artificial intelligence [Nambisan et al., 2017].

The ongoing changes in the work of managers constitute a stable trend in the near future. Considering the level and speed of changes in the technological and information base, the quality of tools and the volume of factors used in making managerial decisions, as well as the possible scale of consequences for the mistakes made, it can be argued that the rates of complications of managerial activities are much higher than in any other profession. The work of managers (in terms of its information saturation, the variety of the used tools, the operational composition of analytics, the level of sociocultural requirements, the dynamism of the factors taken into account and the nature of the made decisions) has become much more complicated than it was a few years ago. It is important to understand that in the foreseeable future great changes will take place in this field while it will become even more intellectually intensive.

In this context it is obvious that the basis of the domestic management education is an outdated paradigm that corresponds to the concepts, ideas and practices of management in the advanced countries of thirty years ago. That is why the gaps between the need to update the industrial sector of the economy and the competencies of managerial personnel are growing and are a serious obstacle to increasing the competitiveness of the country, which declares ambitious goals for a technological breakthrough. This is the main indicator of the crisis state of managerial training.

2. RESEARCH METHODOLOGY

The subject of this study is university management education as a system of elements of different levels, the effectiveness of which is determined by the results of graduate training, and its main goal is to develop conceptual, methodological and organizational proposals for a radical improvement of this system. The decomposition of this goal is presented in table. 1.

The solution of these tasks will ensure:
- continuous generation of knowledge and development of competencies for working in a new area of management – proactive management;
- advanced training of managers for the tasks of technological modernization and creation of a new industry in accordance with national programs for the development of the economy, its individual industries and intersectoral complexes;
- flexibility of educational content, teaching methods and technologies due to their constant improvement and the ability of making quick updates for new tasks;
- motivating students to actively participate in research, project development, discussion of issues and cases of the best practices.

The research intention of the authors was implemented in the following logical sequence of stages.
1. Generalization of scientific literature relating to the problems of formation of the future industries, the development of complex systems, digitalization, proactive management and education, interdisciplinarity, changes in managerial activities and new requirements to the competencies of managers.
2. Theoretical and empirical study of the reasons for the unsatisfactory state of management education.
3. Systematization of ideas about educational models used by leading universities and business schools in the world in training management personnel at the bachelor's, master's and MBA levels.
4. Conducting a survey of experts using a questionnaire method on different aspects of improving management education (proportions between traditional and advanced content, differences between the training of managers and economists, factors in choosing educational programs, reasons for dissatisfaction with the quality of management education).
5. Practical testing of educational models and specific technologies for a radical change in management education with their subsequent introduction into the educational process.
6. Determination of priority areas for reforming management education that require discussion in the expert community.

The empirical basis of the study was the data of surveys of students and teachers of the Ural Federal University, one of the biggest in the Russian Federation, as well as heads of Russian companies: energy companies (“Rosseti Ural”, “T Plus”, “Bashkirenergo”, “FGC UES”, “Chelyaboblkommunenergo”) and telecommunications companies ("K Telecom"). At the same time, the main criteria for the selection of experts were their interest in the problem (willingness to take part in solving the problem), the degree of specialists’ competences (academic degree, work experience, official position, availability of publications), general outlook and creative abilities.

When analyzing the models of the organization of the educational process in the world's leading universities the sample included universities that occupy top positions according to the QS ranking in the subject area of Business & Management Studies. In the course of the analysis special attention was paid to the structure and content of educational programs for bachelor's, master's and MBA's degrees, entrance requirements for applicants, areas of students' design and research activities during training.

Table 1
Decomposition of the main research goal

Components of the main goal	Examples of tasks to be solved
Ensuring continuous interaction between science and management practices	Exploring the interests of participants of the innovation process. Proposing mechanisms for their solution in the form of a specific project agenda
Implementation of educational content that forms the competences of managers for the digital economy	Developing a system for the prompt transfer of scientific results into the educational process and enriching it with new content
Increasing the flexibility of the scientific and educational system for the training of managerial personnel	Defining the principles of modular architecture of educational products, their implementation in conveyor technology based on the ideology of advanced learning

3. REASONS FOR THE UNSATISFACTORY STATE OF MANAGEMENT EDUCATION

3.1. LACK OF CORRESPONDENCE BETWEEN THE GOALS AND PROGRAMS OF MANAGEMENT TRAINING AND THE REQUIREMENTS OF ECONOMIC DEVELOPMENT

Modern managers need to consider several key effects that the current stage of scientific and technological progress generates.

1. 1. A fundamental revolution is taking place in the business models of companies: the process of creating added value acquires a spatial character, and the concept of "value" itself is now determined not so much by a set of useful properties of a particular product, but by the quality of organizing consumer access to the platform, on the one hand, integrating offers and technological solutions of different market players, and on the other hand, involving all interested participants in the process of the joint creation of a product [Trachuk, Linder, 2015; Parker, Van Alstyne, 2018]. The competition for consumers is shifting from offline to online, increasing the growth of virtual transactions exponentially.

   At the same time, technologies are the most significant source of changes in business models, changing industries and markets beyond recognition, transforming consumer preferences, methods of production, purchasing and delivery of products and services to the end user [Gawer, 2014].

2. The speed of reaction to new technologies and changes in consumer preferences sharply increases. This leads to a significant reduction in the life cycles of production processes and products [Kochetkov, 2019]. There is a need for other management systems and flexible organizational design [Gray et al., 2016].

   The wide opportunities opened up for business by scientific and technical achievements presuppose that managers know the technical and economic characteristics of the modern equipment and the needs of customers (existing and potential), the ability to foresee the direction of transformations and to ensure organizational readiness for them [Gancharik, 2019]. The real assessment of consequences (benefits and risks) of the projected transformations is becoming an essential element of innovation management.

3. As the taxonomy of organizational systems becomes more and more complex, and the systems themselves become mobile and changeable, the most important function of management is to ensure their sustainable and balanced development. It is obvious that unexpected events and destructive factors throughout the life cycle of an object (equipment) are inevitable. The role of the locomotive in solving this problem is assigned to interdisciplinary teams, including specialists from different subject areas (managers, engineers, business analysts, economists, IT specialists, lawyers), as well as outside consultants and mentors [Sailer et al., 2019].

The unprecedented scale of changes taking place in the economy characterize the transformation of production systems into cyber-physical ones based on the interaction of computer technology, information networks, people and physical processes [Tilson et al., 2010; Chryssolouris et al., 2013]. Predictive analytics and machine learning systems, digital twins, and artificial intelligence make it possible not only to monitor the status of assets and systems in real time, to build multi-factor sales scenarios or to predict customer mood based on their digital footprint. These smart technologies put the control process in proactive mode – in relation to both weak and strong signals [Gitelman, 2020].

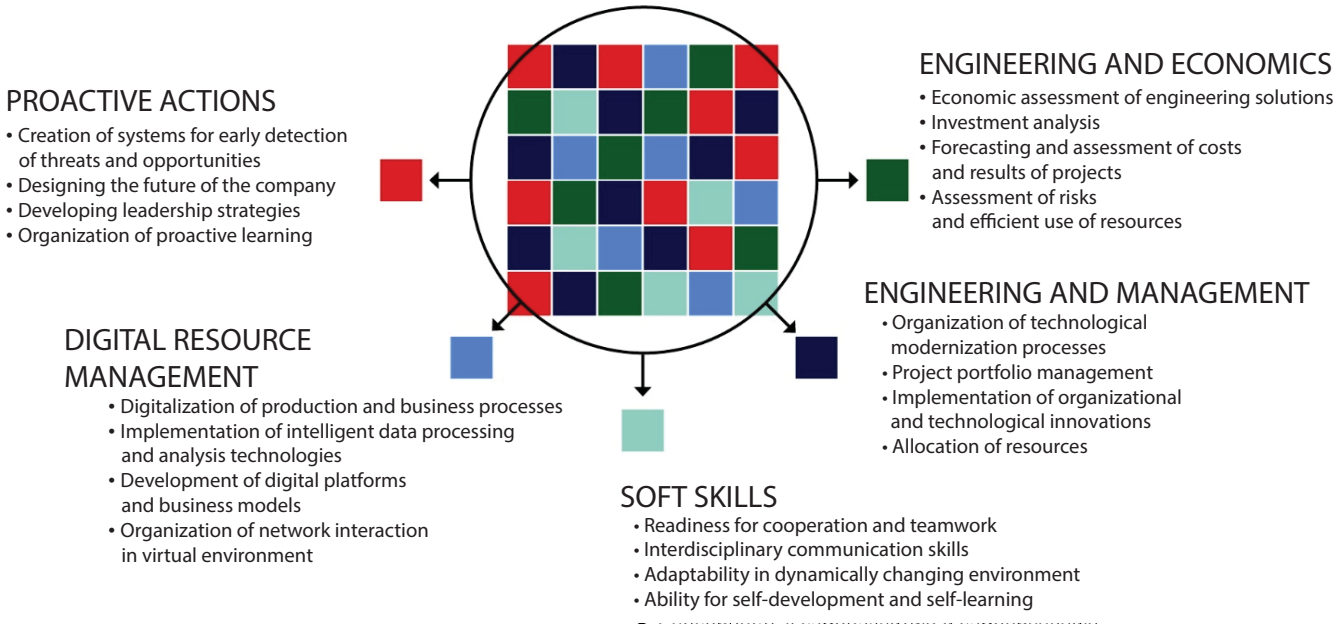
The nature of management and its essence are becoming proactive. This is an axiom and a basic thesis of digital industry management! At the same time, algorithms for solving management problems, which are increasingly complex, nonlinear problems, are undergoing significant changes and require distributed leadership combined with reliance on continuously updated analytics, both retrospective and future trends. Therefore, already at the manufacturing stage engineers and managers during the operation and development of the system must ensure its ability to respond to unforeseen events [Gavrilova et al., 2017].

Such research competencies as the ability to generate ideas, to formulate hypotheses about the development of markets and systems, to verify them, and organize scientific and analytical support for the work of teams are becoming increasingly relevant.

It is obvious that radical changes taking place in the economy under the influence of the industrial revolution and digitalization must be accompanied by an equally global transformation of the formats, content and methods of managerial education. However, one has to admit that all the changes that have occurred in the training of managers in recent years were aimed primarily at improving the formal requirements for the structure of basic educational programs and the conditions for their implementation, determining the results of their development and compliance with professional standards[1]But the main thing is that the complication and changes in the content of managerial activities were not given due attention.

[1] The main regulators of these changes were state educational standards (SES) of the first generation (2000), SES of the second generation (2005), federal state educational standards (FSES) of the third generation (2009) and their subsequent modifications FSES-3 + and FSES- 3 ++, which are still missing in the training of managers..

Figure: 1. Examples of the relevant competencies of managers



All this explains the obvious fact: today in the country there is an acute shortage of managers who know specific industries at the proper level, understand the new, very dynamic architecture of the industrial landscape full of high-tech technological complexes, IT systems and digitalization corresponding to the requirements of a circular economy that creates fundamentally different market structures, business models and social mechanisms.

Our research demonstrates the increased importance of five interrelated groups of competencies in the management of complex production systems, which are based on the knowledge of the latest technologies and their impact on the organization of activities, business models, efficiency and risk assessment, personnel requirements: 1) engineering and management, 2) engineering and economic, 3) digital resource management, 4) soft skills, 5) proactive actions (Fig. 1). Moreover, the competencies of proactive actions acquire special significance – they become a decisive factor in leadership and determine the ability of a leader to set specific meaningful tasks for specialists and interdisciplinary teams; however, it is impossible to master them without mastering the competences of engineering and management and engineering and economic [Gitelman et al., 2019]. At the same time, we emphasize the need to balance these five groups of competencies. After all, any one-sided competence of a manager creates limitations for the solution of modern managerial problems, which can happen if, for example, the role of soft skills or some others is overestimated.

It should be noted that the leading universities of the USA, Europe and Asia have an increased interest in the managers' knowledge of scientific and technical achievements and technologies – drivers of economic development. This is not accidental: the production of the future, Industry 4.0 are becoming increasingly relevant. The Russian universities focused on complex high-tech industries (MEPhI, MAI, Bauman Moscow State Technical University, ITMO, and a number of others) pay considerable attention to the training of managers and economists [Gitelman et al., 2018]. However, there are not enough management programs in Russia, which are focused on the training of specialists for high-tech industries.

The most popular programs among domestic universities are the so-called general management, which are not tied to any production specifics. The analysis of these programs shows that in terms of content, the logic of construction and the formed competencies, they do not correspond to the contemporary and the future challenges. Thus, in most universities the basic part[2] of bachelor's programs in the field of "management", which lay the foundation for the high-quality entrance of students into the profession, consists of blocks of general cultural disciplines; disciplines in the field of statistics, mathematics and computer science; basic economic and management disciplines (table. 2).

Table 3 shows the percentage ratios of these blocks for several leading universities of the Russian Federation, calculated by analyzing the curricula of educational programs.

Two key findings can be derived from Table 3. Firstly, domestic universities devote disproportionately high attention to general cultural disciplines in comparison to professional ones. In some universities their volume

[2] The basic part is actually the first two courses of study, that is, half of the entire classroom load of the bachelor's degree.

Table 2
The standard composition of disciplines for the basic part of bachelor's degrees

General cultural disciplines	Statistics, mathematics and computer science	Basic economics and management disciplines
History	Mathematics	Team building
Philosophy	Optimal decision methods	Macro and microeconomics
Foreign language	Statistics	Business ethics
Safety of vital activity	Computer science	Management Basics
Business communications	Econometrics	Human resource management
Jurisprudence		Accounting and audit
Physical Culture		Marketing Basics
Culturology		Finance and credit
Psychology		
Organization theory		

Table 3
The structure of the basic part of management undergraduate programs (%)

University	General cultural disciplines		Statistics, mathematics and computer science		Basic economics and management disciplines	
	2018	2020	2018	2020	2018	2020
Moscow State University	61	56	17	22	22	22
High School of Economics	36	28	22	32	42	40
RANEPA	54	43	14	20	32	37
Saint Petersburg State Polytechnic University	31	30	25	24	44	46
Kazan Federal University	40	41	13	17	47	42
Ural Federal University	50	41	22	24	28	35
Tomsk State University	38	28	18	16	44	56

exceeds 50% of the entire basic part, while in the European universities the share of the general cultural block, as a rule, does not exceed 20-25% (in addition, this block may be absent – this thesis is detailed in the next section of the article). Moreover, the composition and content of general cultural disciplines have not changed for decades.

Secondly, when forming the basic part many universities generally follow the path of "throwing" into it a large number of various disciplines – up to 30–35[3]. This is done primarily to preserve the academic workload of departments that deliver lectures to big groups of students. However, the mastery of such heterogeneous content by students is extremely superficial, which causes great harm to learning starting from the junior years and interfering with the proper focus on the profession.

3.2. UNDERESTIMATING THE PROBLEM OF THE TRAINING'S QUALITY

The quality of the training of managers is replaced by the assessment of attractiveness of the proposed educational programs and their formal compliance with regulatory requirements. At the same time, the very attractiveness of educational services is often expressed only in the formulation of learning objectives, the names of programs, training courses, learning technologies and declarative description of opportunities that are open to graduates, but not in the real content that ensures effectiveness. The characterization of the quality of training is usually limited to the formulation of competencies. However, the degree of their achievement is most often confirmed only by the names of training courses, a description of the material and technical base, the level of informatization

[3] An exception here is the Higher School of Economics, whose management undergraduate students study only five to seven general cultural disciplines, and the share of the basic part in the total volume of the educational program is no more than 30%. In other universities, the share of the basic part is 50-60%, thus, students study specialized disciplines for only one and a half to two years.

of departments, classrooms and the regalia of lecturers. The actual achievement of learning goals in the form of a given list of competencies is assessed very indirectly by traditional methods used to assess knowledge and, by default, transferred to the assessment of the formed competencies.

The quality problem is also influenced by the "identification" of managerial and economic education. In terms of their content, these types of professional training have long ceased to coincide, although a significant part of educational programs often have common content. There are many reasons for the convergence of managerial and economic education: from the emergence of the first management programs in various universities within economic faculties to understanding the main results of organizations' activities in the form of cost and profit indicators. But managing a modern business is no longer just a solution to economic problems. The high dynamics of changes in production technologies, the digitalization of all aspects of business, the unpredictability of changes in the external environment and the state of the market require that managers have more knowledge of engineering, computer science, psychology, geopolitics, their interdisciplinary relationships than about new economic approaches.

The development of economic and administrative activities does not proceed side by side and parallel, but in substantially different directions. For managers, the multidimensionality, multifactorial and interdisciplinary nature of tasks increases, and for economists the methodological equipment of financial and economic analytics and forecasting increases to a greater extent. The content of real practical problems solved by managers changes every year, and the share of economic knowledge in it does not grow, but decreases. All this leads to increased differentiation of the managerial and economic professions.

There are also many differences in the methods of training of managers and economists. For the management educational process, first of all, interactive teaching methods are needed, including the use of virtual communications [Homayoun, Henriksen, 2018]. They should model the processes of interaction in a group, teamwork, the development of real experience in communicating with qualified managers and in real production conditions, research tasks on topics close to practice, as well as business games of various scales and types, primarily organizational and activity ones [Sautin, Vakhrusheva, 2016].

To train economists it is more effective to study theoretical developments and practical experience in analyzing the use of production resources and identifying various reserves, financial modeling and forecasting, research tasks for improving algorithms and creating conditions for automating and introducing new methods of calculation and analytical activities. Interactive technologies in the educational work of economists are also necessary, but their scope is completely different than in the training of managers.

This author's position is confirmed by the results of a survey of 150 managers (mid-level officials) and 35 university professors. Almost 80% of the respondents are convinced of the fundamental difference between economic and managerial education, although, of course, educational content should include a sufficient amount of economic disciplines (up to 20-40% of the curriculum). Also, according to 63% of the respondents, the training of managers is a more difficult task than the training of economists, primarily due to the high intellectual intensity and interdisciplinary nature of the managerial profession.

3.3. INSUFFICIENT QUALIFICATIONS OF TEACHERS

It distinguishes several components associated primarily with the lack of a holistic perception of the manager's profession, industry-specific incompetence, and the deficit of research competencies that are gaining special significance.

Most of the teachers do not have any practical experience of participating in the management of a real business, a separate production area, or in consulting work. The resulting shortage of practical examples and the weak connection of the issues under consideration to the solution of real problems lead to the fact that students do not see the connection between theory and today's practice and rather quickly cease to understand the need to study the proposed content.

An indicator of the low level of participation of teachers in research activities is an uncertain and heterogeneous range of topics of publications, which indicates the absence of a certain direction of research at departments and personal scientific interests. As a result, students do not acquire the skills of research activity, the role of which in the work of managers is steadily increasing.

An effective teacher who is able to form students' real ideas about production management does not have to have practical experience in managing an organization or its subdivision, although, of course, this is desirable. However, he needs to have the skills and experience in researching management systems, trends in the development of the global environment and have a vision of the possibilities for their use. Only such a teacher is able to set innovative tasks, propose appropriate solutions and be not an observer transmitting information and opinions of other specialists, but an active participant in the exchange of experience and understanding of management specifics. Such teacher-researcher is able to form a holistic view of management activity by students and involve them in the search for opportunities for its improvement. It should be noted that

the actual content of the systemic activity of managers has changed significantly. Its interdisciplinary boundaries expanded, and the close interrelationships of engineering, economics, environmental conservation, entrepreneurship, information security, market changes, geopolitical factors, new trends in technology and images of a promising future came to the fore [Gancharik, 2019].

The volume of interdisciplinary connections, which should constantly be in the focus of attention of managers, has become not only different in complexity, but also larger by an order of magnitude. This understanding of the holistic management landscape and its timely correction make it possible to quickly deal with the flow of new tasks and use a proactive management strategy. It is simply impossible to form such a large-scale, holistic vision of managerial activities without constant research activity. The research experience creates a qualitatively different content of management disciplines and other meanings of its development for students. This is very important in the formation of professional consciousness of future managers who have to work in a rapidly changing environment, often with uncertain requirements. The understanding that continuous improvement is the norm for managerial work will make it possible for students to significantly increase their readiness for practical activity [Maloshonok, 2014].

* * *

The reasons for the crisis state of managerial education are closely interrelated. The lack of a clearly expressed focus on the training of managers for high-tech sectors of the economy leads to a decrease in business cooperation with universities and limits the interest in joint scientific research, which in turn affects the level of professionalism of teachers, and furthermore – the quality of the educational process. In addition, without understanding specific technologies, markets, industries, it is impossible to use teaching methods aimed at researching the latest scientific and technological achievements and digital solutions, and their impact on competitiveness, analyzing the best practices of organizing innovative activities.

4. PRACTICES OF THE WORLD'S LEADING UNIVERSITIES

4.1. PECULIARITIES OF MANAGEMENT EDUCATION IN UNDERGRADUATE STUDIES

It is difficult to find a Russian university that does not have programs in "management" – both at the bachelor's and master's levels. In other countries, the situation is somewhat different. If you look at the top ten universities according to the QS ranking, then only six of them can study management at a bachelor's degree, and even then not always within the framework of a full-fledged program. In universities such as Harvard, the University of Chicago or the Swiss Higher Technical School of Zurich, full-fledged management studies begin only with a master's degree.

Usually, management is implemented in the format of a major[4], and, as a rule, from the second or third year of study (depending on the duration of the program – three or four years). Until that time, students have mastered a certain set of disciplines and modules, the requirements for which are determined by each university independently. For example, at Stanford, before starting to study a major in management, students will have to take a fairly large amount of courses in mathematics, statistics, programming and engineering technology. In terms of engineering, students are given a great freedom of choice: they have an option of studying from six to seven courses out of thirty. At the same time, the range of choices is very wide: there are subjects devoted to quite specific sciences or industries (chemistry, mechanics, genetics, molecular biology, energy, materials science), they deal with the principles of behavior of technical systems (analysis of technological disasters, systems engineering, engineering analysis) or development of technologies and their interaction with society (digital culture and ethics, information security, modern environmental problems).

Within the framework of a major, a Stanford student chooses one of three areas of specialization, in which a graduation work will be written in the future. These areas include: finance and decision-making, operations management and data analytics, organizational and technological business development. In each of the areas there are methodological and applied blocks with their own courses. For example, the methodological block "Organizational and technological development of business" includes such courses as "Principles of business decisions", "Methods and models of strategic analysis", "Technologies of national security". The applied block includes the following courses: “Innovation, Creativity and Change”, “Learning Organizations”, “Technological Entrepreneurship”, “Technological Analysis in Energy and Environmental Activity”, “Leaders of Organizational Changes”.

After graduating with a major, the student is awarded a degree as Bachelor of Science in Management Science and Engineering. According to the developers, the program is designed to train specialists who in the future will plan, design and implement complex economic and technological systems based on the high management and engineering culture.

The Stanford example is one of the most progressive examples of undergraduate management training. It clearly characterizes the so-called American model of managerial education: students do not enter a specific educational

[4] Major (major) - the main area of academic interests of the student, corresponding to the specialty, which is indicated in the diploma.

Table 4
Bachelor's Degree in Management at Oxford university

Course structure	Attestation form
First year of study	
Introduction to economics General management Financial management	Three written works in the form of scientific articles
Second-third years of study	
At least two courses in economics, one of which must be selected from the following list: ● microeconomics ● macroeconomics ● quantitative methods of economics ● history of economic studies At least two courses in management Eight electives: four – in economics, four – in management. The electives include strategic management, industrial economics, organizational behavior, marketing and interaction with consumers, etc.	Written exams and course projects. At least one scientific article. Preparation and defense of a bachelor's thesis

program, but generally a university (college), have greater freedom of choice at the beginning of their studies, after one or two years they choose specializations, but at the same time they can freely study disciplines from different areas.

However, the European model is more common in the world of management education, and in some American universities as well. According to it, a student enters a program in which the basic and professional parts are distinguished. The number of mandatory courses in both parts is small. From the third year onwards the training becomes more applied through projects and electives. For example, at the University of Phoenix (USA), in order to "access" the professional part, a student gains a certain number of credits in the fields of "art of communication", "mathematics", "science and technology", "humanities", "social sciences", "interdisciplinary practice". Next, one of four trajectories of advanced training is selected: general business management, financial management, operational management, procurement management[5]. In the course of training the option of the so-called industrial immersion is provided: communication with practitioners, internships, research of market trends. In addition, senior students can take three courses of the MBA Bridge Program. The use of this option makes it possible to receive an MBA diploma (4 + 1 scheme) within a year after graduation, saving 3,000 dollars.

Another example of the European model is the classical undergraduate program in economics and management at the University of Oxford (Table 4), based primarily on the study of fundamental disciplines. Similar program structures are observed in a large number of other universities – only some of the names of subjects and the proportions of the basic and professional parts change.

On the global market there are more applied bachelor's programs that almost completely ignore the general cultural block, beginning the study of professional disciplines from the first year. A prime example is the University College of London, which ranks eighth in the QS ranking. Here, a three-year bachelor's program was created at the intersection of management, IT and entrepreneurship (Table 5).

The Warsaw University of Economics offers only four general subjects in the Bachelor Management program: civil and commercial law, sociology, organizational theory, the functioning of EU institutions, the share of which in the basic part is 25%, and in the entire program – less than 10%. At the same time, already in the first year students participate in an organizational and activity game "Trends of Modern Business" and, starting from the second year, in addition to classical disciplines such as strategic management or logistics management, disciplines such as demand forecasting, controlling, sustainable business development, and knowledge management are taught.

At the Canadian Research University Dalhousie there is no general education part in the Bachelor Management Program. The only general education subject in the framework of training is the structure of public administration in the second year. From the first year

[5] Similar schemes are also used, for example, by the University of Cambridge (UK) or Nanyang Technological University (Singapore).

Table 5
Bachelor's Curriculum in Management of the University College of London

Year of study	Disciplines	
	First semester	Second semester
First	Management Basics Information systems Information management and business intelligence of the organization Web technologies	Introduction to IT technologies of project management Programming-1 Communication and organizational behavior Methods of research of consumers, markets and industries
Second	Business analytics Programming-2 Software engineering Management accounting for decision making	Database systems Business in the digital age Research methods in business One elective module
Third	Innovation management Management decisions Individual research project One elective module	Management finance Understanding the information economy Individual research project (continued) One elective module

students study subjects such as introduction to management, micro and macroeconomics, ecosystem of goods and services, knowledge management, resource management and environmental management, industry marketing tools, knowledge management, electronic document management. The entire fourth year of study is devoted exclusively to the development and implementation of strategy. The teaching method in the last year includes practical cases in the first semester and internships at companies in the second.

A summary of differences between the American and European models of bachelor's degrees in management is shown in Fig. 2.

Regardless of the model used, top universities use a two- or three-tier system as entrance requirements for applicants to undergraduate programs in management. The first required level is a certificate of school performance, usually with high requirements for grades in mathematics. At the second level there can be an internal university test for logic, intelligence, consistency and critical thinking, identification of abilities to solve problem situations (for example, Thinking Skills Assessment Test used in Oxford). Finally, some universities ask applicants to prepare a motivation letter (essay), in which they should write about their professional goals, hobbies and reasons for entering the program.

Figure: 2. Characteristics of various models of bachelor's degrees in management

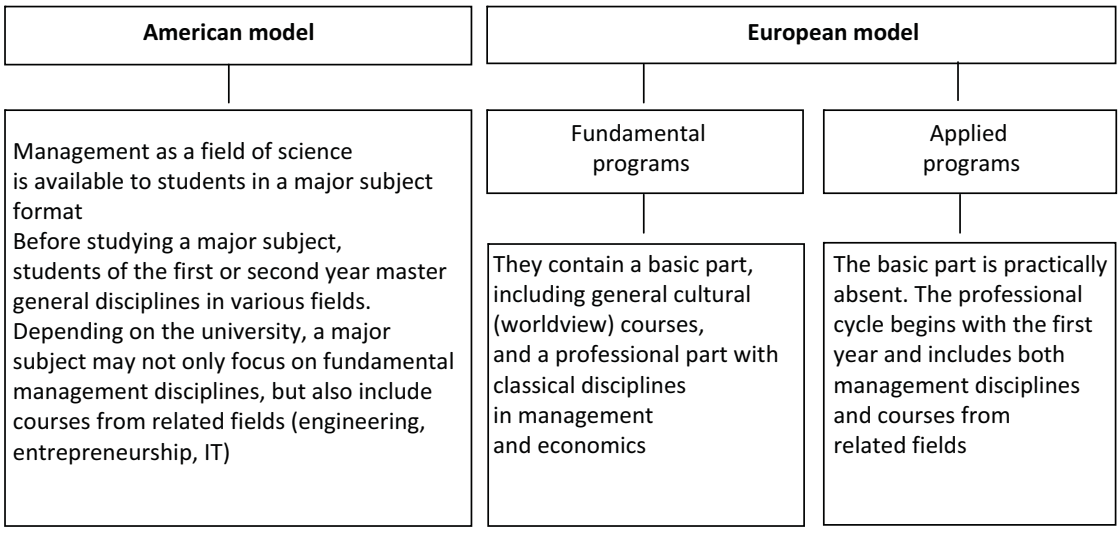
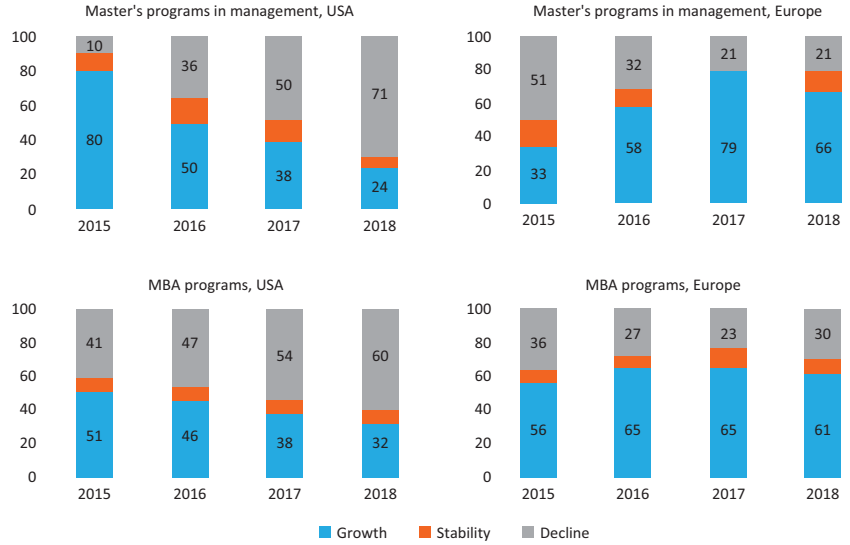


Figure: 3. Comparative dynamics of the number of applicants for master's and MBA programs in the USA and Europe (%)



Source: Application Trends Survey Report 2018. URL: https://www.gmac.com/-/media/files/gmac/research/admissions-and-application-trends/gmac-application-trends-survey-report-2018.pdf; Application Trends Survey Report 2019. URL: https://www.gmac.com/-/media/files/gmac/research/admissions-and-application-trends/application-trends-survey-report-2019.pdf.

4.2. MANAGEMENT EDUCATION OF MASTER'S AND MBA PROGRAMS

MBA programs flourished in the last quarter of the 20th century. FAME's[6] Master of Science programs are relatively new to the global education market.

Until 2010 Master in Management (MIM) programs were much less common than MBAs. However, according to the GMAC[7], studies, there has been a general increase in interest in MIM over the past decade, mainly in the European Region. In the United States, starting from 2015, there has been a decline in interest in management education: both at the MIM level and at the MBA level, and mainly in the segment of long two-year programs[8]. The most serious decline occurred in 2018 – more than 70% of master's programs and 60% of MBA programs experienced a decrease in the number of applications (Fig. 3).

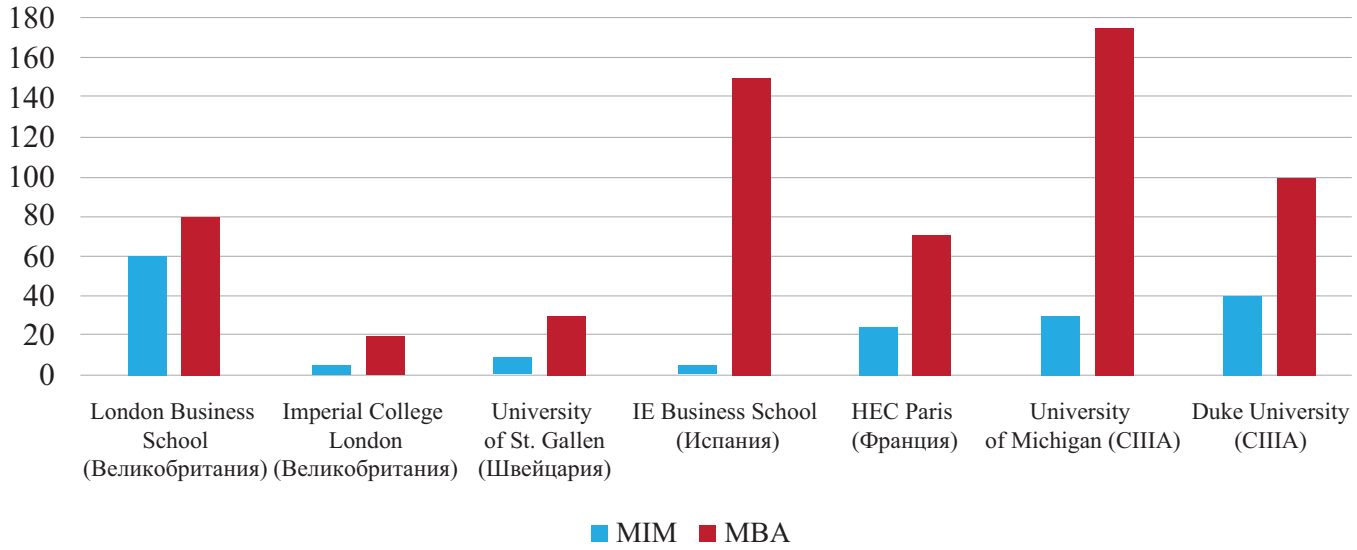
Master's degree programs in Management Sciences are generally designed for individuals with little work experience (less than two years). The average age of graduate students is 23[9] years. MIM programs involve deep theoretical training, in which the key process is research activity combined with training. The actual method or tool for solving any management problem are the main objects of study, their structure is examined in detail, as if under a microscope. Therefore, graduates' master's theses are often science-oriented, and universities practice combined products – Master of Science in Management followed by the accelerated training in PhD programs.

At the same time MBA programs are focused on methods and tools used in specific business situations. MBA graduates should be free to navigate the arsenal of various statistical, financial, marketing methods and tools, but they do not need to remember individual formulas by heart or understand the structure of software systems[10]. The educational content contains the highest possible concentration of practical business cases and projects to improve the efficiency of business results of the companies in which the students work.

The main method of teaching MBA programs is learning through experience, which the founder of the theory David Kolb understands as an acquisition of new knowledge through the reflection of experience, followed by conceptualization (generalization) and the creation of a new, often experimental understanding of reality or a process [Kolb, 1984; Kolb et al., 2000]. The consequence of this is a predominantly team interaction of students in the educational process, who intensively exchange

[6] FAME (Finance, Accounting, Management, Economics).
[7] Graduate Management Admission Council (GMAC) – a global non-profit association with more than 220 schools worldwide.
[8] There is another interesting trend: among employers the demand for MBA graduates is growing. According to the study conducted by the MBA Career Services & Employer Alliance in the summer of 2016, on-campus recruiting grew by 46% in 2015 in the top 20 schools, by 63% for schools in positions 21-50, by 64 % – for schools in positions from 51 to 100, by 66% – for those schools, which were not included in the rating. The recruiting for startups increased by 59%. The demand for MBA specialists fell only in the energy and oil refining industries, but it grew in such areas as consulting, pharmaceuticals, manufacturing, biotechnology, healthcare, media and entertainment. Perhaps, the classic law of the market explains this pattern: the more limited the supply, the higher the demand for it.
[9] MBA VS Masters in management. URL: https://www.mim-essay.com/mba-vs-mim/.
[10] Graf T. MBA vs. Master in management (MIM): Alternatives or substitutes? URL: https://www.mim-compass.com/master-in-management-mba/general-management-masters/master-in-management-mim-and-mba-difference-between-two-postgraduate-career-programs-in-general-management/.

Figure: 4. The number of electives on master's and MBA programs in different universities



Source: MBA VS Masters in management. URL: https://www.mim-essay.com/mba-vs-mim/.

information, knowledge and work on the creation of innovative projects. The professor plays the role of a facilitator in a mutual learning and self-development environment[11].

The entrance requirements for MBA programs are much higher compared to MIM. As a rule, the admission to MBA program involves several levels, the first and standard of which is the GMAT test (Graduate Management Admission Test). It includes several levels: analytical writing assessment, integrated thinking, quantitative and verbal blocks.

MBA courses are attended by mature people (the average age of applicants is 27–32 years), who have decided on their life position, career plans and clearly understand what competencies they need to achieve their professional goals. Perhaps this is the reason for the growing popularity of the so-called customized programs, which are not developed by universities (business schools), but by the students (companies) themselves. For example, the National University of Singapore offers the option of an educational studio, when customers can fully design an MBA program for themselves – from the content of modules, their sequence and duration to the geography of certain projects and educational events.

In most cases, customization is achieved either through the allocation of a separate self-adjusting module in the curriculum with a limited number of hours (for example, the classic MBA program of the IMD business school), or by significantly increasing the project block. The latter method is inherent in both MBA and MIM programs. Within the framework of the master's program in social management at Cambridge Business School, students carry out four joint projects with business: 1) venture project, 2) global consulting project, 3) central project, and 4) research project. Projects 3 and 4 should correspond to one of the subject areas: culture and art, digital transformation, energy and environment, global entrepreneurship, health strategies, social innovation. Within the project block teachers act as consultants for the development of entrepreneurial initiatives of students, which makes it possible for the university to integrate educational and consulting activities into the educational product.

Another form of customization is an increase in the elective part of the program. In this case, electives mean not only whole courses, but also small seminars, field classes, trainings, tests, implemented both in traditional full-time form and in a distant, digital format. The use of "numbers" makes it possible for universities to significantly diversify the learning process.

However, electives as an additional and often paid option are more often used in MBA programs than in master's programs. For example, students of the University of St. Gallen (Switzerland), who study to obtain the master's degree in strategic and international management, have access to ten electives, while students of the MBA program of the same university can choose from thirty electives, divided into five functional blocks ... At the University of Michigan (USA) the number of electives for MBA programs is approaching two hundred (Fig. 4).

The London Business School deserves special attention. The university offers about eighty electives, and most of them can be used by both graduate students and

[11] MBA or MSc – Which is the right Master's degree for you? URL: https://www.topmba.com/mba-program-articles/full-time/mba-or-msc-which-right-masters-degree-you.

MBA students. Therefore, students who do not yet have a lot of work experience get an opportunity to join more experienced practitioners in the course of their studies, to take part in solving real cases. There is a continuity of different levels of managerial education.

Oddly enough, some experts tend to consider MBA education more "generalist" in comparison with master's degree in management. At least in the disciplinary part. As an argument, the fact is given that the main task of MBA is to teach all students, without exception, to think big and see the system in a holistic manner, and not to hone highly specialized skills and abilities. In addition, a limited timeframe does not allow a large number of courses to be taught in MBA programs, so their "theoretical" part often includes short general courses in finance, marketing and strategy.

4.3. TRENDS SHAPING THE DEVELOPMENT OF MANAGEMENT EDUCATION AT LEADING UNIVERSITIES

1. *In general, management education is becoming more "research-oriented" and focused on breakthrough scientific developments.* Almost all leading universities in the world pay increased attention to research activities [Ferguson, Fernández, 2015; Anderson et al., 2017]. Thus, a sample of master's programs at the University of Cambridge shows that out of a total pool of 179 programs, 86 are fully research-oriented programs, 67 contain 50% of research, and only 26 are applied programs, although even they contain some elements of R&D. At Oxford University, the two-year Master's program "Management of big programs and projects" is structured in such a way that students attend in-person trainings for only ten weeks. The rest of the time is devoted to scientific and consulting work. The control over its effectiveness is carried out through weekly written reports of students in the form of essays, which are devoted to the reflection of progress in work.

2. *There has been an increase in interdisciplinary programs for the training of managers.* More and more independent researchers point out that a leader should have a wide range of competencies. According to the Institute of the Future of the University of Phoenix, in the competence characteristics of the future industry manager the main role is given to a holistic vision of organizational processes and the potential for business development, which is formed primarily due to a clear understanding of the global context, the impact of technological modernization processes on business model configurations, strategic thinking and possession of methods to create flexible organizational structures [The future international manager .., 2009].

Examples of interdisciplinary programs among the analyzed universities include: MIT Basic Master's Program "System Design and Management", created at the intersection of engineering and management sciences; Stanford's basic master's program, 50% of which are a wide range of electives - from neuroaesthetics to industrial philosophy; University of California (Berkeley) programs "Industrial Engineering and Operations Management", "Energy and Resources", "Information Management in Complex Systems", "Business and Biology"; basic master's program of the Swiss Higher Technical School of Zurich "Management, technology, economics".

On the American market one can see an increase in management programs carried out within the framework of the interdisciplinary STEM concept (Science + Technology + Engineering + Mathematics) [White, 2014; Zaher, Damaj, 2018]. The first MBA program to receive STEM certification in 2016 was the program of the University of Wisconsin Business School (USA). In 2019 approximately 24% of American FAME[12]. programs had similar certifications. These are mainly Master's degree programs in data analysis. It is noted that such certification has a positive effect on the admission of applicants and allows programs to feel more confident in a declining market.

Universities create special institutes for interdisciplinary programs (including management programs). Examples of such universities are the University of Pennsylvania, Oxford, the Graduate School of Interdisciplinary Information Education at the University of Tokyo, and the Institute for Interdisciplinary Information Sciences at Tsinghua University (China). Similar structures exist in other educational institutions – the University of Amsterdam (Netherlands), University of Texas, University of Toledo (USA).

At the same time, the educational process includes both engineering/management disciplines and humanitarian ones related, in particular, to the issues of design thinking, visual analytics and cognitive technologies. It is believed that the presence of humanitarian block in the educational program helps reduce the complexity of integrated systems, contributes to their holistic perception and understanding by managers and engineers.

The organization of the educational process can be studied using the example of the University of Texas. Students studying at the Institute of Interdisciplinary Sciences must choose one basic and two related sciences. The choice is made from six areas (art and humanities, behavior studies, computer science, economics and political science, management, natural sciences and mathematics), in each of which there are many flexible trajectories in the form of separate modules and creative workshops.

Management programs at the intersection of management and art are increasing. For example, the

[12] Application trends survey report 2019. URL: https://www.gmac.com/-/media/files/gmac/research/admissions-and-application-trends/application-trends-survey-report-2019.pdf.

program "Strategic Leadership & Design" (Indianapolis University, USA) combines such modules as the "Theory of Leadership and Design Thinking", "Cognitive Systems and Learning Organizations", "Development of Intellectual Capital", "Management of information and production technologies" and "Management mathematics".

The Stanford University's graduate and MBA programs include separate courses "Leadership in the Arts and Creative Industries", "Design as a Way to Create Inclusive Enterprises", "Business Evolution: A Literary Metaphor" and others. St. Petersburg National Research University of Information Technologies, Mechanics and Optics (Russia) implements a similar model within the framework of the Art & Science master's program, which is a synthesis of engineering, management and art education.

3. *Business models are being restructured in management education. Now technology is its most important object, and the degree of individualization and geographical distribution of products increases.* Interesting alliances appear on the market. For example, INSEAD business school (France) implements an international MBA program for top managers in cooperation with Tsinghua University, in which students get acquainted with high-tech industries in France, China, Singapore and the United Arab Emirates. Bocconi University (Italy) launched a double degree MBA program, in which students can choose a partner school from Denmark, Russia, Austria, Portugal, Amsterdam or Norway, while the main specializations of the program are not quite typical for classical business education, namely: environmental management, technological innovation management, IT consulting and working with big data. Such business schools as IE (Spain), Waseda (Japan), the European School of Management and Technology (ESMT) (Germany) and others practice similar models.

The strengthening of collaborations between the players on the educational market is associated not only with its general globalization or marketing. Such links make it possible for students to realize the leading leitmotif of programs, which, as a rule, permeates all modules: a deep study of the scientific and technical context that forms the industry of the future and its impact on the socio-economic models of different countries.

In the modern view of leading universities management education is focused on advanced scientific and technical achievements, demonstration of the best practices in the area (and at the intersection) of management and engineering, flexible organization of the educational process, as well as the involvement of students and course participants in active research and development work based on the principles of active communication, team creativity, compliance with the priority scientific directions of the university's development.

(To be continued)

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