



# ГЛАВА 1.<sup>1</sup> РАЗВИТИЕ ПРЕДПРИНИМАТЕЛЬСКИХ УНИВЕРСИТЕТОВ КАК НЕОБХОДИМОСТЬ В УСЛОВИЯХ ЭКОНОМИЧЕСКОЙ НЕСТАБИЛЬНОСТИ И ФИНАНСОВОЙ ТУРБУЛЕНТНОСТИ

*РОЗВИТОК ПІДПРИЄМНИЦЬКИХ УНІВЕРСИТЕТІВ ЯК НЕОБХІДНІСТЬ В УМОВАХ ЕКОНОМІЧНОЇ НЕСТАБІЛЬНОСТІ ТА ФІНАНСОВОЇ ТУРБУЛЕНТНОСТІ  
DEVELOPMENT OF ENTREPRENEURIAL UNIVERSITIES AS A NECESSITY IN CONDITIONS OF ECONOMIC INSTABILITY AND FINANCIAL TURBULENCE*

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## Introduction

In the face of reduced budgetary funding for higher educational institutions, each head and administrative staff of the university is thinking about new sources of funding for his educational institution. Abroad, the concept of "entrepreneurial university" has long been known, but in Ukraine they have recently begun to study this issue. Due to the crisis caused by the global pandemic Covid-19, Ukraine significantly reduced funding for higher education institutions in 2020, which negatively affected the functioning of Ukrainian universities. One of the key mechanisms that has recently attracted the attention of executives institutions of higher education and is an effective method in conditions of limited budgetary funding - it is an entrepreneurial university.

Nowadays, entrepreneurial universities are spread all over the world and are attracting more and more interest in Ukrainian institutions of higher education. This trend can be attributed to several reasons. First, the entrepreneurial university is believed to accelerate the development of the regional economy. Second, the entrepreneurial university does not depend on third-party funding and has the freedom to use financial resources. Thirdly, the entrepreneurial university serves as a mechanism for the transfer of innovations designed to solve many economic and social problems. Moreover, universities are characterized by a strong concentration of scientific personnel, which are important for any innovative enterprise. And the last important argument is that universities can motivate higher education seekers and teachers.

Many foreign and domestic scientists, such as: Romanovsky A.A. [one], Kalenyuk I., Dyachenko A. [2], Kraus N.M., Kraus K.M. O.V. Manzhura [3], Kovalyuk T.V., Kobets N.M. [4], Sin A.S. [5], Belyalov T.E. [6], Itskowitz G. [7], Rothaermel F., Agung S., Jiang L. [eight], Clark BR, [9], Wissema JG, [10], Etzkowitz H., Ranga M.[eleven], Urbano D., Guerrero M. [12], Bronstein J., Reihlen M., [13], Chrisman J. [14], Mowery David C., [15], Grudzinsky A.A., [16], Gutkevich A.E. [17], Ivaschenko N.P. [18], Ropke J. [19], Ivinskaya IV. [20] and others in their works investigated the current state, problems and prospects for the introduction of entrepreneurial universities in the world and the advanced experience of economically developed countries on this issue.

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## **1.1. The genesis of the concept of "entrepreneurial university" and the model of universities in the context of the transformation of their activities**

In 1998, Dr. Burton Clarke from the California Institute was the first to propose the term "entrepreneurial institute". According to the author, the key feature of such a university is the absence of fear to generate ideas, commercialize and distribute them. The University is not afraid to take on the risks arising from the development of new practices, the result of which is difficult to determine; it strives to become a stable independent structure. The university administration sees no danger of upsetting the quality of education and academic traditions. It is noted that the "entrepreneurial university" has a special management style that ensures strategic interaction with the participants in the innovation system and the flexibility of the higher educational institution itself [1, p. 8-21].

According to T.E. Voronkova: "The methodological basis of the concept of an entrepreneurial university, understanding its role in the life of modern society is the concept of the entrepreneurial university by B. Clarke, as well as the concept of the triple helix by G. Itskovits, within which the entrepreneurial university is the driver of the development of the entire model, uniting the state, business community and universities ". B. Clarke noted "An entrepreneurial university through a set of conditions (characteristics) that such an institution of higher education must comply with. Among them: a strengthened guiding core (administration), an expanded development periphery (assuming a high degree of decentralization), a diversified funding base, stimulated academic structures and an integrated entrepreneurial culture "[22, p. 21-26].

H. Etzkowitz provided the following definition of the concept of "entrepreneurial university": "a higher educational institution that, in addition to traditional sources of funding, actively develops and uses patents, research and other areas of contractual cooperation with private enterprises as effective tools to expand funding sources and investment inflow to the university ". According to G. Itskovets, the mission of the new university is the capitalization of knowledge [7, p. 150-155].

The scientist P.G. Shchedrovitsky created his theory of the evolution of the university. In his theory, higher educational institutions are divided into five generations, the first of which includes early universities that arose in monasteries in free cities [22, p. 69]. The second generation are universities that appeared in the 17-19 centuries to train civil servants, create and support bureaucracy. The third generation contains higher education institutions in America and Germany since the end of the 19th century. until the beginning of the 20th century, who were engaged not only in educational activities, but also in scientific research. The fourth generation is the post-war higher educational institutions, conducting scientific and project activities. The last fifth generation of universities carries out educational, scientific, design and consulting activities,

Professor P. Schulze put forward two main characteristics of the entrepreneurial university [24, p. 95]:

- entrepreneurial education - training future entrepreneurs;
- business activities of the universities - the creation of technology parks,



business incubators, spin-off companies. universities actively involves students in entrepreneurial activities, providing them with consulting and resource support.

Burton Clark points to five key elements of an entrepreneurial university, which not only define an entrepreneurial university, but also serve as the main directions of transformation of any university into an entrepreneurial one: an integrated entrepreneurial culture, an academic stronghold, a diversified funding base, an extended development periphery [21, p. 21-26].

Universities that do not care about their reputation or are elite in the public education system may not need a development strategy, continuing to rely on their reputation or government support. If universities are interested in raising their reputation, want to get rid of a weak position in the education system, they need to rebuild their own views on the management of the entire university. This management must quickly adapt to the changing environment, quickly rebuild according to new tasks, and quickly reconcile the traditional values of the university with the entrepreneurial ones.

The extended periphery includes two types of external structures. Firstly, these are professional departments focused on external relations, it is the departments that are engaged in fundraising, the development of intellectual property, the transfer of knowledge, interaction with business, and maintaining relations with alumni. Secondly, these are research and development departments dealing with various business problems. These centers are flexible and easy to set up and dissolve. They bring the university income from solving a variety of problems that are important for social and economic development. At the same time, university departments continue to maintain their importance, knowledge, competence in various disciplines that are very valuable to be neglected.

The next element is a diversified funding base. A university that has begun to reorganize itself into a completely different type of activity requires significant financial resources. Since there is a tendency towards a decrease in the amount of budgetary funds allocated by the state. Entrepreneurial universities use similar situations to their advantage. They seek to receive funds from third sources: commercial companies, local governments, charitable foundations, royalties, income from services provided by the university, student tuition fees.

The behavior of an entrepreneurial university must comply with the following principle of institutional autonomy: no dependence on funding sources.

The fourth element is stimulated academic structures. When a higher education institution becomes an entrepreneurial institution, traditional activities remain a stronghold. They are the operational base of the university, serve as platforms for training and research. These departments are where most academic work is usually done.

And the last, fifth element is an embedded entrepreneurial culture. This culture is about the culture of high-tech enterprises - they are about change.

Modern universities, under the influence of many significant factors, are actively transforming. Considering that such a transformation concerns the entire complex of their main functions, we can talk about changes in the models of modern universities, taking place while preserving their classic models.



The university as a social institution began to function in the Middle Ages and became the main institutional entity operating with knowledge in society. By the period that began in 1815 and ended around 1850, the formation of classical models of the university, including research, was taking place, universities in Europe and throughout the world were exclusively educational institutions; they did not do research work.

To the classical models of universities, with a certain degree of convention, include:

- German the model of the Humboldt Research University, where scientific and educational activities acted as inextricably linked components of university life. Students should gain experience in scientific activity in contact with advanced science, in the process of a continuous search for new scientific knowledge. Its characteristics are: Humboldt ideology, which extols science and creativity - the creation of new knowledge, which was considered the main driving force behind the development of a new German society and a new citizen; competition and decentralization in the German university system, where the main focus was on the efficiency of work and the status of professors; the state that has removed the main powers related to the appointment of professors from universities and assumed them,

- British model of a boarding university (Oxbridge model), based on close communication between students and teachers. Such communication in the form of individual lessons of a student with a mentor-tutor attached to him was considered at least important for the formation of intellectuals than attending lectures and seminars;

- French model of universities - "big schools", which are caste universities with a special atmosphere that expresses the spirit of a meritocratic community that asserts itself as a management elite;

- Hkaga model, where the university course is based on a general educational program with a pronounced humanitarian orientation [17].

Now, in the period of society's transition from industrial to post-industrial, information age, universities are undergoing especially profound transformations that involve their institutional changes.

Among the new university models, there are pragmatic, religious, countercultural and the model of a politicized university. For example, in the pragmatic model, the function of the university is reduced to offering educational and scientific "products" that are in demand by the society. This model focuses on such activities that are not typical of the classical models of the university, such as commerce, service and entrepreneurship.

Experts identify five basic models of universities that exist now and are likely to remain in the future (Table 1).

Despite the many models, the main trend that determines the changes in the modern university is its transition from the 1.0 university model to the 3.0 university model.

University 1.0. is engaged only in educational activities, carries out the transmission of knowledge, training and provides a social lift. University 2.0. Is a research university performing simultaneously two missions - educational and research. Towards University Functions 2.0. includes the creation of new knowledge



through research activities and consulting services for business. University 2.0 carries out scientific research at the request of the industry and creates technologies "on demand". The main mission of such a university is the reproduction of new knowledge, and personnel training is embedded in the scientific process. An even higher status is inherent in University 3.0, where the third mission arises - the commercialization of knowledge and technology. Such a university manages intellectual property rights, forms an entrepreneurial ecosystem, promising technological markets, which turns into a platform for creating the country's economic superiority at the global level. It is these universities that define the face of the modern technological revolution [25, p. 216-222].

**Table 1 - Five models of universities of the present and future**

University models	Specifications
the Elite University	University with a strong global brand, significant endowment, rich in centuries-old history and world-class professors.
The mass university	University that will provide quality education for the growing middle class around the world. One of the results of training in this type of secondary education institution will be the opportunity for graduates to find employment in leading companies in the world.
The niche university	University with a narrow specialization, which have managed to take their place in the international division of intellectual labor and become world leaders in certain areas of research or education.
The local university	University that play a key role in the development of the economy at the city or regional level - through the training of qualified personnel or the organization of applied research requests from regional companies, authorities and the local community.
The lifelong learning mechanisms	A new form of higher education, which will allow you to study various training modules provided by both educational institutions and specialized companies, without visiting any one HEI.

The Organization for Economic Co-operation and Development's Education and Skills 2030 project has identified some of the innovative features of the 21st century education model. Such models are just emerging, but tomorrow they can become the new norm of the education system [26, p. 9-11]. Table 2 presents the features of the traditional and new education systems according to the research.

Within the framework of the University 3.0 model, new formats of universities appear, such as entrepreneurial, innovative, network, which perform not only educational and research functions, but also the functions of an integrator of the main processes in the innovation ecosystem. The university becomes an active participant in the processes related to technological entrepreneurship, business development, and the formation of new markets.



**Table 2 - Comparative characteristics of traditional and "new" education systems**

Peculiarities	Traditional educational system	Embodying education system "New reality"
Education system	The education system is independent education	The education system is part of a larger ecosystem
Responsibility and interested parties	Decisions are made by a select group of people and thus become accountable and responsible for the decisions made. Division of labor (leaders manage, teachers teach, students listen to teachers and learn).	Decision making and responsibility is shared among stakeholders, including parents, employers, communities, and students. Shared responsibility (everyone works together and takes responsibility for the student's education and students also learn to be responsible for their own learning).
Approach to efficiency and quality of experience university	Most Valuable Results: Student performance, student achievement are assessed as indicators for assessing accountability systems and improving the system. Focus on academic performance.	Evaluating not only the "results" but also the "process" (apart from the progress of students and their achievements, the learning experience of students in itself has an intrinsic value). Focusing not only on academic performance, but also on the holistic well-being of students.
Approach to curriculum development and learning progress	Linear and standardized learning (the curriculum is developed based on a standardized linear model of learning and progress).	Non-linear progression (recognizing that each student has their own learning path and is equipped with different prior knowledge, skills and attitudes when he / she starts learning).
Monitoring focus	Accountability and Compliance Assessment.	The accountability of the system, as well as its improvement (for example, continual improvement through constant feedback from all levels).
Assessment of students	Standardized Testing	Different types of assessments are used for different purposes.
Role of students	Learning by listening to the instructions of teachers, but at the same time student autonomy arises and grows.	Student freedom of action. The student is an active participant in both the student community and cooperation, in particular, community of educators.

Currently, under the influence of many significant factors, the university is actively transforming. Considering that such a transformation concerns the entire complex of its main functions, there is a change in the models of modern universities as a whole. The main trend is towards University 1.0 to University 3.0 and further to University of the Future 4.0 (Table 3).

However, not all Ukrainian higher educations are research University 2.0 and have sufficient potential for the transition to the third stage, where the transfer and commercialization of scientific discoveries is becoming one of the main areas of activity of the institution of higher education. Universities do not carry out enough



Table 3 - Comparative characteristics of university models

Model	Model characteristics	Implementati on time	The target audience	Sources of financing
University 1.0.	<ul style="list-style-type: none"> <li>- the classical model of the university;</li> <li>- source of new knowledge;</li> <li>- training of personnel for sectors of the economy;</li> <li>- encouraging creativity and supporting scientific research.</li> </ul>	by 2000	students of higher education establishme	Tuition fee, donation
University 2.0.	<ul style="list-style-type: none"> <li>- the classical model of the university,</li> <li>- personnel training,</li> <li>- transmission of knowledge,</li> <li>- "Pure science", the executor of the GDR, the choice of the GDR project based on the needs of the market;</li> <li>- commercialization of know-how is an initiative of individual research teams;</li> <li>- the important role of the state financing and regulation.</li> </ul>	since 2000	university students	Tuition fees, state
University 3.0.	<ul style="list-style-type: none"> <li>- innovative (entrepreneurial) model of the university,</li> <li>- economic autonomy,</li> <li>- own development strategy,</li> <li>- culture of entrepreneurship; training of entrepreneurial personnel;</li> <li>- commercialization of know-how,</li> <li>- making a profit from the knowledge generated;</li> <li>- active cooperation with business;</li> <li>- research university, the presence of inter-institutional transdisciplinary experienced teams,</li> <li>- consistency in partnerships,</li> <li>- continuity of learning,</li> <li>- multicultural organization,</li> <li>- mega mass education universities .;</li> <li>- socially responsible organization - "service to the community".</li> </ul>	since 2015	whole population	State, own funds, including income from commercialization and
University 4.0.	<ul style="list-style-type: none"> <li>- a new model of the university,</li> <li>- center for social development,</li> <li>- center for the development of territories and sectors of the economy,</li> <li>- unification of educational models around the world;</li> <li>- the principle of platforming;</li> <li>- combination of mass and elite education.</li> </ul>	from 2026-2030	whole population	Income from commercialization and scientific and technological activities

scientific research, the results of which could be actively needed in society. While the formation of the University 3.0 provides for the sequential passage of the university



through three main stages of development: 1.0 - an educational university, 2.0 - an experienced university, and 3.0 - a university that benefits from the results of scientific activity (commercializes the results of its scientific activity) [26; 35]. Various universities are at different stages of development models and independently determine their mission. At the same time, competition continues between different models of universities, and stable niches and breakthrough formats are being identified.

Switching to a new model of the university in practice and carrying out a systemic restructuring of existing educational institutions is an extremely difficult task that not every university can do. One of the successful examples is the Arizona State University in the USA, whose leadership, over 10 years, managed to bring the university to a new model of the American Research University based on interdisciplinary research and development, high-quality mass education (more than 72,000). students) and active participation of the university in the development of the region and local communities. Other notable examples are Stanford, Harvard and the Massachusetts Institute of Technology (MIT), which have a strong core of experience, are moving towards the commercialization of developments and the formation of an entrepreneurial environment around universities [33]. For example, MIT alumni are founders of more than 25 thousand operating companies with an annual turnover of \$ 2 trillion. dollars, which is equivalent in scale to the eleventh economy in the world. Therefore, it is advisable to consider the experience of establishing entrepreneurial universities abroad.

## **1.2. Analysis of foreign experience in the formation and development of entrepreneurial universities**

One of the modern trends in the development of the world higher education system is the formation and spread of entrepreneurial universities. Traditionally, the best foreign practices are considered in the framework of the Atlantic model of higher education (for example, the experience of the Massachusetts Institute of Technology in the United States, described by Itskowitz [7, pp. 58-82]). This model is characterized by institutional and financial autonomy of universities, a high level of self-government, indirect control by the state and close ties with business [7; 11].

Within the framework of the continental model of higher education, the study of entrepreneurial universities in Sweden, Finland and the Netherlands, conducted by B. Clarke at the end of the 20th century, stands out. [9; 21]. At the same time, in his study, B. Clarke does not distinguish between the universities of the Atlantic and continental models of higher education, highlighting five general characteristics that an entrepreneurial university must comply with [9, p. 21-26].

Features inherent in the entrepreneurial universities of the continental model at the present stage:

firstly, the high turbulence of the environment and the need for universities to meet the new challenges of the second decade of the 21st century. These challenges include: the massification of higher education resulting from this problem of



financing and the quality of higher education, an increase in the role of the university in the socio-economic development of the region;

secondly, from the point of view of the possibilities of applying foreign experience for Ukraine, it is more interesting to consider the development of entrepreneurial universities precisely within the framework of the continental model, which is characterized by the hierarchy of educational institutions, close ties with government agencies (sometimes direct ministerial regulation), as well as historically less close relations universities with a business community, now experiencing a stage of active development [9].

The peculiarity of financing the system of higher education in the Netherlands is the prevalence of government sources. Thus, the first source of funding is government grants for research (direct government funding), the second is subsidies allocated by the Netherlands Organization for Scientific Research (NWO) for specific research projects (indirect government funding), the third - international and national government bodies and non-profit organizations. At the same time, the share of private sector financing in the third source is about 10%. In general, funds allocated by the national government to fund research universities consist of an educational component (41%) [24].

In Germany, higher education institutions are either funded by the government (279 educational institutions) or accredited by the government (108 educational institutions). And despite a growing number of private institutions, many of which have been established over the past few years, most tertiary institutions are public. Private higher education institutions are small institutions offering only a very limited range of programs (eg business structuring, media, design). Almost 94% of all students in Germany study at state universities [33].

In Ukraine, despite the rapid development of the non-state education sector, the priority of state institutions of higher education is also observed (as of 2018/2019, there are 10 students of state universities for every student of a non-state university). The predominant role in the formation of the vector of educational policy at all levels is played by the state, nevertheless, researchers note a significant gap between higher education and the real sector of the economy [9, p. 90-91].

Features of the development of entrepreneurship at the Technical University of Eindhoven (Netherlands) and the Technical University of Munich (Germany) were selected for research for several reasons.

Firstly, these institutions of higher education belong to the continental model of the higher education system, so their experience is of interest to Ukrainian universities.

Secondly, each of them is one of the best examples of building successful interaction with business (industry) in their country, as evidenced by the results of numerous ratings and won competitions.

The author highlighted the main activities to strengthen relationships with industry inherent in the universities of Eindhoven and Munich:

1. development of common innovations;
2. technology transfer;
3. business education development;



4. support for startups;
5. participation in regional consortia;
6. activation of interaction with small business [34].

Let's consider these characteristics in more detail.

1. Development of joint innovations, which implies the strengthening of strategic partnerships with large companies in the region. Eindhoven University of Technology is developing a strategic partnership with ASML, one of the largest manufacturers of photolithographic systems in the Dutch microelectronic industry. The partnership is based on holding regular meetings with representatives from the R&D department of the company to discuss current and new projects (one of these projects is devoted to mathematical optimization of chips). Additional areas of cooperation between the university and the company are testing equipment in the laboratories of the university and various scholarship programs for students.

However, in addition to clear advantages, this type of strategic partnership also has negative consequences for universities. Among them: increased dependence on big business, which can be expressed in a change (shift) of the research trajectories of universities for the priorities of partner companies. Moreover, "from a scientific point of view, most commercially profitable developments are trivial" [33, p. 132], and this may negatively affect the development of fundamental university science in general.

Creation of special structures to expand cooperation with technology-oriented companies at the regional, national and international levels.

To achieve these goals, the Eindhoven Technical University created the Innovation Laboratory, which provides large industrial enterprises, small businesses and business scientists with a wide range of services, including: contracts for scientific research and educational activities; general research projects; R&D and internship for graduate students; postgraduate program.

The UnternehmerTUM Center was established by the Technical University of Munich, which is the main center for innovation and business creation at TUM and consists of the public institute UnternehmerTUM GmbH and its subsidiary UnternehmerTUM Project GmbH. The development of UnternehmerTUM has made the Technical University of Munich one of the leading institutions for innovation and business creation in Europe. It is not just a platform for students studying at TUM; it also provides ample opportunities for researchers, entrepreneurs and professionals, and is a source of inspiration for companies from a variety of business areas. In general, the creation of such structures is not a characteristic feature of these universities - this is typical of most entrepreneurial universities of both continental and Atlantic models of higher education [33, p. 33].

2. Technology transfer. Eindhoven University of Technology is actively involved in the marketing and promotion of its technologies through licensing and joint spin-offs in the early stages of the technology cycle. In the case of joint spin-offs, the university is responsible for science and technology, while industry provides general management and finance. Since 2004, 32 joint spin-offs have been created on the basis of the university. Such a functional division is rationally substantiated and prevents the "fading" of the spin-off activity, which is especially important for Ukraine. Experts note that obstacles to the development of spin-offs in Ukraine are:



the difficulty in attracting external funding, the inability of universities to finance spin-offs (most of the currently inactive spin-offs are with 100% university participation), errors in management (including in the registration of intellectual rights), the creation of spin-offs from above (and not in response to business requests). Borrowing the interaction model of the Technical University of Eindhoven and its implementation in Ukraine will contribute to solving these problems.

3. Business education development. In addition to the designated joint innovations and technology transfer, the experience of the Technical University of Eindhoven in the development of business education is interesting for Ukrainian universities. For example, the university offers small business courses for its undergraduate students and certified entrepreneurship programs for its undergraduates. Specialists working in high-tech enterprises are recruited to participate in seminars and meetings with experts. In turn, enterprises support university researchers, students and alumni in the implementation of their business plans for the commercial exploitation of scientific research through the creation of high-tech start-ups [34].

Moreover, business is actively involved in the training of qualified personnel and, thanks to this, has the opportunity to adjust the content of education and subsequently save significant funds on graduates' training. However, this practice also has a downside, which is the bias of the adjusted programs. D. Bock, regarding the experience of medical faculties in the United States, writes that “as a last resort, medical faculties should categorically prohibit any interference of corporations in the planning of educational programs and the content of presentations” [33, p. 194]. The Technical University of Munich also pays great attention to the development of business education. An important feature of it lies in the desire to make its students not only the best in a particular field of research, but also give them the opportunity to use their knowledge in a business environment (students must master key knowledge skills to create their own business). In addition, UnternehmerTUM also offers development programs and special seminars for graduate and doctoral students. In addition, business professionals can participate in these programs and seminars and improve their knowledge in the field of innovation and entrepreneurial skills [7, p. 154-159].

Such practices demonstrate that an increase in entrepreneurial activity and attracting students does not negatively affect the quality of their education, but, on the contrary, is an additional incentive to intensify and increase interest in the learning process, students see a real benefit from studying specific disciplines and features of the practical application of the knowledge gained.

Among the practices that are interesting for Ukraine, one can single out the organization of special seminars on business planning, in which participants learn presentation techniques, and also receive feedback on their business ideas (about 150 business plans are developed annually within the framework of such seminars). An important feature of the seminars is that all teachers work in the field of business and have a practical understanding of how to start and manage a company. International business professionals regularly lecture and organize special "spring and summer schools" for masters and graduate students, thereby creating an excellent platform for



interaction and development of business creativity [7, p. 154-159].

For example, the Manage & More program was developed specifically for highly motivated graduate students and is now offered in all thirteen faculties of TUM. Each year 40 students apply for a scholarship to practice in projects and workshops where they can learn interpersonal skills and teamwork. All of these trainings are combined with the development of innovative business ideas. In addition, since 2008, UnternehmerTUM GmbH has developed and implemented an Executive MBA in cooperation with the Leipzig Graduate School of Management. This one-year course provides 20 professionals and business leaders in the industry, as well as entrepreneurs, the chance to obtain an academic education in combination with the development of their own innovative project, and sometimes - their own start-up [8].

This practice contrasts itself with the traditional accusation for Western universities that they pay more attention to research than teaching, and thus neglect the interests of students [1]; success in teaching does not bring additional remuneration to teachers.

4. Support for startups. Eindhoven University of Technology offers various types of start-up support (for students, alumni and other interested parties) through Technostars (seed fund) and Incubator 3+, consisting of coaching, consulting, lending and special placement conditions. Meetings are held on a regular basis with a focus on topics of particular interest to aspiring entrepreneurs. According to the annual report, the university has created more than 83 companies, received 64 patents and 42 licenses, and won 11 grants to increase the value of knowledge. With regard to small and medium-sized businesses, the university was the executor of 104 tasks subsidized by the Dutch government (Innovation Grants Regulation of the Dutch government) [8].

The Technical University of Munich also pays great attention to the development of startups. The UnternehmerTUM Project GmbH company was created in order to expand and use in practice the knowledge gained in the course of UnternehmerTUM GmbH work. The goals of this company are to help develop start-up entrepreneurial teams and conduct research and projects of existing companies, for example, in the development of new applications and, of course, market research. The division of the center into two parts (UnternehmerTUM GmbH and UnternehmerTUM Project GmbH) clearly shows that UnternehmerTUM is not only engaged in educational activities, but also helps its listeners to promote their ideas in the market.

However, universities should be careful to support companies set up by their professors, even if this support is provided through so-called buffer organizations. It can create a conflict of interest and pose the risk of dependence of professorship on commercial reasoning [1].

5. Participation in regional consortia. Eindhoven University of Technology participates in a number of regional consortia, in particular it has partnerships with major knowledge providers in Brainport and Elat.

Brainport, the smartest region of 2018 (as defined by the Intelligent Community Forum (ICF)), is one of the premier innovation hubs and home to world-class



business and research institutions. The Brainport-Eindhoven region is a powerful innovation player on a European and global scale: it accounts for a third of all private research spending in the Netherlands. The economic success of the Brain-Port-Eindhoven region is the result of a unique collaboration between industry, research institutes and government.

This triple helix of cooperation creates a very favorable climate for internationally renowned companies as well as innovative small and medium-sized enterprises in the region. This experience is especially interesting for Ukraine regarding the innovative development of regions.

6. Enhanced interaction with small businesses. It is more difficult for any university to establish interaction with small and medium-sized businesses than with large ones. This problem is also acute for Ukrainian universities, therefore, consideration of the experience of its solution by the Technical University of Eindhoven is especially important. In order to develop cooperation with small businesses, the university has partnered with the Fontys University of Applied Sciences, the Brabant Regional Development Agency and United Brains (“United Brains”), which serves as a kind of link between small business and academic entrepreneurs. On the United Brains website, a user can leave a question (or, for example, a request to conduct a study), to answer which experts from partner universities are involved. In this way, the user and the universities establish interaction and themselves, in turn, become partners. This approach contributes to both the innovative development of small and medium-sized businesses and the strengthening of entrepreneurship in universities [33, p. 178-183].

Taking this into account, the experience of the Technical University of Eindhoven should be applied, offering its services through the United Brains platform in conjunction with other ZVOs (expanding the range of research areas) and the Regional Development Agency, which contributes to focusing research on the needs of the region, including small businesses.

### **1.3. Sources of funding for higher education institutions in Ukraine**

According to Part 1 of Art. 79 of the Law of Ukraine "On Education", sources of funding for educational institutions can be:

1. the state budget;
2. local budgets;
3. payment for the provision of educational and other services in accordance with concluded agreements;
4. payment for research work (services) and other work performed by order of enterprises, institutions, organizations, other legal entities and individuals;
5. income from the sale of products of training and production workshops, enterprises, workshops and farms, from the lease of premises, structures, equipment;
6. grants from domestic and international organizations;
7. dividends from securities, interest on deposits and placement of the special fund in the current accounts of public sector banks;



8. voluntary contributions through funds, material values, intangible assets received from enterprises, institutions, organizations, individuals;

9. other sources not prohibited by law [27].

The Verkhovna Rada of Ukraine on December 15, 2020 adopted the Law of Ukraine "On the State Budget of Ukraine for 2021" [28]. According to this law, "... in the State Budget for 2021, the Ministry of Education and Science of Ukraine provides for expenses in the amount of UAH 139.5 billion, which is UAH 26.6 billion more than in 2020. Basically, these are funds to increase wages from January 1 by 20% and from December 1, 2021 - by 8.4%. "

This allocated amount of national expenditures (subventions) - UAH 103.7 billion, which is UAH 20.1 billion more than last year, will be directed to the following expenditure items:

"one. educational subvention (teachers' salaries) - UAH 99.65 billion (in 2020 - UAH 80.9 billion);

2. Subvention for the creation of educational and practical centers for vocational education - UAH 0.15 billion (in 2020 - UAH 0.1 billion);

3. Subvention for the provision of state support to persons with special educational needs - UAH 0.5 billion. (in 2020 - UAH 0.5 billion);

4. Subvention for the provision of general secondary education "New Ukrainian School" - UAH 1.42 billion (UAH 0.4 billion - professional development of teachers, UAH 1.02 billion - purchase of teaching aids and equipment) (in 2020, 1, UAH 0.6 billion for the purchase of training aids and equipment);

5. Subvention for the implementation of the Wealthy School for Better Results program - UAH 1.0 billion (in 2020 - UAH 0.5 billion) ”.

In 2021, a new subvention of UAH 1.0 billion is envisaged for activities aimed at combating the acute respiratory disease COVID-19 and its consequences during the educational process in general secondary education institutions.

Public expenditures of the Ministry of Education and Science for 2021 amount to UAH 35.8 billion, which is UAH 6.5 billion more than in 2020, in particular:

- “Training of personnel by institutions of higher education - UAH 20.95 billion;

- training of personnel by institutions of professional higher education - UAH 4.65 billion;

- payment of academic scholarships - UAH 3.94 billion;

- scientific and scientific-technical activities of the Western Military District and scientific institutions - UAH 824.8 million;

- Fund for the Development of Institutions of Higher and Professional Higher Education - UAH 250 million, which will be used to ensure the implementation of fire safety measures in the premises of educational buildings and hostels, to carry out repair work in the hostels of educational institutions;

- ensuring the activities of the National Research Foundation, grant support for scientific research and scientific and technical (experimental) developments - 732.8 million UAH;

- support of priority areas of scientific research and scientific and technical (experimental) developments in higher education institutions - UAH 100 million;



- fulfillment of Ukraine's obligations in the field of international scientific, technical and educational cooperation, participation in the framework program of the European Union for research and innovation - UAH 326.9 million;

- publication, purchase and delivery of textbooks and manuals - UAH 574.2 million;

- development, examination, purchase, maintenance and placement in information and telecommunication systems of distance courses for applicants for complete general secondary education and teachers - UAH 18.5 million;

- financing of five state investment projects - UAH 328.9 million, of which three are transitional and two are new (reconstruction of the educational and recreational center "International Center for Children's Scientific Creativity" ZVO in the name of M.E. Zhukovsky);

- purchase of equipment for laboratories, training workshops and expositions of the scientific and educational space of the Museum of Science in Kiev (exposition "Mathematics") - 54 million UAH "[29].

The Ministry of Education and Science has published a detailed distribution of funds from the state budget among higher education institutions. In total, the Ministry of Education and Science spent UAH 16.26 billion on higher education institutions in 2020.

As the Minister of Education and Science G. Novosad noted: "We have made an important step towards transparency and openness of finances. For the first time, the Ministry of Education and Science published data on the distribution of public funds between higher education and clear criteria for this distribution. Each university received funding depending on the results of its work and an incentive to develop more dynamically. "

Since 2020, higher education institutions are funded according to a formula where universities with better performance receive more funding than last year. This distribution was fixed by the Decision of the Verkhovna Rada of December 24, 2019 [30].

The calculation of the amount of funding in 2020 was made by the Ministry of Education and Science according to actual indicators, which include:

1. the scale of the university;
2. contingent;
3. regional coefficient;
4. positions in international rankings;
5. the amount of research funds that the university attracts from business or international grants [30].

Since this year, the level of employment of graduates, which the Ministry of Education and Science will find using the applications of the State Employment Service, has been added to the above indicators. For a gradual transition in 2020, restrictions were introduced for the minimum and maximum changes in the budget of each institution of higher education - 95% and 120% from 2019, respectively.

According to the official data of the Ministry of Education and Science: "136 institutions of higher education and 12 of their branches with their own estimates will receive funding according to the formula. In 2020, 94 establishments will receive



100-120% of the 2019 budget, and 54 - 95-99% of the 2019 budget ”[30].

According to the new calculation of funding according to the formula, in 2020 17 universities received more budgetary funding by more than UAH 15 million, namely: Kiev Polytechnic Institute named after I. I. Sikorsky, Lviv Polytechnic, Kharkiv Polytechnic Institute, Sumy State University, Uzhgorod National University [31].

According to the aforementioned increase in funding, Deputy Minister of Education and Science Yegor Stadny said: “The new system of financing higher education encourages universities to develop and respond to the demands of the labor market. With increased funding already this year, they can invest that money in quality improvement. For example, increase the salaries of strong teachers. This will increase their motivation and improve the quality of education at the university ”[30].

The actual performance indicators of the university, according to which the Ministry of Education and Science calculates the distribution of funding, give the university a clear understanding in which direction they need to move in order to improve their budget funding.

To date, the actual number of applicants for higher education studying on a budgetary form of education (contingent) is only one of seven indicators affecting the formation of the budget of a higher education institution. Over the next three years, the weight of this indicator will decrease. By such actions, the state motivates universities to maintain their profile, and technical ones to support technical specialties.

The scale indicator plays a large role in increasing university funding, which motivates universities to join and use financial resources efficiently. After all, universities with fewer than 1000 applicants for higher education will receive less, and those with a large number of applicants for higher education will receive more [31].

Such an indicator as the indicator of the regional coefficient in the formula allows regional institutions of higher education to receive the best budgetary funding. In previous years, due to the outflow of applicants to large cities, regional universities lost applicants for higher education and did not have material and financial resources for development. By applying the regional coefficient, the state supports regional universes.

The presence of Ukrainian institutions of higher education in international ratings is an incentive to work on international recognition and reputation, increasing the chances of attracting foreign students. The ministry takes into account positions in the QS World University Rankings, The Times Higher Education World University Rankings and Academic Ranking of World Universities. Currently, five universities in the ranking have received additional funding for this indicator [32].

The amount of research money that the university attracts from business and international grants indicates that institutions are trusted by sponsors and / or businesses. The state, using this indicator, encourages universities to develop science and diversify sources of money.

Employment of graduates is an indicator that the Ministry of Education and Science began to use when calculating university funding in 2021. In 2020, the



Ministry of Education and Science will launch an electronic system that will monitor whether graduates of a particular HEI work in positions requiring higher education. This indicator will stimulate universities to improve the quality of education, take into account the needs of the labor market and facilitate the employment of their applicants for higher education [30].

The next step of the Ministry will be the development and introduction of comprehensive amendments to the legislation, which will provide financial autonomy of the university, together with the specialized committee of the Verkhovna Rada, and this is the main step from a traditional university to an entrepreneurial one.

#### **1.4. Ways of restructuring and formation of entrepreneurial universities in Ukraine**

The transformation of traditional universities into entrepreneurial universities provides for a change in the role of university management, the essence of which is to apply the methodology inherent in the private sector of the economy: maximum commercialization of manufactured products, search for providing a higher education institution with financial, material, human resources, development of an entrepreneurial mission. Educational reform in Ukraine began at the beginning of this century, so one can only assert about the initial stage of the most complex transformation process. The step-by-step movement towards University 3.0 in Ukraine is characterized by some difficulties. The expansion of the commercial focus in the context of weak government financial support and the bureaucratization of management systems cause controversy among the academic community. However, the introduction of an entrepreneurial culture is relevant for all domestic universities. Entrepreneurial activity contributes to their participation in the development of their region through the creation of a comprehensive innovative scientific and educational and training and production infrastructure. They can use the intellectual and material-infrastructure resources of the region for development. The new field of activity of universities includes the development and transfer of technologies, the commercialization of research results, business creation, intellectual property management,

Modern universities are taking on the mission of driving the social and economic development of the region. The level of the innovation index shows its potential for the development of the University 3.0. In the ranking of the countries of the world according to the innovation index (2020), Ukraine ranks 45th.

A significant part of higher education institutions function only as educational institutions for training personnel, in another part, along with training, scientific research is carried out, integrated into the educational process. Few universities have a full-fledged knowledge commercialization and research sector.

The problem is taking into account the requirements of the modern market, in particular, strengthening the practical orientation of mass higher education. In developed countries, there are discussions about the need for general higher education. This raises the question: should higher educational institutions meet the



needs of mass education or conduct elite training of specialists? The development of the global economy and the growth of knowledge production make higher education massive and directly responsible for the development of society. The expanding mass character of higher education is a fundamental resource that should be used for socio-economic development and, in particular, for the introduction of an entrepreneurial and technological culture. Competitive struggle for students should stimulate the growth of the quality of education. Remuneration is associated with the student population,

An entrepreneurial university promotes the development of the idea of a harmonious connection between educational services, research and academic entrepreneurship, which the economic system is able to increase the resources of scientific discovery with commercial potential so that it becomes a viable business [38]. Such a university plays an active role in the socio-economic development of the region as one of the main agents in the production of knowledge and provides students with new skills, develops entrepreneurial talent for a science-oriented business [36; 38]. The global role of new generation universities is not only in training personnel and producing scientific and innovative products, but also in educating young professionals,

The experience of the development of European universities shows that in the context of globalization and high competition in the market of scientific and educational services, there is no alternative to the commercialization of educational activities and scientific research, and hence the concept of an entrepreneurial university. A document from the renowned Dutch University of Twent notes: "The University of Twent is a university offering educational programs in technology and social sciences. We characterize ourselves as an entrepreneurial university that focuses its efforts in education and research to ensure the benefits of society as a whole. Entrepreneurial relationships permeate the entire university from students to professors. This is a state of mind, an intellectual approach to science and society, allowing to quickly respond to new challenges and accept new ideas "[37; 38].

## **Conclusions**

This study used a systematic approach to the study of entrepreneurship in the field of higher education in the context of economic instability and financial turbulence.

Many authors, depending on the period in history, have put forward and continue to put forward different definitions of the concept of "entrepreneurial university". Burton Clarke noted that an entrepreneurial university must create new knowledge, commercialize it and disseminate it. At the same time, he identifies sixteen features that every entrepreneurial university should have. D. Ropke insists on the compliance of the university with three characteristics: the university itself should behave like an entrepreneurial organization, teachers and students should be entrepreneurs within this organization, the university should interact with the environment for the purpose of entrepreneurial activity. Professor Schulze cites two



main functions of an entrepreneurial university, namely the creation of future entrepreneurs, their education and the implementation of entrepreneurial activities by the university, the creation of business incubators, technology parks, etc. Obviously, the definition of Schumpeter is already included in the definition given by B. Clark.

According to the key elements put forward by B. Clarke, five models of universities of the present and the future were identified: elite universities, mass universities, niche universities, local universities, universities of “lifelong” learning. Currently, each university is faced with a strategic task of re-profiling into the new University 3.0 model.

Investigating the sources of funding for higher education institutions in Ukraine, it was found that the funding of some universities decreases due to the fact that they do not meet the conditions of entrepreneurial universities, and vice versa, some domestic universities have increased the amount of funding due to the improvement of the actual indicators, to which the Ministry of Education and Science relates: the scale of the university, the contingent, regional indicator, positions in international rankings, the volume of funds raised for research and employment of graduates of higher education.

The most striking example of the development of entrepreneurial universities stands out in the Netherlands and Germany. It is the experience of these countries that is a good example to apply it in Ukraine. After all, the peculiarity of financing the system of higher education in the Netherlands is the prevalence of government sources. In Germany, higher education institutions are either government funded (279 universities) or government accredited (108 universities). The author identified the main activities to strengthen relationships with industry inherent in the universities of Eindhoven and Munich: the development of common innovations; technology transfer; business education development; support for startups; participation in regional consortia; activation of interaction with small business. Considering the positive experience of the formation of entrepreneurial universities in Germany and the Netherlands,

So, in order for Ukrainian higher education institutions to transform into entrepreneurial universities, it is necessary to establish cooperation with the business environment, thus universities will receive important information about the training of professional personnel and will be able to provide the business community with services for the development of innovative products that will help customers of developments become more competitive products on the domestic and international markets.