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PECULIARITIES OF FINANCIAL MANAGEMENT OF UNIVERSITY CENTERS OF CREATIVE ENTREPRENEURSHIP OF EUROPE AND CHINA

Abstract. University centers of creative entrepreneurship are becoming the drivers of the modern economy of the world's leading countries and form a global academic entrepreneurial movement nowadays. Each of the leading countries or groups of countries has certain peculiarities and its own experience of financial management of such centers. Therefore, there is an actual task of comparative analysis of the peculiarities of these centers of those countries that are most successful in implementing innovations, identifying common features, patterns and differences. Such an analysis is especially important for Ukraine, where the movement of academic creative entrepreneurship is at an early stage of development. The systematic analysis found out that the EU countries are characterized by a predominantly distributed or so-called network structure of financial management of university centers of creative entrepreneurship, and China is characterized by a predominantly hierarchical structure. A characteristic difference between the academic business movement of the EU and China lies also in the fact that the basis of management of these centers in the EU, including financial management, is self-government, which is a consequence of the tradition of self-government of European universities. For China, this factor is inferior to the tradition of centralized administration. The main function of financial management of creative entrepreneurship centers is established. This includes facilitating access to credit for researchers, research and project teams of universities, forming an ecosystem to support innovation, providing intermediary services for financial support of innovation, creating an environment for cooperation, reducing the financial risks of investors and increasing the effectiveness of innovation. The tools of financial management of creative academic entrepreneurship are systematized. The comparative analysis identified and detailed the peculiarities of financial management of university centers of creative entrepreneurship for the European Union and the People's Republic of China, in particular, the peculiarities of the management structure and the tools characteristic of the EU or PRC for funding research and development of the mentioned centers. The results of the study can be useful in creating a national system of financial management of university centers of creative entrepreneurship.

Keywords: system analysis, university centers, creative entrepreneurship, innovation, financial management.

JEL Classification O3, Q43, P5

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ОСОБЛИВОСТІ ФІНАНСОВОГО УПРАВЛІННЯ УНІВЕРСИТЕТСЬКИМИ ЦЕНТРАМИ КРЕАТИВНОГО ПІДПРИЄМНИЦТВА ЄВРОПИ І КИТАЮ

Анотація. Університетські центри креативного підприємництва сьогодні стають рушіями сучасної економіки провідних країн світу і утворюють всесвітній академічний підприємницький рух. Кожна з провідних країн чи груп країн має певні особливості та власний досвід фінансового управління такими центрами. Тому постає завдання порівняльного аналізу особливостей для вказаних центрів тих країн, які є найбільш успішними у впровадженні інновацій, виявлення спільних рис, закономірностей і відмінностей. Такий аналіз є особливо важливим для України, де рух академічного креативного підприємництва перебуває на початковій стадії розвитку. За використання системного аналізу встановлено, що для країн ЄС характерною є переважно розподілена чи так звана мережева структура фінансового управління університетськими центрами креативного підприємництва, а для КНР характерною є переважно ієрархічна структура. Характерною відмінністю академічного підприємницького руху ЄС і Китаю є також те, що основою менеджменту вказаними центрами, у тому числі й фінансового управління, для ЄС є самоврядування, яке є наслідком традицій самоврядування університетів Європи. Для КНР цей чинник поступається традиції централізованого адміністрування. Визначено основну функцію фінансового менеджменту центрів креативного підприємництва. Це полегшення доступу до кредитування науковців, наукових і проєктних груп університетів, формування екосистеми підтримки впровадження інновацій, надання посередницьких послуг для суб'єктів системи фінансової підтримки інновацій, створення середовища для співпраці, зменшення рівня фінансових ризиків інвесторів і збільшення ефективності впровадження інновацій. Систематизовано інструменти фінансового менеджменту креативного академічного підприємництва. При проведенні порівняльного аналізу встановлено і деталізовано особливості фінансового управління університетськими центрами креативного підприємництва для Європейського Союзу і Китайської Народної Республіки, зокрема особливості структури управління та притаманні для ЄС чи для КНР інструменти фінансування науково-дослідних і конструкторських робіт вказаних центрів. Результати дослідження можуть бути корисними при створенні національної системи фінансового управління університетськими центрами креативного підприємництва.

Ключові слова: системний аналіз, університетські центри, креативне підприємство, інновації, фінансове управління.

Формул: 2; рис.: 2; табл.: 0; бібл.: 21.

Introduction. Nowadays, university centers of creative entrepreneurship are becoming the drivers of the modern economy of leading countries. Therefore, a comprehensive comparative analysis of their activities in different countries is important. The results of such an analysis are especially important for Ukraine, which is at the stage of political, social and economic reforms that require powerful drivers, in particular, in the sphere of innovation. The basis of the effectiveness of university centers of creative entrepreneurship is the management of their activities and the formation of the necessary legal, organizational and, above all, financial mechanisms that should ensure the rapid development and realization of new ideas, inventions and technologies.

Analysis of research and problem statement. A significant body of work is devoted to the study of financial management of university centers of creative entrepreneurship (hereinafter, CCE) of Europe and China. There are works in this area by Etzkowitz, the last of which [2] considers the dynamics of entrepreneurship of universities, which leads to a change in the structure of their financial management. Analysis of financial instruments for university centers in Europe is conducted by Kerr [3], detailing on the example of Andalusia is given by Fuster [4], of Italy by Elia

[5], Bazaluk [6], Rudenko [7; 8], Liashenko [9; 10] use the example of Ukraine, Portugal is used as an example by Oliveira [11]. In Feola's research [12], using the classic triple helix model developed to analyze the financial management of universities by Etzkowitz [2] the evolution of the university's role and the relationship between its business and some of the factors influencing this evolution are studied. Riviezzo [13], using a mathematical model, studies the impact of entrepreneurial orientation of university departments on their strategic research, which is expressed in patents and inventions. Cai [14] researched the role of the university as an institutional entrepreneur in the regional innovation system. Ma [15], Chang [16], Chen [17] studied the peculiarities of financing academic creative entrepreneurship in Taiwan. Hanley [18] considers funding innovation in China's regional university centers from two main aspects: financial depth and government intervention in the financial system. In his monograph Cong [19] examines in detail the corporate and private funding of academic innovation, on the example of the formation of structures of business angels. His analysis includes the role of IPOs in the development of creative entrepreneurship in Chinese universities.

The study of the body of scientific works contributed to the development of theoretical and methodological foundations of the presented scientific research.

The purpose of the article is to use a systematic approach to comparative analysis of financial management of creative entrepreneurship in universities in Europe and China, identifying their common features and differences.

Unsolved aspects of the problem. Practical and theoretical aspects of comparing the peculiarities of financial management of university CCEs of the European Union and the People's Republic of China.

Research results. The main feature of the financial management of university CCEs in Europe and China is that the projects they take care of are non-capital-intensive, and the time for which the financial resources are required is relatively short. As a result, the institutions that are usually approached for funding — banks, financial corporations, large investors — are not interested in cooperating with CCEs, transaction operations for large financial structures of CCE projects are unprofitable due to relatively high transaction costs. To this other associated costs of interaction of large financial institutions with the CCE must be added: expert assessments, legal support, and so on. In fact, these factors form the necessary minimum effective amount of investment in CCE projects for large financial institutions [20].

On the other hand, a positive factor is that intangible assets (patents, inventions) managed by the CCE are less vulnerable to the effects of economic crises and other macroeconomic factors. At the same time, the lack of opportunities for relevant valuation of intangible assets and the lack of a secondary market for them is a deterrent for external investors.

Thus, CCE projects potentially have a significant resource to increase their capitalization, but investing in them is risky. The risk of investing in R&D has three parts: technological, market, team. Assessing these components of risk and potential of research projects is usually beyond the competence of investors, government officials, decision-makers, so for them the guarantees of expert confirmation of managers and scientists from CCE is a lever to reduce investment risks.

Nowadays, the following forms of creative entrepreneurship are the most typical for university CCEs, both in the EU and in China: the so-called «spinoffs», startups and individual creative scientists-entrepreneurs.

Spinoffs are new business structures whose activities are based on the direct transfer of scientific knowledge and innovative technologies. The role of university CCEs in the development of spinoffs is to create an environment for cooperation, providing legal and expert services to all participants in the business process of spinoffs. The difference between the CCE both in the EU and China in this regard is the different weight of individual forms of creative entrepreneurship in their total national volume. In the EU countries the form of individual creative scientists, the personal approach prevails, and spinoffs are the last by weight in the total volume of innovative projects. For the People's Republic of China, the opposite is true.

This allows us to formulate the main function of financial management of university CCE which is to facilitate access to credit for scientists, research and project groups of universities. And

the peculiarity of this management is the formation of an ecosystem of support [2], providing intermediary services to both recipients and those who provide funding, creating an environment for cooperation, reducing the risk of funding for investors and increasing opportunities for implementation of ideas for scientists.

All these factors and peculiarities are common to the financial management of creative entrepreneurship in the European Union and the People's Republic of China. However, the use of systems analysis to compare the characteristics of university CCEs in Europe and China indicates that the structure of their financial management is different.

Europe is characterized by a distributed, so-called «network» structure, for China the structure is hierarchical.

Of course, the university centers of the EU and the People's Republic of China are quite complex, diverse, and ramified to be rigidly classified in a similar way. In fact, the CCE of the EU and China is characterized by the use of almost all modern financial management tools. But it is also undoubtful that the weight of each of these instruments in the total amount of funding for the activities of the CCE of the EU and the People's Republic of China is different. Therefore, a more precise definition of their structure is that the EU CCE is characterized by a predominantly distributed structure of financial instruments, while the CCE of China is characterized by a more hierarchical structure.

The comparative analysis revealed that the diversification of funding sources is also more characteristic of the creative projects of European university centers than of the PRC. Thus, ~ 22% of EU creative projects use three or more different financial instruments. Another characteristic feature of EU creative projects is the inclination to private and informal financial instruments, despite the significant work in this direction of state institutions and the wide opportunities for public funding in the EU.

A characteristic difference between the CCE of the EU and the People's Republic of China is that the basis of management of university centers of creative entrepreneurship, including financial, in the EU is self-government, which functions organically because it is a consequence of European university self-government. For China, this factor is inferior to the tradition of administration.

The study found out that such financial institution as business angels is more developed in the university centers of Europe. For example, in the UK, the UK Business Angels Association has 160 organizations and ~ 1.8 thousand investors that invest more than £ 1.5 billion each year in financing creative projects. The most famous pan-European organization of business angels EBAN unites ~ 150 organizations from 50 countries. The Ukrainian Business Angels Community — UAngel is also part of the EBAN structure.

The incentive for both the UK Business Angels Association and EBAN is that they are not philanthropic but highly profitable associations.

A specific characteristic of business angels is the variability of the innovation market for different EU countries, due to its different historical tradition for different European countries, different overall level of competence of national structures and different ratings of national universities. Also, a specific feature is the rapid change of business models and the emergence of new, unusual, innovative areas, especially in areas such as bioengineering and digital technologies.

The EU CCE has extensive cooperation with foundations that support creative startups. An example is the Seed Capital Scheme & Seed Business Angel Funds (Netherlands). Business angel associations and foundations aim to improve the risk-effectiveness ratio for their members. For this purpose, broad contacts with the management of the CCE are intensifying. Also, the problems that CCEs have to solve in contact with investors are the following: lack of competence of managers in related spheres, in particular, in industry in the implementation of innovations; lack of reliable collateral instruments to reduce investment risks; dependence on intangible assets; uncertainty in market prospects; duration of the study period in time.

At the same time, an example of self-organization and, initially, reliance on public investments only was the Brandenburg Center for Academic Entrepreneurship, whose experience is more effectively implemented by the Berlin CCP, a networked self-organized structure to support university entrepreneurship in German universities.

In general, the sources of funding for the CCE of Europe can be systematized in the following areas. Public funding: grants, vouchers (several EU Member States have developed a support system through creative and innovative vouchers: Austria, Ireland, the Netherlands, Germany, Estonia, Lithuania, the United Kingdom and Portugal); tax breaks (a scheme for investing in businesses and business incubators, which is widely used by university CCE United Kingdom); reverse financing; one-stop windows — structures that provide a wide range of financial instruments, such as Creative England (UK), Cultuur & Ondernemen (Netherlands), Hamburg Kreativ Gesellschaft (Germany); debt financing: loans, microfinance, overdraft, factoring, leasing; capitalization (venture capital, business angels, seed financing — so-called «seed capital»); crowdfunding (crowdlending, crowdfunding, crowdfunding based on donations and rewards, etc.); sponsorship, corporate donations, venture philanthropy, public-private partnerships.

Analysis of gross domestic expenditure on R&D at national and regional levels by EU sector (Fig. 1) disrupts some traditional notions of the weight of financial resources in total R&D funding and points to the following features: the share of the non-profit sector is relatively small in funding, and its dynamics in time indicates a permanent character; universities' own funds are higher in R&D funding for the state and their growth rate is higher; the volumes of business financing are twice as large as the total volumes of all other sources of financing and their growth rate is high (for the considered period of 2014—2019 by 27%). Analysis of linearized equations of trends in R&D financing from own funds of EU university CCEs — equation (1) and EU business structures — equation (2), indicates that the growth rate of funding by business structures is 70 times higher:

$$y = 1930x + 54166; \tag{1}$$

$$y = 9158,7x + 149237; \tag{2}$$

where y — R&D expenditures, million €, x — time, years.

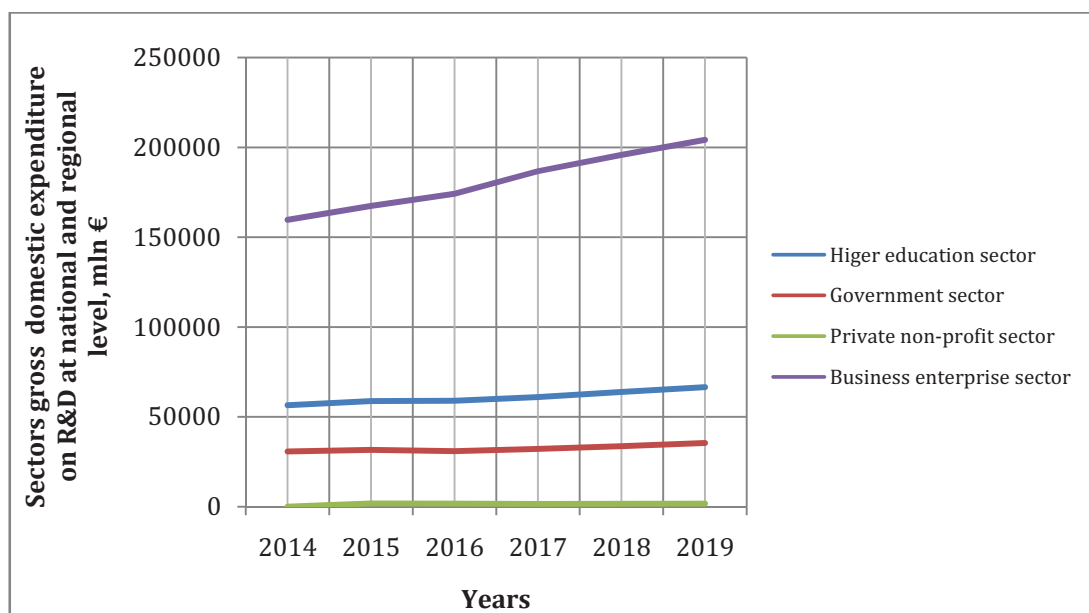


Fig. 1. Dynamics of gross domestic expenditure on R&D at national and regional levels by sector in the EU, million €

We will analyze the implementation of the latest financial instruments in the university CCEs of the European Union and the People's Republic of China in more detail using the example of crowdfunding.

EU University Creative Entrepreneurship Centers were one of the first early adopters of crowdfunding [21]. In 2013—2017, ~75,000 crowdfunding campaigns were conducted in the European Union. More than half of them were successful and brought in ~247 million €. By country, the CCEs of Great Britain and France were more effective in this respect. According to the forms of

crowdfunding, project-based crowdfunding was more common for the EU CCE, and institutional crowdfunding was the least common. Crowdfunding and crowdlending are used very rarely, although these tools are more profitable. The level of cooperation of crowdfunding investment structures with EU CCE universities is currently considered insufficient and work is underway to expand it.

For the People’s Republic of China, crowdfunding as a financial instrument has hitherto been considered uncharacteristic. A deterrent to the use of this tool in China is its uncertainty about investment, which is perceived by the peculiarities of national consciousness as a high degree of risk. This is especially true of the latest forms of crowdfunding, such as equity crowding (or so-called «equity crowdfunding»). In China, the level of crowdfunding risk is exacerbated by the low prevalence of stock market instruments in the population and, in comparison with the EU, somewhat complicated rules of securities transactions, which are one of the traditional instruments for protecting equity-based crowdfunding investments that use equity and issue equity paper. also The fact that there are no regulators of crowdfunding campaigns in the People’s Republic of China or administrative supervisory institutions to inspect them complicates the situation. This also increases the risk for crowdfunding.

Investment in China’s CCE is constrained by the relative weakness of the legal framework for intellectual property protection. But there are trends to improve this situation. An example of this is that nowadays the Chinese company JD, known in the world, launched a crowdfunding platform Fenzhiqian.

University CCEs of the People’s Republic of China are an example of the implementation of the official policy of China «one country — two systems» and the peculiarities of their formation and management differ from their counterparts in the European Union. They are mostly located among a group of large scientific and, of course, engineering centers, but are usually remote from industrial conglomerates; are well integrated into the regions of China and work closely with local authorities under the strict control and political guidance of state institutions that form instruments of financial support and create tax privileges in the implementation of research projects.

One of the declared peculiarities of the CCE of the PRC is the attraction of foreign investments and technologies, including the invitation of scientists from other countries. But, in fact, the main source of funding for China’s CCE is still the state through a number of specially created public financial structures and funds, including mixed private-public capital (Fig. 2).

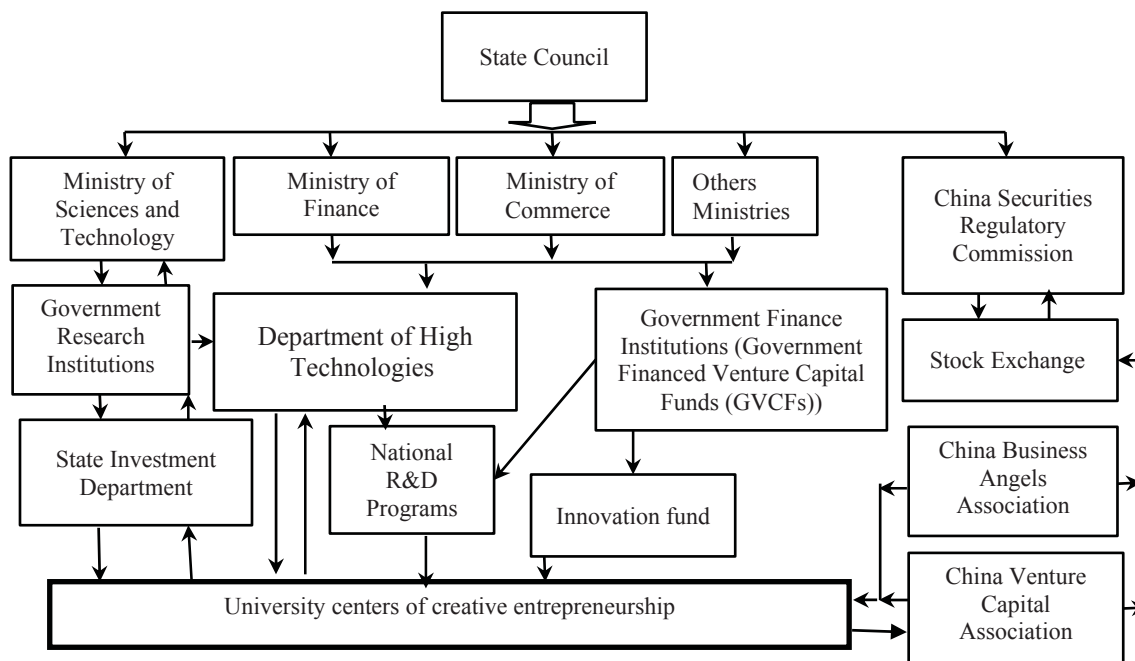


Fig. 2. The structure of decision-making on the financial management of university centers of creative entrepreneurship in China

Although, in recent times, capital-intensive research projects have been financed from several sources, and in particular, the government has begun to require co-financing of such projects by commercial entities. To do this, commercial structures have three main incentives: the high level of national consciousness required of Chinese business; tax benefits (for example, exemption from China's R&D funding from income tax, etc.); elimination of the need to maintain their own scientific structures, laboratories, research centers, etc.

The first university CCEs of the People's Republic of China were Peking University (or Shenzhen CCE) and Shanghai University (or Shanda CCE), which began to take shape in the late 1980s. It was there where the technologies of administration and financial management of the Central Committee of the People's Republic of China were tested.

The innovative breakthrough provided by China's university CCEs and by the relevant state institutions of the People's Republic of China (see *Fig. 2*) implements both President Xi Jinping's declared open door policy for investors and scholars and the Chinese leadership's long-term policy called the Chinese Dream. This long-term policy of the «Chinese dream» is based on four principles declared at the state level: patriotism — «aiguo»; innovations — «chuanxing»; inclusiveness — «baorong» and morality — «houde».

To implement the long-term policy of the «Chinese dream», the leadership of the People's Republic of China has created a number of structures, which are presented in *Fig. 2*. These structures can be divided into three groups by areas of responsibility: public policy, administration and control, financial policy and financial resources (China Venture Capital Association, China Business Angels Association, Innovation fund, Investment Department) and stock exchange structures (Chinese securities regulation commission and stock exchange). The nodal center of administration and control is the Department of High Technologies. The real factor slowing down the Chinese Dream policy is the lack of interaction between university CCEs and industry. This is exactly what the Department of High Technologies should coordinate with the government. The role of the China Securities Regulatory Commission and the Stock Exchange in this structure is to accelerate IPOs for businesses that innovate the CCE of Chinese universities. As it can be seen from *Fig. 2* this should improve the efficiency and effectiveness, first and foremost, of the Venture Capital Association and the Business Angels Association. That is, the Chinese model does not exclude the impact of various financial instruments on the activities of the CCE, but much attention is paid to administration, planning and control.

Conclusions. Using system analysis, it was found out that the EU is characterized by a predominantly distributed, so-called «network» structure of financial management of university centers of creative entrepreneurship, and People's Republic of China is characterized mainly by a hierarchical structure.

The study allowed to formulate the main function of financial management of university CCEs which is to facilitate access to credit for scientists, research and project groups of universities, to form an ecosystem to support innovation, to provide intermediary services for recipients and providers of financial support for innovation, to create an environment for cooperation, reducing the level of funding risks for investors and increasing opportunities for implementation of ideas for scientists.

During the comparative analysis, the peculiarities of financial management of university centers of creative entrepreneurship for Europe and China were established and detailed.

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