

Analysis of the Development of College Students' Innovation Training Projects in the Building Information Related Fields under the Educational Policy of Promoting Innovation and Entrepreneurship in China

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Abstract

The purpose of this study is to discuss the relationship between the innovation and entrepreneurship education and the development policy of the construction industry in the government policy, and to explore and understand the relationship through the analysis of the project of university innovation and entrepreneurship education. The research contents include: 1. Collecting the main policies and contents of the Chinese education authorities (Ministry of Education) for university innovation and entrepreneurship education; 2. Collecting the 2016- 2020 building information policy development planned by the Ministry of Housing and Urban-Rural Development, as a classification basis for analyzing college students' innovation and entrepreneurship projects; 3. The innovative and entrepreneurial projects funded by the Ministry of Education of China in 2016-2017 are the main body, and the related topics in the field of building information are retrieved, and classified and analyzed; Finally, the college students' innovative training programs are analyzed, and the current situation and development of the implementation are discussed.

Key words: College Students' Innovation Training Projects, Innovation and Entrepreneurship, Building Information Related Fields, China

I. Introduction

In recent years, with the development and deepening of innovation and entrepreneurship education policy for undergraduate colleges and universities, as well as the emerging industries and specialties derived from the national development policy for building information or BIM (Building Information Modeling), a large number of talents and entrepreneurship projects in the future building information industry have been created, and gradually face the wide development of the whole country, In the past, most of the methods used to involve practical courses in business only in senior courses [1], but through research and research. It is pointed out that the bottleneck of cultivating high-end talents in building informatization in Colleges and universities includes insufficient database, imperfect data standards, imperfect teaching platform, etc.. Therefore, how to further produce high-end application-oriented talents in building informatization under the existing teaching mode, how to

increase the depth and breadth of technology, and how to encourage college students to participate in innovative training projects are feasible ways at this stage [2,3]. About the promotion and application of building information technology in domestic building and construction related universities (such as civil engineering, engineering management, architecture, etc.), most of them discuss how to combine the existing undergraduate training objectives and programs, or discuss and reform the teaching methods of a single course, and few discuss the "three innovations" education (innovation, entrepreneurship, creativity) for college students. There are also some phenomena in the innovation and entrepreneurship training project of civil engineering specialties subject groups, such as a small number of projects, high difficulty in execution and low effectiveness [4,5].

As the cradle of nurturing high-end talents in China, the government and universities have invested a lot of manpower and material resources each year to foster and cultivate building information entrepreneurship projects with potential in the future. This study aims at the national innovation training project of the Ministry of Education from 2016 to 2018, and screens out projects related to the application of information technology in the field of construction to analyze and discuss, and sums up the domestic projects. The main direction and development suggestions of building information innovation training project in Colleges and universities at the present stage.

II. Innovation and entrepreneurship education and industry development policies in the field of construction

A. Policies of the Ministry of Education

Since 2007 in China, the Ministry of Education (<http://www.moe.gov.cn/>) has implemented the project of innovative entrepreneurship training for college students. The aim is to promote the reform of personnel training mode, cultivate the innovative consciousness of College students, enhance their innovative and entrepreneurial abilities, and enhance their comprehensive qualities. In 2010, the "Opinions on Vigorously Promoting Innovation and Entrepreneurship Education in Colleges and Universities and College Student's Independent Entrepreneurship Work" was issued, requiring all localities to vigorously promote innovation and entrepreneurship education. Innovation and entrepreneurship education in Colleges and universities should be geared to all students and integrated into the whole process of talent cultivation; and the construction of entrepreneurial bases

should be strengthened to We will further implement and improve the support policies for college student's self-employment, strengthen guidance and services for entrepreneurship, and promote innovative entrepreneurship education and college students' self-employment to achieve breakthroughs [3].

In the 13th Five-Year Plan outline of the Ministry of Education in 2016, it is clear that student's innovative and entrepreneurial abilities should be trained, universities and vocational schools should be encouraged to build innovative and entrepreneurial service platforms for students, improve the curriculum system and management system of innovative and entrepreneurial education, guide and encourage students to actively participate in innovative activities and entrepreneurial practices, strengthen the innovative and entrepreneurial orientation of graduation thesis and graduation design, and carry out innovative and creative creation. Business competition, create innovative entrepreneurship campus culture. We will support the construction of a number of Local Application-oriented Undergraduate Colleges and universities, focusing on strengthening the construction of experimental and practical training environment, platforms and bases, encouraging the participation of industry and enterprises, building experimental and practical training facilities with integration of production and education, school-enterprise cooperation and integration of production, learning and research, and promoting the cultivation and application of skilled personnel and technological innovation. Provincial governments are encouraged to coordinate the resources of universities, enterprises, industrial parks, incubation bases and venture capital funds in the region to support college student entrepreneurship.

B. Relevant policies of the Ministry of Housing and Urban-Rural Development

The Ministry of Housing and Urban-Rural Development (<http://www.mohurd.gov.cn/>), as the highest competent authority of civil architecture, recently issued the Outline of Informatization Development of Construction Industry 2016-2020. The Outline clearly points out that in the application of special information technology, the application of big data technology, cloud computing technology, Internet of Things technology, 3D printing technology, intelligent technology and so on are important workers to promote the direction of construction informatization in the future. In terms of technology-oriented safeguard measures, it mentions and emphasizes the orientation of personnel training, including paying attention to introducing BIM and other IT professionals, cultivating compound talents of fine communication information technology and business, strengthening the training of information technology application for all kinds of personnel, and improving the application ability of information technology for all staff.

The issuance of the Outline can serve as a basis for policy-making for lower departments; for enterprise technicians, they can learn about hot technologies and keep up with the pace of the times; for enterprise managers, they can grasp the direction of technological development, avoid directional errors, and refer to it, determine the technological objectives and tasks of enterprises, formulate technological

development plans for enterprises, and promote enterprise technology. Progress in operation.

The main task of this study is to explore the outline, as shown in Figure 1, which includes the following categories:

1. enterprise informatization: refers to the exploration of the new mode of management and production under the situation of "Internet +". It studies in depth the innovative applications of technologies such as BIM and Internet of things, innovating business models, enhancing core competitiveness and realizing leapfrog development.
2. industry regulation and service informatization: it refers to the new mode of building industry structure and resource integration under the situation of "Internet +", and promotes the new format of the construction industry, and supports the innovation and development of enterprises under the situation of "Internet +".
3. the application of special information technology is to explore the development and application of "Internet +" and the integration of BIM and related new technologies.
4. Informatization standards: refer to strengthening the top-level design of informatization standards in construction industry, continuing to improve the informatization standards system of construction industry and enterprises, combining with the application of new technologies such as BIM, focusing on improving the informatization standards system of construction engineering survey, design, construction, operation and maintenance in the whole life cycle, etc.

I. Guidance			
II. Development Goals			
III. Major Tasks			
(1) Enterprise Informatization	(2) Industry Supervision and Service Informatization	(3) Specialized Information Technology Applications	(4) Informatization Standards
1. Survey and Design Enterprises 2. Construction Enterprises 3. General Contractor Enterprises	1. Supervision of construction market 2. Construction supervision 3. Informatization of Key Projects 4. Modernization of construction industry 5. Industry Information Sharing and Services	1. Big Data Technology 2. Cloud computing technology 3. Internet of Things Technology 4. 3D Printing Technology 5. Intelligent Technology	The compilation of informatization standards focuses on compiling and improving the basic data and general standards of coding, data exchange, document and document delivery related to informatization in construction industry and enterprises.
IV. Supporting measures			
(1) Strengthen organizational leadership, improve supporting policies and accelerate informatization of construction industry	(2) Enhancing the Informatization Ability of Construction Enterprises	(3) Strengthening the construction of information security	

Fig.1 Framework of Informatization Development of Construction Industry 2016-2020 in China

III. Analysis of National College Student's Innovation Training Project Based on Information Technology in Building Information Related Fields

A. Project screen and selected process

The research mainly focused on the Ministry of Education "2016 National College Students Innovation and Entrepreneurship Training Program List" with 12,286 items, 2016 National College Students Innovation and Entrepreneurship Training Program List, 20,768 items, 2017 National College Students Innovation and Entrepreneurship Training Program Project List, 13,074 items and 2017 local areas. List of National College Student's Innovation and

Entrepreneurship Training Program Project with 22,794 items and a total of 68,922 items as the main analysis subjects. With BIM, building information, big data, cloud computing, Internet of Things, 3D printing and intellectualization as keywords, 216 items related to BIM were retrieved from information fields including project name, project introduction and so on. There are 1068 big data related application projects, 232 cloud computing related application projects, 684 Internet of Things related application projects, 518 3D printing related application projects, 1026 intelligent related application projects, including 20 big data related application projects, 4 cloud computing related application projects and Internet of Things related application projects. Twelve items, 17 items related to 3D printing and 19 items related to intellectualization were analyzed as follow-up items.

B. Project Classification Result

The 217 items selected from the list of “National College Students' Innovation and Entrepreneurship Training Programs” are analyzed and classified according to the four tasks mentioned in the “Outline”. Among them, as Fig.1, the enterprise informationization tasks are in line with the survey design projects. The number of projects approved was 41,

accounting for 46.6%; the number of projects eligible for construction projects was 35, accounting for 39.8%; the number of projects that met the general contracting projects was 12, accounting for 13.6%;

In the industry supervision and service informationization tasks, the number of projects that meet the supervision of the construction market is 1, accounting for 2.8%; the number of projects that meet the supervision of engineering construction is 10, accounting for 28.5%; the number of projects that meet the informatization of key projects is 5, accounting for 14.30%;

The number of projects that meet the modernization of the construction industry is 18, accounting for 51.4%; the number of projects that meet the industry information sharing and service is 1, accounting for 2.8%;

Among the special information technology application tasks, the number of projects that meet the big data calculation is 19, accounting for 24.7%; the number of projects that meet the cloud computing is 4, accounting for 5.2%; the number of projects that meet the Internet of Things is 14, accounting for 18.2%; The number of projects eligible for 3D printing is 21, accounting for 27.2%; the number of projects eligible for intelligentization is 19, accounting for 24.7%;

In the information standard task, the number of eligible projects is 1 (0.3%).

TABLE 1 PROJECT CLASSIFICATION RESULT OF INFORMATION TECHNOLOGY IN BUILDING INFORMATION RELATED FIELDS

Class	No.	Total Ratio	Subclass	No.	Ratio
Enterprise Informatization	88	32.6%	● Survey and Design Enterprises	41	46.6%
			● Construction Enterprises	35	39.8%
			● General Contractor Enterprises	12	13.6%
Industry Supervision and Service Informatization	35	12.9%	● Supervision of construction market	1	2.8%
			● Construction supervision	10	28.5%
			● Informatization of Key Projects	5	14.3%
			● Modernization of construction industry	18	51.4%
			● Industry Information Sharing and Services	1	2.8%
Specialized Information Technology Applications	77	28.5%	● Big Data Technology	19	24.7%
			● Cloud computing technology	4	5.2%
			● Internet of Things Technology	14	18.2%
			● 3D Printing Technology	21	27.2%
			● Intelligent Technology	19	24.7%
Informatization Standards	1	0.3%	● The compilation of information standards, such as basic data and general standards such as coding, data exchange, document and document delivery, etc.	1	--

IV. Discussion

A. Distribution of Construction Information Related Projects

The distribution of innovation and entrepreneurship projects related to construction information in Table 1 reflects the main investment orientation of universities for innovation and entrepreneurship projects. The related innovation and entrepreneurship projects are mainly focused on enterprise informatization (32.6%) and special information technology applications (28.5%). The corresponding project characteristics aim at the introduction and application of information technology in survey, design and construction in

the life cycle of the project. It is worth noting that besides this classification framework, BIM-based consulting firms and studios are also innovative entrepreneurship projects that most universities will develop and invest in. In the classification of industry supervision and service informationization (12.9%), most projects are focused on the modernization of construction industry (51.4%) and construction supervision (28.5%). The former reflects China's construction industrialization policy, while the latter is the application of construction supervision (such as the development of government's supervision informationization technology for engineering projects). Finally, there is only one (0.3%) related project in the field of

informatization standards. Because informatization standards involve the policy and practical operation problems of government, industry and so on, this part is not the level that university students can involve.

B. Current Situation and Development Suggestions of Innovation and Entrepreneurship Projects and Technical Guidance Related to Construction Informatization in Colleges and Universities

The establishment and guidance process of University Students' innovative entrepreneurship projects need to rely on the academic expertise of the instructor combined with the comprehensive guidance of innovative entrepreneurship. Because the policy of innovative entrepreneurship in the past few years has only been issued by the city of innovative entrepreneurship policy in Colleges and universities, most of the domestic teachers have not received relevant training and training in the early period of submission or research, so it may be difficult to form guidance. On the other hand, most Innovative entrepreneurship projects need to combine the current emerging technologies (such as the Internet, action data, cloud computing, etc.). According to the analysis results, the proportion of the application of special information technology is about 28.5%, which reflects that there is still much space for development of the application of new information technology. In the follow-up, the instructors need to seek and learn new technology again, so as to guide the implementation of University students. Innovative entrepreneurship projects.

V. Conclusion and suggestion

Based on the background of promoting innovative entrepreneurship education in China and the outline of the 13th Five-Year Plan of Building Informatization proposed by the Ministry of Housing and Urban-Rural Development, this study collects and analyses the national innovative entrepreneurship projects for the emerging building informatization-related projects in the civil construction industry from 2016 to 2017, and then explores the informatization of University Innovative Entrepreneurship Education in the construction field. The phenomenon of development, we know that universities have a certain degree of response to the overall development trend and policy level of College Student's innovative entrepreneurship projects, resulting in many innovative entrepreneurship projects, among which for enterprise informatization and the application of special information technology, for most of the development orientation. For the government and industry information standards, through the analysis, it knows that this part is not the development orientation that universities are specialty. In terms of suggestions, the government and universities need to provide better technical platforms, and encourage university teachers and students to explore the research and development of new technologies, so as to develop a good business model. Through the training of innovative entrepreneurship projects, the atmosphere of innovative entrepreneurship education in Colleges and universities should be promoted as a whole, and a virtuous circle should be formed. In the follow-up future research, it is suggested to continue to explore the development trend of annual construction information related innovation and entrepreneurship projects, and follow up the results of

innovation and entrepreneurship transformation.

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