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A Study of University Students' Innovation and Entrepreneurship Competencies under Internet Plus and China's Dual Carbon Targets

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Abstract: - China's policy on carbon peaking and carbon neutrality has sparked a new wave of emerging industries towards reaching the dual carbon targets. The growth of these industries meant that there is an urgent need to develop innovative entrepreneurs who are committed to realizing the dual carbon goals. Therefore, it is of great significance to analyze the innovation and entrepreneurship competencies of university students in achieving the goals. Under the background of internet plus, university students are critical in realizing the dual carbon goals as they possess specific characteristics compared to the comprehensive competencies of innovative entrepreneurs. With the help of the internet and through the combination of online and offline model, this paper examined university students in a specific area to determine the structure and influencing factors of their innovation and entrepreneurship competencies. The results indicate that in the era of internet plus, factors such as national policy, students' place of origin, career direction, as well as innovation and entrepreneurship activities play a key role in the innovation and entrepreneurship competencies of university students towards reaching the dual carbon goals. More proper research needs to be conducted on university students with different personality traits even though university students in the era of internet plus can make use of innovation and entrepreneurship opportunities in achieving the dual carbon targets.

Keywords: Dual carbon; Internet Plus; University Students; Innovation and Entrepreneurship; Competencies

I. INTRODUCTION

The dual carbon policy advocates a green, environmentally friendly, and low-carbon lifestyle. As part of the dual carbon goal, China has pledged to peak its carbon footprint by 2030 and become carbon neutral by 2060 [1]. In the 14th Five-Year Plan, China proposed medium to long-term measures on carbon reduction, pollution reduction, and expansion of renewable power sources, including improving product utilization and promoting innovation on industrial-related energy technologies for optimization. In terms of energy sources, the measures include optimizing the power generation structure and increasing the share of renewables in the energy mix. Other measures include improving the energy efficiency in transport, promoting efficient and clean transportation, as well as developing low-carbon building materials, smart buildings and communities. Another initiative was developing carbon and emission reduction technologies to gradually achieve net-zero carbon emissions through a multi-faceted approach. A wave of new industries, businesses and institutions are expected to emerge as a result of these developments. There is an urgent need for entrepreneurs to contribute to the realization of the dual carbon targets [2]. Under the background of internet plus, the production technology, application mode, industrial form and business model of various industries and fields have gradually realized the transformation and upgrading with the help of the application advantages of Internet-related technologies, so that the enterprises' demand for professional talents is also changing. Hence, under the background of internet plus, it is of great significance to analyze innovation and entrepreneurship competencies in meeting the dual carbon goals.

The essential characteristics of university education determine that universities are important places for the cultivation of innovative talents, as well as cradles and incubators for transporting innovative talents to the society [3]. The research on university students' innovation and entrepreneurship competencies is not only an important part of innovation and entrepreneurship education, but also an important content of social practice research. Studying the structure and influencing factors of university students' innovation and entrepreneurship competencies not only meets the internal needs of the development of innovation and entrepreneurship education, but also is one of the effective ways to comprehensively improve the comprehensive competencies of university students. To improve university students' innovation and entrepreneurship competencies, accurately grasp the current situation of ability, effectively evaluate the level of college students' innovation and entrepreneurship competencies, and put forward feasible training strategies for university students' innovation and entrepreneurship competencies are the realistic requirements of current social development [4]. Based on this, the research on university students'

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innovation and entrepreneurship competencies is not only the demand of educational theory and practice innovation, but also in line with the needs of national economic development.

There is a growing body of research literature on innovation and entrepreneurship competencies among Chinese scholars in recent years. Chinese scholars' definitions of innovation and entrepreneurship competencies are increasingly consistent with those of foreign scholars [5]. According to the Enterprise and Entrepreneurship Education guidance document by the UK's Quality Assurance Agency for Higher Education in 2019, innovation and entrepreneurship competencies refer to the ability to generate ideas and put them into action, which can create cultural, social, and economic value. Meanwhile, Man et al. defined innovation and entrepreneurship competencies as a composite competence of not only innovation and practical skills, but also possess entrepreneurial potential [6]. Based on views of Chandler et al., Baum developed 25 competency indicators, including nine categories such as knowledge, cognitive ability, self-management, administrative management, human resources, decision-making skills, leadership, opportunity identification, and opportunity development, and he also proposed another category, organizational skills [7]. Priyanto et al. studied the relationship between innovation and entrepreneurship competencies and entrepreneurial success. They conducted a data survey on 247 business managers and used structural equation model for analysis. The results showed that innovation and entrepreneurship competencies had a direct impact on entrepreneurial success, and risk growth was a learning medium for entrepreneurs to acquire competence [8]. Edwards et al. believed that entrepreneurial ability included four aspects, namely personal characteristics, masked skills, knowledge, skills, potential and attitudes and metacognitive learning ability. Taking solving practical problems as the starting point, foreign research on innovation and entrepreneurship competencies is mostly carried out under the background of economics and management, focusing on the theoretical analysis and measurement of knowledge and skills, and the evaluation methods are more diversified [9]. Chinese scholar Wang Zhanren pointed out that innovation and entrepreneurship competencies include four aspects, namely cognition, emotion, willpower, and entrepreneurial skills. In particular, entrepreneurial skills include the ability to seize opportunities, as well as practice lifelong learning, leadership and management, teamwork, psychological control, and innovative thinking [10]. Wang Hui et al. believe that innovation and entrepreneurship competencies is mainly composed of seven dimensions, namely opportunity grasp, entrepreneurial perseverance, relational competence, entrepreneurial motivation, innovation and creativity, practical learning ability, and resource integration force [11]. Zhu Changping et al. believe that innovation and entrepreneurship competencies includes five dimensions, such as independent ability, social ability, survival ability, management ability and entrepreneurial skills [12]. Zhao Bo et al believe that innovation and entrepreneurship competencies include two aspects, entrepreneurial professional skills and entrepreneurial essential qualities, and its connotation can be divided into five dimensions, namely entrepreneurial opportunity grasp ability, psychological coping ability, organizational management ability, entrepreneurial learning ability and innovation and creation ability [13]. Ma Zhiqiang et al. divided the ability of innovation and entrepreneurship into five dimensions, such as opportunity grasp, relationship competence, innovation and creation, organization management and commitment learning [14].

Playing a key role in innovation and entrepreneurship, university students have specific characteristics in conducting innovation and entrepreneurship activities due to their differences in age, education level, values, and cultural characteristics [15]. Chinese scholar Yang et al. proposed a four-category structural model with 14 innovation and entrepreneurship competencies among university students, as shown in Figure 1. The model analyzes the structure of university students' innovation and entrepreneurship competencies from the perspectives of students, society, and research literature. A four-category structural model of the students' innovation and entrepreneurship competencies is created with 29 main elements [16].

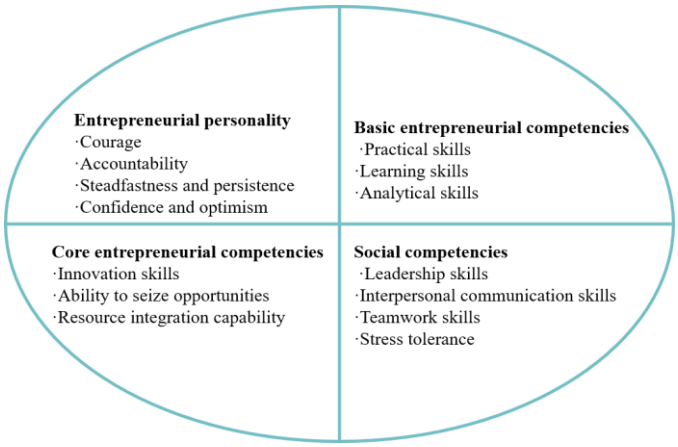

Figure 1: Structural Model of University Students' Innovation and Entrepreneurship Competencies

II. RESEARCH DESIGN AND DATA ANALYSIS

A. Data Collection

Henan province was used as the research area in this study, and the research area was divided into east, west, south, north, and central Henan. The combination of online and offline data collection methods based on the internet plus is selected [17]. To closely reflect the innovation and entrepreneurship practices of university students and ensure data credibility, this study selected university students who have had at least one successful experience of innovation and entrepreneurship while in university or within two years of graduation. Students who have had outstanding innovation and entrepreneurship achievements, received government funding for innovation and entrepreneurship projects, or had successful entrepreneurial experiences were also included in the sample data. The sample subjects have experienced innovation and entrepreneurship activities at university, have a deep understanding of the innovation and entrepreneurship process of university students, and acquired basic competencies required in innovation and entrepreneurship. The selected subjects also have their own insights into factors that affect the development of innovation and entrepreneurship competencies.

B. Research Design

A number of categories were set, including gender, age, academic qualifications, and academic discipline. As shown in Figure 2, five levels of 18 factors were also used, including individuals, families, schools, society, and countries.

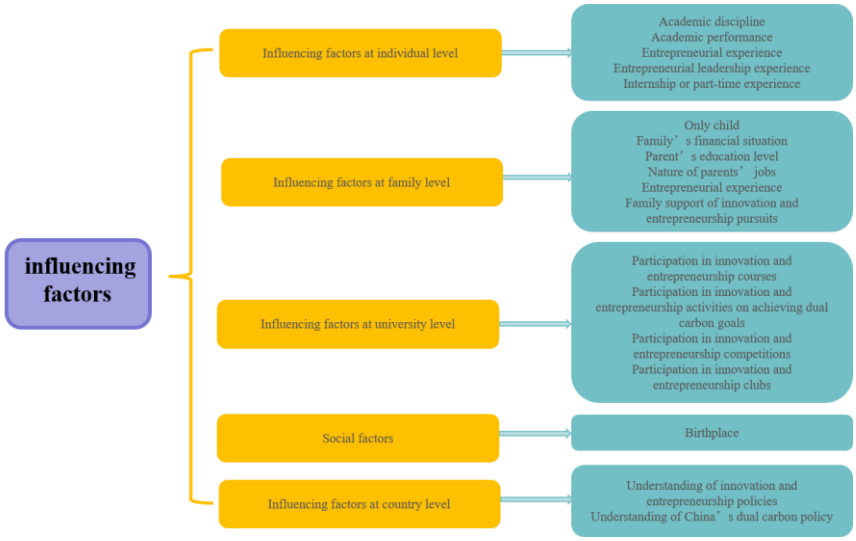

Figure 2: Factors Influencing Innovation and Entrepreneurship Competencies in Meeting Dual Carbon Targets

C. Data Retrieval

The study was conducted using online research and face-to-face interviews, with 200 pieces of data collected. With an effective rate of 91.5%, 183 valid questionnaire responses were obtained after data screening. To meet research requirements, categories in the sample included aspects such as gender, age, academic qualifications, and

academic discipline. In the context of achieving the dual carbon targets, quantitative research on the innovation and entrepreneurship competencies of university students involved the collection of data on family, school and social conditions as well as national policy.

D. Data Analysis

1) Analysis on the Impact of China's Industrial Innovation and Entrepreneurship Policies: There was a significant positive correlation between the national innovation and entrepreneurship policies for industries involved in the achieving of dual carbon goals and the innovation and entrepreneurship competencies of university students. Moreover, there was a significant positive relationship between the country's innovation and entrepreneurship policies for industries involved in the achieving of dual carbon goals and innovation and entrepreneurship competencies in all sub-categories. These results are consistent with Chinese scholars' findings that national policies are a significant influencing factor in university students' innovation and entrepreneurship competencies. China's innovation and entrepreneurship policy for industries involved in reaching the dual carbon goals pointed out the development direction for students' innovation and entrepreneurship practices and development of competencies. It also states specific requirements for talent training, and promotes the improvement of university students' innovation and entrepreneurship competencies.

2) Analysis on the Impact of Dual Carbon Policy on Innovation and Entrepreneurship Courses and Activities: The second important influencing factor is innovation and entrepreneurship courses. There was a significant positive correlation between innovation and entrepreneurship courses and activities and university students' innovation and entrepreneurship competencies. Moreover, there was a significant positive correlation between innovation and entrepreneurship courses and all innovation and entrepreneurship sub-competencies. This shows the importance of innovation and entrepreneurship courses in developing and enhancing the innovation and entrepreneurship competencies of university students. It is imperative to promote innovation and entrepreneurship education based on the dual carbon targets among university students, specifically holding special training, lectures, and discussions with entrepreneurs focusing on the dual carbon goals. The quantitative data further showed that even innovation and entrepreneurship lectures and training and activities that do not focus on the dual carbon goals had a positive impact on the improvement of university students' innovation and entrepreneurship competencies.

3) Analysis on Impact of Family's Financial Situation: Contrary to expectations, there was no correlation between university students' innovation and entrepreneurship competencies and their families' financial situation in industries related to the achieving of dual carbon goals. While families' financial situation has a slight negative correlation with analytical and innovation skills, there was no association with all other sub-categories in innovation and entrepreneurship competencies. Thus, the new industry model of realizing the dual carbon targets offers more opportunities for university students to pursue innovative entrepreneurship. Families' financial situation should not be a critical factor for university students to pursue innovation in reaching the dual carbon goals. Thus, it can be concluded that the majority of university student do not believe emerging industries involved in achieving the dual carbon goals contradict traditional value distribution.

E. Education Optimization Strategies

The era of dual carbon is approaching. With the increasing popularity of related technologies, China has launched a number of supporting policies on this industrial revolution, and the demand for innovation and entrepreneurship talents has gradually increased to meet the dual carbon goals. In the new era of carbon peaking and carbon neutrality, renewable energy and related industries will offer growth opportunities. Innovation and entrepreneurship education will inevitably result in significant changes in teaching methods amid the dual carbon era.

New teaching methods such as MOOC and micro courses can be adopted to create a conducive learning environment and achieve the dual carbon targets. The "online + dual carbon" model makes it easier for university students to explore knowledge related to the dual carbon goals, and learn more about carbon peaking and carbon neutrality based on their career directions, preferences, and learning habits. Scholar Xu Ming believes that higher education institutions should focus on fostering students' entrepreneurial awareness and training related to entrepreneurial and innovative skills. Therefore, innovation and entrepreneurship courses related to the dual carbon goals should be added to train students with good entrepreneurial motivation and conditions, as well as encourage students to participate in various dual carbon-related skills training and competitions. Training will spark new entrepreneurial ideas and improve cohesiveness. Entrepreneurial teams will be created to integrate quality human resources, while working with like-minded individuals enhances innovation and practical skills.

University students can utilize innovation and entrepreneurship opportunities in the dual carbon era. Creating personal wealth provides more employment opportunities that contribute to the realization of the dual carbon goals, alleviate unemployment, and promote industrial digitalization and digital industrialization in the country.

III. CONCLUSION

The dual carbon economy is expected to dominate during the 14th Five-Year Plan period. Employment in dual carbon-related industries are about to undergo major changes, ushering in a new trend of technological development and promoting innovation and entrepreneurship opportunities. In the era of internet plus, universities need to strengthen the influence of internet thinking on the cultivation of university students' innovation and entrepreneurship ability based on the dual carbon background to meet the education goal. University students' innovation and entrepreneurship competencies are necessary to tackle challenges related to profound changes unseen in a century, and studies on their structural system are urgently needed.

Based on the research findings of university students' innovation and entrepreneurship competencies from various studies, this paper analyzed the current system for fostering innovation and entrepreneurship competencies among university students in meeting the dual carbon goals, laying the foundation to further study the weaknesses of university students in innovation and entrepreneurship. Further research is needed on the innovation competence and quality system for reaching the dual carbon targets among university students, especially those with different personality traits.

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