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Exploring the Mediating Role of Innovation Behavior: Unraveling the Impact of Social Capital on Entrepreneurial Performance in University Business Incubators

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Abstract. Due to the lack of entrepreneurial experience, lagging innovative ideas and insufficient external support, new ventures in university incubators had low entrepreneurial performance and profitability. Therefore, it is of great importance to explore the influence mechanism of corporate social capital on the improvement of entrepreneurial performance. This study analyzed the data of 414 entrepreneurs from university incubators in Guizhou province. Results show that: (1) The structural social capital, relational social capital and connected social capital of entrepreneurial enterprises in university incubators have positive effects on entrepreneurial performance; (2) Exploratory innovation and exploitative innovation of new ventures play intermediary roles in the relationship between social capital and entrepreneurial performance.The results heoretically expand the research scope of social capital theory in the field of innovation and entrepreneurship, and enrich the research on the influencing factors of entrepreneurial performance. It also provides an empirical basis for entrepreneurs to carry out the application of entrepreneurial practice, and provide relevant reference value for the management of university incubator managers.

Keywords: Social capital, Entrepreneurial performance, University Business Incubator, Innovation

1. Introduction

Innovative undertaking, a key determinant of innovation promotion and economic sustainability in a country, contributes to the generation of new products, increase in job opportunities, improvement of living standards, and the reduction of poverty. Business incubators, especially university business incubators (UBIs), have been considered an important platform to support Innovative undertaking, entrepreneurial development and the growth of new ventures (Hassan, 2020; Redondo & Camarero, 2019). UBIs have become an ideal platform for grassroot entrepreneurs as well as a paradise for small technology enterprises owing to the support offered in terms of the transfer of technology and scientific knowledge, development of commodity commercialization, promotion of new ventures, and marketing of advanced and cooperative research (Alonso-Conde, Rentas, & Rojo-Suárez, 2019; Hassan, 2020; Pattanasak, Anantana, Paphawasit, & Wudhikarn, 2022; Pellegrini & Johnson-Sheehan, 2021). UBIs act as intermediaries between new ventures and potential external partners. They help new ventures establish friendly and cooperative relationships with suppliers, professional service providers, financial institutions, or research institutions (Hassan, 2020). Pellegrini (2021) believed that UBIs were a set of ecosystems in which professors, scholars, researchers, and local entrepreneurs initiated new ventures, promoted the development of electronic warfare products and services, and established and accelerated new venture companies (Pellegrini & Johnson-Sheehan, 2021).

Entrepreneurial performance is an indicator to test the success of entrepreneurship (Lukeš, Longo, & Zouhar, 2019). Entrepreneurial performance is multidimensional, which is a result obtained by an organization when it reaches a certain level (Sariwulan, Suparno, Disman, Ahman, & Suwatno, 2020). It is a general term for the achievements and efficiency that can be acquired by new enterprises in the process of starting a business (McGee & Peterson, 2019). New ventures can promote the transformation of scientific research and improve the business performance by utilizing various services provided by incubators, including entrepreneurial service resources such as incubation space, business information, technical support, and knowledge (Fang & An, 2017; Lukeš et al., 2019).

China places considerable emphasis on university innovation. The Chinese government actively accelerates the cooperative development between universities and enterprises, promotes the linkage between universities and external institutions, facilitates the growth of new ventures, and successfully produces innovative products and creates new businesses (Mingxing et al., 2020). In 1990, the Northeastern University established the first UBI in China. After 30 years of exploration and development, UBIs have made remarkable achievements on strengthening resource integration, transforming technological achievements, innovating talent training, facilitating coordinated development, and so on (Liu, 2022). However, despite the enormous contributions of the entrepreneurial enterprises of UBIs to the economic growth and development of entrepreneurship (Pellegrini & Johnson-Sheehan, 2021), they still face a wide range of challenges of entrepreneurial performance, especially the limitation of no access to adequate resources (human and financial), technology, and market information needed for its growth and survival (Al-Damen, 2021; Aldammagh, Abdalmenem, & Al Shobaki, 2020).

Social capital is a series of real and potential social resources embedded in the incubator's social network, which can be contacted or acquired by enterprises (Redondo & Camarero, 2019). Some scholars advocated that new ventures could utilize a series of real and potential social capital embedded in the incubation network to obtain external resource support and entrepreneurial experience, so as to improve the performance of new ventures (Lee & Hallak, 2020; Mahfud, Triyono, Sudira, & Mulyani, 2020). On the contrary, some scholars were against it. They believed that too much social connections would distract the attention of new ventures, strong networks would limit the personal boundaries of new ventures, and excessive investment in network social capital would lead to negative returns. They firmly believed that social capital of new ventures has no correlation with entrepreneurial performance, and even a negative correlation (de Vaan, Frenken, & Boschma, 2019; Li, Wang, Huang, & Bai, 2013). Therefore, it is worth discussing whether social capital of enterprises of UBIs have an impact on

entrepreneurial performance. This study draws on social capital theory. Firstly, the dimensions of social capital of start-ups in incubators are determined, and a theoretical model of the impact of social capital on entrepreneurial performance is constructed by deductive method. Secondly, using multiple regression analysis method, this paper empirically analyzes the impact of social capital on entrepreneurial performance in university incubators, and uses objective data to test the relationship between social capital and entrepreneurial performance. This is the first contribution of this study.

The initial venture capital, core employees, orders, scale, and performance of a new venture are mainly acquired through the commercial and social relationship network of the entrepreneur (Redondo & Camarero, 2019). The wider the range of an entrepreneur's relationship resources, the easier it is to acquire the relevant information and resource support (Lee & Hallak, 2020). Furthermore, the internal support synergy of meeting, interacting, and sharing with like-minded people can augment the development of new venture experience, a key factor for the successful incubation of new ventures (Li et al., 2013).

According to Social Capital Theory, social relations form actual or potential resources in the network, which are not owned by individuals but constitute mutually tacit or recognized institutionalized relationships (Mercado & Vargas-Hernández, 2019). Individuals could obtain these resources through purposeful actions so that their actions could benefit them (Ganguly, Talukdar, & Chatterjee, 2019). For new ventures, this purposeful and active action is reflected in enterprises' innovation behaviour (Zeb & Ihsan, 2020). In incubator networks, internal knowledge sharing and information communication can promote collaborative innovation (C. Wang & Hu, 2020). Furthermore, integrity and contract encourage organization members to speak up and share knowledge (Castaneda & Cuellar, 2020). The shared vision, values, and language help organization members to collaborate to practice innovation (Gui, Lei, & Le, 2022).

The enterprise's innovation strategy of companies covers two modes: One is to continue historical experience and traditional strategies to reduce costs. For example, improving product functions according to changes in consumer needs (Gama, Sjödin, Parida, Frishammar, & Wincent, 2022); expanding the scale of production, reducing fixed costs and obtaining scale economy benefits (Cantwell, 2002); Improving the utilization efficiency of distribution channels, penetrate deeply into the market, expand the market scale and increase market share (Zeb & Ihsan, 2020). The other is to abandon historical practices and develop new products to stimulate new consumer demand as well as develop new distribution channels through outsourcing or customer fission (Callegari & Nybakk, 2022). Diversification strategy enables enterprises to maintain new markets and assets (Sun, Liu, & Ding, 2020).

On the one hand, some scholars have believed that new ventures can acquire temporary monopoly to enhance entrepreneurial performance by acquiring new knowledge, developing new products, exploring new services, and creating new markets (Ceipek, Hautz, De Massis, Matzler, & Ardito, 2021; Sun et al., 2020). On the other hand, the existing experience, knowledge, technology, and market of the enterprise should be followed, and the enterprise performance should be achieved by improving technology and expanding the original market (Ceipek et al., 2021; Sun et al., 2020). Whether it is market development or technological improvement, it is the result of knowledge change, social relations improvement and ideological transformation (Cao, Xing, & Zhang, 2021; Cofré-Bravo, Klerkx, & Engler, 2019; Zhang, Zhang, & Song, 2019).

Current work analyses how incubator managers promote the development of incubators and social capital in incubators, and the impact of social capital on the success of incubators. However, little attention has been paid to the influence of managers' social capital initiative on entrepreneurial performance. In particular, how the various dimensions of social capital affects entrepreneurial performance through innovation behavior has not been well explained, which is a gap in existing research.Therefore, another contribution of our research is to explore the effect of social capital on

entrepreneurial performance through innovative behavior from the perspective of entrepreneurial behavior. Mediation test analysis methods will be used to verify the results.

To sum up:, the research objectives of this study are as follows:

1.To verify the relation between social capital and entrepreneurial performance of new ventures supported by UBIs.

2. To determine the impact of different dimensions of social capital on entrepreneurial performance

3. To analysis the mediating effects of innovation behaviour on the social capital and entrepreneurial performance of new ventures supported by UBIs.

2. Literature review

2.1.Theoretical Foundations

The meaning of social capital is the relationship between a group of people who have something in common (Mahfud et al., 2020). It is called "capital" because the resulting relationship is the asset of its members (Sánchez-Arrieta, González, Cañabate, & Sabate, 2021). Adam Smith, the father of classical economics, believed that markets operate by the "invisible hand" as well as moral and other ideas. Accordingly, appropriate "moral sentiment" and "moral behaviour" will promote the development of new economy to a certain extent (Smith, 1937). Pierre Bourdieu (1992) demonstrated that "social capital" was social reputation, title for the symbol, in the form of social statute as institutionalized, actual, or potential resource collection. The resources of a durable network were inseparable. This network was familiar to all and was a type of institutional network of relations (Bourdieu, 1992). Ronald Burt (1992) defined corporate social capital as "a network structure that can bring and control resources to enterprises." (Burt & Celotto, 1992). The corporate social capital was defined as "tangible or virtual resources owned by an enterprise, which can be continuously increased by promoting social relations to achieve goals." (A. Purwati, Budiyanto, Suhermin, & Hamzah, 2021).

Social capital theory states that social relationships and networks can provide valuable resources to participants and lead to development (Dubos, 2017; Kreuter & Lezin, 2002). This is what social capital is built for - development, productivity and overall growth. When people with the same goals come together as a group, they can pool resources, share information and collaborate at the community level (Swanson, Kim, Lee, Yang, & Lee, 2020). Social capital could be divided into cognitive social capital (CSC), structural social capital (SSC), and relational social capital (RSC) (Narayan & Cassidy, 2001). Cognitive Social Capital(CSC) is formed among homogeneous people who having common values, languages, and norms (Mercado & Vargas-Hernández, 2019). Structural Social Capital(SSC) mainly refers to the relation and network structure of individuals, the connection mode between network subjects or network environment (Cofré-Bravo et al., 2019). SSC is reflected in the density, connectivity, and hierarchy of relationships among network members. Relational Social Capital(RSC) indicates the degree to which network members maintain close relationships (Cofré-Bravo et al., 2019).

Social capital is now significant in private and professional circles (Huang, Yu, Shao, Yu, & Li, 2021). Even business organizations and employees are using it for shared tasks. Therefore, social capital theory has been widely applied to organizational behaviour management, such as community governance, education promotion, employee performance, organizational performance, etc (Huang et al., 2021; Razzaque, 2020; Rodriguez-Plesa, Dimand, & Alkadry, 2022; D. Wang & Li, 2022) . When people with the same goals come together as a group, they can pool resources, share information and collaborate at the community level (Fan, Sun, & Lan, 2019).

In the UBI network, the social capital of new ventures is acquired from the cooperative relationships between network agents, which are strengthened by shared perception (Redondo & Camarero, 2019). The bridge function of incubator has provided an effective guarantee for new ventures to establish rich

social relations, making it easier for them to acquire professional consulting services, technical assistance, financial support, policy support, and market information (Battisti & McAdam, 2012). Furthermore, the cluster advantage of the network can help the new venture and other network members to share cognition, common value, and vision; create a network synergistic effect; and improve the efficiency of sharing resources (Ascigil & Magner, 2009; Mercado & Vargas-Hernández, 2019).

Social relationships and networks can provide valuable resources for participants and lead to development(Ganguly et al., 2019). Therefore, we used the theoretical framework of social capital to model the relationship between corporate social capital and entrepreneurial performance in the incubator network. The influence of common cognition, positive interaction and relationship bond among homogeneous people in university business incubators on entrepreneurial performance was discussed.

2.2.Social Capital and Entrepreneurial Performance of New Ventures

Social capital of new ventures supported by UBIs are a series of real and potential resources embedded in social networks, which can be contacted or acquired by individuals or social units (Mahfud et al., 2020; Mercado & Vargas-Hernández, 2019). Social capital has a positive influence on Entrepreneurial Performance of New Ventures because it can make the communication process more manageable and ensure that it has business value. Building networks make a vital process of sharing information and providing access to resources and knowledge (Ganguly et al., 2019). Substantial social capital makes it easy to exchange ideas, give rise to creative innovation ideas (Li et al., 2013; Sánchez-Arrieta et al., 2021), and share information simultaneously, which ultimately improves the business performance of entrepreneurs (Battisti & McAdam, 2012; Rakthai, Aujirapongpan, & Suanpong, 2019). Social capital heterogeneity refers to the uneven endowment of entrepreneurs with social resources in terms of network range (Sánchez-Arrieta et al., 2021), relations and contact resources. Social capital heterogeneity of entrepreneurs leads to varieties of firm performance.

Cognitive Social Capital referred to individuals having common values, languages and norms (Redondo & Camarero, 2019). Nan Lin(1986) emphasized the preexistence of social capital in the definition of social capital, which existed in certain social relations or social structures, and people must follow the rules in order to obtain the social capital needed for social actions. Bøllingtoft (2012) revealed that new ventures of new ventures utilize incubation network social capital through the following two aspects: First, the spatial proximity of new ventures promotes the establishment of daily contractual relationships among entrepreneurs. Incubators develop personal relationships through daily relationships to form relationship networks (Battisti & McAdam, 2012). Second, incubators formulate the entry, exit, and screening criteria for new ventures, reflecting the common values and normative expectations of incubators (Gu, Xie, & Wang, 2016). Furthermore, incubators promote the formation of a network of common values for new ventures. Individuals share common values, languages, and norms, enabling better communication, exchange, and knowledge sharing (Mercado & Vargas-Hernández, 2019). When the products are produced, the benefit trading network is constructed through a new channel and the profits are finally realized, thereby improving entrepreneurial performance.

H1: In the context of UBIs, CSC positively correlates with the entrepreneurial performance of new ventures.

Structural Social Capital mainly referred to the relationship and network structure of individuals, which was the connection mode between network subjects or network environment, and was reflected in the density, connectivity and hierarchy of relationships among network members (Abdulai, 2019). The compact network is conducive for sharing learning and information exchange among network members, thereby promoting entrepreneurs to acquire new knowledge, identifying innovative opportunities, and improving innovation performance (A. A. Purwati, Budiyanto, & Suhermin, 2022). The social capital of new ventures is derived from collaborative relationships between network agents, which are reinforced through shared perceptions (Mercado & Vargas-

Hernández, 2019). The bridge function of incubator provides an effective guarantee for enterprises to establish rich social relations, making it easier to acquire policy support, financial support, professional consulting services, technical assistance, and market information (Battisti & McAdam, 2012).

H2: In the context of UBIs, SSC positively correlates with the entrepreneurial performance of new ventures.

Relational Social Capital was the degree to which network members maintained close relationships. Relational social capital of university business incubators could be characterized by trust, mutual benefit and group identity (Abdulai, 2019; Narayan & Cassidy, 2001). In the communication process, individuals are more inclined to choose those with higher expectations as partners (Wong & Reevany, 2019). When starting a business, entrepreneurs usually choose those who are consistent or comply with their entrepreneurial ideas to exchange ideas (Cofré-Bravo et al., 2019). Trust and common identity promote participants' willingness to help each other, reduce the risk of entrepreneurship, and promote entrepreneurial performance (Swanson et al., 2020). Several scholars have believed that new ventures can use the center position of incubation network and RSC to acquire useful knowledge, resources, and information, thereby promoting innovation and entrepreneurship activities and improving the performance of new ventures (Battisti & McAdam, 2012; Gu et al., 2016; Marie et al., 2022). Accordingly, the following hypothesis are proposed:

H3: In the context of UBIs, RSC positively correlates with the entrepreneurial performance of new ventures.

2.3.Social Capital and Innovation Behavior of New Ventures

Innovation theory holds that innovation is a process of obtaining potential benefits by introducing new production factors into the existing production system or recombining production factors (Castaneda & Cuellar, 2020). Innovation is the "destruction of creativity", which means the establishment of a new production function, including not only technological innovation represented by product and process innovation, but also non-technological innovation such as organizational change and marketing capability (Gui et al., 2022).

For Rogers (2003), the innovation process consists of five processes: knowledge, persuasion, decision, implementation and confirmation. These five stages usually follow each other in a chronological manner. Enterprise innovation is embodied in the transformation of scientific and technological activities in which enterprises transform capital, labor, raw materials, information and other resources into products with market value (Zeb & Ihsan, 2020). Technological innovation is the most important innovation activity, which refers to the process of synthesizing existing knowledge or transforming new technology into productive force through its first popularization and application(Castaneda & Cuellar, 2020). Scholars have opined that interactive behaviours such as knowledge sharing and information communication within organizations can effectively reduce conflicts and incoordination among individuals and promote cooperation. Most scholars have demonstrated that the process of frequent and constant discussion promotes the collision of ideas and the emergence of new ideas, thereby effectively promoting creativity and inspiration (Al-Damen, 2021; Aldammagh et al., 2020).

Both exploratory innovation and exploitative innovation were key factors for the success of entrepreneurship (Arzubiaga, Maseda, & Iturralde, 2019; Gama et al., 2022). However, due to the difference in knowledge base and resource endowment of new ventures, it was difficult to ensure that new ventures implemented exploratory innovation and exploitative innovation at the same time due to the limited resources. Therefore, it was need to weigh which innovation method could better improve entrepreneurial performance in terms of technology or market choice.

The sharing of experience or common resources in the process of innovation growth, such as ways to quickly obtain venture capital, can help new ventures save trial and error costs, improve innovation

risk management, and promote innovation (Zeb & Ihsan, 2020). Furthermore, good faith and contract can effectively strengthen trust among members, reduce knowledge protection and caution caused by distrust and caution. This approach can effectively promote knowledge sharing, creative exchange, and technology sharing among members of the organization (Cao et al., 2021). Meanwhile, the cognitive guarantee of spiritual pillars, such as the formulation of consensus goals, consistency of value orientation, achievement of common vision, can help organization members to make concerted efforts toward the practice of innovation behaviour (Zhang et al., 2019). Scholars have generally believed that knowledge sharing, psychological trust and consensus can promote innovative behaviour of developing new products and creating new markets, which is referred to as exploratory innovation behaviour (Cao et al., 2021; Cofré-Bravo et al., 2019). The integration of exploratory innovation on knowledge resources reflects the influence of social capital on innovation behaviour. Accordingly, the following hypotheses are proposed:

H4a: Social capital effectively promotes exploratory innovation of new ventures supported by UBIs.

H4a1: CSC significantly correlates with exploratory innovation.

H4a2: SSC significantly correlates with exploratory innovation.

H4a3: RSC significantly correlates with exploratory innovation.

The long-term interaction between network subjects can result in mutual benefit, mutual trust, and long-term stable interaction (Engbers, Thompson, & Slaper, 2017). This interactive relationship provides an informal credit guarantee mechanism for the establishment of cooperation between the two sides, promotes the effective transfer of tacit knowledge of enterprises, and significantly helps enterprises to expand production and market networks along the established innovation path (Mercado & Vargas-Hernández, 2019). Moreover, network structural capital provides related heterogeneous knowledge and market information for enterprise innovation activities, which benefits enterprises to acquire integrated resources at a faster and lower cost (Sánchez-Arrieta et al., 2021). They have quickly adjusted and improved enterprise operation efficiency and value creation process. All subjects in the incubator network possess similar knowledge and thoughts (Hassan, 2020). The network subjects understand each other and share common values, thereby promoting mutual learning among new ventures as well as facilitating product development and improvement, market strategies, and organizational forms (Cofré-Bravo et al., 2019). This enables incubated enterprises to re-understand the deficiencies of existing products, acquire knowledge, and use external knowledge for reintegration, thereby continuously improving the performance of existing products (Zhang et al., 2019).

This type of innovation behaviour using the existing experience, knowledge, technology, and market through continuous improvement of products, services, and business model to meet the needs of existing customers or market is called exploitative innovation (Gui et al., 2022). Accordingly, the following hypothesis are proposed:

H5a: Social capital effectively promotes exploitative innovation of new ventures supported by UBIs.

H5a1: CSC significantly correlates with exploitative innovation

H5a2: SSC significantly correlates with exploitative innovation

H5a3: RSC significantly correlates with exploitative innovation

2.4.Innovation Behaviour and Entrepreneurial Performance

Innovation Theory of Profit posits that the main function of the entrepreneur is to introduce innovation and to give profit in the form of rewards for his performance (Nakamori & Nakamori, 2020). According to Schumpeter, who proposed the theory and believed that an entrepreneur can earn economic profits by introducing successful innovations (Sweezy, 1943), innovation is any new policy adopted by an entrepreneur to reduce the overall cost of production or increase the demand for his or her products

(Cantwell, 2002). It can be the adoption of new production methods, the introduction of new technology, the introduction of new machinery to reduce the total production cost (Sun et al., 2020). It can also be the activities of introducing new commodities, opening up new markets, looking for new materials, designing new varieties to increase the demand for products (Callegari & Nybakk, 2022). The Innovation Theory of Profit holds that if an entrepreneur's innovation successfully reduces the overall production cost or increases the demand for the product, then the entrepreneur will make a profit (Callegari & Nybakk, 2022; Cantwell, 2002).

Exploratory innovation helps acquire new knowledge, develop new products, explore new services, and create new markets. Entrepreneurship is flexible and pioneering, enabling enterprises to maintain new assets (Arzubiaga et al., 2019). In applying exploratory innovation strategy, new ventures will not rely on familiar knowledge and experience. Even the previous experience will hinder enterprises from searching for new knowledge in the market to promote exploratory innovation in order to sell new products in emerging markets. If better products than those in the current market are developed to meet the needs of consumers, enterprises may be benefitted by higher market returns (Arzubiaga et al., 2019; Gama et al., 2022). Furthermore, enterprises may be benefitted through improved corporate image, reputation, and brand value (Nakamori & Nakamori, 2020). Accordingly, the following hypothesis is proposed:

H4b: Exploratory innovation effectively promotes the entrepreneurial performance of new ventures supported by UBIs.

Exploitative innovation is another form of innovation (Arzubiaga et al., 2019). New ventures are often faced with risks of product or service development, narrow market, and limited resources (Zeb & Ihsan, 2020). Accordingly, new ventures use the exploitative innovation strategy to continuously enhance the quality of existing products, improve the utilization efficiency and reliability of distribution channels, and promote enterprises to create more value in the market through scale expansion by expanding and utilizing existing resources, knowledge, and skills (Arzubiaga et al., 2019; Gama et al., 2022), as well as by continuously maintaining enterprise growth of probit. Accordingly, the following hypothesis is proposed:

H5b: Exploitative innovation effectively promotes the entrepreneurial performance of new ventures supported by UBIs.

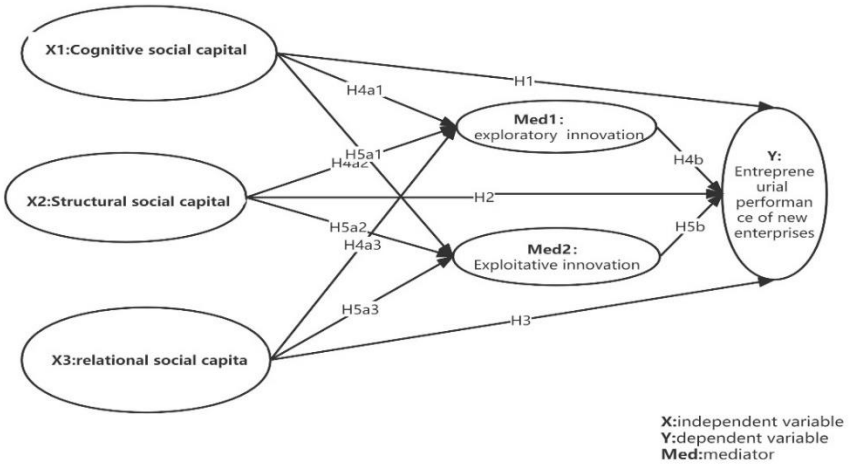

Fig. 1: The research theoretical framework

3. Methodology

3.1.Measurement of variables

In order to validate the propositions made in this research study, a five-point Likert scale (1=strongly disagree to 5=strongly agree) was developed. Three dimensions of social capital, i.e. Cognitive, Structural and Relational social capital were adapted from the scale of Redondo et al (2019). These three dimensions comprises of 3, 3 and 4 items respectively. For measuring employee innovative behaviour of entrepreneurs, exploratory innovation and exploitative innovation was measured by the Yuan (2018). The two dimensions comprise of 3 items respectively. Based on the Walker and Brown (2004), Yuan(2018) , profitability performance, growth performance and innovation performance were used to measure the entrepreneurial performance in the study. These three dimensions comprises of 2, 3 and 3 items respectively. For maximizing the response rate and for the better understanding of Chinese respondents. this questionnaire was translated into Chinese language.

3.2.Population and sampling technique

The target respondents for this study are managers of new ventures of UBIs in Guizhou Province in China. Guizhou Province, which is located in the hinterland of southwest of China, is a provincial administrative region of the People's Republic of China. Guizhou Province is currently derived from innovation and entrepreneurship drive. As of December 2021, there were 18 university business incubators in Guizhou Province with 1506 new ventures. The managers of 1506 new ventures are our population of the study. Figure 2 shows the distribution of university business incubators in Guizhou Province.

The study approximated the sample size of the sample using the formula for calculating the sample size by simple random sampling commonly used in social survey research (Feng, 2018; Wu, 2018). After calculation, it can be known that the minimum sample size required for the study is 306. The total number of new ventures in each incubator could be retrieved from the statistical website, and the level of each university incubator (national, provincial and general) could be determined. But we did't have access to a database of all the businesses in each incubator. Therefore, Stratified sampling and purposeful sampling techniques were used to collect data on the managers of these new enterprises.

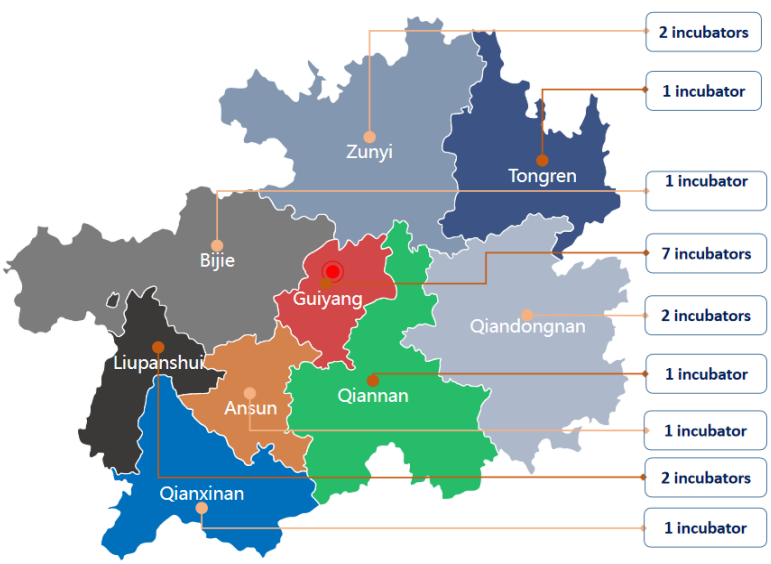

Fig. 2: The distribution of university business incubators in Guizhou Province

3.3.Sampling and survey process

In order to ensure a reasonable and adequate sample size, it is necessary to increase the sample size. On the basis of the minimum sample size, increase the sample size of each category by 50%, that is, expected sample size are 459. Therefore,we sent out a total of 459 questionnaires from January 2022 to March 2022. Each questionnaire was screened to exclude copies with severely missing data and linear patterns. After data screening, 414 questionnaires were retained for estimation. Statistical remedies

were used to address potential common methodology biases. The data results of the effective questionnaire showed that the number of entrepreneurs with bachelor degree was the largest, accounting for 62.62%; The number of employees was concentrated between 6 and 10 people, accounting for 42.5%; The incubation time was mainly less than 3 years.

3.4.Data analysis

SPSS.26 and AMOS.24 software were used for data analysis work. SPSS mainly did the fundamental data analysis, while AMOS allows for more rigorous structural equation modeling (SEM), can retain the complete information of variables, and can evaluate complex models. First, in SPSS, descriptive statistical analysis and internal consistency reliability analysis of each variable, validity analysis, and correlation analysis between variables were conducted. Second, we tested the fit of latent variables through confirmatory factor analysis (CFA) with maximum likelihood estimation in AMOS. Third, the study used SEM to verify the research model and hypothesis. Finally, we used 5000 subsamples and set a 95% confidence level for the significance of the mediating effect of Exploratory and exploitative innovation, which mastered the influence path relationships between various variables.

4. Result

4.1. Descriptive Statistics

In order to analyze the nature of the data and variables, descriptive statistics were conducted. Table 1 presents the values of minimum, maximum, mean and standard deviation from these analyses.

Table.1: Descriptive Statistics (n= 414)

Variables	Minimum	Maximum	Mean	Std. Deviation
Profitability Performance	1	4	2.87	.670
Growth Performance	1	4	2.84	.452
Innovative Performance	1	4	2.79	.572
Cognitive Social Capital	1	5	3.55	.871
Structural Social Capital	1	5	3.41	.866
Relational Social Capital	1	5	3.63	.833
Exploratory Innovation	1	5	3.26	.784
Exploitative Innovation	1	5	3.36	.909

4.2.Reliability and Validity

Although researchers adapted previously validated and reliable scales for present study, however, the revalidation for the reliability of these scales was very important. Therefore, Cronbach's Alpha reliability test was conducted using SPSS26.0. Table 2 provides the Alpha reliability values for social capital、innovation behavior and entrepreneurial performance.

All measures resulte in higher Cronbach's Alpha reliability. The Cronbach's Alpha value of 0.6 or higher is considered as a reliability proof for scale and suggests its acceptability for use in study (Pallant et al., 2016). Since the Alpha values of present study measures are all higher than 0.7, they were found reliable to test the hypotheses of this study.

Table.2: Cronbach’ s Alpha reliability analysis(n=414)

Sr.No	Study variables	Number of items	Cronbach’s Alpha reliability
1	Profitability Performance	2	0.821
2	Growth Performance	3	0.739
3	Innovative Performance	4	0.792
4	Cognitive Social Capital	3	0.866
5	Structural Social Capital	4	0.850
6	Relational Social Capital	4	0.863

7	Exploratory Innovation	3	0.819
8	Exploitative Innovation	3	0.867

Validity refers to the extent to which the scale can accurately measure a variable. The test results in Table 3 indicate that the Kaiser–Meyer–Olkin test value was 0.852, greater than 0.70. Bartlett sphericity test results indicated that the approximate Chi-square value was 6503.792, which was relatively large. The probability of significance was 0.000 (P < 0.01), implying that factor analysis is feasible.

Table.3: KMO and Bartlett tests

KMO		.852
Bartlett's sphericity test	Approximate chi square	6503.792
	Degrees of freedom	435
	Sig.	.000

Rotation component matrix is the correlation between common factor and item after rotation of factor, also known as rotation factor load, which represents the weighted way of item to each common factor. According to factor load evaluation criteria, factor load greater than 0.5 can be accepted (Pallant et al., 2016). The convergent validity is the level at which the similar idea of a contract is evaluated by multiple items (Hair, Sarstedt, Matthews, & Ringle, 2016).This study followed these criteria recommended by Hair et al. (2016), related to AVE, composite reliability (CR), and factor loadings for the establishment of convergent validity. The results are provided in Table 4, and we can see that the printed load of each item is higher than 0.5, and there is no high double factor load. these values are within permissible range, because the lowest allowable values of AVE and CR are 0.570 and 0.636.

Table.4: Estimation of loading, AVE and CR

Construct	Items	1	2	3	4	5	6	7	8	AVE	CR
PP	PP 1	.888								0.803	0.820
	PP 2	.904									
GP	GP 1		.770								
	GP 2		.723							0.570	0.637
	GP 3		.770								
IP	IP 1			.814							
	IP 2			.819						0.639	0.689
	IP 3			.764							
CSC	CSC 1				.838						
	CSC 2				.825					0.691	0.729
	CSC 3				.830						
SSC	SSC1					.848					
	SSC2					.856				0.690	0.728
	SSC3					.787					
RSC	RSC1						.817				
	RSC2						.826			0.640	0.636
	RSC3						.776				
	RSC4						.781				
ERI	ERI1							.821			
	ERI2							.814		0.652	0.699
	ERI3							.787			
ETI	ETI1								.838		
	ETI2								.795	0.691	0.729
	ETI3								.860		

Note: Extraction method: principal component analysis.

4.3.Correlation Analysis

Pearson correlation coefficient is a linear correlation coefficient used to reflect the degree of linear correlation between two variables. Pearson correlation denotes the size of the correlation coefficient, which can range between −1 and +1. Significance (bilateral) P-value coefficient denotes the correlation between variables. The calculated results of the correlation among the dimensions of social capital, innovation behaviour, and entrepreneurial performance of entrepreneurial enterprises are presented in Table 5. The correlation coefficients among all variables are positive and less than 1. The P values are all less than 0.05, and most of them are less than 0.01, implying a significant positive correlation between all variables.

Table.5: Pearson product Moment Correlation Analysis of the variables (n=414).

Items	1	2	3	4	5	6	7	8
PP	1							
GP	.137**	1						
IP	.052*	.290**	1					
CSC	.174**	.350**	.316**	1				
SSC	.184**	.300**	.256**	.413**	1			
RSC	.189**	.335**	.281**	.336**	.293**	1		
ERI	.202**	.354**	.277**	.298**	.281**	.377**	1	
ETI	.158**	.374**	.334**	.348**	.296**	.353**	.329**	1

*Note. * represents p< 0.05, * represents p<0.01.*

4.4.Hypothesis Testing

In this paper, Amos 26.0 was used to assess the direct effect of social capital on entrepreneurial performance as well as the mediating role of exploratory and exploitative innovation behaviours. A structural equation model of the relation among the three variables was constructed. The model fitting results are presented in Table 6: CMIN of the model was 169.902, DF was 138, χ^2/df was 1.231 < 3, implying a good fit of the model. CFI = 0.991, TLI = 0.989, IFI = 0.991, NFI = 0.945, with all indexes being greater than 0.9, indicating that the model was acceptable. RMSEA was less than 0.08, implying that the model had a good fit.

Table.6: Model fitting results

Indicator	CMIN	DF	χ^2/df	GFI	AGFI	NFI	IFI	TLI	CFI	RMSEA
ideal value			<3	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	<0.08
Goal value			<3	>0.8	>0.8	>0.8	>0.8	>0.8	>0.8	<0.1
fitted value	169.902	138	1.231	0.959	0.943	0.954	0.991	0.989	0.991	0.024

Figure 3 presents the structural equation model. According to the structural equation model, the path coefficients of the relation among CSC, SSC, RSC, and entrepreneurial performance were 0.29, 0.16, and 0.21 (all $t > 1.96$, $p < 0.005$). This result indicates that entrepreneurial social capital positively affects entrepreneurial performance, thereby supporting H1, H2, and H3.

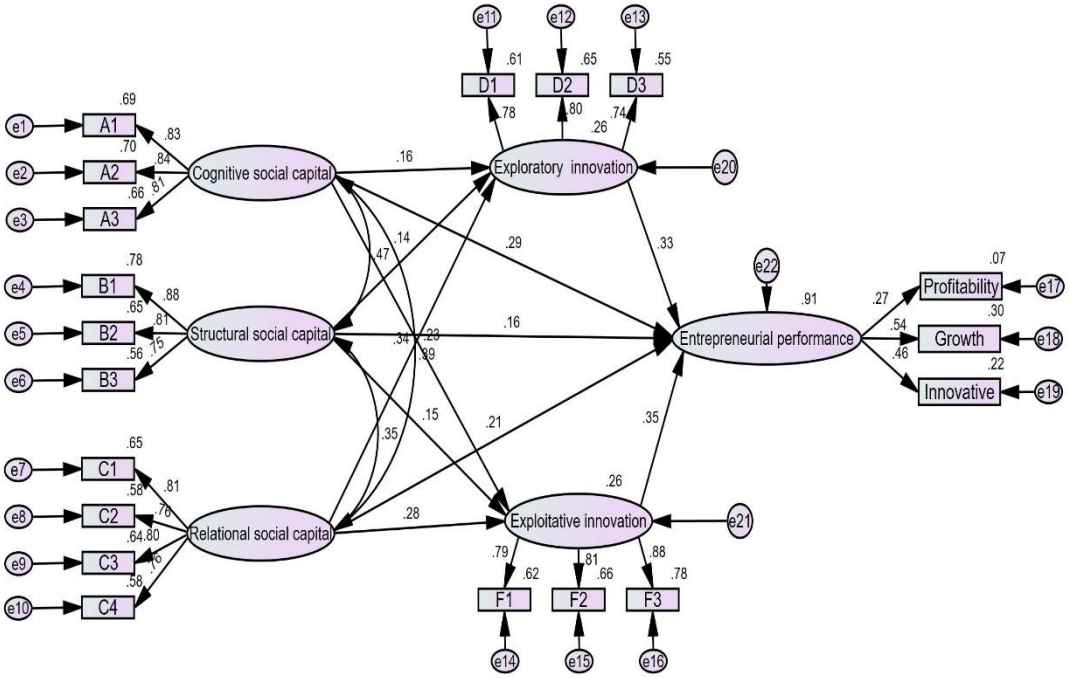

Fig. 3: Standardized path estimation for structural equation models

Table 7 presents the estimated path coefficients. The structural equation model and the estimated path coefficient indicate the following: The path coefficients of the relation among CSC, SSC, RSC, and exploratory innovation were 0.16, 0.14, and 0.34 (all $t > 1.96$, $p < 0.005$). The path coefficients of the relation with exploitable innovation were 0.23, 0.15, and 0.28 (all $t > 1.96$, $p < 0.005$). H4a1, H4a2, H4a3, H5a1, H5a2, and H5a3 were supported. The path coefficients of the relation between exploratory and exploitative innovation and entrepreneurial performance were 0.33 and 0.35 ($t > 1.96$, $p < 0.005$), supporting H4b and H5b. This result indicates that innovation behaviour partially mediates the relation between social capital and entrepreneurial performance.

Table.7: The estimated path coefficients

Relationships	Hypothesis	Std.	UC	S.E.	T	P	Inference
CSC→EP	H1	0.288	0.065	0.022	2.98	0.003**	supported
SSC→EP	H2	0.164	0.041	0.021	1.96	0.05*	supported
RSC→EP	H3	0.21	0.05	0.021	2.323	0.02*	supported
CSC→ERI	H4a1	0.159	0.143	0.058	2.451	0.014*	supported
SSC→ERI	H4a2	0.144	0.146	0.064	2.27	0.023*	supported
RSC→ERI	H4a3	0.341	0.322	0.059	5.454	0.000***	supported
ERI→EP	H4b	0.326	0.081	0.025	3.28	0.001***	supported
CSC→ETI	H5a1	0.227	0.254	0.07	3.639	0.000***	supported
SSC→ETI	H5a2	0.147	0.185	0.076	2.42	0.016*	supported
RSC→ETI	H5a3	0.276	0.323	0.069	4.704	0.000***	supported
ETI→EP	H5b	0.354	0.071	0.02	3.562	0.000***	supported

** represents P＜ 0.05，** represents P＜ 0.01，***represents P＜ 0.001*

4.5.Mediation Effect Analysis

The test results of the structural model (Fig.3) indicate that social capital affects entrepreneurial performance of enterprises through exploratory innovation and exploitative innovation behaviour, thereby continuing the intermediate effect test. In this paper, the bootstrap method was adopted. The mediation effect test was performed at the 95% confidence level. Based on the study of Preacher Z et al., when the bootstrap confidence interval does not contain 0, the corresponding indirect, direct, or total effect exists. The test results of mediating effect are presented in the table 8.

Table.8: The mediating effect result

Relationships	Effect size	Bias-corrected（95%）		Inference
		Lower	Upper	
CSC→ERI→EP	0.012	0.002	0.032	supported
SSC→ERI→EP	0.012	0.001	0.034	supported
RSC→ERI→EP	0.026	0.009	0.057	supported
CSC→ETI→EP	0.018	0.006	0.04	supported
SSC→ETI→EP	0.013	0.003	0.035	supported
RSC→ETI→EP	0.023	0.009	0.049	supported

Analyzing the mediating influence of CSC, SSC, and RSC on entrepreneurial performance through exploratory innovation of intermediary variables, it can be seen that the mediating influence coefficients were 0.012, 0.012, and 0.026, respectively. The value ranges of bias-corrected data were 0.002-0.032, 0.001-0.034, and 0.009-0.057, excluding 0, implying that entrepreneurial social capital had a significant mediating effect on entrepreneurial performance through exploratory innovation, thereby verifying H4a.

Analyzing the mediating influence of CSC, SSC, and RSC on entrepreneurial performance through exploitative innovation of intermediary variables, we can see that the mediating influence coefficients were 0.018, 0.013, and 0.023, respectively. The value ranges of bias-corrected data were 0.006-0.04, 0.003-0.035, and 0.023-0.049, excluding 0, implying that social capital of entrepreneurial enterprises has a significant mediating effect on entrepreneurial performance through exploitative innovation of intermediary variables and verifying H5a.

5. Discussion and Implications

5.1.Discussion of the significant results

Our study aimed to shed new light on entrepreneurial performance by proposing a research model in which innovation behaviour mediated the impact of social capital on entrepreneurial performance of new ventures of UBIs. That was, we developed and successfully gauged 11 hypotheses that consisted of the direct effect of social capital on entrepreneurial performance and the mediating role of innovation behaviour. All of the hypotheses were supported as a result of our empirical study.

In the context of university incubator, cognitive social capital, structural social capital and relational social capital are positively correlated with entrepreneurial performance. Our result confirmed the conclusions of previous studies (Battisti & McAdam, 2012; Gu et al., 2016) and negated the concept that excessive investment in network social capital leaded to negative returns .

Entrepreneurial enterprises have historical interaction and daily contractual relationship through the spatial proximity relationship or the standardized entry and exit mechanism formulated by the incubator manager, thereby establishing mutually recognized culture, language, and norms (Mercado & Vargas-Hernández, 2019) and forming a common value network. The common systematic resources of expression, interpretation, and communication among new ventures facilitate the exchange and flow of knowledge (Li et al., 2013). When a new product is produced, a new channel is used to build an interest trading network and finally realize profits and improve entrepreneurial performance (A. A. Purwati et al., 2022).

UBIs are a “hotbed” of knowledge transfer and technological innovation (Pellegrini & Johnson-

Sheehan, 2021). The frequent interactions of entrepreneurial enterprises in the incubation network generate reciprocity and trust, promote the effective transfer of tacit knowledge among enterprises (Redondo & Camarero, 2019), and significantly expand the exchange of innovative knowledge and experience as well as the innovation path (Mercado & Vargas-Hernández, 2019).

Meanwhile, the structural position of entrepreneurial enterprises in the incubation network determines the level of enterprises' access to heterogeneous knowledge and market information resources in addition to the opportunities for internal innovation exchange, thereby promoting the successful transfer of innovation from universities and improving the ability of universities to successfully transfer innovation to external organizations (Rakthai et al., 2019).

Enterprise innovation includes new product development, technological improvement, organization and coordination, etc., which is the ability basis for enterprises to obtain, transform and shape resources and gain differentiated competitive advantages (Castaneda & Cuellar, 2020). The frequent interaction of entrepreneurial enterprises produces reciprocity and trust, and promotes the effective transfer of tacit knowledge between enterprises (Khairuddin, Haider, Tehseen, & Iqbal, 2021). This approach significantly expands the exchange of innovation knowledge and experience, and expands the innovation path (Cao et al., 2021). Regardless of whether new ventures adopt utilization innovation to improve the original experience or exploration innovation to reconsider, the enterprise can gain certain benefits and promote the performance (Callegari & Nybakk, 2022; Cantwell, 2002), which is the embodiment of the essence of the entrepreneurial enterprise. The research results further reveal that innovation behaviour directly correlates with entrepreneurial performance and has the intermediary performance of shuttling between social capital and entrepreneurial performance.

Theoretically, this new research model helps to examine the catalytic role of the social capital dimension and entrepreneurial performance. In addition, this study provides new insights into the mediating role of social capital in entrepreneur performance management. The intermediary value of innovation behavior is demonstrated. The results of this study provide empirical support for the hypothesis proposed in this paper.

5.2.Implications

As a bridge, incubators establish a rich social network for new ventures, making it easier for them to obtain external policy support, financial support, professional consulting services, technical assistance, and market information (Battisti & McAdam, 2012) as well as increasing the possibility of obtaining external resources and improving the performance. In practice, this study is helpful to realize knowledge exchange and technology transformation in innovation management. On the one hand, it provides management enlightenment for helping new ventures to utilize incubator resources for knowledge exchange, experience sharing and technological innovation so as to promote entrepreneurial success. On the other hand, it is of great practical significance to build a common cognition and culture within the incubator, so as to facilitate enterprises to reach a consensus, strengthen the governance of the network structure to optimize the function of the incubator network structure, strengthen the resource channel, and finally improve the social capital of new ventures under the incubator and improve the entrepreneurial performance of new ventures.

The managers of incubator are the connector of the "structure hole" of the university incubator relationship network(Bliemel et al., 2021). The proactive behavior of managers promotes the connection between entrepreneurial enterprises and other entrepreneurs, universities, governments and intermediaries(Redondo & Camarero, 2019). It promotes the establishment of individual trust and friendship among cluster enterprises, increases the social capital of new enterprises, affects the flow of knowledge, and promotes the development of innovation. Therefore, it is necessary for managers to develop management mechanisms, hold regular communication meetings, and actively strive for external support. The managers of incubators need to think about how to optimize the incubator management system, give full play to the functions of the incubator platform, and build a benefit

transaction network and common value norms for new enterprises, so as to promote the performance improvement of entrepreneurial enterprises.

At the same time, frequent contact, daily interaction, and group training among entrants are conducive to building trust (de Vaan et al., 2019). The close relationship and mutual trust among network members promote the sharing of technical secrets, business ideas, and entrepreneurial experience (Ganguly et al., 2019); reduce the risk of "new entrant defect" when entrepreneurs enter new markets (Sánchez-Arrieta et al., 2021); and improve entrepreneurial performance (A. Purwati et al., 2021). Mutual understanding, shared values, and mutual trust among new ventures effectively promote mutual learning and joint discussion of product development and improvement, market strategies, and organizational forms (Gu et al., 2016). This makes new ventures constantly look at product innovation and improvement, market discovery, or organizational optimization (A. A. Purwati et al., 2022). The entrepreneurial enterprise decides to conduct exploratory innovation activities such as new product creation (Gui et al., 2022), market development (Zeb & Ihsan, 2020), or organizational restructuring for product technology improvement, market penetration, or organizational improvement of exploitative innovation (Sajilan & Tehseen, 2019).

Entrepreneurs need to seriously attach great importance to the accumulation of corporate social capital, actively participate in interactions, strengthen internal and external ties, increase dominance, trust partners, and share experiences.

6. Limitations and Future Research Directions

The limitations of this study are mainly reflected in three aspects: First, the research background of this paper was based on the Chinese context, and only UBIs in Guizhou Province of China were selected as the research objects. Constrained by experience and time, certain limitations exist with regard to the selection of research samples. It will be better if more sample data and more regions can be found for verification. Second, according to the different connotations, functional positioning, operation mode, incubation objects, and investment subjects of business incubators, incubators can be divided into five types: government-led, university, independently operated, in-house, and virtual incubators (Redondo & Camarero, 2019). This paper only discusses the social capital and entrepreneurial performance of entrepreneurial enterprises based on UBIs. Third, this study only focuses on the mediating effect of innovation behaviour on the relation between social capital and entrepreneurial performance of new ventures. Future studies can examine the mediating effect of different variables from different cognitive perspectives.

Future research can be focused on two aspects. On the one hand, the research scope can be expanded to include government-led, independent, internal, and virtual incubators. With the development of the Internet, more focus can be placed on the characteristics and connotation of virtual incubators. The relation between social capital and entrepreneurial performance under different types of incubators can also be compared and analyzed. On the other hand, the research perspective can be changed. Future studies can be conducted from different cognitive perspectives, such as the thinking and path of the impact of social capital on entrepreneurial performance through different business models.

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