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Research Paper

The Impact of Social Capital on the Entrepreneurial Performance of University Business Incubators: The Moderating Roles of Entrepreneurs' Risk-taking and Managers' Proactive Behavior

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Abstract

University incubators are regarded as the main mode of promoting knowledge transfer and innovation development. How to overcome the lack of entrepreneurial experience and obtain positive external support is the key to improve entrepreneurial performance. The purpose of this study is to explore the impact of social capital on entrepreneurial performance through the enhancement of entrepreneurs' risk-taking behavior and incubator managers' proactive behavior. This study employed a quantitative approach: 414 entrepreneurs from 18 university incubators of Guizhou Province in China were investigated through stratified sampling and purpose sampling. SPSS.26 software was used for descriptive statistics, inferential statistics and multiple regression analysis. The analyses revealed a significant direct relationship between social capital and the entrepreneurial performance of new ventures in university incubators. The proactive behavior of incubator managers was found to moderate the relationship between social capital and entrepreneurial performance. Furthermore, entrepreneurs' risk-taking was found to moderate the relationship between relational social capital and entrepreneurial performance but did not affect the impacts of cognitive and structural social capital on entrepreneurial performance.

Keywords: Social capital, Entrepreneurial performance, UBIs, Entrepreneurs' risk - taking, Managers' proactive behavior

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Introduction

Newly established companies often face various challenges, such as limited funding sources, restrictions on marketing plans, and limited business experience, all of which can contribute to entrepreneurial failure. To improve the success rate of new companies and foster business incubation, university business incubators (UBIs) have emerged (Hassan,2020, Redondo & Camarero,2019) . UBIs serve as an ideal platform for entrepreneurs to start their businesses by facilitating technology and knowledge transfer, promoting product commercialization, and nurturing entrepreneurial enterprises (Nicholls-Nixon, et al.,2022) UBIs also provide critical resources, such as office space, physical and financial support, intellectual property guidance, social connections, and legal assistance, to support the growth of businesses. Acting as intermediaries between internal new ventures and external potential partners, they further help establish favorable and collaborative relationships with suppliers, service providers, funding institutions, and research organizations (Mercado & Vargas-Hernández,2019).

The entrepreneurial performance of a new venture, which encompasses the achievements and efficiency gained during the business startup process, is a focal point for UBI managers and entrepreneurs (Shi, et al.,2022). This performance is multidimensional and represents the outcomes attained by an organization when it reaches a certain level. Financial indicators, such as return on equity, sales growth rate, sales revenue, net profit rate, return on investment, and staff size, can be used to measure the performance of new ventures (Batjargal,2003). Alternatively, indicators such as the incubator's entrepreneurial support, enterprise investment, achievement conversion, and level of collaboration with external entities can be employed to evaluate their performance as well (Su & Wang,2018). Regardless of these measures, the challenge lies in identifying how to enhance the entrepreneurial performance of new ventures. Corporate Social Capital Theory suggests that focusing on the services provided by incubators, including incubation space, business information, technical support, knowledge resources, and other entrepreneurial services, can facilitate technology transfer and improve the entrepreneurial performance of new ventures. (Rakthai, et al.,2019, Zhao, et al.,2022).

In this regard, the concept of social capital has gained increasing prominence in entrepreneurship research as a contributor to the growth of innovative new ventures (Mahfud, et al.,2020). Social capital is defined as "a network structure that brings resources to and controls resources for enterprises" (Burt,2000). Within the context of new ventures in incubators, social capital refers to a series of tangible and potential resources embedded in the social network, which can be accessed or acquired by individuals or social units (Marie, et al.,2022). Some scholars argue that new ventures can leverage the social capital embedded in the incubation network to obtain external resource support and entrepreneurial experience, thereby improving their performance (Lee & Hallak,2020, Purwati, et al.,2021). Conversely, other scholars hold the contrasting view that excessive social connections may divert the attention of new ventures, limit their autonomy, and generate negative returns from overinvestment. They firmly argue that there is no correlation, or even a negative correlation, between the social capital of new ventures and entrepreneurial performance (de Vaan, et al.,2019, Li, et al.,2013, Soetanto & Jack,2013). Therefore, it is worth investigating whether the social capital of UBI enterprises impacts entrepreneurial performance.

Entrepreneurs' risk-taking is commonly considered a crucial factor in starting a business, given that entrepreneurship itself is a process of recognizing and seizing novel but inherently uncertain opportunities. To achieve better performance, new ventures often allocate resources to risk policies and actions with uncertain outcomes (Hoskisson, et al.,2017), reflecting the risk-taking strategies of entrepreneurial enterprises. On one hand, Entrepreneurs' risk-taking increases the likelihood of identifying entrepreneurial opportunities (Games & Rendi,2019). On the other, new ventures characterized by risk-taking tendencies may allocate resources to risky strategic choices, such as introducing innovative products to the market (Zeb & Ihsan,2020). As such, this study focuses on the moderating role of entrepreneurs' risk-taking in the relationship between new ventures' social capital and entrepreneurial performance, which has received limited attention in previous research.

To optimize the relationships within the incubator, the willingness of new ventures to participate in activities and reciprocate is crucial for the success of incubator managers. Proactive managers remove barriers that hinder communication and the exchange of resources. Additionally, managers can facilitate network-building and social interactions based on trust and friendship among incubator participants (Redondo & Camarero,2019). In fact, managers can serve as the backbone of an incubator. On one hand, their proactive initiatives can connect new ventures to other networks (Moscoso & Przybysławska,2022). On the other hand, they can strengthen the establishment of trust and friendship among individuals within the organization, enhance the social capital of new ventures, influence the flow of knowledge, and promote entrepreneurial development (Bliemel, et al.,2021, Op den Kamp, et al.,2023). While existing research has analyzed how incubator managers contribute to the development of incubators and social capital within them, as well as how social capital influences incubator success, little attention has been paid to the moderating effect of managers' proactive behavior between social capital and entrepreneurial performance.

Therefore, exploring the relationship between social capital and entrepreneurial performance within the incubator venture context requires examining entrepreneurs' risk-taking and incubator managers' proactive behavior. To address the aforementioned issues, we draw upon social capital theory in this study. Firstly, we identify dimensions of social capital for new ventures in incubators and construct a deductive theoretical model to understand the impact of social capital on entrepreneurial performance. Secondly, through multiple regression analysis and moderation analysis, we empirically test the relationship between social capital and entrepreneurial performance in UBIs, along with the moderating effects of entrepreneurs' risk-taking and incubator managers' proactive behaviors on this relationship. Lastly, based on the specific context of university incubators in Guizhou Province, China, we propose a support system to enhance the entrepreneurial performance of new UBI ventures by leveraging incubator managers' active behavior and entrepreneurs' risk-taking, improving the incubator network structure, enhancing enterprise awareness, and strengthening relationships.

Literature Review

Corporate Social Capital and Entrepreneurial Performance

Social capital refers to the existing and potential resources embedded within a social

network that can be accessed and utilized by individuals or social entities (Aşcıgil,2009, Mercado & Vargas-Hernández,2019, Redondo & Camarero,2019). According to social capital theory, it encompasses the resources available within an individual's social network and how individuals can obtain and effectively utilize these resources for their own benefit (Mahfud, et al.,2020). Forms of social capital include participation, amity, general norms, trust measures, sociability, and voluntarism (Narayan & Cassidy,2001). Redondo (2019) further categorized corporate social capital within incubation networks into three dimensions: cognitive, relational, and structural. Cognitive social capital refers to shared values, language, and norms among individuals, while structural social capital pertains to the relationships and network structure among individuals. Relational social capital is manifested in trust, mutual benefit, and group identity that foster close relationships among network members (Redondo & Camarero,2019).

Social capital within a network structure not only influences information flow but also reinforces the network of relationships. As relationships between individuals strengthen, social capital gradually permeates and becomes embedded within the social network structure (Sánchez-Arrieta, et al.,2021). Individuals occupying structural positions in interpersonal networks possess a competitive advantage, gaining early access to valuable information and resources (Ganguly, et al.,2019).

In UBI networks, the social capital of new ventures arises from cooperative relationships between different network participants and is strengthened through shared perceptions (Mercado & Vargas-Hernández,2019). Incubators, acting as bridges, facilitate the establishment of rich social connections for new ventures, making it easier for them to access professional consulting services, technical assistance, financial support, policy backing, and market information (Nicholls-Nixon & Valliere,2019). Moreover, the clustering effect within the network fosters shared understanding, common values, and vision among new ventures and other network members, creating network synergies and enhancing resource-sharing efficiency (Redondo & Camarero,2019). The following hypotheses outline the expected effects of each dimension of social capital on entrepreneurial performance.

Cognitive social capital and entrepreneurial performance

Bøllingtoft (2012) discovered that new ventures leverage social capital within the incubation network through two main aspects. Firstly, the spatial proximity of new ventures facilitates the establishment of daily contractual relationships among entrepreneurs, through which incubators foster personal connections that lead to the formation of relationship networks. Secondly, incubators establish entry, exit, and screening criteria for new ventures, which essentially reflect the shared values and normative expectations of the incubation environment. This promotes the development of a network with shared values among new ventures (Bøllingtoft,2012). Indeed, shared values, languages, and norms enable better communication, exchange of ideas, and knowledge sharing among individuals (Mercado & Vargas-Hernández,2019). As products are developed and the trading network for mutual benefits is established through new channels, the ultimate realization of profits leads to improved entrepreneurial performance. This creates a closed loop of value creation, value delivery, and value realization (Marie, et al.,2022). Therefore, Hypothesis 1 is proposed as follows:

H1 Cognitive social capital is positively correlated with the entrepreneurial performance of new ventures in UBIs.

Structural social capital and entrepreneurial performance

The compact network within the incubation environment is conducive to the sharing of learning and exchange of information among network members, thereby enabling entrepreneurs to acquire new knowledge, identify innovative opportunities, and enhance their innovation performance (Lee & Hallak,2020). The social capital of new ventures is derived from collaborative relationships between different network actors, which are reinforced by shared perceptions. The bridging role of the incubator serves as an effective means for businesses to establish diverse social connections, thereby facilitating their access to policy support, financial assistance, professional consulting services, technical guidance, and market information (Battisti & McAdam,2012). Therefore, Hypothesis 2 is proposed as follows：

H2 Structural social capital is positively correlated with the entrepreneurial performance of new ventures in UBIs.

Relational social capital and entrepreneurial performance

During the process of communication, individuals tend to gravitate towards partners who share higher expectations. This is especially true when starting a business, as entrepreneurs often seek out individuals who share similar entrepreneurial ideas and visions, and who are acknowledged by themselves as potential idea-exchange partners. Trust and shared identity foster a willingness among participants to assist each other, reduce entrepreneurial risks, and enhance entrepreneurial performance (Gu,2016). Consequently, many scholars argue that new ventures can leverage their central position within the incubation network and tap into relational social capital to access valuable knowledge, resources, and information. This, in turn, promotes innovation and entrepreneurial activities and improves the performance of new ventures (Gu,2016, Marie, et al.,2022, Redondo & Camarero,2019). Therefore, Hypothesis 3 is proposed as follows:

H3 Relational social capital is positively correlated with the entrepreneurial performance of new ventures in UBIs.

The Moderating Role of Entrepreneurs' Risk-taking

Entrepreneurship is a highly risky, resource-consuming, lengthy, and uncertain process that involves leveraging technological advancements to capitalize on market opportunities through knowledge sharing among firms (Abdullah & Othman,2019). Entrepreneurs thus face numerous challenges throughout their entrepreneurial journey, and their psychological resilience empowers them to effectively address these challenges, thereby enhancing their ability to carry out entrepreneurial activities and improve overall performance (Zeb & Ihsan,2020). The success of new ventures also largely hinges on the entrepreneurial traits of individuals who possess creativity, enthusiasm, determination, and adaptability in navigating dynamic environments. These traits enable them to develop new products, explore emerging market demands, and drive enterprise growth (Huang, et al.,2021).

The most defining characteristic of entrepreneurs is their willingness to take risks. (Rakthai, et al.,2019). Risk-taking capacity manifests as a propensity to take calculated risks by venturing into new markets and investing in resources with uncertain outcomes (Salmony & Kanbach,2022). Specifically, the need for achievement represents a psychological force that fuels individuals' continuous pursuit of success and spurs them to take decisive actions (Salmony & Kanbach,2022, Zeb & Ihsan,2020). Numerous studies have explored the role of innovation-related characteristics, including risk-taking ability (Antoncic,2019) and high achievement drive (Huang, et al.,2021), in understanding innovation and entrepreneurial performance.

Considering these arguments, the following hypotheses are proposed in this study:

H4a Entrepreneurs' risk-taking can strengthen the relationship between cognitive social capital and entrepreneurial performance.

H4b Entrepreneurs' risk-taking can strengthen the relationship between structural social capital and entrepreneurial performance.

H4c Entrepreneurs' risk-taking can strengthen the relationship between relational social capital and entrepreneurial performance.

The Moderating Role of The Incubator Managers' Proactive Behavior

The proactive behavior of incubator managers plays a crucial role in fostering social capital and promoting enterprise innovation. Proactivity, within the realm of human resources literature, refers to an individual's behavior of going beyond assigned tasks, being proactive, and continuously overcoming obstacles (Marie, et al.,2022). In the context of incubators, proactive managers are those who exceed formal requirements and actively engage in facilitating relationship building among the incubated enterprises (Redondo & Camarero,2019). Although there is limited research analyzing the role of incubator managers in relationship development, managers have the potential to cultivate social capital within the organization, as well as foster connections between employees and external stakeholders within the incubator ecosystem (Bliemel, et al.,2021).

As previously mentioned, university entrepreneurs often face challenges in accessing external business networks, resulting in "structural holes." However, active managers can fill these gaps by proactively developing social capital (Ghaffar & Hurley,2021) . By connecting new ventures with other networks, managers ensure that incubated startups establish relationships with consultants, financial institutions, and professionals from diverse industries (Hassan,2020). Thus, given that they are facilitators of social capital between individual startups and the incubator community as a whole, the effectiveness of incubator managers' work depends on their initiative and proactivity (Mercado & Vargas-Hernández,2019).

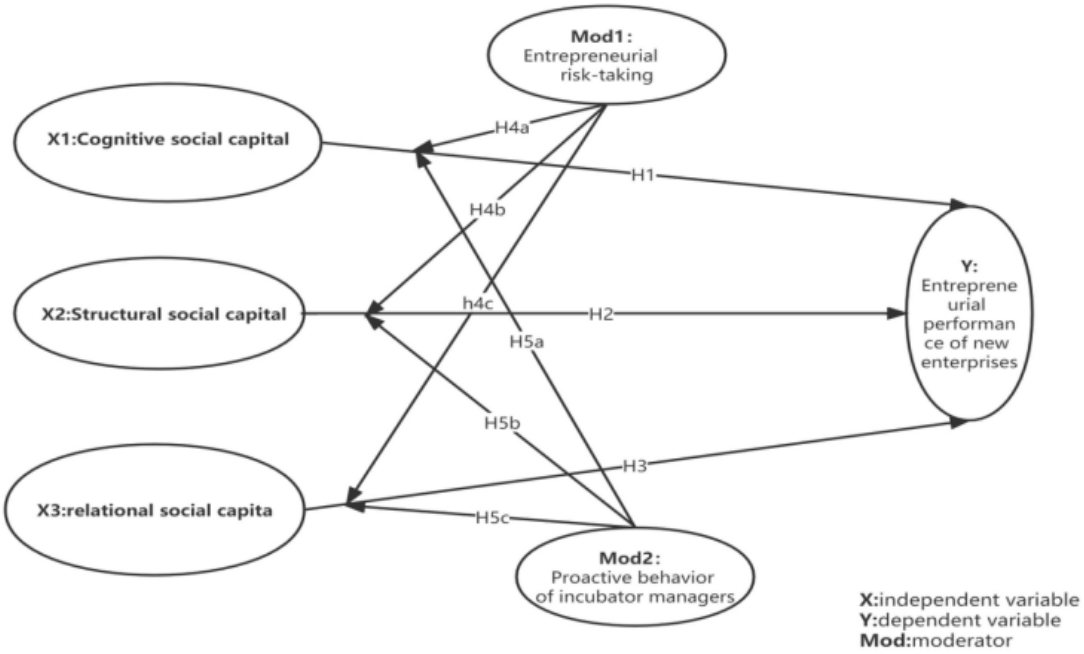
Based on the preceding discussion, the following hypotheses are proposed in this study:

H5a Incubator managers' proactive behavior strengthens the relationship between cognitive social capital and entrepreneurial performance.

H5b Incubator managers' proactive behavior strengthens the relationship between structural social capital and entrepreneurial performance.

H5c Incubator managers' proactive behavior strengthens the relationship between relational social capital and entrepreneurial performance.
The research's conceptual model is shown in Figure 1.

Figure 1: The conceptual model



Methodology

Research Design

The premise of our study assumes that both incubator managers and business leaders are rational subjects who always make choices in the best interest of their businesses or themselves and should not be influenced by emotions and circumstances. At the same time, it is believed that the trust and recognition between subjects within the regulated incubator can strengthen the incubation construction and promote the performance of the company, and that there is an objective causal relationship between the two. The researcher wants to play a "neutral" role to examine the logical relationship between social capital and performance of new ventures. The above discussion is consistent with the ontological, epistemological and methodological positions of positivism. Therefore, quantitative research methods were used in this study.

Sample and Data Collection

The target respondents of this study were the managers of new ventures in UBIs located

in Guizhou Province, China. Guizhou Province is a provincial administrative region situated in the southwest of China and is currently witnessing a surge in innovation and entrepreneurship activities. As of December 2021, there were 18 UBIs in Guizhou Province, housing a total of 1,506 new ventures. However, access to a comprehensive database of the businesses within each incubator was unavailable. Thus, a combination of stratified sampling and purposeful sampling techniques was employed to collect data.

First, the total number of new ventures in each incubator was obtained from a statistics website, and the level of each UBI (national, provincial, or general) was determined. Subsequently, from November 2022 to March 2023, a total of 459 questionnaires were distributed to the managers of these new ventures. Each questionnaire that was returned was screened to eliminate copies with substantial missing data or straight-lining patterns. After the screening process, 414 questionnaires were deemed suitable for analysis. Based on the valid questionnaires, the majority of entrepreneurs in our sample held a bachelor's degree, while most of the sampled ventures had between six and 10 employees and had an incubation time of less than three years. Statistical remedies were then employed to address potential common method bias before proceeding to data analysis.

Measurement Scales

All the measurement items were extracted from past studies and were modified to suit the current context. Entrepreneurial performance was measured with eight items based on the studies by Su and Wang (2018). While the social capital was adapted from Xie (2016). This study combines entrepreneurs' risk-taking in 3 dimensions (Hughes & Morgan,2007). Managers' proactivity was measured by a three-item reflective scale from María Redondo (2019).

To measure the research constructs, a five-point Likert scale ranging from '1 - strongly disagree' to '5 - strongly agree' was utilized. The scale items used to measure the variables were adopted from previous studies in the literature (Glaser, et al.,2016, Mercado & Vargas-Hernández,2019, Redondo & Camarero,2019). In total, 24 measurement items were included in the questionnaire to comprehensively assess the variables, including nine items for social capital (three items each for cognitive social capital, structural social capital, and relational social capital), three items for Entrepreneurs' risk-taking, three items for managers' proactive behavior, and eight items for entrepreneurial performance (three items each for innovative performance and growth performance, and two items for profitability performance). To ensure the appropriateness of the selected scales, an in-depth review process involving four research experts in the field was conducted. Their expertise and insights contributed to enhancing the reliability and validity of the final questionnaire used in the study(Kumar, et al.,2013).

Data Analysis Method

SPSS 26 and PROCESSv4.1 software were used for data analysis work. SPSS mainly did the fundamental data analysis, while PROCESS allowed for more rigorous moderating effect test, could retain the complete information of variables, and evaluated complex models (Shmueli et al., 2016). On the one hand, in SPSS, internal consistency

reliability analysis, validity analysis, significance between independent and dependent variables were conducted. On the other hand, we added the interaction terms and set a 95% confidence level for the significance of the moderating effect of entrepreneurs' risk-taking and managers' proactivity by the PROCESSv4.1.

Reliability and Validity

Table 1 presents the reliability analysis results, demonstrating that the reliability coefficients for each dimension exceeded 0.7. Additionally, the total correlation of the corrected items was above 0.5. Moreover, the Cronbach's Alpha value for each dimension surpassed the communality values of its individual items. These findings indicate that the reliability of each construct met the necessary criteria, and there was no need for item deletion.

Table 1: Reliability tests

Key dimensions and items	Communalities	Cronbach's Alpha
Cognitive social capital 1	0.806	0.866
Cognitive social capital 2	0.81	
Cognitive social capital 3	0.82	
Structural social capital 1	0.749	0.85
Structural social capital 2	0.787	
Structural social capital 3	0.834	
Relational social capital 1	0.817	0.863
Relational social capital 2	0.829	
Relational social capital 3	0.824	
Relational social capital 4	0.833	
Entrepreneurs' risk-taking 1	0.84	0.892
Entrepreneurs' risk-taking 2	0.849	
Entrepreneurs' risk-taking 3	0.849	
Managers' proactive behavior 1	0.888	0.922
Managers' proactive behavior 2	0.87	
Managers' proactive behavior 3	0.903	
Innovative performance 1	0.705	0.792
Innovative performance 2	0.723	
Innovative performance 3	0.726	
Profitability performance 1	0.729	0.821
Profitability performance 2	0.774	
Growth performance 1	0.64	0.739
Growth performance 2	0.636	
Growth performance 3	0.685	

Validity refers to the extent to which a scale accurately measures the intended variable. In this study, the validity of the scale was assessed using the Kaiser-Meyer-Olkin (KMO) test and the Bartlett's sphericity test. The KMO test value was 0.852, which exceeded the recommended threshold of 0.70. This indicates that the data is suitable for factor analysis, and the scale has good sampling adequacy. Furthermore, the Bartlett's sphericity test yielded an approximate Chi-square value of 6503.792, which was relatively large, with a significance of 0.000 ($P<0.01$). These results support the internal consistency and validity of the scales used in the study.

Results

This study aimed to examine the impact of social capital on the entrepreneurial performance of new ventures in UBIs, while also considering the moderating effects of entrepreneurs' risk-taking and incubator managers' proactive behavior. The data collected was analyzed using SPSS 26.0, and multiple linear regression analysis was conducted to obtain the regression results.

To investigate the moderating effect of entrepreneurs' risk-taking, a hierarchical regression approach was employed, resulting in seven different models as presented in Table 2. In Model 1, control variables such as gender, age, educational background, and years of establishment of the entrepreneur were included to control for their potential influence on the overall findings, ensuring a more accurate assessment of the relationship between social capital and entrepreneurial performance. In addition to the control variables, Models 2 and 3 introduced cognitive social capital and the interaction term cognitive social capital*entrepreneurs' risk-taking as independent variables, respectively, to establish multiple regression models. Similarly, Models 4 and 5 included structural social capital and the interaction term structural social capital*entrepreneurs' risk-taking, while Models 6 and 7 incorporated relational social capital and the interaction term relational social capital*entrepreneurs' risk-taking as independent variables. The same method was used to test the moderating effect of managers' proactive behavior. Hierarchical regression analysis was conducted again, resulting in seven test models as before. The analysis results are presented in Table 3.

Table 2: Hierarchical regression results of Entrepreneurs' risk-taking

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Control variable							
Gender	-0.038 （-1.047）	-0.038 （-1.218）	-0.04 （-1.301）	-0.039 （-1.204）	-0.04 （-1.233）	-0.012 （-0.382）	-0.014 （-0.437）
Age	-0.036 （-1.353）	-0.008 （-0.35）	-0.009 （-0.406）	-0.022 （-0.935）	-0.023 （-0.983）	-0.029 （-1.276）	-0.03 （-1.314）
Education	0.011（0.412）	0.026（1.174）	0.026（1.197）	0.019 （0.84）	0.022 （0.966）	0.015 （0.65）	0.018（0.801）
Years of enterprise	-0.005 （-0.334）	-0.007 （-0.532）	-0.007 （-0.498）	-0.008 （-0.603）	-0.007 （-0.498）	-0.011 （-0.805）	-0.007 （-0.506）
Independent variables							
Cognitive social capital		0.172**（9.675）	0.168**（9.396）				
Structural social capital				0.137** （7.27）	0.136** （7.22）		
Relational social capital						0.155**（7.991）	0.161**（8.26）
Interaction term							
Cognitive social capital *Entrepreneurs' risk-taking			0.021（1.577）				
Structural social capital *Entrepreneurs' risk-taking					0.02（1.55）		
Relational social capital *Entrepreneurs' risk-taking							0.026*（2.211）
R^2	0.008	0.295	0.299	0.232	0.237	0.250	0.259
Adjusted R^2	-0.002	0.284	0.287	0.221	0.223	0.239	0.246
F-value	0.801(0.525)	28.318(0.000)	24.717(0.000)	20.492(0.000)	17.968(0.000)	22.606(0.000)	20.260(0.000)

*Note: * represents P＜0.05， ** represents P＜0.01*

Table 3: Hierarchical regression results of managers' proactive behavior

	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Control variable							
Gender	-0.038 （-1.047）	-0.045 （-1.45）	-0.047 （-1.52）	-0.046 （-1.41）	-0.047 （-1.472）	-0.02 （-0.61）	-0.018 （-0.563）
Age	-0.036 （-1.353）	-0.005 （-0.227）	-0.004 （-0.199）	-0.018 （-0.777）	-0.023 （-0.98）	-0.025 （-1.095）	-0.022 （-0.951）
Education	0.011（0.412）	0.025 （1.13）	0.021（0.944）	0.019（0.826）	0.02 （0.869）	0.015 (0.654）	0.012 （0.539）
Years of enterprise	-0.005 （-0.334）	-0.006 （-0.415）	-0.005 （-0.396）	-0.007 （-0.505）	-0.007 （-0.475）	-0.01 （-0.711）	-0.009 （-0.646）
Independent variables							
Cognitive social capital		0.162** (8.958）	0.162**（9）				
Structural social capital				0.13** （6.819）	0.132**（6.963）		
Relational social capital						0.152** (7.819）	0.162** （8.294）
Interaction term							
Cognitive social capital*Managers' proactive behavior			0.033*（2.209）				
Structural social capital*Managers' proactive behavior					0.045**（3.016）		
Relational social capital*Managers' proactive behavior							0.044** （2.998）
R^2	0.008	0.295	0.299	0.228	0.245	0.252	0.269
Adjusted R^2	-0.002	0.284	0.287	0.217	0.232	0.241	0.256
F-value	0.801 (0.525)	26.608 (0.000)	23.721 (0.000)	20.067 (0.000)	18.841 (0.000)	22.906 (0.000)	21.304 (0.000)

*Note: * represents P＜0.05， ** represents P＜0.01*

Moderating Effect Test

In Model 1 and Model 8, the regression coefficients of the control variables (e.g., gender, age, educational background, and years of establishment) were found to be insignificant, indicating that these variables have no significant effect on entrepreneurial performance. However, in Model 2, Model 4, Model 6, Model 9, Model 11, and Model 13, the independent variables cognitive social capital, structural social capital, and relational social capital showed a significant positive effect on entrepreneurial performance. The p-values were less than 0.01, and the beta values were positive. Therefore, research hypotheses H1, H2, and H3 were supported.

The moderating test of entrepreneurs' risk-taking

In Model 1, the regression coefficients of controlling variables such as gender, age, educational background, and years of establishment were not significant, indicating that they have no significant effect on entrepreneurial performance. Next, in Model 2, cognitive social capital showed a significant positive effect on entrepreneurial performance ($P<0.01$, $\beta=0.172$, $t=9.675$). In Model 3, however, the interaction between cognitive social capital and entrepreneurial performance had a p-value greater than 0.05, indicating that the interaction term does not have a significant effect on entrepreneurial performance. Therefore, H4a failed the hypothesis test. Similar results were observed in Model 4 and Model 5 on the interaction between structural social capital and entrepreneurial performance. As such, H4b was also rejected.

In Model 6, relational social capital demonstrated a significant positive effect on entrepreneurial performance ($P<0.01$, $\beta=0.155$, $t=7.991$). In Model 7, the interaction between relational social capital and entrepreneurial performance was significant ($P<0.01$) as well, implying that the interaction term has a significant impact on entrepreneurial performance. Additionally, the R2 of Model 6 was 0.250 while the R2 of Model 7 was 0.259, showing a significant improvement in the explanatory power of the model. These results support the validity of H4c, confirming that entrepreneurs' risk-taking play a significant moderating role in the relationship between relational social capital and entrepreneurial performance. This moderation effect is depicted in Figure 2.

The moderating tests of managers' proactive behavior

Like the results of Model 1, the control variables in Model 8 exhibited no significant impact on entrepreneurial performance. In Model 9, cognitive social capital showed a significant positive effect on entrepreneurial performance ($P<0.01$, $\beta=0.162$, $t=8.958$). Following that, in Model 10, the interaction between cognitive social capital and entrepreneurial performance was significant ($P<0.01$), suggesting that the interaction term has a significant influence on entrepreneurial performance. Additionally, the R2 increased from Model 9 (0.295) to Model 10 (0.299), showing an improvement in the explanatory power of the model. Therefore, managers' proactive behavior can be surmised to have a significant moderating effect on the relationship between cognitive social capital and entrepreneurial performance. This supports the validity of hypothesis H5a. Model 11 to Model 14 reported similar significant results on the interaction of managers' proactive behavior with structural and relational social capital, respectively

validating H5b and H5c. Figure 3 to Figure 5 illustrate the moderating effect of managers' proactive behavior between the three dimensions of social capital and entrepreneurial performance.

Fig. 2 The moderating effect of entrepreneurs' risk-taking between relational social capital and entrepreneurial performance

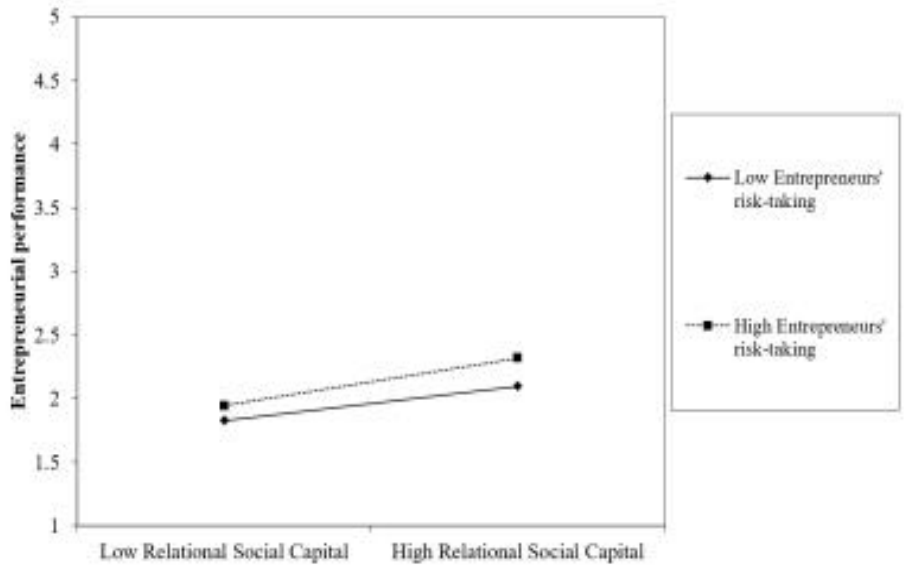


Fig. 3 The moderating effect of managers' proactive behavior between cognitive social capital and entrepreneurial performance

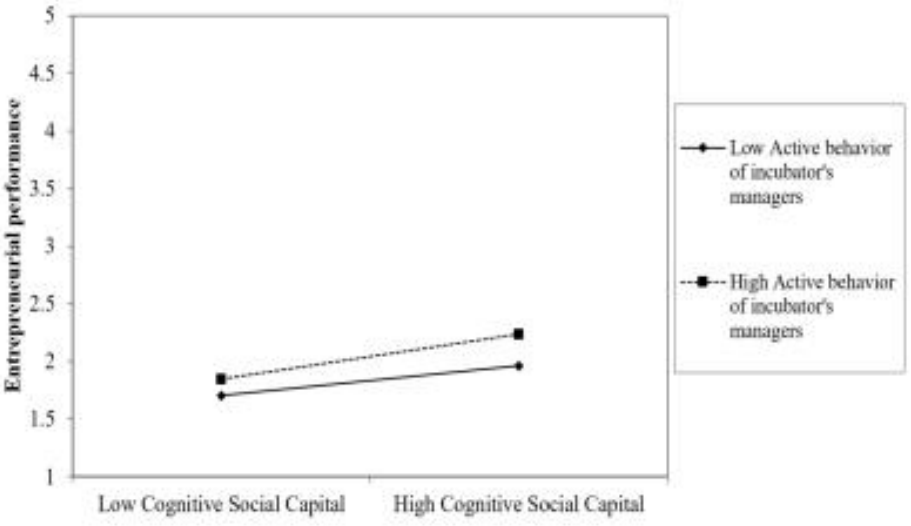


Fig. 4 The moderating effect of managers' proactive behavior between structural social capital and entrepreneurial performance

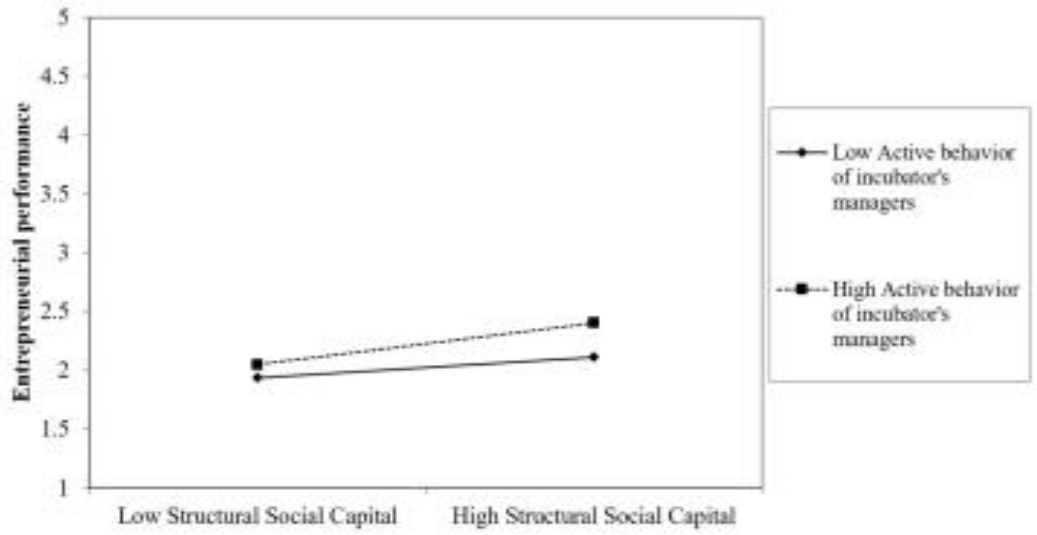
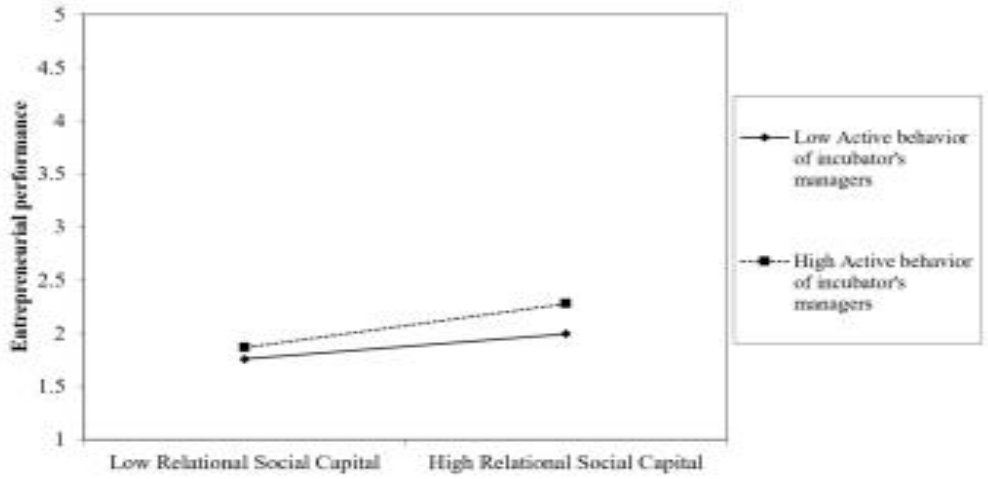


Fig. 5 The moderating effect of managers' proactive behavior between relational social capital and entrepreneurial performance



Discussion

Based on the theory of social capital, this study examined the influence of social capital on entrepreneurial performance in UBIs, specifically via the moderating effects of entrepreneurs' risk-taking and managers' proactive behavior. The findings clearly demonstrate that the social capital of new ventures in UBIs significantly contributes to stimulating their entrepreneurial performance. The proximity and daily interactions among the ventures within the incubators foster the development of a shared culture, language, and norms (Mercado & Vargas-Hernández,2019). As a result, incubators provide a rich social network for ventures, facilitating access to external policy support, financial resources, professional consulting services, technical assistance, and market information (Mercado & Vargas-Hernández,2019). Trust-building among ventures also encourages the sharing of technical secrets, business ideas, and entrepreneurial experiences (Li, et al.,2013, Sánchez-Arrieta, et al.,2021). The presence of shared

values, external resource support, and experience sharing represent cognitive, structural, and relational social capital, all of which contribute to enhancing entrepreneurial performance.

Entrepreneurs are faced with many challenges when carrying out entrepreneurial activities, and their psychological ability helps them to cope with these challenges, to better complete entrepreneurial activities (Robinson & Sexton, 1994; Arooj & Anjum,2020), the stronger the entrepreneur's willingness to take risks and desire for success, the easier it is to take innovative actions. The need for achievement re-presents a psychological force that motivates a person to always desire success and thus to act with urgency (Hasan, 2016; Hassan & Nahia, 2016).

Entrepreneurs' risk-taking manifests in the form of risk-taking propensity, which involves their ability to take bold steps by venturing into new markets and investing in resources with uncertain outcomes (Huang, et al.,2021, Salmony & Kanbach,2022, Zeb & Ihsan,2020). It is important to note that entrepreneurs' risk-taking behavior reflects their sense of risk and responsibility. Entrepreneurs who demonstrate courage in assuming responsibility and taking risks tend to gain the trust of their peers, thereby stimulating the sharing of trade secrets, business ideas, and entrepreneurial know-how, ultimately building relational social capital and leading to positive effects on entrepreneurial performance (Zeb & Ihsan,2020). However, the adventurous nature of entrepreneurs may sometimes clash with established rules and norms, hindering the formation of a common value network (i.e., cognitive social capital) among ventures. Moreover, external policy and financial support tend to focus on assessing the "risk" involved in investment decisions, often leading to the rejection or elimination of projects or ventures deemed excessively risky (Zeb & Ihsan,2020). Therefore, while Entrepreneurs' risk-taking can promote the impact of relational social capital on entrepreneurial performance, it may impede the influence of structural social capital on entrepreneurial performance. In short, the risk-taking spirit of entrepreneurs carries both advantages and disadvantages, which demands careful consideration.

Furthermore, The proactive behavior of managers effectively fills the "structural hole" in the incubator relationship network and ensures the effective link between entrepreneurs and external social capital (Redondo & Camarero,2019). It is crucial to highlight the positive moderating role of managers' proactive behaviors in the relationship between social capital and entrepreneurial performance within the incubator setting. Managers actively develop and implement measures for enterprise entry, exit, and management, which establish standardized requirements and norms for ventures while also fostering the formation of shared values among them. Proactive managers serve as connectors within the incubator's relationship network, occupying "structural holes" (Glaser, et al.,2016), linking ventures with other networks, and facilitating relationships with external entities (Redondo & Camarero,2019). Similarly, managers enhance the connections among ventures by transferring relationships among managers of different ventures (Mercado & Vargas-Hernández,2019). This cultivates the establishment of trust and friendship among individuals within the organization, increases the social capital of ventures, influences knowledge flow, and promotes innovation and development. Therefore, the enhancement of individual social capital within each venture and the collective social capital of the incubator greatly depend on the proactive behaviors of managers (Redondo & Camarero,2019). Managers should hence develop effective management mechanisms, organize regular communication meetings, and actively seek external support to foster a thriving entrepreneurial

environment.

Future Research Directions

The limitations of this study are three-fold. Firstly, the research was conducted within the context of China, which may limit the generalizability of its findings. The sample selection process may also present limitations due to constraints in the participants' experience and time. Secondly, the study primarily focused on university-based incubators; thus, it remains unclear whether the research conclusions can be applied to other types of incubators such as science and technology incubators, corporate incubators, and virtual incubators. Further research is needed to explore the applicability of the findings in these different contexts to broaden the scope of research and further enrich our understanding of this topic. Lastly, while this study examined the moderating effects of entrepreneurs' risk-taking and managers' proactive behaviors, there are still many untested variables and unanswered questions to be addressed in future research, including the feasibility of conducting longitudinal studies to gain deeper insights. Future research efforts could also concentrate on exploring the mechanisms of knowledge synergy within incubators, investigating the influence of other forms of capital on entrepreneurial performance, and expanding the framework of the present research model.

Managerial Implications

The present study adds significantly to the rapidly expanding knowledge in the field of entrepreneurial management and offers valuable implications for future practice. UBIs have been recognized as crucial mechanisms for supporting entrepreneurship and fostering the growth of entrepreneurial ventures (Hassan,2020, Pattanasak, et al.,2022). Nonetheless, the primary challenges faced by new ventures in UBIs are how to effectively translate technology into commercially viable products, survive in competitive markets, and achieve successful incubation. In addressing these issues, our research demonstrates that social capital within new ventures has a positive impact on entrepreneurial performance. Furthermore, we find that entrepreneurs' risk-taking behavior moderates the relationship between relational social capital and entrepreneurial performance, while managers' proactive behavior moderates the relationship between all dimensions of social capital and entrepreneurial performance.

As a result, it is essential for entrepreneurs and incubator managers to leverage these concepts to strive for performance improvement. Specifically, to improve performance, entrepreneurs should critically evaluate their willingness to take risks, enhance both internal and external connections, establish dominance, foster trust with partners, and actively share their experiences. Incubator managers, in turn, need to proactively contemplate ways to optimize the incubator management system, capitalize on the full potential of the incubator platform, and establish networks for beneficial transactions and common value norms among new ventures.

From a theoretical perspective, this research model sheds light on the catalytic role of social capital dimensions in entrepreneurial performance. Additionally, the study provides fresh insights into the moderating roles of Entrepreneurs' risk-taking and managerial proactivity in the context of entrepreneurial performance management. By providing empirical support for the proposed hypotheses, the results of this study ultimately strengthen the theoretical foundations of the literature.

Practical Implications for Asian Business

Although the concept of business incubators originated in the US, business incubators are now being functioning all over the world. They can potentially play a significant role in developing countries such as China, India, Malaysia and Pakistan. Asia, the largest and mostly developing region with around 50 countries, enjoys more than 2000 Bis (Jamil, et al.,2016), including large of UBIs.

In various Asian countries, 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 (Hassan,2020, Pattanasak, et al.,2022) (Alonso-Conde, Rentas et al., 2019, Pellegrini, Johnson-Sheehan et al., 2021). The active set-up of UBIs has gradually become a development strategy in many Asian countries. For example, the Tsukuba Science City project in Japan, launched in the 1960s, has predominantly relied on the University of Tsukuba. In 2004, Thailand's Ministry of Education established the UBI program under the Higher Education Commission to enhance technology commercialization in public and private higher education institutions (Wonglimpiyarat,2016). In China, Northeastern University established the first UBI in 1990, marking the beginning of the development of university incubators (Larionov, et al.,2020).

Limited technical and business expertise, infrastructure, and lack of resources are major obstacles for startups within incubators to achieve performance goals (Kurtulmuş & Warner,2015). Within the incubator network, internal knowledge sharing and information communication play a vital role in promoting collaborative innovation (Cofré-Bravo, et al.,2019). Such knowledge sharing among members is encouraged by integrity and contractual agreements (Engbers et al., 2017), whereas a shared vision, values, and language facilitate organizational collaboration and innovative practices (Ievdokymov, et al.,2020). To this end, this study provides managerial insights to help new ventures in Asia leverage incubator resources for knowledge exchange, experience sharing, and technological innovation, thereby promoting entrepreneurial success. Additionally, it highlights the importance of building a common understanding and culture within the incubator to foster consensus among enterprises, optimize the network structure, strengthen resource channels, enhance social capital of new ventures, and ultimately improve their entrepreneurial performance. Therefore, in practical terms, this study is valuable for enhancing knowledge exchange and technology transformation in innovation management, both in China and other Asian countries.

Moreover, this study emphasizes the influence of entrepreneurs' risk-taking behavior in the Asian context. The willingness of entrepreneurs to take risks and pursue success positively correlates with their propensity for innovative actions (Redondo & Camarero,2019). While risk-taking behavior may sometimes clash with established rules and norms and prevent the formation of a common value network, the courage of Asian entrepreneurs to take on risks fosters trust among peers and stimulates the sharing of technical secrets, business ideas, and entrepreneurial experiences.

Finally, this research underscores the importance of proactive behavior by UBI managers in Asia. Proactive managers play a crucial role in transferring relationships between enterprises, enhancing the social capital of new ventures, establishing

networks and social interactions based on trust and friendship among incubator tenants, and facilitating knowledge flow and innovation (Op den Kamp, et al.,2023). Proactive managers act as connectors within the UBI relationship network (Bliemel, et al.,2021), facilitating linkages between entrepreneurial enterprises, universities, governments, and intermediaries (Redondo & Camarero,2019). Such connections are especially relevant in the collectivistic context of most Asian countries. Therefore, it is crucial for Asian managers to develop effective management mechanisms, conduct regular communication meetings, and actively seek external support.

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