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Systems Thinking and Entrepreneurial Persistence Among Technology Entrepreneurs in China

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Abstract

Based on the theoretical framework of systems thinking, this study investigates the mechanism of systems thinking in promoting entrepreneurial persistence among technology entrepreneurs in China's digital economy development. From a dynamic complex systems perspective, 409 technology entrepreneurs from China, were measured using the systems thinking scale, the psychological ownership scale, the resource bricolage scale, and the entrepreneurial persistence scale. Systems thinking among technology entrepreneurs has been found to enhance entrepreneurial persistence significantly. Psychological ownership of technology entrepreneurs partially mediates the process of systems thinking influencing entrepreneurial persistence. Resource bricolage positively moderates the systems thinking process, influencing entrepreneurial persistence among technology entrepreneurs. This study innovatively introduces systems thinking into the field of technology entrepreneurship, reveals the relationship between systems thinking and entrepreneurial persistence of technology entrepreneurs, and provides theoretical guidance for Chinese technology entrepreneurs to enhance entrepreneurial persistence through systems thinking.

Keywords: systems thinking; entrepreneurial persistence; psychological ownership; resource bricolage; technology entrepreneurs

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1. Introduction

The accelerating development of digital technologies, including artificial intelligence, the internet of things (IoT) and cloud computing, has had a far-reaching and profound impact globally [1]. In China, these new digital technologies have become a major driver of economic growth. Data from the Bureau of Statistics of China show that the number of technology entrepreneurs in China has increased significantly under the influence of this digital wave. Numerous technology entrepreneurs are seizing new business opportunities through digital transformation. This involves adopting innovative business models, technologies, and methodologies that seamlessly fit into real-world application scenarios to achieve desired entrepreneurial goals. The 2023 report on youth employment and entrepreneurship development in the digital economy, published by the China Academy of Social Security Science and Technology for Labour, noted that digital ecosystems like WeChat have played an essential role in facilitating entrepreneurial opportunities, thereby expanding the scope of entrepreneurship and providing valuable support to technology entrepreneurs [2].

However, against slowing global economic growth, the path to entrepreneurship is fraught with obstacles and challenges, and existing success rates remain disappointingly

low [3]. Empirical evidence suggests that entering the digital space for technology entrepreneurship is becoming increasingly complex. Statistics indicate that only 10% of Chinese firms will survive more than 42 months by the end of 2024, meaning that only a minority of entrepreneurs choose to persist with their business endeavors [4]. Data from the U.S. Bureau of Labor Statistics (2023) indicate that global startup ventures demonstrate exceptionally low survival rates, with fewer than 10% surviving beyond the five-year horizon [5]. Existing literature suggests that technology entrepreneurs who persist in pursuing their goals are more likely to achieve entrepreneurial success, despite significant changes in the entrepreneurial landscape in the digital age [6].

Systems thinking, as a way of thinking and a personal characteristic that can help entrepreneurs integrate resources and solve complex problems, is gradually becoming an essential requirement and an urgent need for technology entrepreneurs to persist in entrepreneurship in digital transformation [7]. In the context of the rapid development of the digital economy, it has become an important research topic in the field of entrepreneurship research to systematically explain the heterogeneous characteristics of entrepreneurial persistence behaviors of technology entrepreneurs and their intrinsic motivations, especially the profound impact of the differences in systems thinking on entrepreneurial decision-making [8].

Existing research suggests that psychological ownership, as a key psychological construct in the digital economy, not only shapes technology entrepreneurs' self-assessment of systems thinking efficacy but also influences their determination to persist in entrepreneurship [9]. This study will analyze and reveal the mediating role of psychological ownership between systems thinking and technopreneurs' entrepreneurial persistence.

Technology entrepreneurial practices in the digital economy present new features that break through traditional theoretical explanatory frameworks [10]. (1) Systems thinking differences become the core dimension distinguishing the decision-making level of technopreneurs, whose heterogeneity of thinking styles directly affects the sustainability of entrepreneurial behavior [11]. (2) As a key psychological variable, psychological ownership mediates systems thinking into entrepreneurial persistence [12]. (3) The moderating effect of the resource bricolage has been continuously strengthened along with the accelerated iteration of digital technology [13]. Therefore, there is an urgent need to construct a theoretical framework of 'individual thinking-psychological cognition-decision-making behavior' to fill the gap of existing research, to deconstruct the operating law of the complex system of technological entrepreneurship in the era of digital economy [14].

The possible marginal contributions of this paper lie in the following three aspects.

First, deepening methodological and variable-related research on the relationship between systems thinking and technology entrepreneurs' entrepreneurial persistence. Currently, relevant studies remain in the stage of theoretical qualitative analysis, and few have taken systems thinking as an explanatory variable and technology entrepreneurs' entrepreneurial persistence as an explained variable [15]. This paper addresses these gaps while also enriching research on systems thinking and providing a theoretical basis for technology entrepreneurs to utilize systems thinking to gain entrepreneurial persistence, willingness, and ability, which is adaptive to the turbulent digital economy environment.

Second, exploring the internal mechanism and boundary conditions from the perspective of systems thinking. Guided by the "thinking-cognition-behavior" logical chain [16], this paper aims to open the "black box" between systems thinking and entrepreneurial persistence among Chinese technology entrepreneurs, revealing the boundary conditions under which systems thinking affects entrepreneurial persistence.

Third, focusing on the resource bricolage of technology entrepreneurs in the context of technology entrepreneurship, this study adopts the grounded theory research method to

identify the driving factors triggering their resource bricolage. Furthermore, it summarizes and deconstructs the new connotations and characteristics of resource bricolage in the context of technology entrepreneurship under the digital economy, so as to optimize the measurement scales and enrich the research system in the field of resource bricolage.

2. Theoretical Background and Hypothesis Development

2.1. Entrepreneurial Persistence

As a core issue in entrepreneurship research, entrepreneurial persistence has always received sustained attention from the academic community. Existing research mainly focuses on the theoretical construction from the three dimensions of individual traits, resource endowment, and environmental adaptation [17]. At the personal level, scholars concentrate on the mechanisms of entrepreneurs' psychological resilience, opportunity recognition ability, and risk appetite on entrepreneurial persistence [18]. The resource endowment perspective emphasizes the key role of dynamic capability building and resource bricolage strategies in breaking through growth bottlenecks [19]. The environmental adaptation perspective analyzes strategic adaptation mechanisms under exogenous shocks such as institutional pressure, market volatility, and technological iteration [20].

In the era of the digital economy, the study of entrepreneurial persistence of entrepreneurs is undergoing a paradigm shift from static trait to dynamic system, the essence of which is to reveal the entrepreneurial subject's continuous entrepreneurial decision-making process in a complex adaptive system [21]. The current theoretical construction is faced with a challenge. It needs to break away from the simplified treatment of embedded features of digital entrepreneurship contexts in traditional analytical frameworks [22]. The research frontiers have shown a significant shift towards system science, with scholars increasingly focusing on the dynamic persistence process of entrepreneurs in multiple pressure fields such as technology iteration, market turbulence, and resource constraints [23].

The study of entrepreneurial persistence from the perspective of systems thinking focuses on enhancing entrepreneurial persistence in complex situations [24]. It redefines entrepreneurial persistence as a dynamic entrepreneurial decision-making behavior and process adapted to complex adaptive systems, breaking through the traditional analytical frameworks of environmental determinism and individual trait theory [25].

2.2. Systems Thinking

The conceptual foundations of systems thinking (ST) were formalized in seminal works on learning organisations. By the beginning of the 21st century, systems thinking began to permeate research in the field of entrepreneurship. This decades-long trajectory of thought highlights the growing maturity of systems thinking theory and its emergence as an enduring analytical paradigm. Its core focus is how entrepreneurs can make more resilient strategic decisions by identifying the dynamic linkages, feedback mechanisms, and overall structure of complex business environments through a systems perspective [26]. The theoretical roots of systems thinking can be traced back to the fusion of general systems theory and cybernetics, which emphasizes the interaction of system elements and the emergence of the whole [27].

It has been shown that entrepreneurs with systems thinking are better at deconstructing complex problems through modelling tools [28]. Systems thinking requires entrepreneurs to focus on the coupling effects of supply chain, organizational culture, external policies, and other levels in digital transformation [29]. However, there are significant challenges to developing systems thinking, including high cognitive load in dynamic environments, short-term entrepreneurial performance pressures, etc.

2.3. Systems Thinking and Entrepreneurial Persistence

In the era of profound digital technology evolution, the emergence of new high-quality productivity and the dynamic change of market demand make the practice of technology entrepreneurship face unprecedented opportunities and complex challenges. This requires technology entrepreneurs to have systems thinking to cope with the entrepreneurial threats posed by the iteration of digital technologies [30]. Systems thinking, as an essential characterization of the core cognitive ability of technology entrepreneurs, covers the ability to reconstruct cognitively in complex environments, construct dynamic feedback mechanisms, and manage resources systematically [31]. Systems thinking is a key individual trait of technology entrepreneurs and a core factor that influences technology entrepreneurs' sustained entrepreneurship.

According to the theory of resource conservation, the dynamic balance of resource stock is decisive for individuals' sustainable development [32]. Its scope covers the four-dimensional structure of individual characteristics, material, conditional, and energy resources [33]. Among them, the level of systems thinking of technology entrepreneurs, as a typical individual characteristic resource, not only reflects the uniqueness of their cognitive structure but also characterizes their ability to optimize the allocation of energy resources [34].

In the context of accelerated iteration of digital technologies, entrepreneurial persistence of technology entrepreneurs is essentially an externalized manifestation of complex decision-making tendencies, i.e., the decision-making behavior of dynamically persist in entrepreneurship through cognitive adaptation and behavioral resilience despite multiple adversities and opportunity costs [35]. The realization of such entrepreneurial persistence relies on the systematic integration of core resources such as technical expertise, time allocation, energy management, and capital operation, and systems thinking plays a leading role in the optimal allocation of resources in this process [36].

H1. *Systems thinking of technology entrepreneurs positively affects entrepreneurial persistence.*

2.4. Systems Thinking and Psychological Ownership

Psychological ownership is defined as "a state in which individuals develop feelings of possessiveness toward a specific target (e.g., their work, team, or organization) as if it were an extension of the self" [37].

Psychological ownership is characterized as a cognitive construct in which an individual perceives a particular object or work product as an extension of the self, and is centered on the value that the subject attaches to the output of his or her creative work [38]. The concept comprises four dimensions: affective belonging, self-efficacy beliefs, role identity, and responsibility commitment. In the technology entrepreneurship context, affective belonging is reflected in the depth of the emotional connection between the entrepreneur and the innovation entity, self-efficacy beliefs point to the strength of their confidence in achieving their strategic goals, role identity reflects the level of perceived value of the entrepreneurial identity, and responsibility commitment characterizes the behavioral tendency to take entrepreneurial risks proactively [39].

Building on Pierce et al.'s (2003) [37] foundational framework, psychological ownership in organizational contexts is engendered through three core mechanisms: control-based pathways, knowledge-investment synergy, and supportive catalysts. Control-based pathways include autonomy, perceived control, and related factors. Knowledge-investment synergy includes information access, self-expression opportunities, resource investment (time/skills/effort), and related factors. Supportive catalysts include organizational support, empowering leadership styles, and related factors. For entrepreneurs, psychological

ownership formation diverges due to volatile contexts. Systems thinking, defined as the cognitive capacity to perceive interdependencies, emerges as a critical antecedent [40]. Distinct from employees, entrepreneurs cognitively reframe environmental complexity through systems thinking, transforming exogenous constraints into integrative problem-solving opportunities that inspire psychological ownership [41]. Systems thinking, as the core mindset of technology entrepreneurs, profoundly shapes the path of psychological ownership construction by reconfiguring the interaction logic between entrepreneurs and entrepreneurial systems [42]. Research has shown that systems thinking can significantly strengthen entrepreneurs' emotional belonging and responsibility commitment by enhancing the global perception of the environment, the agility of decision-making and feedback, and the systemic nature of resource assemblage [43].

In digital entrepreneurship practice, technology entrepreneurs with higher-level systems thinking can accurately identify the coupling relationship of various elements of the entrepreneurial system through dynamic cognitive modelling, which drives their value recognition of the entrepreneurial entity [44]. At the same time, the strategic foresight empowered by systems thinking can optimize the risk decision-making framework and enhance the stability of self-efficacy beliefs [45]. This process of mindset reconstruction prompts entrepreneurs to establish a deep synergy mechanism with stakeholders, which can be used to achieve an iterative upgrading of role identity through innovative information sharing, dynamic balance of the network, and the accumulation of trust capital.

H2. *Systems thinking of technology entrepreneurs positively affects psychological ownership.*

2.5. The Mediating Effect of Psychological Ownership

In the field of technology entrepreneurship, the impact of the level of systems thinking on the psychological ownership of entrepreneurs is particularly salient [46]. Entrepreneurs with a high level of systems thinking can transform external pressures into opportunities for cognitive restructuring by systematically decoding environmental signals and dynamically adjusting resource networks [47]. In the face of entrepreneurial adversity, they are able to identify opportunities driven by systems thinking, thus activating entrepreneurial passion, generating optimistic expectations and resilient actions, and thus enhancing their psychological ownership.

In summary, the application of psychological ownership to technology entrepreneurship is theoretically sound and empirically supported, despite the ownership of founding enterprises being clearly established by law.

Psychological ownership is fundamentally defined as a subjective state where individuals experience targets as psychologically "theirs". In this paper, the focus is on entrepreneurial persistence, which operates distinctly from legal property rights. This critical distinction underscores that technology entrepreneurs develop profound ownership feelings toward facets central to their venture journey, such as specific behaviors, projects, knowledge, tools, and client relationships. It is irrespective of the founding enterprise's formal legal ownership (held by shareholders).

The core antecedents of psychological ownership, namely feelings of control and the investment of the self, are inherently nurtured within the dynamic and demanding environment of technology entrepreneurship, where autonomy, deep personal commitment, and sustained effort toward entrepreneurial goals are paramount. There is substantial empirical evidence that psychological ownership is a valid predictor of important organisational outcomes across diverse businesses with explicit legal ownership [48–50].

Therefore, psychological ownership emerges as a vital and applicable psychological mechanism uniquely positioned to explain the drivers of entrepreneurial persistence among Chinese technology entrepreneurs, capturing their deep-seated psychological con-

nection and sense of responsibility towards the act of persevering in their entrepreneurial endeavors.

Established research has shown that psychological ownership also significantly impacts entrepreneurial persistence and that its mechanisms work across different stages of the entrepreneurial process [51]. The challenges faced by technology entrepreneurs at various stages of development are dynamic and evolving: from resource constraints in the early stages to complex issues such as adaptation to the institutional environment in the later stages [52]. High levels of psychological ownership are often associated with strong emotional belonging, stable self-efficacy beliefs, clear role identification, and proactive commitment to responsibility, and such cognitive-emotional composite traits enable entrepreneurs to build a resilient decision-making framework and break through bottlenecks by capitalizing on competencies and integrating expertise [53].

This thinking-cognition-behavior synergy mechanism suggests that psychological ownership essentially acts as a mediating variable for the transformation of systems thinking into entrepreneurial persistence by reshaping the entrepreneur's way of thinking and promoting a more profound fusion of digital technological competence, psychological capital formation, and resource bricolage strategies to achieve sustained entrepreneurship ultimately [54].

H3. *Psychological ownership partially mediates the relationship between systems thinking and entrepreneurial persistence.*

2.6. The Moderating Effect of Resource Bricolage

Resource conservation theory emphasizes establishing new value creation rules through the deconstructive identification and innovative restructuring of existing resources [55]. The deepening application of this theory in entrepreneurship research, especially the exploration of the mechanism of how entrepreneurs cope with uncertainty and capture opportunities through resource reconstruction, has become the focus of attention in the academic community.

The accelerated digital technology iteration puts technology entrepreneurs in a highly dynamic, competitive arena. To build the dual advantages of technological innovation and market breakthroughs, technology entrepreneurs continue to strengthen systems thinking, optimize cognitive decision-making frameworks through resource bricolage, and cultivate panoramic environmental insights and strategic control capabilities. In this process, technology entrepreneurs drive the value transformation of heterogeneous resources by systematically integrating physical resources, human capital, and technological elements, and simultaneously activating the strategic foresight function of systems thinking and the entrepreneurial action network [56].

In digital-era entrepreneurial practices, technology entrepreneurs continue calibrating initial resource allocation deviations and mitigating systemic risks from resource constraints through goal-oriented resource bricolage. Entrepreneurs with higher-level systems thinking demonstrate profound deconstruction of complex systems and dynamic adaptation, which strengthens their emotional connection with entrepreneurial stakeholders and, in turn, increases the stability of entrepreneurial commitment.

Although systems thinking equips technology entrepreneurs with a macro perspective and correlative cognition, specific resource scarcity can still trigger a sense of powerlessness. Resource bricolage overcomes these constraints through practical action, translating strategic insights derived from systems thinking into viable solutions and validating entrepreneurial agency. Resource bricolage confers a 'creator' identity upon entrepreneurs, which aligns strongly with the core sense of control inherent in psychological ownership [57]. When technology entrepreneurs with high systems thinking can successfully

employ resource bricolage to solve problems, their confidence in their ability to influence entrepreneurship (sense of control) increases, directly reinforcing psychological ownership. Furthermore, resource bricolage constitutes a knowledge creation process [58]. This deep engagement and knowledge generation naturally infuse the entrepreneur's identity, skills, and creativity into solutions and ventures, representing a core source of psychological ownership. Thus, a successful resource bricolage experience not only addresses entrepreneurial challenges but also validates the effectiveness of systems thinking.

H4. *Resource bricolage positively moderates the relationship between systems thinking and psychological ownership.*

The theoretical model is demonstrated in Figure 1.

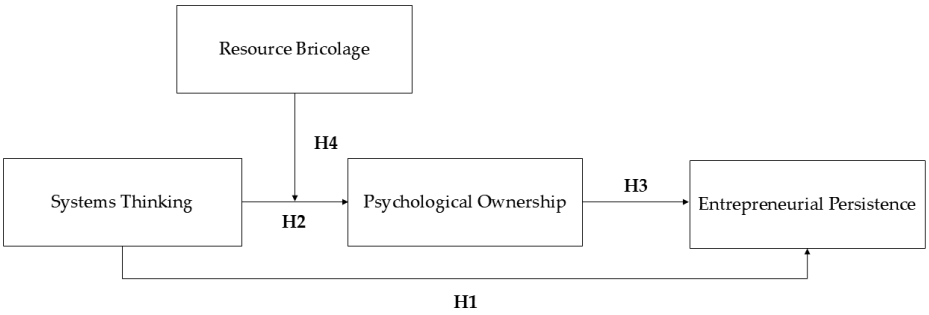


Figure 1. Theoretical model.

3. Methods

3.1. Sampling and Data Collection

Two rounds of questionnaire surveys and in-depth interviews were conducted in China to validate the model and hypotheses proposed in this paper. Given the large scale and rapid development of China's digital economy, as well as its leadership in several application areas, studying the entrepreneurial persistence of Chinese technology entrepreneurs from a systems thinking perspective can provide a highly representative case study of global technology entrepreneurship. Deconstructing the mechanism of systems thinking on entrepreneurial persistence using China as a sample can provide valuable insights into the cognitive foundations and adaptive strategies for revealing the formation of global technology entrepreneurial resilience, as well as identifying the key paths for late-developing economies to break through the dilemma of technology entrepreneurship in the era of digital economy.

Cardon and Kirk (2013) argue that in the field of entrepreneurship research, the object of study should focus on individuals involved in the creation and development of enterprises [59]. Based on this, this paper focuses on technology entrepreneurs who are involved in the creation of an enterprise and only administers the questionnaire to respondents who have experience in technology entrepreneurship (are starting or have started a business). The questionnaire has appropriate screening questions: (1) Have you conducted or are you conducting entrepreneurial activities using the technology you own? (2) Have you been or are you currently a founder or team member of a technology enterprise? Answers to both questions were required to be screened for this study.

Before the formal research, the research team of this paper carried out the following work. Firstly, a professional English translator and a doctor with overseas study experience in the entrepreneurship field anonymously translated and retranslated the English scale involved in this study in both directions to ensure the accuracy of the translation. Secondly, during the questionnaire design process, experts in the field of systems thinking and

entrepreneurship were repeatedly consulted to modify the content and presentation of the questionnaire. Finally, to test the feasibility of the questionnaire and ensure respondents' understanding of the questions, a pre-test was conducted to refine the questionnaire based on the feedback.

The target population of the sample is Chinese technology entrepreneurs. The research team uses three sampling methods to conduct the survey: purposive sampling through incubation centers and entrepreneurship parks, snowball sampling initiated from known contacts, and convenience sampling through online platforms. Purposive sampling targeting members of incubation centers and entrepreneurship parks across diverse regions was employed to ensure access to qualified respondents while aiming for geographical and sectoral diversity. Technology entrepreneurs are typically a 'low visibility, high privacy' group of people, and official directories (business registries, patent databases) only contain information about their founding companies, and rarely disclose their personal contact information. Traditional random sampling (e.g., by mail or phone) requires a complete sample, resulting in a long time and is highly costly. In contrast, snowballing and online convenience sampling are more feasible under time and financial constraints.

In September–October 2024, the research team for this paper conducted the first round of questionnaire data collection at science and technology business incubation centers and technology business parks in Jiangsu, a province known for its active technology entrepreneurship in eastern China. Considering the actual situation of China's technology entrepreneurship context and taking into account socio-cultural and contextual differences, the research team of this paper, based on the findings of the pre-survey on the variable of resource bricolage, adopted the suggestions of experts to conduct in-depth interviews on this variable and add items reflecting the innovativeness and flexibility of technology entrepreneurs in terms of resource bricolage.

Considering the levels of development of the digital economy and technology entrepreneurship across China, we selected provinces with high levels of entrepreneurial activity for large-scale data collection in the second round of research. The study focused on eastern China (Jiangsu, Zhejiang, and Shanghai), southern China (Guangdong), northern China (Beijing), and central China (Hubei and Sichuan), collectively seven of China's major economic regions. These regions reflect China's entrepreneurial density gradient, referring to the data of the China High-Tech Industry Yearbook 2023 [60].

The research was conducted in three main ways, through a combination of online and offline methods in mid-to-late June 2025 to collect and collate first-hand data on technology entrepreneurs from all over China. Firstly, the research team visited the incubation centers and entrepreneurship parks, and asked eligible technology entrepreneurs to complete the questionnaires on-site. Secondly, with the help of the staff at incubation centers and entrepreneurship parks, the staff were asked to contact technology entrepreneurs to fill out the e-questionnaires. Thirdly, the snowball approach was adopted by using the connections of the friends who are starting their own business, alumni, and MBA students to distribute the e-questionnaires to the technology entrepreneurs in their region.

The questionnaire conceals the specific variable names to avoid the psychological implications these names may have for the research participants. Since the research used three ways to collect the questionnaires, this study conducted a *t*-test on the three groups of data to analyze whether there were differences. The results showed that there were no significant differences between the three groups of data, indicating that the different sampling methods had no significant impact on the analysis results. A total of 600 questionnaires were distributed, and 467 were collected, excluding those with obvious errors and excessive omissions, as well as those that required identity verification and assessment

of response time. A total of 409 valid questionnaires were obtained, with a valid recovery rate of 68.16%. Descriptive statistics of the samples are shown in Table 1.

Table 1. Descriptive statistics of the samples (N = 409).

Variable	Category	Frequency	Percent	Variable	Category	Frequency	Percent
Gender	Male	96	23.47%	Level of education	Undergraduate	94	22.98%
	Female	313	76.53%		Postgraduate	315	77.02%
Age	24–30 years old	67	16.38%	Firm age	0~2 years	241	58.92%
	31–40 years old	213	52.08%		2~4 years	82	20.05%
	41–50 years old	107	26.16%		4~6 years	62	15.16%
	Over 50 years old	22	5.38%		6~8 years	24	5.87%
Entrepreneurial experience	Yes	409	100%	Entrepreneurial position	Yes	106	25.92%
	No	0	0		No	303	74.08%
Industry	Internet industry	119	29.10%	Firm scale	<10	225	55.01%
	Medical industry	53	12.96%		10~30 people	79	19.32%
	Manufacturing industry	96	23.47%		31~50 people	73	17.85%
	Electronic and computer industry	141	34.47%		>51 people	32	7.82%

3.2. Questionnaire Design and Measurement of Variables

The scales employed in this study were obtained from reputable academic journals, while the English scales underwent a comprehensive translation-back-translation process. Subsequently, the English scales were converted to a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) for scoring. For further details on the variables and their corresponding measures, please refer to Table A1 in Appendix A.

Explanatory variable: systems thinking. The systems thinking scale has not yet been standardised. Based on Sweeney & Sterman's (2000) systems thinking Scale [61] and Stave & Hopper's (2007) systems thinking assessment instrument [62], this study adapted the two scales to the specifics of technology entrepreneurship in China, and constructed an integrated systems thinking scale aimed at assessing the technology entrepreneurs' ability to analyses problems systematically in complex management situations. The scale consists of three dimensions: dynamic relationship resolution, system structure identification, and key intervention point selection, for five items. Higher scores indicate a higher level of systems thinking among those engaged in technology entrepreneurship.

Explained variable: entrepreneurial persistence. There is a wealth of research on measuring entrepreneurial persistence. The entrepreneurial persistence scale, developed by Sabiu et al. (2017) [63], has been employed to assess the entrepreneurial persistence of technology entrepreneurs, exhibiting robust reliability and validity. Subsequently, the scale was adapted to align with the distinctive context of digital entrepreneurship in China. By evaluating the behavioral responses of technology entrepreneurs in China to challenges, setbacks, and failures, this scale offers insight into the extent of entrepreneurial persistence among this group. The scale comprises four items, with a higher score indicating a greater inclination towards persistence among technology entrepreneurs. A higher score indicates a stronger inclination towards persistence among those engaged in technology entrepreneurship.

Mediating variable: psychological ownership. The psychological ownership scale, developed by Avey et al. (2009) [64], has been employed to evaluate the psychological ownership of technology entrepreneurs. The scale has demonstrated robust reliability and validity. Subsequently, the scale was adapted to align with the distinctive context of digital entrepreneurship in China. The scale comprehensively captures the psychological ownership experienced by technology entrepreneurs through two dimensions: a sense of belonging and a sense of responsibility. The scale is comprised of four carefully constructed

questionnaire items. A higher score on this scale indicates greater psychological ownership among technology entrepreneurs. The research sample covers internet industry (29.10%), medical industry (12.96%), manufacturing industry (23.47%), electronic and computer industry (34.47%), and its industry distribution is consistent with the entrepreneurial ecosystem published in the '2024 Report on Entrepreneurial Investment and Financing by Professors and Scientists of China's Universities' [65], which enhances the external validity.

Moderating variable: resource bricolage. Baker and Nelson (2005) first introduced the concept of 'bricolage' into the field of entrepreneurship research [66]. Existing studies have focused on resource bricolage under the conditions of a mature market economy, but have given less attention to resource bricolage in the context of a transition economy. In the context of China's digital economy development, the resource bricolage behaviors of technology entrepreneurs present features with a high degree of specificity. Its essence and characteristics can be better explored by applying the grounded theory approach. Given this, this paper developed the first draft of an interview outline based on a content analysis of the literature on the development of relevant resource bricolage scales, drawing on the research of Senyard et al. to capture a general description of resource bricolage in the field of technology entrepreneurship [67,68]. The interview outline topics were then streamlined into five questions following extensive discussion and the incorporation of relevant feedback. The outline of the interviews is shown in Table A2 in Appendix A.

Before the interviews, preliminary communication with the interviewees was conducted, including a brief introduction to their entrepreneurial experiences. During the interview process, by asking interviewees to provide actual examples or experiences of resource bricolage in the entrepreneurial process, and by asking follow-up questions as appropriate, the connotation, manifestation, and characteristics of resource bricolage among technology entrepreneurs were explored in depth. The research team of this paper interviewed a total of five technology entrepreneurs, primarily from the integrated circuits (IC), Internet of things (IoT), and industrial software industries, as shown in Table 2. Interviews were conducted primarily through face-to-face interviews, telephone voice interviews, or Tencent meetings, with an average interview length of 20 min per participant.

Table 2. Basic information on interviewees.

Number	Code	Gender	Age	Education	Firm Age	Industry
1	A	Male	41	PhD	2	Integrated circuits
2	B1	Male	47	Master	3	Internet of things
3	B2	Male	36	Master	1	Internet of things
4	C1	Male	39	Master	1	Industrial software
5	C2	Male	42	PhD	1	Industrial software

This paper adopts a grounded theory approach [69] to construct a new dimension of the resource bricolage of technology entrepreneurs during the development of the digital economy. It utilizes NVivo 12.0 analytical software to conduct analyses of the interview data, following an initial conceptualization, open coding, and selective coding. Examples of coding are shown in Table 3.

Technology bricolage refers to the use of a technology entrepreneur's own accumulated knowledge to acquire the necessary technology for starting an enterprise. Network bricolage emphasizes the use of network resources by technology entrepreneurs to carry out bricolage activities to solve entrepreneurial dilemmas. Customer bricolage refers to the consumer groups formed by technology entrepreneurs through the interpersonal relationships accumulated in their lives, work, and studies to build sales channels for new products and technologies. Institutional bricolage refers to the fact that technology entrepreneurs actively respond to the call for technology policies and talent policies, and rely on subsidy policies and other measures to actively engage in technology innovation. Combinatorial

bricolage refers to the ability of technology entrepreneurs to actively respond to any new challenges to entrepreneurship by combining all the resources at hand. The scale consists of five items, with higher scores indicating a higher ability of technology entrepreneurs to combine resources.

Control variable. To minimize the confounding effects of control variables on the study outcomes, this study employs a similar approach to that used in previous relevant studies, including gender, age, and level of education as covariates. Moreover, this study incorporates industry, entrepreneurial experience, entrepreneurial position, firm age, and firm scale as control variables to enhance the accuracy and validity of the model validation.

Table 3. Coding example.

Raw Data Records	Initial Concepts	Open Coding	Selective Coding
We couldn't afford industrial-grade sensors, so we took apart the consumer-grade bracelets, reprogrammed them, and plugged them into the production line to monitor equipment vibration. Although the accuracy is worse, the cost is only 1/10th.	Repurposing hardware Low-cost technology substitution	Resource reorganization using technology	Technology Bricolage
Facing a scarcity of AI training data, we mined industrial creator forums to source alternative algorithmic resources.	Digital community prospecting	Using the web to access resources	Network Bricolage
Allow logistics companies to trial our IoT platform, provided that their drivers provide daily feedback on breakdown data. This real data is much more valuable than lab tests!	User-co-created R&D Demand-driven iteration	Engage clients in resource creation	Customer Bricolage
The local talent policy is primarily focused on R&D personnel with a master's degree, whereas our team consists of many undergraduates. We have partnered with universities to offer joint training, enhancing the education of our R&D staff.	Repackaging policy constraints	Resource reconfiguration in response to policy calls	Institutional Bricolage
Technology fusion of e-commerce inventory algorithms and medical image recognition to develop a defect detection system. This is a new solution pieced together from the technology of two failed projects	Cross-domain technology reconfiguration Modular solution bundling	Innovation in cross-disciplinary resource pooling	Combinatorial Bricolage

4. Results

The present study employed the PROCESS program in SPSS 26.0 to examine the primary impact of systems thinking on entrepreneurial persistence. Specifically, it investigated the mediating role of psychological ownership and the moderating influence of resource bricolage, while controlling for gender, age, and educational qualifications.

4.1. Reliability and Construct Validity

The CFA results demonstrated an appropriate fit of the measurement model. The Cronbach's α values for the four constructs in this study exceeded 0.8, indicating high reliability. The scales were derived from established literature and underwent a rigorous review process by entrepreneurs to ensure their dependability.

The results of reliability and validity are shown in Table 4. The factor load of all items, was more significant than 0.5 and less than 0.95, and all were at the significance level of $p < 0.01$. Furthermore, the composite reliability (CR) values for each variable exceeded the threshold of 0.8, indicating satisfactory internal consistency. All variables demonstrated good convergent validity, evidenced by their average variance extracted (AVE) values exceeding 0.5. Moreover, the square roots of AVE values for all variables surpassed their respective correlation coefficients, confirming excellent discriminant validity in this study.

Table 4. The results of reliability and validity.

Constructs	Items	Factor Loadings	Cronbach's α	AVE	CR
Systems Thinking	ST1	0.645	0.903	0.653	0.904
	ST2	0.729			
	ST3	0.645			
	ST4	0.743			
	ST5	0.736			
Entrepreneurial Persistence	EP1	0.773	0.798	0.513	0.808
	EP2	0.C			
	EP3	0.673			
	EP4	0.745			
Psychological Ownership	PO1	0.656	0.825	0.517	0.836
	PO2	0.786			
	PO3	0.752			
	PO4	0.581			
	PO5	0.564			
Resource Bricolage	RB1	0.708	0.876	0.611	0.884
	RB2	0.736			
	RB3	0.767			
	RB4	0.741			
	RB5	0.756			

4.2. Common Method Bias

As the questionnaire in this study was completed using self-assessment, there is a possibility of common method biases among the variables. The Harman single-factor method was used; the explained variance of the unrotated first factor was 44.178, less than 50%. This finding indicates that there was no significant common variance bias.

4.3. Descriptive Statistics

The data about the means, standard deviations, and correlation coefficients are presented in Table 5. The findings reveal a positive correlation between four variables: systems thinking, entrepreneurial persistence, psychological ownership, and the resource bricolage of technology entrepreneurs. The correlation analysis revealed a significant positive association between systems thinking and psychological ownership ($\beta = 0.387$, $p < 0.01$), as well as a significant positive association between systems thinking and entrepreneurial persistence ($\beta = 0.520$, $p < 0.01$). Furthermore, a positive correlation was observed between psychological ownership and entrepreneurial persistence ($\beta = 0.397$, $p < 0.01$). These findings offer preliminary empirical evidence in support of the hypotheses.

This paper conducted an exploratory ANOVA comparing psychological ownership levels across industries. The minor variations exist. Highest in manufacturing industry: M = 4.29, SD = 0.66; lowest in medical industry: M = 4.03, SD = 0.54. The result in the internet industry: M = 4.19, SD = 0.61; the result in the electronic and computer industry: M = 4.17, SD = 0.60. The F-statistic was non-significant (F = 2.184, $p = 0.089$), suggesting psychological ownership operates consistently as a core driver. The different industry samples show significance ($p > 0.05$) for psychological ownership, implying that the different industry samples are consistent and not significantly different in terms of psychological ownership.

Table 5. Descriptive statistics.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	1.765	0.424	1										
2. Age	2.205	0.775	−0.047	1									
3. Level of education	1.770	0.421	−0.275 **	−0.028	1								
4. Entrepreneurial position	1.741	0.439	−0.038	−0.124 *	0.048	1							
5. Industry	2.633	1.228	−0.039	0.028	0.334 **	−0.013	1						

Table 5. *Cont.*

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
6. Firm age	1.680	0.935	0.187 **	0.375 **	−0.212 **	−0.083	0	1					
7. Firm scale	1.785	0.999	0.002	−0.095	−0.048	−0.049	−0.082	−0.024	1				
8. Systems thinking	3.948	0.721	0.043	0.064	−0.004	0.007	0.041	0.171 **	−0.052	1			
9. Entrepreneurial persistence	4.187	0.611	0.013	0.020	0.042	0.029	0.014	0.160 **	−0.044	0.520 **	1		
10. Psychological ownership	4.581	0.478	−0.048	−0.093	0.197 **	0.074	0.103 *	0.064	−0.035	0.387 **	0.397 **	1	
11. Resource bricolage	4.235	0.621	−0.015	0.074	0.021	−0.003	0.017	0.145 **	0.005	0.691 **	0.606 **	0.482 **	1

Note(s): * $p < 0.05$ ** $p < 0.01$. Table 5 indicates the highest mean score for psychological ownership, which may be attributed to sample characteristics. Surveyed technology entrepreneurs represented high-tech sectors in China: internet, medical, electronics, and computer. Additionally, 77.02% held postgraduate degrees, constituting a highly educated cohort. These contextual factors may collectively elevate psychological ownership among sampled technology entrepreneurs.

4.4. Hypothesis Testing

4.4.1. Tests of Main and Mediation Effects

As demonstrated in Table 6, the influence of systems thinking on entrepreneurial persistence is 0.365, with a confidence interval that does not include zero (CI (95%) = [0.301, 0.429]), thereby substantiating hypothesis H1. Secondly, the introduction of mediating variables resulted in an effect of systems thinking on psychological ownership of 0.585, with a confidence interval that does not include zero (CI (95%) = [0.508, 0.662]), thereby supporting hypothesis H2. The impact of psychological ownership on entrepreneurial persistence is 0.108, with a confidence interval that does not include zero (CI (95%) = [0.027, 0.189]). Furthermore, systems thinking maintains a substantial impact on entrepreneurial persistence, with an effect value of 0.302 and a confidence interval that does not include zero (CI (95%) = [0.222, 0.381]), indicating that psychological ownership partially mediates the relationship between technology entrepreneurs' systems thinking and entrepreneurial persistence. Therefore, hypothesis H3 is supported.

Table 7 illustrates that the mediating effect of psychological ownership is 0.063, while the direct impact of systems thinking on entrepreneurial persistence is 0.302. These results provide proof for the validation of hypotheses H1 and H3.

Table 6. Test of the mediation effects model.

Variables	Entrepreneurial Persistence	Psychological Ownership	Entrepreneurial Persistence
Gender	−0.014 (−0.278)	0.021 (0.354)	−0.016 (−0.326)
Age	−0.098 ** (−3.442)	−0.049 (−1.441)	−0.093 ** (−3.270)
Level of education	0.208 ** (3.889)	0.081 (1.263)	0.200 ** (3.745)
Entrepreneurial position	0.059 (1.266)	0.038 (0.691)	0.054 (1.184)
Industry	0.014 (0.786)	−0.008 (−0.393)	0.015 (0.842)
Firm age	0.051 * (2.093)	0.070 * (2.404)	0.043 (1.781)
Firm scale	−0.017 (−0.844)	−0.029 (−1.200)	−0.014 (−0.692)
Systems thinking	0.365 ** (11.166)	0.585 ** (14.942)	0.302 ** (7.447)
Psychological ownership			0.108 ** (2.611)
R^2	0.295	0.382	0.307
F	20.968 ***	30.876 ***	19.667 ***

Note(s): * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7. The pathways encompass both direct and indirect effects.

Pathway	Effect	SE	z/t	95%CL	
				LLCI	ULCI
Main effect	0.365	0.033	11.166	0.301	0.429
Direct effect	0.302	0.040	7.447	0.222	0.381
Indirect effect	0.063	0.032	1.953	0.023	0.153

4.4.2. Tests of Moderating Effects

Once the effects of gender, age, and education had been controlled, psychological ownership was introduced as a mediating variable, while resource bricolage was considered a moderating variable. The results of the data are presented in Table 8, which demonstrates that the product term of systems thinking and resource bricolage has a significant effect on psychological ownership (β = 0.042, p = 0.019 *). This result supports hypothesis H4, indicating that technology entrepreneurs' resource bricolage positively moderates the relationship between systems thinking and psychological ownership.

Table 8. Test of the moderating effects model.

Variables	Psychological Ownership	Psychological Ownership	Psychological Ownership
Gender	0.021 (0.354)	0.011 (0.180)	0.004 (0.063)
Age	−0.049 (−1.441)	−0.047 (−1.397)	−0.049 (−1.448)
Level of education	0.081 (1.263)	0.083 (1.302)	0.085 (1.343)
Entrepreneurial position	0.038 (0.691)	0.035 (0.642)	0.034 (0.626)
Industry	−0.008 (−0.393)	−0.011 (−0.523)	−0.012 (−0.572)
Firm age	0.070 * (2.404)	0.062 * (2.147)	0.064 * (2.201)
Firm scale	−0.029 (−1.200)	−0.023 (−0.973)	−0.024 (−0.983)
Systems thinking	0.585 ** (14.942)	0.464 ** (8.728)	0.469 ** (8.740)
Resource bricolage		0.153 ** (3.321)	0.152 ** (3.292)
Systems thinking * Psychological ownership			0.042 * (0.716)
R^2	0.382	0.398	0.399
F	30.876 ***	29.359 ***	26.442 ***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Moreover, a simple slope analysis suggests that this positive effect is more pronounced at higher levels of resource bricolage than at lower levels (see Figure 2). As can be seen from Figure 2, for technology entrepreneurs with higher levels of resource bricolage, the higher their systems thinking, the higher the psychological ownership they will have; while for technology entrepreneurs with lower levels of resource bricolage, the lower their systems thinking, the lower the psychological ownership they will have. This also suggests that resource bricolage moderates the relationship between systems thinking and psychological ownership, further validating H4.

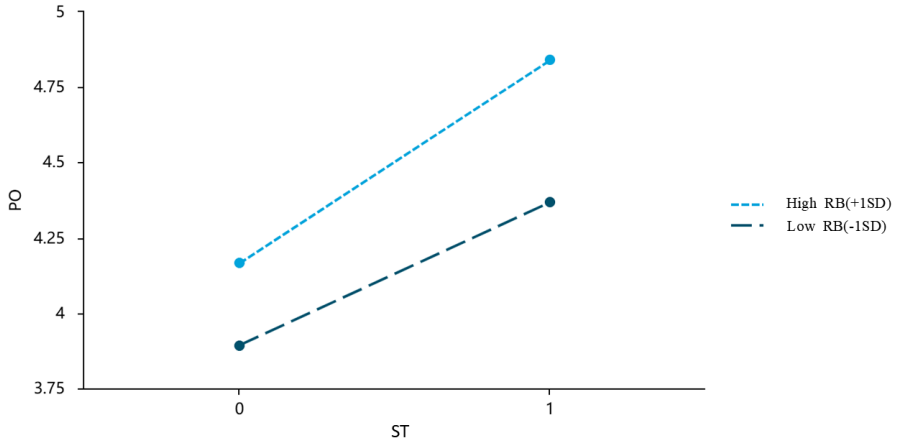


Figure 2. Moderating effect. Note: ST: Systems Thinking, PO: Psychological Ownership.

4.5. Robustness Checks

This study employed the methodological approach previously utilized in the existing literature to evaluate the reliability of the model results. In particular, the median value (4.433) of the continuous independent variable, systems thinking, was calculated and categorized into high and low levels to create a dichotomous dummy variable with

a threshold of 4.433. Subsequently, the original independent variable was replaced with the aforementioned dummy variable, and the data were reanalyzed while maintaining the analytical model and control variables. The results indicate that all four variables examined—systems thinking, psychological ownership, resource bricolage, and entrepreneurial persistence—continue to demonstrate significant relationships, albeit with slight alterations in the levels of significance attributed to the regression coefficients. These results serve to confirm the robustness of the findings of this study.

5. Discussion and Conclusions

5.1. Discussion

Based on the theoretical framework of systems thinking, this study reveals the formation mechanism and role path of technology entrepreneurs' entrepreneurial persistence. Firstly, systems thinking has a significant positive driving effect on entrepreneurial persistence, which verifies hypothesis H1. Secondly, psychological ownership partially mediates between systems thinking and entrepreneurial persistence, which verifies hypotheses H2 and H3. Finally, the resource bricolage shows a significant positive moderating effect, which verifies hypothesis H4, and its intensity directly affects the efficiency of transforming systems thinking to psychological ownership.

This finding confirms the theoretical presupposition that systems thinking contributes to the enhancement of technopreneurs' entrepreneurial persistence. It provides new evidence for the construction of technopreneurs' thinking skills in the context of China's digital economy. Technology entrepreneurs with higher-level systems thinking show stronger strategic determination and opportunity-capturing ability, and the probability of breaking through entrepreneurial dilemmas through dynamic feedback and precise selection of key intervention points is significantly higher. Also, this study shows that systems thinking significantly enhances entrepreneurs' sense of ownership and commitment to belonging to the entrepreneurial process by reconfiguring their perceived dimensions of entrepreneurship. This conduction mechanism deeply echoes the systems thinking theory, revealing the micro-path of the synergistic evolution of thinking architecture and cognitive mechanisms. The study further found that the cognitive empowerment effect of psychological ownership can translate the complex rationality of systems thinking into the behavioral resilience of sustained entrepreneurship, which provides a new perspective for understanding sustained entrepreneurship among technology entrepreneurs in the digital age.

5.2. Theoretical Contributions

This study starts from the systems science perspective and deepens the theoretical boundaries of entrepreneurial persistence research in three dimensions.

Firstly, it constructs an explanatory model of entrepreneurial persistence under the framework of complex systems. Current research primarily focuses on static element analysis and lacks an in-depth deconstruction of the dynamic evolution mechanism of the entrepreneurial system in the digital era.

Secondly, based on systems feedback theory, this paper confirms the role of psychological ownership as a mediator between systems thinking and entrepreneurial persistence. By revealing how systems thinking shapes entrepreneurial willingness and behaviors by enhancing the global perception of the environment and the sense of control over the entrepreneurial process, this study provides a new paradigm for studying psychological mechanisms in digital entrepreneurial ecosystems.

Thirdly, the systematic interpretation of resource bricolage can significantly affect the effectiveness of transforming systems thinking into entrepreneurial persistence. This regulatory mechanism confirms the core assertion of complex adaptive systems theory

about the dynamic adaptation of elements. It solves the technological entrepreneurship's 'high failure rate dilemma' that combines cognitive science and management attributes.

5.3. Management Insights

Based on a systems thinking perspective, this paper comprehensively describes the influencing factors of entrepreneurial persistence from the individual factors of science and technology entrepreneurs, which has certain insights for entrepreneurs and government departments.

For technology entrepreneurs themselves, they need to strengthen systems thinking and entrepreneurial mental ownership. Technology entrepreneurs should cultivate a systems thinking approach and build up entrepreneurial self-confidence. At the same time, they should face up to their interest in entrepreneurship and see entrepreneurship as a way to realize their values.

For the relevant government departments, on the one hand, through short videos to create an atmosphere of tolerance and respect for entrepreneurship; on the other hand, organise seminars to help technology entrepreneurs to master the systematic way of thinking, to enhance the psychological ownership of technology entrepreneurs in the process of entrepreneurship, and promote the success of technology entrepreneurs in entrepreneurial endeavours.

5.4. Limitations and Future Directions

Although this study reveals the mechanism of systems thinking on entrepreneurial persistence of technology entrepreneurs, several limitations remain to provide room for extension in subsequent research. Firstly, the depth of theoretical integration needs to be expanded. The current study focuses on the direct path of systems thinking and entrepreneurship, and does not fully explore the moderating effects of the external environment and policies. In the future, we will explore the boundary conditions of the effectiveness of systems thinking in different contexts. Secondly, the dynamic evolution mechanism has not yet been deconstructed. The study used scale data to validate the variable relationships and failed to capture the dynamic differences in the role of systems thinking in different stages of entrepreneurship. A longitudinal case-tracking approach can be followed up to structure systems thinking and its characteristics about key events.

We will also rigorously address endogeneity concerns among systems thinking, psychological ownership, resource bricolage, and entrepreneurial persistence. Future research will employ instrumental variable techniques, utilizing regional digital economy development levels and entrepreneurial policy support strength as instruments. These factors correlate with entrepreneurs' systems thinking, psychological ownership, and resource bricolage but remain exogenous to entrepreneurial persistence. Instrumental variables will enhance causal inference validity, strengthening the credibility of conclusions.

Privacy constraints precluded the sampling of entrepreneurs lacking public registration or contact information, a group that potentially included over-representations of technology entrepreneurs benefiting from incubation center and business park policies. Future research should employ stratified random sampling where feasible.

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Appendix A

Table A1. Measurement scales.

Constructs	Items	Measurement Items	References
Systems Thinking	ST1	1. I can recognise positive feedback loops for user growth.	Sweeney &Sterman [61] Stave & Hopper [62]
	ST2	2. I can anticipate the delayed impact of technology iterations.	
	ST3	3. I can define cross-platform interaction boundaries.	
	ST4	4. I can design modular system architectures.	
	ST5	5. I can focus on high-converting user paths.	
Entrepreneurial persistence	EP1	1. A critical factor in my success is that I do not give up easily.	Sabiu et al. [63]
	EP2	2. I have the staying power to do work that requires long hours and hard work.	
	EP3	3. When I hit a snag in what I am doing, I don't stop until I have found a way to get around it.	
	EP4	4. I need to prove I can succeed.	
Psychological ownership	PO1	1. I feel that the people I work with in my organization should not invade my workspace.	Avey et al. [64]
	PO2	2. I am confident in contributing to my organization's success.	
		3. I can make a positive difference in this organization.	
		4. I would challenge anyone in my organization if I thought something was done wrong.	
	PO3	5. I feel I belong in this organization.	
	PO4	6. I feel this organization's success is my success.	
Resource bricolage	RB1	1. I can acquire or learn new technologies in my field.	Senyard et al. [67,68]
	RB2	2. I can leverage networks to address new entrepreneurial challenges.	
	RB3	3. I can guide customers to participate or replace resources to seize the new business opportunities.	
	RB4	4. I can respond to policy calls for innovation in technology, products, and operations.	
	RB5	5. I can to combine all the resources at hand to meet any new challenges facing the enterprise.	

Table A2. Interview Outline.

Number	Question
1	Briefly introduce your entrepreneurial experience.
2	Has there been any experience of bricolage in combining resources during the entrepreneurial process? If so, please give examples.
3	When faced with a new entrepreneurial challenge, how do you find an effective solution using existing resources? If so, please provide examples.
4	When faced with a new business opportunity, how do you use the resources at hand to seize it? If yes, please provide examples.
5	Did you have any experience in combining resources that you had planned to use for other purposes to meet new challenges during the start-up process? If so, please provide examples.

References

1. Zhang, T.; Wei, L.; Liu, J. How China's Digital Technology Development Affects the Environmental Costs Related to Global Value Chains? Evidence from Regional Manufacturing Sectors. *Sci. Total Environ.* **2023**, *886*, 163978. [CrossRef]
2. China Academy of Labour and Social Security Sciences. 2023 Digital Economy Era Youth Employment and Entrepreneurship Development Report. 2023. Available online: https://www.calss.net.cn/p1/kybgList/20230601/38515.html (accessed on 12 May 2025).
3. Lu, S.; Yu, H. Research on Digital Business Model Innovation Based on Emotion Regulation Lens. *Front. Psychol.* **2022**, *13*, 842076. [CrossRef] [PubMed]
4. Zhou, Q. The Impact of Cross-Cultural Adaptation on Entrepreneurial Psychological Factors and Innovation Ability for New Entrepreneurs. *Front. Psychol.* **2021**, *12*, 724544. [CrossRef] [PubMed]
5. U.S. Bureau of Labor Statistics. Entrepreneurship and the U.S. Economy. 2023. Available online: https://www.usa.gov/agencies/bureau-of-labor-statistics (accessed on 18 July 2025).
6. Song, F.; Zhao, C. Why Do Chinese Enterprises Make Imitative Innovation? An Empirical Explanation Based on Government Subsidies. *Front. Psychol.* **2022**, *13*, 802703. [CrossRef] [PubMed]
7. Arnold, R.D.; Wade, J.P. A Definition of Systems Thinking: A systems approach. *Procedia Comput. Sci.* **2015**, *44*, 669–678. [CrossRef]
8. Ferreira-Neto, M.N.; De Carvalho Castro, J.L.; De Sousa-Filho, J.M.; De Souza Lessa, B. The Role of Self-Efficacy, Entrepreneurial Passion, And Creativity in Developing Entrepreneurial Intentions. *Front. Psychol.* **2023**, *14*, 1134618. [CrossRef]
9. Huang, M.J.; Li, Z.B.; Su, X.F. Anticipated Regret, Entrepreneurial Cognition, and Entrepreneurial Persistence. *Front. Psychol.* **2022**, *13*, 788694. [CrossRef]
10. Maclure, K.; Stewart, D. Digital Literacy Knowledge and Needs of Pharmacy Staff: A Systematic Review. *J. Innov. Health Inform.* **2016**, *23*, 840. [CrossRef]
11. Bai, Q.; Chen, H.; Zhou, J.; Li, G.; Zang, D.; Sow, Y.; Shen, Q. Digital Literacy and Farmers' Entrepreneurial Behavior-Empirical Analysis Based on CHFS2019 Micro Data. *PLoS ONE* **2023**, *18*, E0288245. [CrossRef]
12. Wei, Z.; Lee, M.J.; Jia, Z.; Roh, T. Do Entrepreneurial Resources Drive Startup Activation? Mediating Effect of Entrepreneurial Orientation. *Heliyon* **2023**, *9*, E15603. [CrossRef]
13. Morewedge, C.K. Psychological Ownership: Implicit and Explicit. *Curr. Opin. Psychol.* **2021**, *39*, 125–132. [CrossRef] [PubMed]
14. Uthaileang, W.; Kiattisin, S. Developing the Capability of Digital Financial Literacy in Developing Countries: A Case of Online Loan for Small Entrepreneurs. *Heliyon* **2023**, *9*, e21961. [CrossRef] [PubMed]
15. Yener, H. A study on effects of system thinking and decision-making styles over entrepreneurship skills. *Turk. J. Eng.* **2022**, *6*, 26–33. [CrossRef]
16. Peng, X.; Guo, R.; Zu, J.; Song, X. The Impact of Resource Bricolage on Entrepreneurial Orientation in Start-Ups: The Moderating Roles of TMT Heterogeneity and TMT Behavioral Integration. *Front. Psychol.* **2022**, *13*, 900177. [CrossRef] [PubMed]
17. Van Hugten, J.; Vanderstraeten, J.; van Witteloostuijn, A.; Coreynen, W. When the Going Gets Tough, the Entrepreneurs Get Less Entrepreneurial? *PLoS ONE* **2023**, *18*, e0290253. [CrossRef]
18. Carter, R.G.; Mundorff, K.; Risien, J.; Bouwma-Gearhart, J.; Bratsch-Prince, D.; Brown, S.A.; Campbell, A.L.; Hartman, J.C.; Hasemann, C.A.; Hollenbeck, P.J.; et al. Innovation, Entrepreneurship, Promotion, And Tenure. *Science* **2021**, *73*, 1312–1314. [CrossRef]
19. Knighton, S. Research, Innovation, and Entrepreneurship (A Powerful Combination of Forces). *Appl. Nurs. Res.* **2018**, *44*, 113. [CrossRef]
20. Abeysekera, I. Innovation and Business Performance on Australia: Role of Entrepreneurship and Intrapreneurship in a Crisis. *Front. Psychol.* **2023**, *14*, 1126313. [CrossRef]
21. Zhou, M.; Mu, W.; Li, F.; Zhou, Y.; Huang, D.; Wang, K.; Zhang, J. Entrepreneur-Region Fit and Entrepreneurial Success in China: The Effect of "Confucian" Personality. *Front. Psychol.* **2022**, *12*, 724939. [CrossRef]
22. Rafiei, S.; Mehrtak, M.; Amerzadeh, M.; Rafiei, S.; Moosavi, S.; Kalhor, R. The Relationship Between Succession and Intellectual Capital with Entrepreneurship in Hospitals. *BMC Health Serv. Res.* **2023**, *23*, 474. [CrossRef]
23. Fabbro, E.; Kyrdoda, Y.; Dore, S.; Marzi, G.; Borruso, G.; Battino, S.; Piani, G.C.; Vianelli, D. Is Entrepreneurship a Key Factor in the Development of European Countries? A Proposal for an Innovation Readiness Environment (IRE) Index. *Open Res. Eur.* **2024**, *4*, 12. [CrossRef]
24. Marques, C.S.; Valente, S.; Lages, M. The Influence of Personal and Organisational Factors on Entrepreneurship Intention: An Application in the Health Care Sector. *J. Nurs. Manag.* **2018**, *26*, 696–706. [CrossRef] [PubMed]
25. Li, C.; Bilimoria, D.; Wang, Y.; Guo, X. Gender Role Characteristics and Entrepreneurial Self-Efficacy: A Comparative Study of Female and Male Entrepreneurs in China. *Front. Psychol.* **2020**, *11*, 585803. [CrossRef] [PubMed]
26. Rogoll, L.; Schulz, K.; Schulz, J. Participatory modeling meets African swine fever—Systems thinking in action. *BMC Vet. Res.* **2025**, *21*, 313. [CrossRef] [PubMed]
27. Monat, J.P.; Gannon, T.F. What Is Systems Thinking? A Review of Selected Literature Plus Recommendations. *Am. J. Syst. Sci.* **2015**, *4*, 11–26. [CrossRef]

28. Ackoff, R.L. Systems Thinking and Thinking Systems. *Syst. Dyn. Rev.* **1994**, *10*, 175–188. [CrossRef]
29. Leischow, S.J.; Best, A.; Trochim, W.M. Systems Thinking to Improve the Public's Health. *Am. J. Prev. Med.* **2008**, *35*, S196–S203. [CrossRef]
30. Irabor, T.J.; Yameogo, P.S.A.; Perrin, L. Gaming for Change-Exploring Systems Thinking and Sustainable Practices Through Complexity-Inspired Game Mechanics. *Humanit. Soc. Sci. Commun.* **2025**, *12*, 680. [CrossRef]
31. Dodd, K.; Salmon, P.M.; Solomon, C. Applying A Systems Thinking Lens to Child Sexual Abuse in Sport: An Analysis of Investigative Report Findings and Recommendations. *Child Abuse Negl.* **2025**, *165*, 107488. [CrossRef]
32. Zhang, J.; van Gorp, D.; Kievit, H. Digital Technology and National Entrepreneurship: An Ecosystem Perspective. *J. Technol. Transf.* **2023**, *48*, 1077–1105. [CrossRef]
33. Su, Y.; Li, M. Applying Technology Acceptance Model in Online Entrepreneurship Education for New Entrepreneurs. *Front. Psychol.* **2021**, *12*, 713239. [CrossRef]
34. Bai, J.Y.; Tian, Q.; Liu, X. Examining Job Complexity on Job Crafting Within Conservation of Resources Theory: A Dual-Path Mediation Model. *Front. Psychol.* **2021**, *12*, 737108. [CrossRef]
35. Dou, G.; Yang, J.; Yang, L.; Liu, B.; Yuan, Y. Where There is Pressure, There is Motivation? The Impact of Challenge-Hindrance Stressors on Employees' Innovation Performance. *Front. Psychol.* **2022**, *13*, 1020764. [CrossRef]
36. Wang, H.; Sun, W.; Zhou, Y.; Li, T.; Zhou, P. Teachers' Assessment Literacy Improves Teaching Efficacy: A View from Conservation of Resources Theory. *Front. Psychol.* **2022**, *13*, 1007830. [CrossRef] [PubMed]
37. Pierce, J.L.; Kostova, T.; Dirks, K.T. The State of Psychological Ownership: Integrating and Extending a Century of Research. *Rev. Gen. Psychol.* **2003**, *7*, 84–107. [CrossRef]
38. Morewedge, C.K.; Weiss, L. Psychological Ownership: Actors' and Observers' Perspectives. *Behav. Brain Sci.* **2023**, *46*, e344. [CrossRef] [PubMed]
39. Iseki, S.; Sasaki, K.; Kitagami, S. Development of a Japanese Version of the Psychological Ownership Scale. *PeerJ* **2022**, *10*, e13063. [CrossRef]
40. Senge, P.M. *The Fifth Discipline: The Art and Practice of the Learning Organization*; Doubleday/Currency: New York, NY, USA, 1990; ISBN 0-385-26094-6.
41. Renz, F.M.; Posthuma, R. 30 Years of Psychological Ownership Theory: A Bibliometric Review and Guide for Management Scholars. *J. Manag. Hist.* **2023**, *29*, 179–204. [CrossRef]
42. Karjanto, N.; Peng, A. Exploring Sustainability Through the Lens of the Lotka-Volterra Model in Population Ecology. *bioRxiv* **2025**. [CrossRef]
43. Lehtonen, K.; Uuskylä, P.; Jalonen, H. A Systems Thinking Approach for Examining the Turning Points in the Finnish Public Sport Policy. *Front. Sports Act. Living* **2025**, *7*, 1591211. [CrossRef]
44. Ghani, U.; Teo, T.; Li, Y.; Usman, M.; Islam, Z.U.; Gul, H.; Naeem, R.M.; Bahadar, H.; Yuan, J.; Zhai, X. Tit for Tat: Abusive Supervision and Knowledge Hiding the Role of Psychological Contract Breach and Psychological Ownership. *Int. J. Environ. Res. Public Health* **2020**, *17*, 1240. [CrossRef]
45. Chen, X.; Lee, C.; Hui, C.; Lin, W.; Brown, G.; Liu, J. Feeling Possessive, Performing Well? Effects of Job-Based Psychological Ownership on Territoriality, Information Exchange, and Job Performance. *J. Appl. Psychol.* **2023**, *108*, 403–424. [CrossRef] [PubMed]
46. Zhou, X.; Zhang, L.; Su, X. Entrepreneurial Institutional Environment and Entrepreneurial Orientation: The Mediating Role of Entrepreneurial Passion. *Front. Psychol.* **2022**, *13*, 840548. [CrossRef] [PubMed]
47. Deng, X.; Wang, Y.; Sun, X. How Turbulence Brings Benefit: The Influence of Dynamic Team Environment on Entrepreneurial Team Innovation. *Front. Psychol.* **2020**, *11*, 759. [CrossRef]
48. Avey, J.B.; Wernsing, T.S.; Palanski, M.E. Exploring the Process of Ethical Leadership: The Mediating Role of Employee Voice and Psychological Ownership. *J. Bus. Ethics* **2012**, *107*, 21–34. [CrossRef]
49. Bernhard, F.; O'Driscoll, M.P. Psychological ownership in small family-owned businesses: Leadership style and nonfamily-employees' work attitudes and behaviors. *Group Organ. Manag.* **2011**, *36*, 345–384. [CrossRef]
50. Peng, H.; Pierce, J. Job- and organization-based psychological ownership: Relationship and outcomes. *J. Manag. Psychol.* **2015**, *30*, 151–168. [CrossRef]
51. Feng, B.; Chen, M. The Impact of Entrepreneurial Passion on Psychology and Behavior of Entrepreneurs. *Front. Psychol.* **2020**, *11*, 1733. [CrossRef]
52. Tu, Y.; Hao, X.; Rosak-Szyrocka, J.; Vasa, L.; Zhao, X. Obsessive Passion, Opportunity Recognition, and Entrepreneurial Performance: The Dual Moderating Effect of the Fear of Failure. *Front. Psychol.* **2023**, *13*, 1037250. [CrossRef]
53. Zhao, S.; Zhou, Y.; Guan, H.; Xu, W. Entrepreneurial Passion Psychology Based Influencing Factors of New Venture Performance. *Front. Psychol.* **2021**, *12*, 696963. [CrossRef]
54. Du, Y.; Hu, H.; Wang, Z. Entrepreneurs' Felt Responsibility for Constructive Change and Entrepreneurial Performance: A Moderated Mediation Model of Technology Action and Market Orientation. *Front. Psychol.* **2021**, *12*, 751821. [CrossRef]

55. Hou, F.; Qi, M.D.; Su, Y.; Tan, X.X.; Yang, B.X. Trickle Down Effects of Entrepreneurial Bricolage and Business Model Innovation on Employee Creativity: Evidence from Entrepreneurial Internet Firms in China. *Front. Psychol.* **2022**, *12*, 801202. [CrossRef] [PubMed]
56. Yuan, Y.H. A Study From a Psychological Perspective of High Performance to Explore the Relationship Among Resource Bricolage, Social Capital, Entrepreneurial Attitude, and Intention. *Front. Psychol.* **2022**, *13*, 944151. [CrossRef] [PubMed]
57. Hsu, D.K. 'This Is My Venture!' The Effect of Psychological Ownership on Intention to Reenter Entrepreneurship. *J. Small Bus. Entrep.* **2013**, *26*, 387–402. [CrossRef]
58. Yitshaki, R. Entrepreneurs' Emotional Intelligence as a Factor Explaining Entrepreneurial Psychological Ownership and High-Tech Start-Up Growth. *J. Small Bus. Enterp. Dev.* **2021**, *28*, 489–514. [CrossRef]
59. Cardon, M.S.; Kirk, C.P. Entrepreneurial passion as mediator of the self-efficacy to persistence relationship. *Entrep. Theory Pract.* **2013**, *39*, 1027–1050. [CrossRef]
60. National Bureau of Statistics of China & Ministry of Science and Technology. China High-Tech Industry Statistical Yearbook. 2023. Available online: https://www.shujuku.org/china-statistical-yearbook-on-high-technology-industry-2023.html (accessed on 19 May 2025).
61. Sweeney, L.B.; Sterman, J.D. Bathtub Dynamics: Initial Results of a Systems Thinking Inventory. *Syst. Dyn. Rev.* **2000**, *16*, 249–286. [CrossRef]
62. Stave, K.; Hopper, M. What constitutes systems thinking? A proposed taxonomy. In Proceedings of the 25th International Conference of the System Dynamics Society, Boston, MA, USA, 29 July–2 August 2007; Volume 29, pp. 1–27.
63. Sabiu, I.; Abdullah, A.; Amin, A. Impact of Motivation and Personality Characteristics on Bumiputeras' Entrepreneurial Persistence in Malaysia. *J. Dev. Entrep.* **2017**, *22*, 1750009. [CrossRef]
64. Avey, J.; Avolio, B.; Crossley, C. Psychological Ownership: Theoretical Extensions, Measurement and Relation to Work Outcomes. *J. Organ. Behav. Manag.* **2009**, *30*, 173–191. [CrossRef]
65. SuperChance Venture Planet. Entrepreneurial Investment and Financing Report of Chinese University Professors and Scientists 2024. Available online: https://roll.sohu.com/a/901550225_122440406 (accessed on 5 June 2025).
66. Baker, T.; Nelson, R.E. Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage. *Adm. Sci. Q.* **2005**, *50*, 329–366. [CrossRef]
67. Senyard, J.; Baker, T.; Davidsson, P. Entrepreneurial Bricolage: Towards Systematic Empirical Testing. *Front. Entrep. Res.* **2009**, *29*, 5.
68. Senyard, J.; Baker, T.; Steffens, P.; Davidsson, P. Bricolage as a Path to Innovativeness for Resource-Constrained New Firms. *J. Prod. Innov. Manag.* **2014**, *31*, 211–230. [CrossRef]
69. Jia, X.D.; Tan, X.H. The Practical Value of Classical Grounded Theory and its Spirit for Chinese Management Research. *Chin. J. Manag.* **2010**, *7*, 656–665. [CrossRef]

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