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Toward a Quantitative Validation of Entrepreneurial Characteristics and Ecosystem in Japan: An Exploratory Factor Analysis

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Abstract

This study aims to quantitatively validate the Entrepreneurial Characteristics (EC) Model, which conceptualizes the interaction between internal factors (mindset and skillset) and external factors (entrepreneurial support systems and cultural context) in the decision-making of Japanese entrepreneurs. Based on prior qualitative research, we developed a scale reflecting these dimensions and conducted a pilot survey with 106 participants. Using exploratory factor analysis (EFA) with maximum likelihood estimation and promax rotation, we identified a three-factor structure: (1) Environmental Readiness, (2) Entrepreneurial Drive, and (3) Sense of Purpose. These factors reflect key dimensions of the EC model and demonstrate theoretical coherence and practical relevance. The findings offer a foundational framework for subsequent confirmatory factor analysis (CFA) and structural equation modeling (SEM), contributing to both academic theory and entrepreneurial support policy. This study serves as a bridge between qualitative insights and empirical validation, offering new directions for entrepreneurship research in Japan.

Keywords: Entrepreneurial Characteristics, Entrepreneurial Ecosystems, Mindset and Skillset,

Entrepreneur, Entrepreneurship

1 Introduction

Entrepreneurial activity in Japan has remained sluggish compared to other OECD countries for a long time. Prior studies have indicated Based on these findings, that this situation is the result of the complex interplay between individuals' internal characteristics and external environments. In recent years, there has been a growing demand for comprehensive frameworks to understand entrepreneurs' decision-making and behaviors by simultaneously considering internal factors such as intrinsic motivation, mindset, and skillset, and external factors such as funding, networks, and support systems.

Previous research on entrepreneurship has mainly focused on individuals' psychological traits, discussing how factors like self-efficacy, achievement motivation, and risk tolerance influence entrepreneurial intentions and decisions. At the same time, increasing attention has been paid to the role of the external environment surrounding entrepreneurs, namely the Entrepreneurial Ecosystems (EE). EE comprises various elements such as human capital, financial resources,

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institutions, networks, and cultural contexts, and it has been reported that the complementary interaction among these elements fosters the creation and growth of new businesses.

Through previous qualitative research, the authors have clarified that internal and external factors influence entrepreneurs' decision-making in a phased and cyclical manner[1]. For example, interview data revealed a structural process in which an entrepreneur's "mindset" motivates the acquisition of skills, which in turn leads to leveraging personal networks, securing financing, and scaling up the business. Moreover, insufficient utilization of cultural support and public systems was identified as an issue, reflecting the dysfunctionality of Japan's EE.

Based on these findings, the authors have proposed a hypothetical model called the *Entrepreneurial Characteristics Model (EC Model)*, which conceptualizes the interaction between entrepreneurs' internal factors (mindset and skillset) and external factors (EE) [1]. The EC Model captures entrepreneurs' decision-making as a dynamic process starting from internal factors and evolving through interactions with external factors. However, this model is grounded in qualitative research, and its structural hypotheses have not yet been statistically validated.

In this study, we aim to quantitatively examine the preliminary structure of the EC Model by conducting an exploratory survey and applying Exploratory Factor Analysis (EFA). Specifically, we designed and administered survey items covering internal factors such as psychological qualities and behavioral tendencies, and external factors such as networks, funding, and support systems. Through EFA, we seek to extract multiple latent factors and explore their causal and structural relationships.

This approach is expected to enhance understanding of the EE adapted to the institutional and cultural context of Japan, thereby contributing to the foundation for more practical entrepreneurship support measures. Furthermore, this study serves as a preliminary investigation for future large-scale surveys and the refinement of the hypothetical model through Confirmatory Factor Analysis (CFA) and covariance structure analysis. Thus, it aims to bridge theoretical frameworks and empirical data.

The remainder of this paper is organized as follows: Section 2 reviews prior studies on internal factors of entrepreneurs and the challenges of EE, positioning the current research. Section 3 explains the hypothetical model, the development of measurement scales, the research design, and the analytical methods. Section 4 reports the results of the exploratory factor analysis (EFA) and discusses the extracted factor structures. Section 5 discusses the theoretical implications and practical insights derived from the findings, and Section 6 concludes the study and suggests directions for future research.

2 Related Work

2.1 Studies on Internal Factors of Entrepreneurs

In addressing the sluggish entrepreneurial activity in Japan, prior research has primarily focused on individuals' internal characteristics. Repeatedly, psychological factors such as self-efficacy, risk tolerance, achievement motivation, career fulfillment, and the desire for self-actualization have been pointed out as influencing entrepreneurial decision-making and behavior[2][3]. Furthermore, unique internal traits of Japanese entrepreneurs, such as "shrewdness" and "career fulfillment" were revealed[1].

Recently, internal factors have increasingly been categorized into two dimensions: Mindset and Skillset, with growing research interest in how each dimension influences entrepre-

neurial behavior. Regarding mindset, studies on the entrepreneurial mindset (EM) have advanced, defining it as a "Entrepreneurial mindset is defined as a cognitive perspective that enables an individual to create value by recognizing and acting on opportunities, making decisions with limited information, and remaining adaptable and resilient in conditions that are often uncertain and complex."[4]. Skillset, on the other hand, refers to the practical abilities, knowledge, skills, and experiences necessary to execute entrepreneurial tasks[5]. Studies attempting to clarify the relationship between mindset and skillset report, for example, that individuals with a growth mindset tend to flexibly adapt to environmental changes and actively acquire new skills[6], thus, attention is increasingly paid to the dynamic interaction between practical knowledge and internal attitudes. From this perspective, entrepreneurial capability formation is now viewed not as a product of innate traits but as dynamically shaped through interaction with the environment and accumulated experiences.

2.2 Structure and Research Trends of the EE

In recent years, the concept of the EE has rapidly gained attention in entrepreneurship research. Defined by Isenberg, EE encompasses the external environment necessary for entrepreneurial activities, including domains such as policy, finance, culture, support, human capital, and markets[7]. Furthermore, Stam classified these elements into framework conditions and systemic conditions, suggesting a causal structure where their interaction leads to entrepreneurial outcomes[8]. Spigel further organized EE elements into three layers—cultural, social, and material—and demonstrated how their complementary interplay supports entrepreneurial activities[9]. A distinctive feature of EE research is its emphasis on the dynamic interplay among elements, rather than merely listing individual factors. For example, cultural conditions such as societal trust and the presence of role models can enhance human networks and access to funding, thereby creating mechanisms that promote entrepreneurial activities. Similarly, the design of public policies can impact the accessibility of financial resources, highlighting the interdependent nature of EE components.

However, these EE models have primarily been constructed based on Western contexts. In Japan, there are some specific challenges such as the low mobility of human resources, limited societal understanding of entrepreneurship, and the institutional fatigue of support systems. As a result, studies that take into account Japan's entrepreneurial culture and institutional background remain scarce, and the academic discussion is still underdeveloped. It has been pointed out that, in order to foster an EE that supports entrepreneurial activities, it is first necessary to generate the cultural and social characteristics of the ecosystem[10].

2.3 Positioning of This Study within the Entrepreneurial Characteristics (EC) Model

Based on prior qualitative research, the authors have proposed a hypothetical framework called the *Entrepreneurial Characteristics Model (EC Model)*, which integratively explains the interaction between internal factors (mindset and skillset) and external factors (elements of the EE) influencing entrepreneurs[1]. This model focuses on the hierarchical and cyclical relationships between internal and external factors. For example, the mindset enhances the development of skillsets, which then interact with business resources (BR), cultural factors (CF), and infrastructure factors (IF), leading to the formation of entrepreneurial decision-making and behavior

processes. A key feature of the EC Model is its emphasis on the *relationships* between internal and external factors from the entrepreneur's perspective, rather than simply listing the static elements of the EE. Specifically, the model visualizes a chain-like process in which the strengthening of mindset promotes the formation of human networks, which subsequently lead to building relationships with customers and partners. Moreover, the model provides a structural framework to grasp Japan-specific challenges, such as inconsistencies between government policies and cultural values.

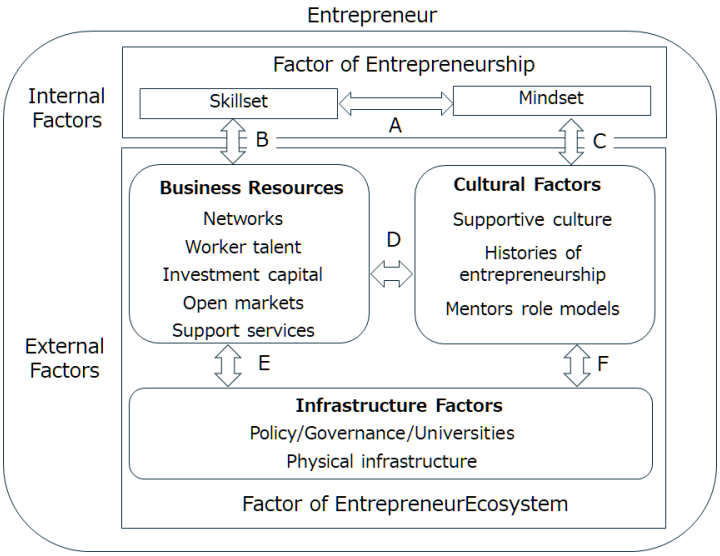

Figure 1: EC Model Yasuoka et al., 2024 [1]

This study aims to quantitatively verify the structural hypotheses of the EC Model as a preliminary step. By using Exploratory Factor Analysis (EFA), we seek to extract latent structures underlying internal and external factors and examine the validity of the model. Through this analysis, we aim to confirm the reproducibility and structural consistency of the factors identified qualitatively in prior research and to lay the groundwork for future Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) to refine the model.

3 Research Methodology

3.1 Hypothetical Model and Measurement Structure

In this study, we constructed a hypothetical model (the EC Model) concerning the internal factors (mindset and skillset) and external factors (business resources, cultural factors, and infrastructure factors) that influence the decision-making processes of Japanese entrepreneurs. We then developed measurement scales to verify the structural hypotheses of the model.

The development of the scales followed multiple stages based on findings obtained from prior qualitative research. First, we referred to the structure of the EC Model proposed by Yasuoka et al. (2024), which outlines a conceptual flow from mindset to skillset to external factors[1]. Measurement items corresponding to the conceptual content of each component were organized,

initially collected based on interview surveys and findings from existing literature. Subsequently, a pilot survey was conducted with actual entrepreneurs, allowing adjustments to reflect practical realities and to ensure content validity. Through this process, we established a scale suitable for hypothesis testing.

3.2 Development of Scale Items

The development of scale items proceeded through the following process:

1. Generation of Initial Items Based on Theoretical Background

In the EC Model, *Mindset* (entrepreneurial spirit) and *Skillset* (practical competencies) play central roles. Mindset was conceptualized with factors such as "risk tolerance," "challenge orientation," and "intrinsic motivation," while Skillset was associated with abilities such as "strategic planning," "resource acquisition," and "networking skills." Regarding external factors, based on EE models proposed by Stam and Spigel, elements like "funding access," "support systems," and "cultural soil" were selected[8][9].

2. Supplementation Based on Qualitative Research (Interview Analysis)

A separate preliminary interview survey conducted by the authors, targeting 16 entrepreneurs through semi-structured interviews, revealed various internal and external factors influencing entrepreneurial decision-making and behavior. For example, comments such as "I leveraged a reliable referral network," "My initial business funding relied mainly on personal savings," and "Self-efficacy encouraged me to take on challenges" corresponded to specific factors in the hypothetical model. These findings were used to reinforce the initial scale items.

3. Revision and Specification of Items

Based on qualitative data, we developed 38 items using a five-point Likert scale (e.g., "I can maintain a proactive attitude even in difficult situations," "My business has a reliable support network"). These items were designed to comprehensively cover each conceptual factor while ensuring that practitioners could intuitively respond.

4. Final Composition of Items and Preparation for Reliability Assessment

The items were finalized by verifying four criteria: theoretical validity, practical applicability, ease of response, and factor independence. They were constructed with the intention of subsequent Exploratory Factor Analysis (EFA) to identify latent structures and integrate or eliminate items as necessary. This ensured readiness for examining the structural validity of the scales prior to statistical hypothesis testing.

3.3 Overview of Sample and Data Collection

1. Characteristics of Participants

This study collected valid responses from 106 individuals who had entrepreneurial experience, were preparing for entrepreneurship, or had an interest in starting a business within Japan. Participants were recruited via an online survey platform and represented diverse backgrounds in terms of age, industry, and entrepreneurial stages. This diversity is expected to allow the factor structures extracted through EFA to broadly reflect the characteristics of entrepreneurial behaviors.

Additionally, detailed demographic attributes (such as industry, age, and region) were collected separately; however, this paper focuses on analyzing responses to the scale items.

2. Data Collection Methodology

The Data were collected through an online questionnaire conducted by January 2025. Partici-

pants responded to each scale item using a five-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree"). Each item was explicitly linked to the internal factors (Mindset, Skillset) or external factors (business resources, cultural factors, infrastructure factors) based on the pre-established EC Model, ensuring consistency with the study's hypothesis testing framework.

3.4 Exploratory Factor Analysis (EFA) Methodology

To identify the factor structure underlying the scale items, we conducted an Exploratory Factor Analysis (EFA) following the procedures and criteria described below.

1. Analytical Methodology

The Maximum Likelihood Method was employed for factor extraction, combined with Promax rotation, which allows for correlations between factors. This approach was deemed optimal for balancing theoretical consistency and statistical validity when examining the structural hypotheses of the EC Model regarding entrepreneurial characteristics.

2. Determination of the Number of Factors

The number of factors was determined based on eigenvalues greater than 1.0 (Kaiser's criterion) and the shape of the inflection point on the scree plot. In addition, theoretical consistency in factor interpretation was also taken into account.

3. Criteria for Item Evaluation

Items with factor loadings below 0.40, as well as those exhibiting high cross-loadings on two or more factors, were considered for removal based on both statistical and theoretical validity.

4. Naming of Factors

For each extracted factor, names were assigned based on their conceptual alignment with the components of the EC Model (Mindset, Skillset, Business Resources, Cultural Factors, and Infrastructure), ensuring consistency with their underlying meanings. The specific content of each factor and the details of their naming are reported in Section 4.

4 Results

4.1 Identification of Factor Structure

In this study, we conducted an Exploratory Factor Analysis (EFA) using the Maximum Likelihood method to clarify the latent factor structure underlying the scale items constructed based on the EC Model. Promax rotation was applied, assuming a structure that allows correlations between factors. The summary of the results is shown in Table 1.

1. Results of Factor Extraction

As a result of the analysis, three major factors were extracted. Each factor included between 5 and 16 items with high factor loadings ($\geq .40$), largely reflecting the conceptual components assumed in the EC Model. The extracted factors supported the structural hypothesis based on internal factors (Mindset, Skillset) and external factors (External Resources).

2. Determination of the Number of Factors

In determining the number of factors, a three-factor solution was deemed most appropriate based on eigenvalues greater than 1.0 and a clearly identifiable inflection point in the scree plot. In addition, the clarity of factor naming and theoretical consistency supported the adoption of the three-factor structure.

4.2 Item Elimination Criteria and Interpretation of Results

1. Criteria for Item Deletion

We refined the factor structure by applying the following criteria:

- Items with factor loadings below 0.40 were deleted due to their weak association with any factor.
- Items with high cross-loadings on multiple factors were also removed to avoid interpretive ambiguity.

	Item	Factor 1	Factor 2	Factor 3	Factor Attributes
Overall Scale	**α = 0.91**				
Factor 1	**Environmental Readiness : α = 0.78**				
36	Has government or municipal legislation or deregulation helped your business development?	0.734378402	-0.181902333	-0.175224371	Infrastructure factors
40	Has the government's dissemination of best practices motivated entrepreneurs?	0.725467714	-0.227288083	0.097507704	Infrastructure factors
34	Have you ever used an entrepreneurship support program offered by the government or local authorities?	0.71458786	-0.277804026	-0.392284184	Infrastructure factors
35	Has government or municipal legislation or deregulation contributed to the development of your business?	0.710256875	-0.292952073	-0.335561822	Infrastructure factors
41	Have policies that encourage entrepreneurship influenced the entrepreneurial mindset of society as a whole?	0.689493314	-0.261081383	-0.042221688	Infrastructure factors
32	Do you feel that entrepreneurship contests are raising society' s overall entrepreneurial awareness?	0.608616823	-0.181507239	0.224411861	Cultural context
39	Do you feel that institutional support from governments, municipalities, and universities is fostering a local entrepreneurial culture?	0.592080382	-0.37538262	-0.037585043	Infrastructure factors
29	Do you feel that Japan has a culture that tolerates failure and allows it to lead to the next challenge?	0.587970311	-0.107511578	0.301176758	Cultural context
30	Do you feel that entrepreneurs' status and roles are socially recognized in Japan?	0.559250607	0.145865074	0.282991799	Cultural context
37	Have you ever collaborated with universities or research institutions in the region?	0.556567472	-0.409767831	-0.003751419	Infrastructure factors
21	In terms of recruiting human resources, have you been able to secure personnel with the necessary skills?	0.515828776	-0.096899492	0.277185502	Business resources
38	Are you collaborating with local entrepreneurship support organizations (such as chambers of commerce)?	0.496278162	-0.1816107	0.073545448	Infrastructure factors
22	Does your skill set help you obtain resources?	0.4055732	0.210720137	0.318966039	Business resources
Factor 2	**Entrepreneurial Drive : α = 0.92**				
18	Do you have the will to keep challenging yourself without giving up in difficult situations?	0.398199907	0.627457274	0.010615414	Mindset
12	Are you excited to think of new projects that do not exist in the world?	0.277573289	0.627428259	-0.252273892	Mindset
13	Do you view failure as a learning opportunity and feel positive about taking on new challenges?	0.186675736	0.576838554	0.001469894	Mindset
16	Do you have a strong desire to accomplish something on your own?	0.350540614	0.573125787	-0.081871933	Mindset
6	Do you feel that having technical knowledge or industry-specific expertise is beneficial for your business or activities?	0.116873888	0.51366241	-0.198259748	Skill sets
2	Do you strongly feel the need to acquire new skills by observing the attitudes of successful people around you?	0.266652509	0.508130522	-0.04821185	Skill sets
1	Are you motivated to learn new skills and knowledge on a daily basis?	0.271699023	0.489016936	-0.118355106	Skill sets
11	Do you routinely look for new business ideas?	0.328513202	0.482737263	-0.316123231	Skill sets
15	Are you willing to take on new challenges that involve risk?	0.360851875	0.469092403	-0.162845845	Mindset
19	Do you have the ability to generate creative ideas and take action to realize them?	0.430584789	0.467540702	-0.231799823	Mindset
17	Do you feel you have the ability to quickly identify business opportunities and capitalize on them?	0.439661858	0.43057767	0.129614251	Mindset
Factor 3	**Sense of Purpose : α = 0.78**				
26	Do you feel that there is a network or human resources around you that are useful for business?	0.40373569	0.283030582	0.465165182	Business resources
33	Do you feel that your region has a culture that respects entrepreneurs?	0.501710724	0.001370165	0.457223663	Cultural context
23	Do you feel that you have adequate access to financing? (e.g., bank loans, angel investors, VC, etc.)	0.437342735	-0.113987147	0.444405228	Business resources
25	Are you effectively utilizing external experts (such as lawyers, accountants, and consultants)?	0.293350568	0.10409938	0.401522979	Business resources
	Eigenvalues	4.87	5.35	5.03	
	Contribution Rate (%)	29.77	11.69	12.26	
	Cumulative Contribution Rate (%)	29.77	41.46	53.72	
	Factor Correlations Factor 1	-	0.402	0.364	
	Factor 2	0.402	-	0.347	
	Factor 3	0.364	0.347	-	

Table 1: The summary of the results

As a result of this screening process, several items were excluded, and the final structure retained 26 items assigned across three factors.

2. Naming and Composition of Each Factor

The extracted factors were named as follows, each characterized by distinct features:

- Factor 1: Environmental Readiness
  This factor includes items related to the utilization of support systems, formation of networks, and the development of an entrepreneurial environment. It primarily reflects the degree of enhancement of external resources.
- Factor 2: Entrepreneurial Drive
  This factor captures items concerning intrinsic motivation, risk tolerance, and growth aspirations. It corresponds to the psychological tendencies associated with an entrepreneur's mindset.
- Factor 3: Sense of Purpose
  This factor consists of items representing autonomy, responsibility, and strong purpose consciousness. It is closely related to skillset traits, particularly the maturity of internal behavioral attributes.

4.3 Preliminary Reliability Assessment

As a result of examining the relationship between the group

The internal consistency of each factor was assessed using Cronbach's alpha coefficients. The results showed that all factors demonstrated high reliability:

- Factor 1 (Environmental Readiness): $\alpha = .78$
- Factor 2 (Entrepreneurial Drive): $\alpha = .92$
- Factor 3 (Sense of Purpose): $\alpha = .78$

These results indicate that the developed scales achieved stable measurements consistent with the theoretical structure, ensuring sufficient foundational reliability for subsequent Confirmatory Factor Analysis (CFA) to verify structural validity.

5 Discussion

5.1 Theoretical Implications

This study empirically examined the validity of the factor structure based on the EC Model, which captures the interaction between internal factors (mindset and skillset) and external factors (external resources) influencing entrepreneurs' decision-making and behavior, through Exploratory Factor Analysis (EFA). As a result, a three-factor structure was extracted, with each factor reflecting different aspects of entrepreneurial characteristics. This section discusses the theoretical implications of the three-factor structure.

First, **Environmental Readiness** represents an aggregated evaluation of external factors, such as the utilization of support systems, the formation of networks, and the presence of an entrepreneurial culture within local communities. This factor closely relates to the EE perspective that has gained attention in recent years. In models proposed by Spigel (2015) and Stam (2015), the impact of institutional support, cultural values, and social capital on entrepreneurial behavior is emphasized, and the present factor structure empirically supports these theoretical views.

Second, **Entrepreneurial Drive** reflects elements corresponding to the entrepreneur's mindset, such as intrinsic motivation, risk tolerance, and proactive acceptance of challenges. This aligns with psychological traits long discussed in entrepreneurial research, such as "entrepreneurial intention" and "need for achievement", and also connects with the concept of the "growth mindset" emphasized in recent entrepreneurial education[2][6].

Lastly, **Sense of Purpose** captures skillset-like traits such as autonomy, a strong sense of responsibility, and proactive engagement in decision-making. Importantly, the skillset identified here measures not only the acquisition of generic abilities (e.g., presentation skills, business knowledge) but also deeper behavioral traits like judgment and execution capabilities in response to environmental changes. Thus, it offers an enriched understanding of the deeper structure of entrepreneurial skills.

Another important theoretical contribution of this study is the suggestion that internal and external factors do not function as independent variables, but rather operate in a complementary and multilayered structure. For example, a higher level of entrepreneurial drive may promote proactive engagement, while a well-developed external environment may contribute to the activation of an entrepreneurial mindset. This highlights the necessity of addressing personal and environmental factors in an integrated manner and contributes to establishing a structural perspective that moves beyond single factor approaches.

Furthermore, this study makes a significant contribution by empirically supporting the validity of the EC Model through the statistical method of Exploratory Factor Analysis (EFA), serving as an important bridge between theory and empirical research. While previous studies on entrepreneurship tended to treat internal and external factors separately, this study simultaneously measured these components and presented an initial integrated latent model with a correlational structure. In doing so, it provides a theoretical starting point for future validation through confirmatory factor analysis (CFA) and structural equation modeling (SEM).

In this way, the factor structure identified in this study not only supports the conceptual validity of the EC Model but also establishes a foundation for a new framework that overcomes the theoretical fragmentation in existing entrepreneurship research and enables an integrated understanding of internal and external factors.

5.2 Practical Implications

The findings of this study offer valuable insights not only for academic research but also for practice in entrepreneurship support, education, and policymaking. Below, we discuss practical applications corresponding to each of the three extracted factors.

First, **Environmental Readiness** indicates that the existence of institutional support and human networks is a critical foundation for promoting entrepreneurial activity. This implies that local governments and entrepreneurship support organizations should not only focus on establishing policies but also emphasize creating opportunities for networking and information exchange. For example, initiatives such as regular networking events, accelerator programs, and opportunities for entrepreneurs to connect with supporters and experts are essential for building and maintaining social capital. Furthermore, in evaluating entrepreneurship support, it is important to move beyond quantitative indicators like the number of startups or the amount of funding raised.

Instead, qualitative indicators such as the entrepreneur's internal growth and the degree of fit with the support environment should be emphasized. The three factors extracted in this study can be directly utilized as individual monitoring indicators, providing a framework to enhance regional development and improve support measures.

Second, **Entrepreneurial Drive** relates to entrepreneurs' intrinsic motivation and self-efficacy. In the field of entrepreneurship support, this suggests that providing only systems and information is insufficient; instead, support should also foster the mindset that embraces challenges and overcomes psychological barriers. For instance, mentoring programs, introducing role models, and workshops focused on building self-confidence can be important measures to cultivate an entrepreneurial mindset.

Third, **Sense of Purpose** highlights the importance of entrepreneurs actively engaging in decision-making and taking responsibility. This suggests that entrepreneurship training programs should incorporate experiences that develop decision-making skills and opportunities for reflection. Specifically, the use of Project-Based Learning (PBL) or the case method can provide entrepreneurs with repeated experiences of making judgments and confronting the consequences of their decisions, thereby fostering autonomous decision-making capabilities.

Overall, the findings of this study offer practical guidelines for supporters, policymakers, and educators on how to align individual entrepreneurial traits with environmental support. By addressing both psychological and environmental factors, more effective entrepreneurship support and education programs can be developed.

5.3 Reflection on Factor Structure

In this study, Exploratory Factor Analysis (EFA) extracted three factors encompassing internal and external factors. This result aligns well with the structure assumed by the EC Model, which hypothesized Mindset, Skillset, and External Factors, serving as a simple and clear expression of the theoretical model. However, from a statistical perspective, it was observed that the eigenvalues corresponding to the fourth and fifth factors were close to 1.0, suggesting the potential existence of five- or six-factor structures.

Specifically, the scree plot showed a relatively gentle slope beyond the third factor, and some items exhibited cross-loadings across multiple factors, indicating the possibility of further subdivision. Moreover, analyses assuming a five-factor structure suggested the extraction of more specific traits, such as goal orientation and flexible adaptability, implying the potential to expand toward a more multifaceted factor structure.

On the other hand, considering theoretical consistency and clarity of interpretation, this paper adopts a three-factor structure. Increasing the number of factors could introduce ambiguities in interpretation and semantic overlaps between factors, risking the loss of model simplicity and applicability. Especially for practical applications, the three-factor structure has advantages in terms of both explanatory power and usability.

The EC Model originally encompasses five elements (differentiating Mindset and Skillset, and subdividing External Factors into three components), and it is anticipated that future analyses using Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) will refine these more detailed structural hypotheses. Thus, the three-factor structure presented here repre-

sents an initial integrated expression of the EC Model, while five- or six-factor models are positioned as expanded or advanced variations for future comparative validation.

In conclusion, the determination of the number of factors should be optimized by balancing statistical fitness, theoretical validity, and practical usability. This study presents a three-factor structure as the initial foundation. Future analyses are expected to refine the structure by comparing alternative models and verifying the stability of the structure.

5.4 Limitations and Future Directions

This study constructed structural hypotheses regarding entrepreneurs' internal and external factors based on the EC Model and conducted an initial validation of these hypotheses through Exploratory Factor Analysis (EFA). While certain contributions were made, several limitations exist, and future tasks remain to be addressed.

First, there is the limitation concerning **sample size and composition**. Although the number of respondents (106) satisfies the minimum requirements for EFA, larger and more diverse datasets will be necessary for future model refinements. In particular, to perform multi-group comparisons considering differences in age, gender, industry, and entrepreneurial stages (e.g., preparatory, operational, multiple ventures), a larger sample size will be essential.

Second, there are **limitations in the design and coverage of scale items**. Although the scales were developed based on qualitative research and prior theoretical frameworks, they do not comprehensively cover all six components proposed in the EC Model. In particular, further refinement of items concerning external environmental factors—such as cultural factors and infrastructure—and the multidimensionality of mindset (e.g., resilience, self-regulation) will be necessary in future studies.

Third, there are **methodological limitations**. This study conducted only exploratory analysis using EFA; hypothesis testing via Confirmatory Factor Analysis (CFA) and theory testing through Structural Equation Modeling (SEM) remain tasks for future research. Specifically, multi-model comparisons between three-factor, five-factor, and six-factor structures, and clarifying causal relationships among factors through SEM, are expected.

Fourth, the study lacks a **longitudinal perspective**. We evaluated entrepreneurial decision-making characteristics at a single point in time, without fully capturing changes before and after business initiation or the impact of institutional and economic changes on entrepreneurs. Future research should conduct longitudinal or tracking studies to examine temporal changes and structural stability in entrepreneurial decision factors.

Taking these limitations into account, this study aims to build a foundational understanding and measurement system for the integrated study of internal and external entrepreneurial factors. Moving forward, we plan to conduct large-scale surveys with approximately 600 respondents, refine the theoretical model through CFA and SEM, and integrate fieldwork-based approaches to bridge empirical findings and practical applications.

6 Conclusion

This study developed measurement scales based on the Entrepreneurial Characteristics Model (EC Model), which integrates internal factors (mindset and skillset) and external factors (such as entrepreneurial support environments) influencing entrepreneurial decision-making.

Using Exploratory Factor Analysis (EFA), we conducted a preliminary validation of the latent factor structure.

As a result, three factors— Environmental Readiness, Entrepreneurial Drive, and Sense of Purpose—were extracted. Each factor corresponded closely to the fundamental structure of the EC Model, capturing psychological tendencies, behavioral engagement, and the external support environment. Furthermore, all factors demonstrated high reliability (Cronbach's $\alpha > .78$), confirming that the developed structure is theoretically and practically valid.

The theoretical contribution of this study lies in presenting a structural perspective that goes beyond the fragmented understanding of internal and external factors in entrepreneurial research, emphasizing their complementary and integrated nature.

Practically, the findings suggest a wide range of applications, including identifying characteristics of entrepreneurs for support programs, designing evaluation frameworks for entrepreneurship education, and developing new policy measures. However, the study has limitations in sample composition, item design, and analytical methods. Future research needs to validate the model's fit using Confirmatory Factor Analysis (CFA) based on large-scale surveys with approximately 600 participants and further explore causal structures through Structural Equation Modeling (SEM). Additionally, theoretical comparisons with all six components included in the EC Model and longitudinal studies incorporating time-series perspectives remain important future tasks.

Overall, this study serves as an initial step toward constructing a theoretical and empirical framework for measuring and understanding entrepreneurial decision-making characteristics, providing a foundation for future research.

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