Classification of Entrepreneurial Opportunity Recognition and Evaluation of Each Type: Focusing on the Support Case of H University in Korea

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Abstract This study aims to classify how entrepreneurial preparers recognize opportunities and evaluate the appropriateness of preparer's evaluation by type. Additionally, it examines the effectiveness of entrepreneurship education. Data were collected from participants in the entrepreneurship support program at H University, Korea. Startup opportunities were categorized based on the domains of preparation and insight, resulting in 16 types. The findings are as follows: First, the primary source of entrepreneurial opportunities was experience, followed by social networks and specialized knowledge. Second, 27.5% of participants exhibited proper opportunity recognition in the preparation domain, while only 7.5% did so in the insight domain. Third, entrepreneurs evaluated their entrepreneurial opportunities more favorably than experts. Fourth, entrepreneurship education significantly affected specific business plan components, such as market analysis, product development, and profit strategies. Fifth, entrepreneurship education not only enhanced entrepreneurial skills but also discouraged those not suited for entrepreneurship.

Keywords Entrepreneurial opportunity recognition, Entrepreneurial opportunity source, Entrepreneurial opportunity type. Entrepreneurial opportunity evaluation, Entrepreneurial education effectiveness.

I. Introduction

Entrepreneurial opportunities are crucial for startups (Kim et al., 2015). Recognizing opportunities with a high probability of success and acting proactively to capitalize on them creates economic value. Identifying valuable opportunities in uncertain situations is inherently risky and challenging, underscoring the entrepreneurial nature of opportunity recognition. As such,

entrepreneurs, resources, and opportunities are frequently cited as core elements of entrepreneurship (Hills et al., 2004; Wang et al., 2013; Lee and Kim, 2019).

Initially, opportunities recognized by entrepreneurs exist at a conceptual level (Lumpkin et al., 2004; Shan and Heo, 2019). These recognized opportunities undergo internal and external evaluation and refinement, developing into more sophisticated business models and plans (Kim and Lim, 2017; Ko, 2024). Evaluating opportunities—whether recognized by the entrepreneurs themselves or through various social networks, such as family, friends, and mentors—is particularly important. Optimal outcomes are achieved through a cyclical process of recognizing and restructuring new opportunities via evaluation (Ardichvili et al., 2003; Kim and Lim, 2017; Shan and Heo, 2019; Ko, 2024).

However, research on how these opportunities are recognized is still in its early stages (Wang et al., 2013; Lim et al., 2015). Moreover, there is insufficient research on the evaluation process of recognized opportunities. Evaluations can be conducted using subjective intuition based on experience or objective scientific methods based on data (Lumpkin and Lichtenstein, 2005; Tauqeer and Bang, 2019; Hills and Singh, 2004). Reliance solely on intuition can lead to cognitive biases, an illusion of control, and errors stemming from limited data, distorting the evaluation process and outcomes (Keh et al., 2002). Therefore, both reevaluation and objective evaluation are necessary.

As of 2024, the Korean government is funding 397 startup support projects with a budget of $2.74 billion (Ministry of SMEs and Startups, 2024). Despite this, the survival rate of startups in Korea as of 2019 (32.1%) is low compared to the US (50.8%) and the average of five EU countries (46.3%) (Ko, 2024). Notably, 87.3% of startups were based on "my own idea" (Ministry of SMEs and Startups, 2021). Therefore, it is essential to assess whether these perceived opportunities were appropriate. However, no research currently addresses this issue.

This study aims to classify how opportunity recognition is structured and to evaluate each type of opportunity recognition. To achieve this, we compare the self-assessments of startup preparers with evaluations made by experts. Additionally, this study examines the effectiveness of entrepreneurship education for entrepreneurs with varying perceptions of entrepreneurial opportunities. Chapter 2 reviews the literature related to opportunity recognition, Chapter 3 introduces the research data, methods, and models, and Chapter 4 presents the results. Finally, Chapter 5 discusses the findings, implications, and limitations of this study.

II. Theorical Review

1. Opportunity Recognition and Utilization

1.1 Entrepreneurial Opportunity Recognition

Opportunity recognition is the first step in the entrepreneurial process and a central topic in entrepreneurship research (Hills et al., 2004; Wang et al., 2013; Shamsudeen et al., 2017; Filser et al., 2023). Despite extensive research across various disciplines on identifying and utilizing opportunities, a clear explanation remains elusive (Wang et al., 2013; Lim et al., 2015).

Opportunities can be classified into recognition, discovery, and creation (Sarasvathy et al., 2003; Miller, 2008; Dyer et al., 2008). Kirzner (1973) emphasizes the discovery of opportunities from either the demand or supply side, while Sarasvathy et al. (2003) highlights the recognition of opportunities from both the demand and supply sides. Regardless of the market situation, the entrepreneur's alertness to market opportunities is crucial. In contrast, opportunity creation aligns with Schumpeter's concept of creative destruction (Filser et al., 2023).

There have been various attempts to model the components of opportunity recognition. For example, Kirzner's (1973) model distinguishes between alertness to market imbalances and the subsequent evaluation and utilization of these opportunities (Yu, 2001; Hills et al., 2005; Frank and Mitterer, 2009). This model was further developed by Gaglio (1992), who introduced the information search process to address the limitation of relying solely on entrepreneurial intuition to solve market imbalances (Hills et al., 2005). However, this model has the drawback of positioning entrepreneurship as a market imitator or follower (Yu, 2001; Zho and Lee, 2020).

The opportunity creation perspective, rooted in Schumpeter (1934), evolved into a five-stage process proposed by Lumpkin et al. (2004). This process suggests that entrepreneurial profits can be generated by discovering (preparation-cultivation-insight) and forming (evaluation-refinement) creative ideas. Consequently, the opportunity creation model positions entrepreneurs as market leaders or innovators (Yu, 2001).

1.2 Entrepreneurial Opportunity Utilization

Economic and social values are generated through the decision-making and utilization of recognized opportunities. This process involves not only entrepreneurial orientations, such as creativity, risk-taking, and an enterprising spirit, but also effort and passion (Seo et al., 2019). Entrepreneurs must effectively utilize perceived opportunities to create the value necessary for entrepreneurial success and to provide value to startup investors (Ardichvili et

al., 2003; Shamsudeen et al., 2017). There is a positive correlation between entrepreneurial orientation and opportunity recognition (Shamsudeen et al., 2017).

Kuckertz et al. (2017) divided opportunity recognition into six sub-activities and opportunity utilization into six sub-activities. The sub-activities of opportunity utilization include product or service development, securing human resources, business planning, understanding customers and markets, gathering resources, and setting up an organization. These utilization activities influence entrepreneurial success and are reflected in business plans that serve as guides (Shamsudeen et al., 2017). These studies on opportunity utilization align with Ko's (2024) research on entrepreneurial preparation capabilities, which are categorized into business model conception and entrepreneurial implementation. The detailed capabilities include digital understanding, business model concept derivation, business plan composition, product technology development, securing human resources and networks, and establishing marketing strategies, including securing sales channels.

2. Theoretical Model

Lumpkin et al. (2004)'s opportunity recognition model is divided into five stages: preparation, incubation, insight, evaluation, and elaboration. This study reviews the model through these stages.

2.1 Preparation

Preparation involves acquiring the necessary experience and knowledge for the creative process (Hills et al., 2004; Lumpkin and Lichtenstein, 2005; Hansen and Lumpkin, 2009). This knowledge encompasses market knowledge, industry knowledge, understanding customer problems, management know-how, business ownership experience, and securing financial resources (Aldawod, 2022). Essentially, it refers to the ability to identify and solve market problems or potential customer pain points from an entrepreneurial orientation perspective (Hansen et al., 2011). This stage also includes the intentional accumulation of knowledge, such as through projects or research to identify customer problems (Hansen and Lumpkin, 2009; Hansen et al., 2011).

Social networks and entrepreneurial alertness are also important factors in the preparation stage. Recognizing good opportunities requires leveraging the knowledge and experience of others (Aldawod, 2022; Hills et al., 2004; Hans et al., 2011) or being alert to quickly and accurately process information (Yu, 2001; Baron, 2006; Frank and Mitterer, 2009).

2.2 Incubation

Incubation refers to the latent process where new associations are formed through the collision and combination of knowledge in the subconscious (Hansen and Lumpkin, 2009; Hansen et al., 2011). It is an unconscious process that does not involve conscious problem-solving or systematic analysis (Lumpkin and Lichtenstein, 2005; Hansen et al., 2011). During this process, various knowledge and experiences are connected, leading to the formation of creative results through unique associations.

Baron (2006) describes the incubation process as pattern recognition, where new opportunities are identified by connecting seemingly unrelated events, changes, and trends. In other words, external changes are detected within an individual's cognitive frameworks, forming new creative combinations. Therefore, incubation is a process in which creative outcomes are generated through the subconscious collision and connection of knowledge, leading to new insights.

2.3 Insight

Insight is a moment of recognition often referred to as a "eureka" or "flash" (Lumpkin and Lichtenstein, 2005; Hills and Singh, 2004). A series of associations occurring during the incubation process culminates in moments of clear solution derivation, characterized by sudden flashes of inspiration (Hansen and Lumpkin, 2009; Hansen et al., 2011). Through this, problems or solutions for the market or potential customers are conceptualized in new ways (Hansen et al., 2011; García-Cabrera and García-Soto, 2009). Consequently, the ideas formed during these moments of insight are perceived by entrepreneurs as opportunities that can bring their dreams to life (Hills et al., 2004).

Insight involves radical and creative ideas and incremental improvements of existing ideas (Lumpkin et al., 2004; Hansen and Lumpkin, 2009; García-Cabrera and García-Soto, 2009). Powerful ideas take longer to develop than smaller ones and are often created through the repetition and accumulation of smaller ideas. Additionally, ideas do not usually reach their full potential with initial insights. Therefore, for smaller ideas to evolve into powerful ones, transferring knowledge or experience from the preparation stage or revisiting the incubation stage is necessary (Hansen and Lumpkin, 2009). Insights are, therefore, ideas that immediately or repeatedly conceptualize problems or solutions for the market and potential customers, with customer problems and solutions clearly defined.

2.4 Evaluation

Opportunity evaluation involves investigating and analyzing recognized ideas to determine whether they are worth implementing (Hansen and Lumpkin, 2009). These ideas are validated through feasibility studies, technical

assessments, preliminary market testing, financial feasibility analysis, and surrounding evaluations (Lumpkin and Lichtenstein, 2005). This process encompasses the initial selection of ideas and the evaluation of business feasibility.

Evaluation types can be categorized into subjective intuition (Tauqeer and Bang, 2019), scientific investigation based on objective criteria (Hills and Singh, 2004), or formal and informal evaluations (García-Cabrera and García-Soto, 2009). However, evaluations are sometimes conducted non-systemically due to the lack of a standardized format, method, or procedure (Kim and Lim, 2017; Shan and Heo, 2019). Entrepreneurs and investors often prefer intuition for quick decision-making over gathering objective data and performing scientific evaluations (Tauqeer and Bang, 2019). Intuition is particularly useful when there are no entry barriers and rapid market entry is required, whereas scientific analysis is more suitable for markets with high entry barriers and mature conditions (Hills and Singh, 2004). However, intuition-based evaluations can be distorted by cognitive biases, an illusion of control, and reliance on limited information (Tauqeer and Bang, 2019; Keh et al., 2002). Therefore, a variety of evaluation methods are necessary. Based on the evaluation results, a perceived idea may be abandoned, improved, or repeatedly refined until the best outcome is achieved (Kim and Lim, 2017; Shan and Heo, 2019).

2.5 Elaboration

Elaboration refers to developing specific plans and actions to realize perceived opportunities (Hansen and Lumpkin, 2009). Entrepreneurs need detailed plans to reduce uncertainty and convert perceived business ideas into economic and social value (Lumpkin and Lichtenstein, 2005; Hajizadeh and Zali, 2016). Entrepreneurial intentions are established through interactions with formal and informal networks (Hansen et al., 2011), and this stage requires significant effort and resources for preparation, including specifying a business plan, establishing a support system, and organizing resources (Lumpkin and Lichtenstein, 2005). Elaboration continues even after the startup is launched and the product or service is introduced to the market (Hansen et al., 2011). Therefore, if there is a discrepancy between the plan and the execution result during elaboration, the stages and interactions, such as problem recognition in the preparation stage, insight, and evaluation, are repeatedly revisited. This includes modifying plans and actions through market interaction, both before and after the startup.

2.6 Open Opportunity Recognition Process

This study analyzed opportunity recognition based on the research of Lumpkin et al. (2004) and Hansen et al. (2011). Additionally, the research model, as illustrated in <Figure 1>, incorporates open innovation during the startup preparation stage (Ko, 2004).
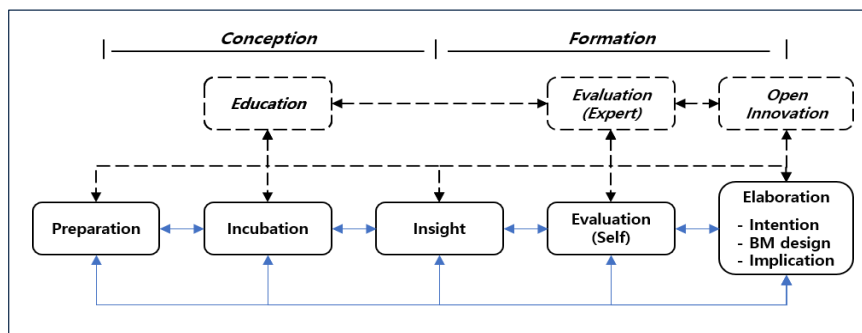
Source: Modified from Lumpkin et al. (2004), Hansen et al. (2011), and Ko (2024).

Figure 1. Research Model 1. Open Opportunity Recognition Process

Ⅲ. Research Data and Methods

1. Research Data and Methods

H University in Korea has been running a program to support the feasibility of startup ideas with the backing of the Korea Innovation Foundation since 2012. Startup preparers who participate in the program submit a business plan at the start of their participation and then resubmit a revised plan after completing startup education. This study targets 46 individuals who completed the startup education program in 2023.

The study first developed an analytical framework and research model through a literature review. Next, documents for each participant were classified and organized according to the analytical framework. In the third step, each item of the analytical framework was measured using a 5-point Likert scale. Finally, the factors organized by the analytical framework were analyzed.

The research sequence can be summarized as follows:
1. Development of the research model and analytical framework through a literature review.
2. Document review:
    1) Application form a first business plan and self-evaluation, revised plan after startup education.
    2) Expert evaluation of startup items and business plans.
3. Measurement on a 5-point scale for each item according to the analytical framework.
4. Analysis.

Participants' documents consist of the application form, the first business plan and self-evaluation, and the revised plan. In addition, the expert evaluation of the second business plan was utilized. By comparing the expert evaluation with the participants' self-assessments, the appropriateness of the participants' opportunity evaluations was analyzed. The evaluations were conducted by 4-5 experts with experience in business management, startup acceleration, and IPO support.

2. Research Model

The purpose of this study is to analyze the sources and insights of opportunity recognition by startup preparers, as well as the appropriateness of their evaluations. First, the sources of opportunity are divided into industry and market experience, social networks (friends, family, customers, etc.), and knowledge, as outlined by Hills and Singh (2004). These are detailed in <Table 3>.

Table 1. Research Model 2. Types of Opportunity Recognition

Preparation Domain

Technology \ Market		Market capacity	
		Yes	No
Technology capacity	Yes	Combined	Technology-centered
	No	Market-centered	Simple knowledge

Insight Domain

Solution \ Problem		Customer problem definition	
		Clear	Unclear
Problem Solving	Appropriate	Opportunity-identifying	Solution-holding
	Inappropriate	Problem-identifying	Ambiguous

Second, opportunity recognition was divided into preparation and insight, as shown in <Table 1>, following the process of preparation and insight. The preparation domain pertains to the attributes of entrepreneurs preparing for startups, and market entry potential was examined based on the insight domain, connecting the two areas. Technology startups rely on market understanding (Hansen et al., 2011), which involves recognizing market or potential customer problems and understanding the technical composition and characteristics of products or services that address these market needs (Kim et al., 2012). Therefore, the preparation domain was classified into combined market and technology, technology-centered, market-centered, and simple knowledge,

based on market and technological capacities. In the opportunity recognition process, the insight stage involves deriving a solution. Consequently, the insight domain was classified into opportunity-identifying, solution-holding, problem-identifying, and ambiguous, depending on whether the customer's problem is clearly defined and whether the problem-solving method is appropriate.

Table 2. Evaluation Criteria

Category		Evaluation criteria	Research
Market	Market understanding	Level of market definition and analysis	A B C D
	Customer understanding	Level of customer definition and analysis	A B C D
	Competitor understanding	Level of competitor definition and analysis	A C D
Product	Implementation	Level of product development method and plan	A B C D
	Differentiation	Level of innovation compared to competitive products	A B C D
	Exclusivity	Level of patent registration and preparation	A B C D
Organization	Preparation competency	Level of knowledge and experience in the fields	A C D
	Team composition	Level of core personnel	A C D
	Partner acquisition	Level of value chain and cooperation partner	A C D
Profit	Market creation potential	Level of marketing plan for market creation	B C D
	Profitability	Level of projected income	B C D
	Growth potential	Level of growth roadmap	C D

Note: [A] Kuckertz et al. (2017) [B] Tauqeer and Bang (2019) [C] Heo (2020) [D] Goh et al. (2022)

Evaluations of opportunities recognized at the insight stage are reviewed from various perspectives. Representative examples include entrepreneurial opportunity utilization (Kuckertz et al., 2017), initial idea selection criteria (Tauqeer and Bang, 2019), and investment decision factors (Heo, 2020; Goh et al., 2022). Accordingly, this study derived evaluation criteria using these studies. The criteria for evaluating perceived opportunities and analyzing the effectiveness of entrepreneurship education are outlined in <Table 2>.

Meanwhile, since most of the data used in this study are in written form, they were converted to the Likert 5-point scale and expressed as data. The scale for each item is detailed in <Appendix 1>.

IV. Analysis Results

1. Source of Opportunity Recognition

   Among the 40 participants in this study (excluding 6 who abandoned their startups after entrepreneurial education), 28 (70.0%) were male, and 12 (30.0%) were female. In terms of age distribution, 18 participants (45.0%) were in their 30s, 12 (30.0%) were in their 20s, 5 (12.5%) were in their 40s, 4 (10.0%) were in their 50s or older, and 1 (2.5%) was in their teens. Regarding educational backgrounds, 30 participants (75.0%) were college graduates, 7 (17.5%) held master's or doctoral degrees, 3 (7.5%) were students, and 1 (2.5%) was a high school graduate. The participants' majors were as follows: 17 (42.5%) in science and engineering, 14 (35.0%) in humanities and social sciences, 3 (7.5%) each in arts, physical education, and interdisciplinary studies, and 2 (5.0%) in other fields. Additionally, their areas of experience included 10 individuals (25.0%) with entrepreneurship experience, 9 (22.5%) in technology development, 8 (20.0%) in office management, 5 (12.5%) as students, and 4 (10.0%) as researchers.

Table 3. Sources of Opportunity Recognition

Type		Participants	%
Experience	Work	10	25.0
	Life	10	25.0
	Business	5	12.5
	Subtotal	25	62.5
Social network		10	25.0
Specialized knowledge		5	12.5
Total		40	100.0

   The majority of opportunity recognition sources were based on experience (62.5%). Specifically, ideas were generated from work and life experiences (each contributing 25.0%). In contrast, only 12.5% of participants identified business experience as a source. Opportunity recognition through social networks, such as family and friends, accounted for 25.0%, while specialized knowledge contributed to only 12.5% of cases.

2. Two Domains of Opportunity Recognition

In the opportunity recognition process, the preparation stage involves recognizing and defining customer problems, while the insight stage focuses on deriving solutions. The preparation and insight aspects of opportunity recognition were analyzed as shown in <Table 4>.

Table 4. Types of Opportunity Recognition

Preparation / Insight	Combined	Technology-centered	Market-centered	Simple knowledge	Total
Opportunity-identifying	3	2	-	1	6 (15.0)
Solution-holding	-	2	-	-	2 (5.0)
Problem-identifying	5	4	4	4	17 (42.5)
Ambiguous	3	4	1	7	15 (37.5)
Total	11 (27.5)	12 (30.0)	5 (12.5)	12 (30.0)	40 (100.0)

Note: "Combined" refers to a combination of market and technology.

The ability to define market or potential customer problems during the preparation stage was assessed as follows: 11 participants (27.5%) had knowledge and experience that combined market and technology. Additionally, 12 participants (30.0%) were technology-centered, possessing knowledge and experience in a specific field; 5 (12.5%) were market-centered, and 12 (30.0%) had simple knowledge, meaning they had knowledge but lacked social experience or were students. In the insight stage, 8 startup preparers (20.0%) presented appropriate solutions to these problems.

3. Evaluation of Opportunity Recognition

Recognized opportunities undergo repeated evaluation and refinement processes. The evaluations by startup preparers and experts are shown in <Table 5>. Although it might seem intuitive to compare both evaluations of the second plan, we compared the self-evaluation of the first plan with the expert evaluation of the second plan. This is because experts evaluated the second plan negatively, even after it had been revised and improved through entrepreneurship education, highlighting the difference between self-evaluation and expert evaluation.

In summary, participants rated their initial ideas at 4.1, indicating some improvement. In contrast, experts rated the revised business plans at 3.1, indicating significant improvement. Participants tended to evaluate their ideas much more positively. As noted by Keh et al. (2002), startup preparers often

exhibit an illusion of control, believing they can resolve the risks that arise in business.

Table 5. Evaluation of Opportunity Recognition

Insight / Preparation	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	4.0 (0.0)	4.5 (1.0)	-	4.0 (0.0)	4.2 (0.3)
Solution-holding	-	4.5 (1.0)	-	-	4.5 (1.0)
Problem-identifying	4.4 (1.0)	4.0 (1.0)	4.8 (1.3)	3.8 (0.8)	4.2 (1.0)
Ambiguous	4.3 (1.7)	3.8 (1.0)	3.0 (-1.0)	3.9 (1.4)	3.9 (1.2)
Average	4.3 (1.2)	4.1 (1.0)	4.4 (0.8)	3.8 (1.1)	4.1 (1.0)

Note: Values in parentheses indicate the difference between preparer and expert scores.

In the preparation domain, the difference between preparer and expert scores was the largest in the combined type (1.2) and the smallest in the market-centered type (0.8). The average difference was 1.0, indicating that participants were generally optimistic. In the insight domain, the ambiguous type had the most considerable difference (1.2), while the opportunity-identifying type had a difference of 0.3, which is relatively small. The opportunity-identifying type appears to be the most advantageous for startups. An exception was the market-centered preparer in the ambiguous category, where preparers rated their plans lower than experts.

The results for the subcategories of business plans—such as market, product, organization, and profit—are presented in <Appendix 2>. To summarize the key points:

- In market opportunity, there was no significant difference between participants and experts, with an average score of 2.9. However, participants rated problem-identifying (combined type) (+1.2), opportunity-identifying (technology-centered) (+1.0), and opportunity-identifying (market-centered) (+1.0) more positively. Conversely, experts rated opportunity-identifying (combined) (2.0) and simple knowledge (1.0) more positively.
- In product opportunity, experts were more negative than participants across all types, particularly in problem-identifying (market-centered) (1.9) and opportunity-identifying (technology-centered) (1.5). However, experts rated ambiguous (market-centered) (2.0) more positively.
- In organization opportunity, there was no significant difference between participants and experts, with an average score of 3.2. However, there

were significant differences by type, with some cases where participants rated more highly and others where experts did.

- In profit opportunity, the average score was 2.9, but experts rated it significantly lower (0.7) than participants. Participants rated combined (0.8) and technology-centered (0.8) higher than experts.
- Overall, experts were more negative in their evaluations of profit (0.7) than participants. Technology-centered and market-centered types were rated more negatively by experts, indicating that preparers with a market-only or technology-only focus tend to have a biased perception of opportunities.

4. Insights by Technology Readiness

The concretization of a business involves planning and action to turn a perceived opportunity into economic and social value (Hansen and Lumpkin, 2009). In the elaboration stage, securing resources and developing products or services to address customer problems are specifically planned and executed (Lumpkin and Lichtenstein, 2005; Hajizadeh and Zali, 2016).

Table 6. Insights and Technology Readiness

Insight / Readiness	Opportunity-identifying	Solution-holding	Problem-identifying	Ambiguous	Average
Mass production	3.3	-	2.7	-	3.0
Commercialization	3.1	-	2.8	2.5	2.8
Prototype	3.1	3.2	2.6	2.1	2.7
R&D	-	-	2.1	2.1	2.1
Idea	-	-	2.4	2.0	2.1
Average	3.1	3.2	2.5	2.1	2.5

<Table 6> examines insights by technology readiness. Overall, participants with higher technology readiness levels tend to have more well-defined business plans, indicating well-defined customer problems and appropriate solutions:

1. The level of business planning increased from 2.1 to 3.0 with higher technology readiness, showing a positive relationship.
2. The difference in business planning levels also increased from 2.1 to 3.2 depending on the level of insight among participants.
3. The opportunity-identifying and solution-holding types, which have higher readiness levels, such as those at the prototype, commercialization, and mass production stages, scored higher than other groups.

5. Effect of Startup Education

A business plan is the outcome of conceptualizing the problems and solutions of the market and potential customers. It serves as a document that organizes the details necessary to implement the business concept developed during the insight stage, and it can be used to assess the level of opportunity recognition among participants. The effects of entrepreneurship education, as observed through comparisons of business plans submitted before and after the education, are as follows:

First, some participants abandoned their entrepreneurial pursuits after completing the entrepreneurship education. Out of 46 participants, 6 chose to stop.

Second, the opportunity recognition type changed for 5 out of 40 participants after the education: 3 shifted from an ambiguous type to a problem-identifying type, indicating improvement; 1 changed from a problem-identifying type to an ambiguous type; and 1 shifted from an opportunity-identifying type to a problem-identifying type, which worsened their level of insight.

Third, the overall level of business plans improved by only 0.1 points from an initial score of 2.4, indicating no significant effect. However, when examining specific types, a slight improvement was observed in the technology-centered type (+0.3) and the problem-identifying type (+0.3). On the other hand, the ambiguous type in the combined category showed the most significant negative effect (-0.6). These results suggest that entrepreneurship education may have a negative effect on entrepreneurs who struggle to define problems and solutions clearly.

Table 7. Effect of Startup Education

Insight \ Preparation	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	2.8	2.8	1.7 *	3.2	2.7 (+0.5)
Solution-holding	-	3.0	-	-	3.0 (+0.2)
Problem-identifying	2.4	2.2	2.2	1.9	2.2 (+0.3)
Ambiguous	2.9 (-0.6)	2.3	2.2	2.2	2.4 (-0.2)
Average	2.7 (+0.1)	2.4 (+0.3)	2.1 (+0.2)	2.1	2.4 (+0.1)

Note 1. Only changes of ±0.5 or more are displayed, except for the average.
    2. * indicates cases where participants moved to a different type.

The details of improvements in the components of business plans, such as market, product, organization, and profit, are presented in Appendix 3. However, unlike the overall results, some improvements were observed:

- **Market Dimension**: Significant improvement was noted in the problem-identifying type (+0.7) and the opportunity-identifying type (+0.5). Notably, problem-identifying by technology-centered (+1.2) and opportunity-identifying by combined (+0.9) showed the most substantial improvements.
- **Product Dimension**: Improvement was high in the opportunity-identifying type by market-centered (+1.0) and technology-centered (+0.5). Interestingly, despite achieving the highest evaluation score of 4.2, no educational effect was observed.
- **Organization Dimension**: While there were some differences by type, no significant improvement effects were observed overall.
- **Profit Dimension**: Overall, there was no significant effect (+0.3), but variations by type showed both positive and negative effects. Significant improvement was seen in the opportunity-identifying type (+1.0) and the problem-solving type (+0.5).

These results suggest that entrepreneurship education has some effect on improving participants' business plans. In the insight domain, the opportunity-identifying type showed the highest improvement (+0.5), followed by the problem-identifying type (+0.3). In the preparation domain, improvements were also observed in the technology-centered type (+0.3).

V. Conclusion

1. Research Results

The purpose of this study was to classify the types of entrepreneurship opportunity recognition and evaluate how each type was assessed by the participants and experts. From a theoretical perspective, this study examined the differences in opportunity recognition as described in entrepreneurship theory. Additionally, it sought to assess the impact of entrepreneurship education on different types of opportunity recognition.

Entrepreneurial opportunity recognition was defined in two dimensions: preparation and insight. The preparation domain was divided into four types: (technology and market) combined, technology-centered, market-centered, and simple knowledge. The insight domain was also divided into four types: opportunity-identifying, solution-holding, problem-identifying, and ambiguous. When these two domains are connected, opportunity recognition can be classified into 16 types.

The key findings are as follows:

1. The primary source of opportunity recognition among entrepreneurs was experience (62.5%), followed by social networks (25.0%) and specialized knowledge (12.5%). This differs from Hills and Singh's (2004) findings, which identified social networks (73.3%), experience (55.9%), and technical knowledge and expertise (28.6%) as primary sources.

2. In the preparation domain, only 11 participants (27.5%) had a combined preparation for market and technology. In the insight domain, only 7.5% of the entrepreneurs had appropriately defined problems and solutions.

3. Entrepreneurs' self-evaluation of perceived opportunities was 4.1 on a 5-point Likert scale, compared to the experts' evaluation of 3.0, indicating that entrepreneurs tend to overestimate their readiness. Overestimation was particularly high in the profit (0.7) and product (0.3) components of business plans. By type, the ambiguous type, where both problem definition and solution were insufficient, showed the highest tendency for overestimation (1.2). These results align with Keh et al. (2002), who found that participants often have an illusion of control, believing they can manage future risks and influence outcomes.

4. The analysis of business plans revealed that higher technological readiness levels were associated with better-prepared business plans. Business plans were most effectively prepared in the opportunity-identifying type, followed by the solution-holding and problem-identifying types in the insight domain. These findings support the notion that greater effort and resources invested in reducing uncertainty lead to higher levels of elaboration, consistent with previous studies (Lumpkin and Lichtenstein, 2005; Hajizadeh and Zali, 2016).

5. Entrepreneurship education appeared to have minimal impact on improving business plans, with an average improvement of only 0.1 from the initial score of 2.4. However, when examining the detailed components of business plans, there were both positive and negative effects. These results somewhat contradict Lee et al. (2018), who found that entrepreneurship education positively influenced the ability to recognize entrepreneurial opportunities.

6. One notable effect of entrepreneurship education on perceived opportunities was the cessation of startup preparations. Six participants decided to stop pursuing their business ideas after their education. Additionally, five participants changed their type of opportunity recognition, with three showing positive and two showing negative effects.

2. Implications

The implications of this study can be considered from both theoretical and practical perspectives:

2.1 Theoretical Implications:
1. The study provides a clearer definition of the types of opportunity recognition, often theoretically vague. Opportunity recognition is divided into the domains of preparation and insight.
2. By comparing entrepreneurs' self-evaluations with expert evaluations, the study offers a more precise assessment of the appropriateness of opportunity recognition by the preparers.
3. The study confirms the impact of entrepreneurship education on opportunity recognition, offering a new perspective on the effectiveness of such education.

2.2 Practical Implications:
1. The 16 classifications of opportunity recognition can serve as a valuable tool for objectively evaluating entrepreneurial ventures.
2. There is a need to strengthen basic entrepreneurship education. The evaluation of business plans at the idea or R&D stage scored only 2.1 out of 5, and even at the mass production stage, the score was only 3.0. These results underscore the importance of enhancing basic education for business planning.
3. Customized support should be provided based on the type of entrepreneur, as the educational effect varies by type. This is particularly important in the Korean startup ecosystem, where 83% of startup ideas originate from "my own idea" (Ministry of SMEs and Startups, 2021).

3. Limitations and Future Research

The limitations of this study are clear:
1. The study is limited to the startup support program at H University, with a small sample size. Therefore, expanding the sample size is essential for generalization.
2. Future research could explore transforming business plans into successful entrepreneurial ventures, beyond merely analyzing the improvements achieved through entrepreneurship education.
3. It is also necessary to monitor which types of opportunity recognition are most likely to lead to business success through mid- to long-term observation. While technology-centered and problem-solving

entrepreneurship is generally preferred, this study reveals that the types of entrepreneurship through opportunity recognition are more diverse than typically acknowledged.

Acknowledgment

Appendix 1. Evaluation scale of insight domain (5-point scale)

		1	2	3	4	5
Market	Market understanding	No analysis	Market definition	General analysis	Trend analysis	Value-chain analysis
	Customer understanding	No analysis	Customer definition	General analysis	Needs analysis	Demand analysis
	Competitor understanding	No analysis	Competitor definition	General analysis	Business analysis	Key factor analysis
Product	Implementation	No Content	Simple description	Outsourcing	Capability	Specific plan
	Differentiation	No Content	Simple description	Improvement	Innovation	Leading possible
	Exclusivity	No Content	Recognizing needs	Preparation	IP application	IP registration
Organization	Competency	Low (students)	Know. or experience	Know. & experience	Startup experience-low	Startup experience
	Team	No Content	Plan	Specific field	Market & tech-low	Market & tech
	Partner	No Content	Simple description	Specific field	General partners	Outside partners
Profit	Sales	No Content	Simple description	General description	Channel description	Strategic description
	Feasibility	No Content	Simple sketch	Simple plan	Forecasting	Income Statement
	Growth potential	No Content	Domestic expansion	Overseas expansion	Product expansion	Business expansion

Appendix 2. Evaluation of Opportunity Recognition

Appendix 2-1. Evaluation of Market Opportunity

Preparation / Insight	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	1.7 (-2.0)	5.0 (1.0)	1.0*	3.0 (-1.0)	2.3 (-1.5)
Solution-holding		3.0 (0.5)			3.0 (0.5)
Problem-identifying	4.0 (1.2)	2.8 (-0.8)	3.7	3.0	3.3
Ambiguous	2.6 (0.6)	3.2 (0.5)	4.0	2.5	2.8
Average	2.7 (0.1)	3.2	3.2 (-0.2)	2.8 (0.3)	2.9

Note 1. Preparer score (Preparer score – experts score)
2. * Indicates a case moved to another type after education.

Appendix 2-2. Evaluation of Product Opportunity

Preparation / Insight	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	3.0	5.0 (1.5)	4.0*	4.0	3.7 (0.5)
Solution-holding	-	3.5 (1.0)			3.5 (1.0)
Problem-identifying	3.3	2.3	3.7 (1.9)	2.6	2.9 (0.5)
Ambiguous	2.6	2.4	2.0 (-2.0)	2.2	2.4 (0.1)
Average	2.9 (0.1)	2.8 (0.2)	3.4 (1.2)	2.5 (0.3)	2.8 (0.3)

Note: As above

Appendix 2-3. Evaluation of Organization

Preparation / Insight	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	3.3 (1.0)	3.0 (-1.5)	3.0*	3.0 (2.0)	3.2 (0.3)
Solution-holding	-	3.0 (-1.0)	-	-	3.0 (-1.0)
Problem-identifying	3.0	3.3	3.7 (0.7)	2.8 (-0.5)	3.1
Ambiguous	2.6 (-1.1)	3.2	3.0 (1.0)	2.8	2.9 (-0.3)
Average	2.9 (-0.2)	3.2 (-0.4)	3.4 (0.6)	2.8 (-0.2)	3.0 (-0.2)

Note: As above

Appendix 2. Evaluation of Opportunity Recognition

Appendix 2-1. Evaluation of Market Opportunity

Insight \ Preparation	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	1.7 (-2.0)	5.0 (1.0)	1.0*	3.0 (-1.0)	2.3 (-1.5)
Solution-holding		3.0 (0.5)			3.0 (0.5)
Problem-identifying	4.0 (1.2)	2.8 (-0.8)	3.7	3.0	3.3
Ambiguous	2.6 (0.6)	3.2 (0.5)	4.0	2.5	2.8
Average	2.7 (0.1)	3.2	3.2 (-0.2)	2.8 (0.3)	2.9

Note 1. Preparer score (Preparer score – experts score)
    2. * Indicates a case moved to another type after education.

Appendix 2-2. Evaluation of Product Opportunity

Insight \ Preparation	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	3.0	5.0 (1.5)	4.0*	4.0	3.7 (0.5)
Solution-holding	-	3.5 (1.0)			3.5 (1.0)
Problem-identifying	3.3	2.3	3.7 (1.9)	2.6	2.9 (0.5)
Ambiguous	2.6	2.4	2.0 (-2.0)	2.2	2.4 (0.1)
Average	2.9 (0.1)	2.8 (0.2)	3.4 (1.2)	2.5 (0.3)	2.8 (0.3)

Note: As above

Appendix 2-3. Evaluation of Organization

Insight \ Preparation	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	3.3 (1.0)	3.0 (-1.5)	3.0*	3.0 (2.0)	3.2 (0.3)
Solution-holding	-	3.0 (-1.0)	-	-	3.0 (-1.0)
Problem-identifying	3.0	3.3	3.7 (0.7)	2.8 (-0.5)	3.1
Ambiguous	2.6 (-1.1)	3.2	3.0 (1.0)	2.8	2.9 (-0.3)
Average	2.9 (-0.2)	3.2 (-0.4)	3.4 (0.6)	2.8 (-0.2)	3.0 (-0.2)

Note: As above

Appendix 2-4. Evaluation of Profit Opportunity

Insight \ Preparation	Combined	Technology- centered	Market- centered	Simple knowledge	Average
Opportunity- identifying	3.7 (1.0)	3.0 (1.0)	3.0*	4.0 (-1.0)	3.5 (0.7)
Solution-holding		2.5 (1.5)		-	2.5 (1.5)
Problem- identifying	4.0 (1.0)	3.0 (1.3)	2.7 (0.9)	3.6 (1.9)	3.3 (1.2)
Ambiguous	2.8 (1.1)	2.2	3.0 (-2.0)	1.8	2.3 (0.2)
Average	3.4 (0.8)	2.6 (0.8)	2.8 (0.4)	2.8 (0.7)	2.9 (0.7)

Note: As above

Appendix 3. Effect of improving opportunity recognition

Appendix 3-1. Effect on market recognition

Insight \ Preparation	Combined	Technology- centered	Market- centered	Simple knowledge	Average
Opportunity- identifying	2.6 (+0.9)	3.3	2.3 (2.3)*	3.7	2.8 (+0.5)
Solution-holding	-	2.5	-	-	2.5 (+0.3)
Problem- identifying	2.5	1.8 (+1.2)	2.3 (+0.6)	2.1 (+0.6)	2.2 (+0.7)
Ambiguous	2.8	2.8 (-0.5)	2.4 (-0.8)	2.4	2.6 (-0.4)
Average	2.6 (+0.3)	2.4 (+0.4)	2.4 (+0.3)	2.4 (-0.1)	2.4 (+0.2)

Note 1. Original plan score (Improvement, only ±0.5 or more, except average)
　　 2. * Indicates cases moved to another type.

Appendix 3-2. Effect on product recognition

Insight \ Preparation	Combined	Technology- centered	Market- centered	Simple knowledge	Average
Opportunity- identifying	3.0	2.0 (+0.5)	1.0 (1.0)*	3.7	2.6 (+0.4)
Solution-holding	-	4.2	-	-	4.2
Problem- identifying	2.1 (+0.6)	2.5	1.0	2.1 (-0.5)	2.1 (-0.1)
Ambiguous	3.3 (-1.6)	2.3	1.6 (-0.6)	1.9	2.2 (-0.3)
Average	2.7 (+0.1)	2.7	1.3 (-0.1)	2.1 (-0.2)	2.3 (-0.1)

Note: As above

Appendix 3-3. Effect on organization recognition

Insight \ Preparation	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	3.2	2.7	2.3 (2.3)*	3.0	2.9 (-0.1)
Solution-holding		2.5	-	-	2.5 (+0.3)
Problem-identifying	2.9	2.4	3.0	2.0	2.5 (+0.2)
Ambiguous	2.8	2.4	2.2	2.3	2.4 (-0.1)
Average	3.0 (-0.3)	2.4 (+0.2)	2.4 (+0.2)	2.2 (+0.1)	2.5 (0.0)

Note: As above

Appendix 3-4. Effect on profit recognition

Insight \ Preparation	Combined	Technology-centered	Market-centered	Simple knowledge	Average
Opportunity-identifying	2.4 (+1.0)	3.0	1.0 (1.0)*	2.3 (+0.7)	2.3 (+1.0)
Solution-holding	-	2.8	-	-	2.8
Problem-identifying	2.1 (+0.6)	2.0	2.3	1.6 (+0.7)	1.9 (+0.5)
Ambiguous	2.9 (-0.7)	1.8 (+0.9)	2.4	2.0	2.2
Average	2.4 (+0.4)	2.2 (+0.5)	2.1 (+0.3)	1.8 (+0.1)	2.1 (+0.3)

Note: As above

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