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# Impacts of Metacognition on Innovative Behaviors: Focus on the Mediating Effects of Entrepreneurship

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**Abstract:** Metacognition is important as a leading factor in enhancing innovation behavior because it involves elements of planning, monitoring, and regulating for specific actions in the creation and introduction of new ideas. A more extended approach is needed in the interpretation and application of entrepreneurship. Considering entrepreneurship as the exclusive property of top management within the enterprise is not beneficial as it limits the scope for entrepreneurship, given the importance of entrepreneurship and the economic and social significance of corporate success. Entrepreneurship education provides trainees with a way to work within the global dimension of their economic activities and their influence, and to understand the various elements of the economy and society they live in and the process of their transformation. In order to explore existing knowledge and new knowledge, it is necessary to take more innovative actions by responding flexibly to unforeseen situations and utilizing the knowledge required for various tasks. The lack of intrinsic motivation to demonstrate innovative behavior can lead to individual differences in innovation behavior. Those who are given intrinsic motivation are learning-oriented and say that they want to get rid of stereotypes and get new alternatives and ideas for problem solving.

**Keywords:** metacognition; entrepreneurship; innovative behavior

## 1. Introduction

From a business perspective, entrepreneurship is an organizational process [1] that emphasizes innovation and takes (an) aggressive action to take over competitors without losing customers or opportunities [1], and provides solutions when problems happen in an unexpected situation. Schumpeter [2] notes that entrepreneurship is achieved by promoting new combinations of innovation. The uprising of entrepreneurship can be recognized in systematic ways which try to solve the problems in economic progress. In other words, positive attitudes to solve problems can be manifested in entrepreneurial spirit. Metacognition utilized in the process of solving problems stimulates manifestation of entrepreneurship. In other words, metacognition in the problem-solving process makes it possible to identify the problem rationally and to implement the appropriate strategy [3]. Metacognition is an idea of thinking by a concept of cognition and a function of understanding the cognitive process. Also, metacognition is planning and checking the process of thinking in order to solve the problem [4].

In this context, the meaning of metacognition is related to the concepts as follows: to plan what to learn to solve the problem, and to check and evaluate what kind of information is connected to knowledge and how to achieve the goal. Therefore, metacognition is a systematic plan for performing tasks as a behavior and an idea that learners engage while learning [5].

If the planning, researching, and controlling elements in the problem-solving process are good, a problem can be solved without difficulty. If these are not executed properly, the problem will become

difficult and the entrepreneurs will be frustrated by psychological pressure. In this case, weakened metacognitive function may increase the risk sensitivity of entrepreneurship and negatively affect innovation and entrepreneurship. Finally, the negative effects of entrepreneurship will act as a factor to weaken or stimulate motivation in the innovative behavior of individuals.

Flavell [6] described metacognition as a medium to store up actively and intentionally as well as retrieve the relationship between the actor and information in his environment. The ability to actively and intentionally store and retrieve information is employed by many people who have metacognitive functions, when events happening in this situation are fortunate enough to predict in advance [7]. This metacognition is the recognition of self as a strengthened sense of self and the development of memory as the application which applies all the cognitive means developed by the individuals to the problem in memories. Schoenfeld [8] emphasized three categories of knowledge, which are control or self-regulation, beliefs and intuition about thinking processes, and explanation of these intellectual behaviors. In other words, the three categories are, firstly, how well you can describe your thinking process; secondly, how to control or self-control; and thirdly, how well you can emphasize the managerial ability of problem solving while referring to your resources, the process, and your mental state. In particular, beliefs and intuitions are subjective knowledge acquired through living a cognitive life, which means that beliefs and intuitions act as important determinants of behavior as well as control and self-regulation. In addition, according to previous research, metacognition has a meaning of learning strategy in the process of completing active and innovative behaviors such as self-directed learning. In order for an individual to have the ability to set and perform goals, he or she needs a mechanism to monitor and control the goals themselves. In the case of self-directed learning, voluntary planning assumes that the metacognition must precede the individual's strategic behaviors in order to achieve self-learning by cognitive characteristics [9]. Taken together, these relationships suggest that metacognition can be an influential factor in entrepreneurial spirit as well as innovative behavior, and entrepreneurship can play an important link in the relationship between metacognition and innovative behavior.

## 2. Theoretical Background and Literature Review

### 2.1. Metacognition and Entrepreneurship

People are subjected to a social cognitive process when they have to confront a new environment. In this situation, people recognize the alternatives that can be taken [10]. People can recognize various alternatives based on their contextual factors. Some people are more cognitively flexible than those who can recognize only one suitable alternative. Also, higher cognitive flexibility tends to adapt more aggressively by exploring and choosing a variety of ways to adapt effectively rather than sticking to your own way of new situations in which you have to adapt [11]. According to Georgsdottir and Getz [12], cognitively flexible people can do a variety of actions to present creative solutions and to find a way from new perspectives. They are open to change and prefer new things. They are not willing to experience problems faced during their work. They seek to find a new solution instead of trying to solve the problem according to established rules. Metacognition has generally been studied as a preliminary variable for academic performance [13–15]. According to Zimmerman's study [16], students who use a lot of metacognition tend to have higher achievement in learning. Metacognition is primarily a result of high-level awareness in the learning process by planning learning, using appropriate skills, and choosing strategies for problem solving [14]. In a social cognitive perspective, individuals can be innovative or entrepreneurial when they realize that they have opportunity or support to develop their abilities [17].

**Hypothesis 1.** *Metacognition will have a positive effect on entrepreneurship.*

## 2.2. Metacognition and Innovative Behaviors

According to Kanter [18], innovative behaviors originate from the recognition of problems and the adoption of new ideas or the generation of solutions. In business administration, activities create, introduce, and apply new ideas mainly for the purpose of improving work and performance [19]. Innovation behavior consists of a three-step process: step 1 is the process of finding new ideas to identify and solve problems; step 2 is the process of finding ideas to implement ideas found. The last step is the realization of a solution by introducing an innovation model that can be used throughout an individual's work, department, or organization [20]. Amabile et al. [21] argue that innovation behavior in any area starts with finding new and useful ideas. New ideas arise from the adoption, combination, and application of existing knowledge [17]. This is because they determine behavior through comprehensive judgment, perception of surrounding objects, and environments. Innovation behavior research suggests that members may have the opportunity to develop new insights and abilities through knowledge discovery and use, and that the breadth and depth of available knowledge is a driving force for innovative ideas [22].

Huh [23] suggests that by discovering and using knowledge, members discover new and useful knowledge and also they create new knowledge by recombining knowledge in a creative way. Popadiuk and Choo [24] noted that integrating the knowledge into the knowledge base can enhance the innovation behavior. Innovation behavior means all activities that create and implement new ideas can increase the work or performance of the members themselves. It also deliberately represents the process of developing, modifying, applying, implementing, and spreading ideas [25]. Previous studies have tried to identify the factors that induce the innovation behavior of the members. These factors varied from individual, relationship, task, and organizational characteristics. The results of this study are as follows. First, the study focused on the individual factors, the cognitive style, openness, creative personality, self-efficacy, job satisfaction, and continuous learning activities as important factors [26,27]. From this point of view, metacognition will have a major impact as a premise of processes involving the induction and execution of ideas at a previous stage that embodies innovation behavior.

**Hypothesis 2.** *Metacognition will have a positive effect on innovation behavior.*

## 2.3. Entrepreneurship and Innovative Behaviors

Entrepreneurship can be seen as a part of the mental, physical, and situational experience of humans manifested in the course of transforming a series of uncertain situations into certain situations. In particular, entrepreneurship in the spiritual aspect can be said to be an expression of an individual's beliefs and intuition. Innovation is expressed as a result of this reality, not an automatic occurrence but an entrepreneurial spirit. Nadkarni [28] describes innovation as a process of entrepreneurship and Brenkert [29], Oke, Burke, and Myers [30] also argue that the source of innovation comes from entrepreneurship. In other words, entrepreneurship is a part of the process of innovation and, if expanded, is an important determinant of economic performance [31]. Innovation is seen as the most important source for achieving a competitive advantage and outstanding performance [32], because the combination of new knowledge and existing knowledge provides opportunities and insights for new products and markets [33] with a better understanding of new technology trends and opportunities. Witt [34] and Brokel and Binder [35] suggest that all innovative behaviors are to try new opportunities and activities. These behaviors involve knowledge exploration and use. The activation of entrepreneurship can have significant influence on behavior performance through the recognition of members and a more diverse approach to the relationship required between entrepreneurship and innovation behavior [36,37]. According to Person [38], entrepreneurship not only promotes effective

innovation, but also increases competitiveness and productivity because entrepreneurship has a strong internal control and an innovative and proactive behavioral orientation [39]. Amabile and Conti [40] found empirical studies on the effects of entrepreneurship on innovation, and Song [41] found that when they are highly risk-sensitive, challenging, and aggressive, they promote and invest heavily in innovation activities.

**Hypothesis 3.** *Entrepreneurship will have a positive impact on innovation behavior.*

#### 2.4. Method and Results

We used statistic program SPSS Version 23 for hypothesis testing of this research model. In order to verify the suggested research model, the researcher collected 171 questionnaires from university students in Korea. Table 1 shows the results of this research model.

### 3. Conclusions and Implications

Metacognition as a leading factor in strengthening innovation behavior is most important because it involves elements of planning, checking, and controlling specific actions in the creation and introduction of new ideas [19]. Innovation behaviors involve the inducement and execution of ideas and require a variety of specific behaviors [18]. In this process, the function of metacognition plays a very important proactive role. In other words, the function of metacognition leads to more innovative behavior in a systematic and stable direction. Human beings have a cognitively flexible ability [42] to establish appropriate cognitive processing strategies when new or unexpected situations are encountered, thereby enabling recognizing the presence of appropriate alternatives available in a given situation. In particular, when cognitive style differences occur early, people determine how individuals should cope with all stages of the problem-solving process, including the nature of the problem, the range of possible solutions, and the implementation of the selected solution [43].

People become more resilient to difficulties while trying to apply their knowledge and skills because self-efficacy reinforces self-confidence [44]. A person with a strong self-efficacy tends to concentrate on analyzing and solving problems, whereas a person with a weak self-efficacy tends to doubt his skills and abilities. A person with a weak self-efficacy also anticipates failure before investing in problem-solving efforts [44]. This kind of self-efficacy has different bias and makes it possible to derive meaningful results depending on the direction of approach.

The results of this study are as follows. First, the relationship between self-efficacy and perceived performance has a positive effect on the self-efficacy and is partly mediated [45]. The relationship between metacognitive activity and self-efficacy is somewhat complex, but one thing is clear: meta-intellectual activity leads to more self-efficacy [46]. In addition, self-efficacy is a mediator of the relationship between learning style and performance by students who believe that they have the ability to perform tasks, using more cognitive participation tools, for lasting and more prominent performance [45]. This self-efficacy can be directly or indirectly influenced by the interaction between self-efficacy and resilience [47] because of the confidence that an individual can have. In future studies, it is necessary to further investigate the relationship using positive factors such as self-efficacy and resilience.

Baron and Shane [48] emphasized that the application of entrepreneurship should be understood as an expanded concept. In other words, a more extended approach is needed in the interpretation and application of entrepreneurship. Bessant and Tidd [49] view entrepreneurship as an important characteristic of human life, presupposing that entrepreneurship is very important in human society. In other words, he regarded entrepreneurship as an object that every individual should exert. The expansion of entrepreneurship into these societies can be confirmed by the study of Bygrave [50]. He interpreted entrepreneurship as “a very unique, dynamic, holistic event by human free will that changes the state” and understood it as an act of existence in the organization of all levels of the

individual's life. In addition, Audretsch, Keilbach, and Lehmann [51] argued that the accumulation of entrepreneurial capital and behaviors will affect economic performance. In this regard, Taylor and Plummer [52] found that entrepreneurship education will provide the trainees with a way to work within the global dimension of their own economic activities and their influence. Trainees can understand it. Bae and Cha [53] also found that entrepreneurship should be exercised not only in corporations but also in universities, governments, nonprofit organizations, and social enterprises. In addition, in order to expand, entrepreneurship must exert itself not only at the individual level but also at the organizational level and even at the national level.

Ultimately, the expansion of entrepreneurship into society can be understood as a logical and indispensable extension of understanding the essential aspects of entrepreneurship and understanding its attributes and qualities. Because people cannot live their lives alone, people live together as organizations, corporations, and nations to achieve a special purpose. Management is needed when individuals lead their lives and all organizations run their lives. According to Mankiw [54], humans have to do efficient planning, checking, and implementing to achieve a goal. Because human desires are infinite and resources are limited, it is not easy to perform successfully. Entrepreneurship is a product of human reason that is naturally derived from 'management', which is inherently embedded in the thinking process of individuals, organizations, companies, and states that exist as 'management subjects' and decision-making processes. Individuals, corporations, and nations are regarded as the major economic entities in economics. All of them are 'management entities'. Entrepreneurship is the property executed and exerted in 'management' by all these managing entities. It is a quality. According to Carsrud and Brannback [55], entrepreneurship exercised by individual citizens is important to both individuals and communities in the formation of social wealth. Thus, understanding and learning entrepreneurship, which has a significant impact on the lives of ourselves and others, is important. Therefore, everyone should be exposed to entrepreneurship education and training [56].

Recently, governments have been increasing their policies to educate entrepreneurs in their own countries. Their policies are focused on promoting entrepreneurial activities and creating institutional and social infrastructure [56,57]. New economics are also studying the individual's cognition, thinking, and selection behavior in entrepreneurship [58]. Kayne [59] places emphasis on entrepreneurship education in human development. He says that entrepreneurship is not a formal process, but a process of human thinking and decision-making, which is called a "state of mind to change the future" [60]. It must be strategically trained to bring about change in all facets, knowledge, attitudes, perceptions, and executive abilities. Kayne [59] has mentioned that some of the educational effects of entrepreneurship education appears when it is taught to underage students. First, the change in perception about the personal and professional success of life and future plans cause movement based on the entrepreneurial spirit. Second, there is the perception that social and economic needs and desires can be solved by creating value through their own lives. Third, it clearly understands the difference between ideological imagination and practice. Finally, it demonstrates leadership in one's own life through demonstration of entrepreneurial spirit.

As the environment changes drastically, innovation needs to be exploited by using a variety of knowledge [61]. However, in order to solve the problems that are encountered by everyone first, or to innovate beyond the existing way of thinking, a lot of knowledge is required, but in most cases, the rules and old knowledge of the past are used [62]. In addition to responding flexibly to unpredictable situations by exploring existing knowledge and new knowledge, more innovative behaviors should be pursued by utilizing the knowledge in order to perform various tasks [63].

Table 1. Regression.

Model	Innovation		Risk-Taking		Proactiveness		Innovative Behaviors		Innovative Behaviors					
	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t
Constant		5.038 **		5.546 **		7.104 **		6.515 **		3.936 **		3.675 **		3.859 **
Gender	−0.206	−2.791 *	−0.250	−3.479 **	−0.104	−1.321	−0.160	−2.212 *	−0.038	−0.631	−0.017	−0.268	−0.123	−1.797 *
Major	−0.005	−0.072	−0.179	−2.456 *	−0.113	−1.412	0.108	1.476	0.118	1.974 *	0.173	2.756 *	0.146	2.087 *
Meta-C	0.320	3.784 **	0.273	3.318 **	0.173	1.918 *	0.307	3.710 **	0.117	1.654	0.158	2.183 *	0.245	3.076 **
Meta-P	0.069	0.889	0.076	1.017	0.118	1.431	0.142	1.886 *	0.153	2.342 *	0.129	1.899	0.167	2.196 *
Meta-R	0.039	0.469	0.129	1.580	0.016	0.175	0.068	0.829	0.020	0.288	−0.037	−0.513	0.034	0.428
Innovation									0.552	8.754 **				
Risk-Taking											0.0524	7.715 **		
Proactiveness													0.268	3.895 **
R	0.440		0.486		0.292		0.478		0.698		0.669		0.555	
R	0.194		0.236		0.085		0.228		0.488		0.448		0.308	
Adj R	0.168		0.212		0.057		0.204		0.468		0.427		0.282	
F	7.726 **		9.934 **		2.992 *		9.522 **		25.386 **		21.622 **		11.866 **	
Durbin-Watson	2.109		2.075		2.125		1.998		2.081		2.133		1.871	

\*  $p < 0.05$ ; \*\*  $p < 0.01$ .



In general, as measures for promoting innovation behavior in corporate management activities, it is necessary to determine the degree of effort to obtain information on the related industries of the CEO, the atmosphere in which employees can participate in decision-making processes, education for innovation, and creating an organizational atmosphere that can implement new ideas (Kanter, 1988). Because of the risk of innovation and the destructive nature of innovation, many conflicts appear in the introduction stage and in the implementation process. To resolve these, a strong entrepreneurial spirit is required for management [64]. However, lack of intrinsic motivation to demonstrate innovative behavior can lead to individual differences in innovation behavior [65]. Dyer et al. [66] argue that intrinsically motivated people are learning-oriented and these people want to get rid of stereotypes and get new alternatives and ideas for problem solving. Implicitly synchronized members put more efforts into knowledge activities for work. The reason for this is that intrinsic motivation reflects the individual's pursuit of learning and cognitive goals in order to express the pleasure or curiosity of the work and the desire to work hard by paying attention to it [67,68].

The above results have limitations. It is not enough to apply to all students. Therefore, for more meaningful implication, an expanded research has to do with collecting considerable data.

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