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# The effects of network reliance on opportunity recognition: A moderated mediation model of knowledge acquisition and entrepreneurial orientation

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## ABSTRACT

Opportunity recognition is one of the most important aspects of entrepreneurship. It is particularly crucial for new enterprises, as the identification of opportunities is an indispensable initial step for entrepreneurial activities. This study investigates the internal mechanism through which network reliance affects opportunity recognition. To reveal this internal mechanism, we propose a moderated mediation model of knowledge acquisition and entrepreneurial orientation. Using survey data from 278 startup managers in South Korea, hierarchical regression analysis and bootstrapping analysis are used to investigate mediation and moderation effects. The results show that knowledge acquisition positively mediates the relationship between network reliance and opportunity recognition. Moreover, entrepreneurial orientation negatively moderates not only the relationship between knowledge acquisition and opportunity recognition, but also the overall mediation model. This demonstrates that low entrepreneurial orientation individuals recognize opportunities better when they have accumulated enough business knowledge. Based on these findings, we conclude that opportunity recognition may be achieved more effectively through the complex process of networking, knowledge acquisition, and entrepreneurial orientation.

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## 1. Introduction

Issues related to new ventures have arisen in recent times, notably after the venture boom of the 2000s. The world currently seems to be in the grip of venture fever. In 2014 alone, venture capitalists invested >47.3 billion USD in 4000 startups, which was the largest investment since 2001. The number of startups that achieved valuations of one billion dollars skyrocketed in 2014 (CBI insights, 2015). Additionally, there were 8 startups among the top 10 firms listed on NASDAQ, indicative of the global startup trend.

Nonetheless, not every startup is successful; there are no shortcuts to success. According to a survey report by Startup Alliance (2014), a public-private network association supporting startups in South Korea, many entrepreneurs consider networking to be the key to success, despite numerous difficulties associated with establishing and managing business networks. Some studies have also confirmed the importance of networking. It has been found that entrepreneurs may discover innovative ways more effectively through a combination of external networks and internal resources (Gulati and Singh, 1998). As such, it

would be important to investigate early-stage entrepreneurs, who have been operating for less than five years and are striving to find opportunities through their networks (Korunka et al., 2003). However, studies related to such networks have mainly focused on large firms and small- and medium-sized companies older than five years.

In addition, entrepreneurship research has mostly focused on business performance, including Initial Public Offerings (IPOs) or the amount of seed capital raised, as the dependent variable, which only captures the entrepreneurial outcome at a particular point of time. However, financial results are not the only concern of entrepreneurs. Although measuring financial performance is necessary, entrepreneurs' performance should also be analyzed in terms of the entrepreneurial process, as entrepreneurial activities reflect the work of the startup over its entire life and are not just a one-stop exercise. Opportunity recognition is a continuous entrepreneurial process across all stages: pre-startup, startup, and growth of a venture. Analyzing opportunity recognition allows researchers to forecast the power of potential gains, which cannot be captured simply through monetary outcomes (Singh et al., 1999b). Moreover, according to De Carolis and Saporito (2006), a combination of networks and cognition give birth to successful opportunity recognition. An entrepreneur's network is a critical resource in expanding bounded rationality. Entrepreneurs are more successful in recognizing opportunities when they perceive that vital technical or

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market knowledge can be gained from the networks. Therefore, it is beneficial to examine opportunity recognition as a consequence of an entrepreneur's networking process. However, previous research has not fully accounted for these mechanisms through the identification of suitable mediators or moderators (Wasdani and Mathew, 2014).

Hence, the main contributions of this study are as follows. First, we extend previous entrepreneurship research by examining the initial level of entrepreneurial performance in terms of opportunity recognition. Second, we investigate how an entrepreneur's external network is connected to entrepreneurial outcome by analyzing the relationship between the entrepreneur's network reliance and opportunity recognition. We suggest that entrepreneurs who rely highly on their networks are likely to acquire useful knowledge for running their startups, which in turn might increase their capacity to perform effectively in the market. Third, we expand the entrepreneurship literature by confirming the factors that prompt positive outcomes from an entrepreneur's external network. Specifically, we measure entrepreneurial orientation as a moderator of the relationship between knowledge acquisition and opportunity recognition. We then identify a moderated mediation effect by evaluating the extent to which the effect of network reliance on opportunity recognition through knowledge acquisition is contingent on entrepreneurial orientation. Building on theories of entrepreneurship and psychology, our study investigates the early process of entrepreneurship from a cognitive point of view, and then suggests how to use this mechanism effectively.

## 2. Theoretical background and hypotheses

We propose a novel integrated model of entrepreneurship, which jointly examines knowledge acquisition as a mediator between network reliance and opportunity recognition, and introduces entrepreneurial orientation as a moderator. We simply refer to this as a moderated mediation model in this study. All the underlying hypotheses are shown in Fig. 1.

### 2.1. Network reliance

Entrepreneurs rely on social networks to acquire strategic resources including useful knowledge and business information. A social network is defined as the sum of the links between actors among individuals and organizations (Brass, 1992). In the field of entrepreneurship, an entrepreneur's networks are usually described as all the relationships established for exchanging business resources (Dodd and Patra, 2002). The entrepreneurship literature has emphasized the effect of social networking as a key determinant of entrepreneurial performance (Aldrich et al., 1987; Hoang and Antoncic, 2003). Social networks have long been considered an important predictor of business success (Johannisson,

1990). According to meta-analysis results, an entrepreneur's social network is positively associated with small firm performance (Stam et al., 2014).

Scholars have generally accepted the importance of social networking with respect to recognizing opportunities (Hills et al., 1997; Ma et al., 2011; Ramos-Rodríguez et al., 2010). For example, Hills et al. (1997) reported that entrepreneurs who sought opportunities through their networks discovered more opportunities than those who explored them on their own. Singh et al. (1999a) confirmed similar results in their empirical study. They indicated that an entrepreneur's network is positively associated with idea identification and opportunity recognition. This means that entrepreneurs who actively interact with their networks acquire additional insights for business growth. In other words, the more information entrepreneurs get from their networks, the more they want to connect with them, and vice versa.

Researchers have investigated the relational aspect of social capital for exchanging resources between strong and weak ties. Some scholars argue that weak ties enable entrepreneurs to access more novel information while others stress the benefits of strong ties in the attainment of vital resources (Batjargal, 2003; Granovetter, 1973). Similarly, weak ties may be in line with network breadth; by contrast, strong ties are associated with network depth. Network breadth refers to the number of networks needed for firms to innovate, which necessitates the seeking of various types of knowledge. Network depth refers to the importance of information sources; hence, researchers have used it to measure the qualitative aspects of networking (Boh et al., 2014; Laursen and Salter, 2006).

Network reliance is one of the key characteristics of strong ties. Since network size is relatively restricted in the early stages of entrepreneurship, entrepreneurs' assessments of the criticality of their networks is worth investigating. Entrepreneurs are often confronted with information asymmetry, which functions as an inhibitor of venture success. Such information asymmetry could be noticeably mitigated if entrepreneurs and their resource-providers were to rely on each other, as people are more likely to share important knowledge with those they trust (Tsai and Ghoshal, 1998). For instance, entrepreneurs who frequently behave in a trustworthy-manner receive additional investment from angel investors (Maxwell and Lévesque, 2014). In addition, time-consuming activities, such as bargaining or cross-checking, may be reduced once faith is established (Dyer and Singh, 1998). Nevertheless, questions related to the impact of network reliance on entrepreneurial performance in early developmental stages remain unanswered. Therefore, the effect of network reliance on the entrepreneurial process needs to be investigated in detail.

In this study, we follow Ganesan (1994)'s definition of network reliance, which is the extent to which entrepreneurs are willing to depend on and trust their partners' expertise, purpose, and motives.

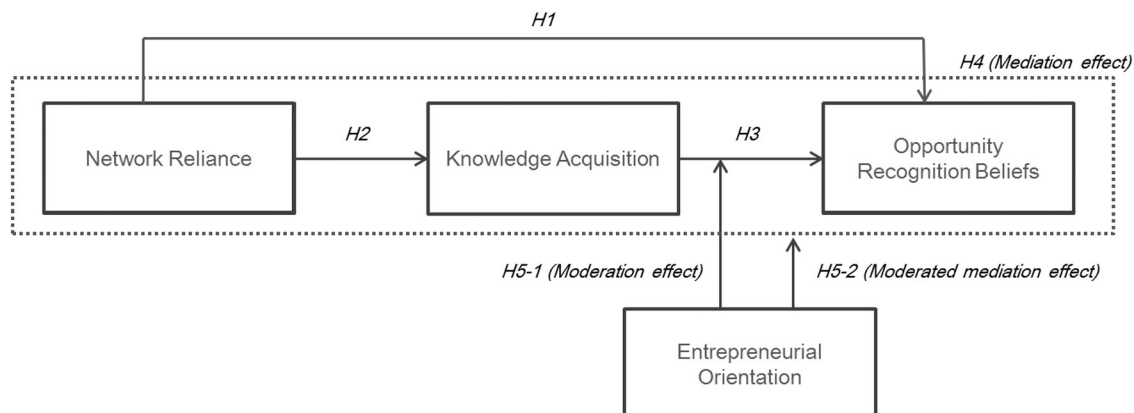


Fig. 1. The research model.

## 2.2. Opportunity recognition beliefs

Opportunity recognition is an entrepreneurial activity that occurs from the point of starting a business to the stage when it is fully established (Singh et al., 1999a). Recognizing opportunities may yield considerable revenue, growth potential, and competitive advantages for young firms. Indeed, opportunity recognition has been a central part of the field of entrepreneurship research (Davidsson, 2003; Short et al., 2009). Many studies have acknowledged that recognizing opportunities is an important step for entrepreneurship as it could trigger processes, which eventually lead to profit creation (Shane and Venkataraman, 2000).

Nonetheless, there have been many debates as to the origin and the concept of opportunity is quite subtle. Although Short et al. (2009) tried to establish the definition of opportunity recognition, it is no more than an integration of two different perspectives, i.e., opportunity is created either through the imaginative behaviors of entrepreneurs, or through natural discovery in the inefficient market (Kirzner, 1973). However, “opportunity itself” should be distinguished from “the origin of opportunity” (Gregoire et al., 2010). In other words, almost all entrepreneurs should identify opportunities despite the objective or subjective nature of the phenomenon. They conceive a venture idea through a cognitive frame, and develop and elaborate on it more concretely, i.e., opportunity recognition is an internal process (Davidsson, 2003). By incorporating these opinions, Gregoire et al. (2010) defined opportunity as a planned way of action to launch “a new and/or improved supply-demand combination” providing solutions to alleviate the imbalance between market supply and demand. This definition is important because it includes the formation of beliefs about the feasibility of opportunities.

Opportunities are in the eye of the beholder (Baron, 2006). This suggests the importance of investigating the entrepreneurial process at a cognitive level. Entrepreneurial cognition provides substantial insights into understanding why some entrepreneurs are better at identifying opportunities than others. Several efforts have been devoted to examining opportunity recognition as a cognitive process (Short et al., 2009). Theory of learning emphasizes that experiential learning facilitates opportunity recognition. According to this theory, more experienced entrepreneurs may assimilate information more efficiently than budding entrepreneurs, given their wide range of cognitive images of opportunity, based on their observations and experiences (Kolb, 1984). According to cognitive psychology, individuals with high levels of entrepreneurial alertness tend to recognize opportunities better than normal individuals because of their unique styles of interpreting events (Kaish and Gilad, 1991). These findings suggest that the pattern of entrepreneurs' cognition is an internal process, which may lead to differences in the success of early businesses (Dyer et al., 2008). Hence, exploring the factors that enhance the perception of business opportunities would offer fruitful contributions to the literature in this field.

By adopting the definition of Gregoire et al. (2010), we define opportunity recognition as the entrepreneurs' beliefs that they may discover and create new opportunities to solve market problems by introducing their business solutions.

## 2.3. Mediation effect of knowledge acquisition

In this study, we propose a mediation mechanism of knowledge acquisition between network reliance and opportunity recognition. There are four steps to establishing this mediation effect. First, the significant relations between predictor and mediator (step 1), mediator and outcome (step 2), and predictor and outcome (step 3) should be satisfied. In step 4, the mediation effect is established if the strength of step 3 is significantly reduced while controlling the mediator.

At the outset, we assume that an entrepreneur's network reliance may increase opportunity recognition, which is a fundamental unit

of entrepreneurship. In a rapidly changing world, an entrepreneur consistently needs to find opportunities beyond existing resources. Previous studies on opportunity recognition as an initial entrepreneurial process have highlighted the role of networks (Singh, 2000). Since starting a new business often requires multidimensional information with limited financial capability, entrepreneurs cannot help but depend on their social capital in order to supplement their insufficiencies (Brush et al., 2001). On these grounds, studies focusing on entrepreneurial networks emphasize trust as an essential element of networks (Welter, 2012). Reliance upon networks contributes to encouraging entrepreneurial persistence and success, and reducing transaction costs (Davidsson, 2003; Uzzi, 1997). As such, network reliance plays an important role in relational aspects; this includes an entrepreneur's relations with angel investors, venture capitalists or mentors, which eventually have positive effects on entrepreneurial outcomes (Maxwell and Lévesque, 2014). An entrepreneur's ability to recognize an opportunity comes from questioning, feedback, sharing of ideas, and experimenting via networks (Dyer et al., 2008). In practice, social sources, such as mentors or forums, improve an entrepreneur's ability to recognize opportunities (Ozgen and Baron, 2007). Moreover, trust raises an entrepreneur's confidence to share key information and work together, which promotes innovativeness in the discovery of business opportunities (Stull and Aram, 2005). Likewise, stronger ties with resource providers increase the likelihood of opportunity recognition (Zimmer, 1986). Hence, entrepreneurs who regularly turn to their networks may collect key information from them and would thereby be able to identify a business opportunity more easily. These arguments suggest the following hypothesis:

**Hypothesis 1 (H1).** Entrepreneur's network reliance positively influences opportunity recognition.

Knowledge acquisition is strategically crucial for new firms, as it strengthens entrepreneurial competitiveness. According to the resource-based view, knowledge is regarded as a primary resource for achieving entrepreneurial outcomes (Conner and Prahalad, 1996). An entrepreneur is often confronted with a dynamic business environment, which he/she needs to break through. Since it is impossible for entrepreneurs to have indisputable knowledge at multiple levels of the decision-making process, they should turn their attention outside the firm to explore useful information. The practical knowledge from external sources enables an entrepreneur to be less prone to adversities by facilitating the development of skills and providing insights into the market (Danneels, 2000).

On the one hand, an entrepreneur could gain useful knowledge on his/her own by reading a newspaper or conducting an experiment. On the other hand, knowledge could be attained through interactions with other parties. Entrepreneurs can accumulate various kinds of knowledge and utilize it effectively for their own companies when interacting with others (Cohen and Levinthal, 1990). Previous studies argue that an entrepreneur's network is a determinant of knowledge acquisition. It is noticeable that a startup tries to overcome the liabilities associated with its newness through networking. Networking allows entrepreneurs to access useful knowledge that they do not possess, particularly for those who lack business knowledge (Birley, 1986; Granovetter, 1973). For example, networking between technology-based ventures and their key customers helps startups accumulate essential knowledge, which encourages the development of new products (Yli-Renko et al., 2001).

Notably, an entrepreneur would strive to get useful information from a network when he/she believes the knowledge provided by the network is reliable. Indeed, the knowledge may easily be transferred to entrepreneurs when the relationship is based on trust. Additionally, network reliance helps an entrepreneur to refine business knowledge

(Zahra and Hayton, 2008). Therefore, an entrepreneur may have more sophisticated technical and market knowledge when they rely highly on networks. These arguments suggest the following hypothesis:

**Hypothesis 2 (H2).** Entrepreneur's network reliance is positively associated with knowledge acquisition.

Knowledge acquisition has been considered an important predictor of business performance, especially for new firms (Barney, 1991; Sullivan and Marvel, 2011; Yli-Renko et al., 2001). Entrepreneurial activities related to exploring and acquiring business information are regarded a crucial part of opportunity identification. Previous research indicates that accumulating knowledge helps an entrepreneur to identify opportunities. For instance, acquiring knowledge about the industry, market, and technology enhances an entrepreneur's cognitive judgment of realizing an opportunity (Shane, 2000). In essence, knowledge plays an important role in developing an original business idea as it serves as a criterion of the opportunity's feasibility. Therefore, the broader or deeper the knowledge gained, the easier it is to recognize an opportunity.

Unlike previous research, the present study focuses on an entrepreneur's cognitive process by examining how knowledge is acquired and used to find a business opportunity. In fact, besides knowledge itself, the meaningful links among possessed knowledge influence opportunity recognition. Detecting patterns between independent events is a cognitive process, which differs across individuals. In practice, while millions of people are exposed to the same events, only a few people "connect the dots" by applying their previous knowledge to recognize an opportunity. An entrepreneur observes a variety of information in the external world and utilizes it to identify a business opportunity. In this cognitive activity, an entrepreneur enables business-related schemas to be developed and enriched until an opportunity is found (Baron, 2006). Thus, an entrepreneur recognizes an opportunity through a cognitive process by forming links among acquired knowledge. This study assumes that an entrepreneur applies the acquired knowledge to the process of opportunity recognition, leading to the following hypothesis:

**Hypothesis 3 (H3).** Knowledge acquisition is positively associated with opportunity recognition.

We assumed that an entrepreneur's network reliance increases knowledge acquisition, which positively affects one of the critical entrepreneurial activities, i.e., opportunity recognition. To substantiate our argument, we draw a Stimulus-Organism-Reaction (SOR) model (Woodworth, 1928). According to this model, an organism's psychological transition process mediates the relationship between environmental stimuli and reaction, i.e., the effects of networking (external stimuli) on an entrepreneur's reaction may be mediated by knowledge acquisition (internal mechanism).

To explore the SOR model, we consider the need for achievement (nAch) theory (McClelland, 1967). Need for achievement refers to an individual's aspiration to master significant goals or high standards. Those with a high nAch mostly take pleasure from a course of action, rather than from material or financial rewards, when achieving a goal. These people are usually characterized as risk-takers, since it is mostly acceptable for them to undertake challenging tasks that are likely to fail. This aspect matches closely with entrepreneurs. Scholars have concluded that risk-taking propensity, need for achievement, and ambiguity tolerance are the distinctive characteristics of entrepreneurs (Wincent and Örtqvist, 2009). Hence, given that an entrepreneur aspires for achievements in business, he/she may identify many more opportunities. This internal process of need for achievement acts as an organism's psychological transition, which, in turn, mediates stimulus and reaction, as discussed.

In this regard, we suggest a mediation effect of knowledge acquisition in the process whereby entrepreneur's network reliance

affects opportunity recognition. Network reliance may enrich an entrepreneur's knowledge acquisition, especially for those who desire to achieve goals. Other researchers have discussed a similar perspective of the mediating role of knowledge acquisition, characterizing knowledge as a part of the entrepreneurial process between the number of networks and product innovation (Yli-Renko et al., 2001). Network reliance may facilitate entrepreneurial activities of knowledge accumulation, which leads to opportunity recognition. These arguments suggest the following hypothesis:

**Hypothesis 4 (H4).** Knowledge acquisition mediates the relationship between network reliance and opportunity recognition.

#### 2.4. Moderation effect of entrepreneurial orientation

A moderation effect occurs when there is a third variable between the independent and dependent variables. This third variable is called a moderator, which changes the strength or direction of the relation between the two variables. Moderators are generally introduced in previous studies when the relations are inconsistent (Baron and Kenny, 1986). According to earlier investigations, the relation between knowledge acquisition and opportunity recognition appears elusive. Some studies insist that prior knowledge of customers or technology enhances the company's ability to exploit opportunities more effectively (Rosenberg, 1994; Shane, 2000). In contrast, other studies maintain a negative relationship, describing a large firm's failure to recognize opportunities in the emerging market despite having extensive knowledge, management experience, and infrastructure (Christensen, 2013; Schumpeter, 2013). This ambiguous relationship between knowledge and opportunity recognition suggests the existence of a moderator.

There have been considerable attempts to confirm the existence of a moderator in the process of recognizing opportunities. The relationship between an opportunity and its determinants or outcomes can be altered not only by endogenous factors, such as personal ability, but also by exogenous elements including global economic conditions (Short et al., 2009). However, few studies have investigated the impact of personal orientation despite it being a good predictor of future behavior. Orientation refers to the capacity to recognize and to locate oneself in one's environment with reference to time, place, and people. The effect of knowledge acquisition on opportunity recognition is expected to be of different strengths depending on entrepreneurial orientation. Entrepreneurial orientation is a strategic orientation characterized by risk-taking, innovativeness, and proactiveness, which provides a basis for entrepreneurial decisions, especially for those who are facing a market opportunity (Rauch et al., 2009). Entrepreneurial orientation has rarely been investigated as a moderator in the process of recognizing opportunities, even though it is one of the most established and researched variables in entrepreneurship literature (Wales, 2015).

Based on this logic, this study assumes that the strength of knowledge acquisition could be altered by entrepreneurial orientation. We regard entrepreneurial orientation as a moderator at the personal level. This view is aligned with job characteristics theory, whereby the influence of environmental characteristics on job performance is moderated by personal factors (Hackman and Oldham, 1976). Therefore, we predict that there will be a strong relationship between knowledge acquisition and opportunity recognition when entrepreneurial orientation is high, leading to the following hypothesis:

**Hypothesis 5-1 (H5-1).** Entrepreneurial orientation moderates the relationship between knowledge acquisition and opportunity recognition. This positive relationship is much stronger for those with a high degree of entrepreneurial orientation.

Assuming that entrepreneurial orientation moderates the relationship between knowledge acquisition and opportunity recognition, it is also plausible that an entrepreneur's characteristics might conditionally

affect the strength of the indirect relationship between network reliance and opportunity recognition. In other words, the effect of knowledge gained from trustworthy networks on opportunity recognition (mediation effect) may be moderated by entrepreneurial orientation, thereby demonstrating a moderated mediation effect. As we assume a strong association between knowledge acquisition and opportunity recognition when entrepreneurial orientation is high, we expect that entrepreneurial orientation will positively moderate the mediation effect. That is, the mediation effect will be stronger when entrepreneurial orientation is high, as claimed in the following hypothesis:

**Hypothesis 5-2 (H5-2).** Entrepreneurial orientation moderates the indirect effect of network reliance on opportunity recognition (via knowledge acquisition). Specifically, knowledge acquisition positively mediates the indirect effect when entrepreneurial orientation is high.

### 3. Method

#### 3.1. Data collection and respondent characteristics

This study was conducted using data collected from entrepreneurs who had started their own business <5 years ago and who were registered in either the Korea Creative Economy Research Network or the Rocket Punch website. Seven thousand questionnaires were distributed by email and 284 responses were collected. After excluding missing data and outliers based on boxplot analyses, 278 responses were analyzed.

In the final data, 20 respondents were in their 20s (7.2%), 78 respondents in their 30s (28.1%), 104 respondents in their 40s (37.4%), and 76 respondents were >50 years of age (27.3%). Among all respondents, 240 had a bachelor's degree or higher (86.3%). "Information technology and computer operation services" was the most popular industrial category, accounting for 21.2% of all respondents. Regarding their past experience, 46.4% of all respondents had prior venture/startup experience and 30.6% had experience working within the same industry. Table 1 presents the demographic information of the research sample.

**Table 1**  
Demographics of survey respondents.

Variable	Category	N	Percentage (%)
Age	20s	20	7.2
	30s	78	28.1
	40s	104	37.4
	≥50	76	27.3
Education	Vocational school	38	13.7
	Bachelor's degree	101	36.3
	Master's degree	88	31.7
	Doctoral degree	51	18.3
Industry type	Daily supplies	19	6.8
	Petrochemicals	5	1.8
	Nonmetal, metals, machine equipment	7	2.5
	Medical appliances and instruments	7	2.5
	Computer and office machine	3	1.1
	Electric, electronics, communication and precision	40	14.4
	Information technology, computer operation service	59	21.2
	R&D, scientific activities	20	7.2
	Bio, environmental activities	19	6.8
	Design	15	5.4
	Other manufacturing areas	41	14.7
	Other services	35	12.6
Startup experience	Other industries	8	2.9
	Yes	129	46.4
Work experience in the same industry	No	149	53.6
	Yes	85	30.6
	No	193	69.4

N = 278.

#### 3.2. Network reliance

The measurement of entrepreneurs' network reliance was based on the rationale proposed by Choi, Park, Jeong, and Lee (2013), and Ganesan (1994). Respondents were asked to rate how much they depended on their business network. Items included "If our relationship is discontinued, we will face difficulties in replacing them," and "Our business network is trustworthy." Responses were based on a 5-point Likert scale ranging from 1 – "strongly disagree" to 5 – "strongly agree," with a Cronbach's alpha of 0.82. According to Nunnally (1978), a reliability of 0.70 or better is recommended (Nunnally, 1978). Hence, this value has sound scale reliability.

#### 3.3. Knowledge acquisition

The knowledge acquisition scale developed by Sullivan and Marvel (2011) was used to measure how an entrepreneur gains business-related expertise or know-how. Respondents were asked to rate the quality of technological and market knowledge that they had acquired. Items included "I gained new knowledge of technologies that were central to the forthcoming business" and "I gained new knowledge about how the market would function in forthcoming business." Responses were based on a 5-point Likert scale, ranging from 1 – "strongly disagree" to 5 – "strongly agree," with a Cronbach's alpha of 0.92, reasonable scale reliability.

#### 3.4. Opportunity recognition beliefs

The scale adopted from Gregoire et al. (2010) was modified to measure the opportunity recognition beliefs. It has two subscales: The degree of alignment between focal means of supply and target market, and the general feasibility of the opportunity. Items include "My business item can be used to solve the problems of the targeted market," and "Applying my business item with individuals/firms constitutes a feasible opportunity." The responses were based on a 5-point Likert scale, ranging from 1 – "strongly disagree" to 5 – "strongly agree," with a Cronbach's alpha of 0.89, which represents good scale reliability.

#### 3.5. Entrepreneurial orientation

The scale for entrepreneurial orientation was originally developed by Covin and Slevin (1989) and Miller (1983), and validated against the Korean population by Park and Kim (2004) and Yoon (2014). We modified the items of the scale, basing them on the entrepreneur's perspective instead of addressing them at the firm level. This modification seems acceptable as the entrepreneur answers these questions on behalf of the firm hence, his/her views and opinions are representative of those of the firm. The items were grouped into three dimensions consisting of innovativeness, risk-taking, and proactiveness. Items included "I have a strong preference for carrying out high-risk, high-reward project," "R&D, technological leadership, and innovations are very important," and "I am typically the first to take action, ahead of my competitors." Responses were based on a 5-point Likert scale ranging from 1 – "strongly disagree" to 5 – "strongly agree" with a Cronbach's alpha of 0.86, which is adequate internal consistency reliability.

#### 3.6. Control variables

Two variables were included in this study as control variables: experience of entrepreneurial activities and experience in the same industry. These variables were controlled for since similar experiences would be helpful towards the achievement of entrepreneurial goals (Dimov, 2010; Singer, 1995). Each control variable was anchored on a question on their past experience with startups and with the same industry, with "yes-no" responses.

**Table 2**  
Descriptive statistics and correlations of the variables.

Variable	Mean	S.D.	1	2	3	4
1. Network reliance	3.81	0.56	1			
2. Knowledge acquisition	3.97	0.64	0.48**	1		
3. Entrepreneurial orientation	3.84	0.56	0.37**	0.42**	1	
4. Opportunity recognition	4.17	0.59	0.36**	0.40**	0.56**	1

N = 278.  
\*\* p < 0.01 (two-tailed test).

**4. Results**

Before verifying the hypotheses, two validity tests were conducted. First, a confirmatory factor analysis (CFA) was performed using AMOS 23 to test convergent and discriminant validity. The result shows that the hypothesized four-factor model (comprised of network reliance, knowledge acquisition, entrepreneurial orientation, and opportunity recognition) has a good fit for the data set ( $\chi^2 = 109.36$  (48, N = 278), RMR = 0.03, GFI = 0.93, CFI = 0.95, RMSEA = 0.06). Further, we checked the average variance extracted (AVE) and composite reliability (CR). All the AVEs are above 0.8 and the CRs are above 0.9, which satisfies convergent validity. Discriminant validity is also fulfilled, since the range of AVEs is from 0.84 to 0.96 and all the AVEs are larger than the squared correlation coefficients of each item (Hair, Black, Babin, Anderson, & Tatham, 2006). Next, we arranged the survey data in random order and then performed Harman’s one-factor test to avoid common method bias. According to Podsakoff and Organ (1986), common method bias can occur when a single factor explains >50% of the total variance. All the variables were tested using a principal component factor analysis. Based on the results, the first factor accounted for 27.49% of the total variability, out of four distinct factors. This implies the absence of common method bias.

Based on the above verification results, we tested all the hypotheses using SPSS 23 and SPSS PROCESS. Collectively, H1–H4 represent an indirect effect whereby the association between network reliance and opportunity recognition is mediated by knowledge acquisition. Such a mediation effect was tested using the multiple step approach suggested by Baron and Kenny (1986). However, recent studies recommend a bootstrapping analysis to confirm a significant indirect effect, as this method is powerful in determining the statistical significance of mediation (Preacher & Hayes, 2004). Hence, we employ a bootstrapping analysis in addition to the method proposed by Baron and Kenny (1986) in order to confirm the significance of the indirect effect. In H5-1 and H5-2, we assumed the moderating effect of entrepreneurial orientation. Hierarchical regression analysis was used to test a simple moderation effect and SPSS PROCESS was used to ensure a moderated mediation effect. Before verifying H5-1 and H5-2, control variables were dummy coded

and other variables were mean-centered to avoid multicollinearity. Table 2 shows the correlation coefficients of the variables. All variables are strongly correlated.

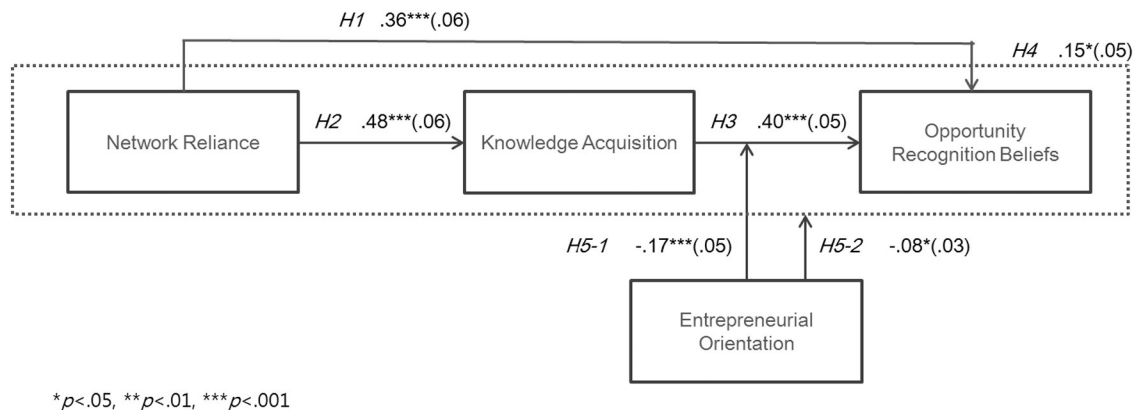
**4.1. Mediation effect of knowledge acquisition**

We adopted Baron and Kenny’s (1986) suggestion to test the mediation effect (H1, H2, H3, and H4) of knowledge acquisition between network reliance and opportunity recognition. According to Baron and Kenny, four requirements should be met to assess mediation effect. First, both the independent variable X and the mediation variable M should each be regressed on the dependent variable Y. The variable X should also be regressed on the variable M. Partial mediation effect is confirmed if the variable X remains significant and its effect becomes smaller while controlling the variable M. Full mediation effect occurs if the variable X is no longer significant. The results show that network reliance is positively related to opportunity recognition ( $\beta = 0.36$ ,  $t = 6.36$ ,  $p < 0.001$ ) and knowledge acquisition ( $\beta = 0.48$ ,  $t = 9.04$ ,  $p < 0.001$ ), respectively. Knowledge acquisition is also positively associated with opportunity recognition ( $\beta = 0.40$ ,  $t = 7.20$ ,  $p < 0.001$ ). Thus, H1, H2, and H3 are statistically supported. The effect of network reliance is still significant, but the size of its effect is diminished when controlling for knowledge acquisition. Hence, the partial mediation effect of knowledge acquisition is confirmed ( $\beta = 0.22$ ,  $t = 3.52$ ,  $p < 0.001$ ). Moreover, the result of the bootstrapping analysis also shows that the indirect effect of network reliance on opportunity recognition is statistically significant (indirect effect = 0.149, 95% bias-corrected CI [0.069, 0.273]). As a result, knowledge acquisition partially mediates the relationship between network reliance and opportunity recognition, meaning H4 is supported. The bootstrapping results of these four hypotheses are presented in Fig. 2.

**4.2. Moderation effect of entrepreneurial orientation**

H5-1 postulates that the effect of knowledge acquisition on opportunity recognition would be positive for entrepreneurs with high entrepreneurial orientation. This hypothesis was tested using hierarchical regression analysis. The result shows that the model’s explanatory power increases when the interaction term is included in the regression equation as per Model 3 ( $\Delta R^2 = 0.03$ ,  $F = 11.46$ ,  $\beta = -0.17$ ,  $t = -3.39$ ,  $p < 0.01$ ). The main effects of knowledge acquisition ( $\beta = 0.44$ ,  $t = 8.12$ ,  $p < 0.001$ ) and entrepreneurial orientation ( $\beta = 0.17$ ,  $t = 3.28$ ,  $p < 0.001$ ) on opportunity recognition are also significant. Each of the variable’s variance inflation factors (VIF) is <1.28. Table 3 reports the results for the moderation effect.

We also conducted a slope test to identify the pattern of this moderation effect, as suggested by Aiken, West, and Reno (1991). Fig. 3



**Fig. 2.** Summary of analyzed coefficients in the integrated model.

**Table 3**  
Hierarchical regression analysis of moderation effect.

	Opportunity recognition					
	Model 1		Model 2		Model 3	
	$\beta$	t	$\beta$	t	$\beta$	t
Control variables						
Business experience	−0.12	−1.96	−0.05	−1.20	−0.06	−1.32
Startup experience	0.17	2.79**	0.09	1.77	0.10	2.00*
Knowledge acquisition			0.48	8.95***	0.44	8.12***
Entrepreneurial orientation			0.18	3.33***	0.17	3.28***
Interaction						
Knowledge acquisition $\times$ entrepreneurial orientation					−0.17	−3.39***
$\Delta R^2$	0.04		0.32		0.03	
$R^2$	0.04		0.36		0.39	
F	5.18		68.85		11.46	

Standardized coefficients are reported.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

presents the result of the slope test. In contrast with our expectation, the result indicates that an entrepreneur's knowledge acquisition has a stronger impact on opportunity recognition when entrepreneurial orientation is low (simple slope = 0.245,  $t = 4.41$ ,  $p < 0.001$ ). On the other hand, the slope is relatively weak for those with high entrepreneurial orientation (simple slope = 0.076,  $t = 1.35$ ,  $p = n.s.$ ). Hence, the interaction effect between knowledge acquisition and entrepreneurial orientation is statistically confirmed. Note, however, that its direction is opposite to what was assumed in H5-1.

Having confirmed that the moderation effect is supported, we further analyzed the moderated mediation effect (H5-2). SPSS PROCESS was used to compute the moderated mediation effect at various values of the moderator. The output of this analysis provides detailed results of the interaction effect by presenting its statistical significance at the degree of entrepreneurial orientation one standard deviation above and below the mean. This allows us to verify the value of entrepreneurial orientation for which the conditional indirect effect is significant at  $\alpha = 0.05$ . The result demonstrates that the moderated mediation effect is negative, and has a non-zero probability ( $\beta = -0.075$ , 95% bias-corrected CI:  $[-0.130, -0.013]$ ). Additionally, this moderated mediation effect is significant when the degree of entrepreneurial orientation is low or equal to the standardized scale, but not when it is high (Table 4). Similar to H5-1, H5-2 is partially supported in that the

moderated mediation effect is statistically significant, although its direction differs from our expectation.

## 5. Discussion

The purpose of this study is to verify the mediation effect of knowledge acquisition between the entrepreneur's network reliance and opportunity recognition, and the moderation effect of entrepreneurial orientation.

First, the current study reveals that reliance on social resources may be positively related to entrepreneurial activities through specific channels, while previous investigations have mainly identified its direct effect (Shepherd and DeTienne, 2005). The mediating role suggests that knowledge acquisition could be considered a key sensor to explain how network reliance motivates opportunity recognition. Concretely, entrepreneurs' perception of the knowledge obtained from social capital appears to be crucial in that it mediates the relationship between network reliance and opportunity recognition. By verifying this mediation effect, entrepreneurs' perception of knowledge acquisition turns out to be an important factor for opportunity recognition.

Second, a moderation effect was confirmed. Entrepreneurs who believe that they could gain plentiful knowledge from the network recognize business opportunities better when their entrepreneurial

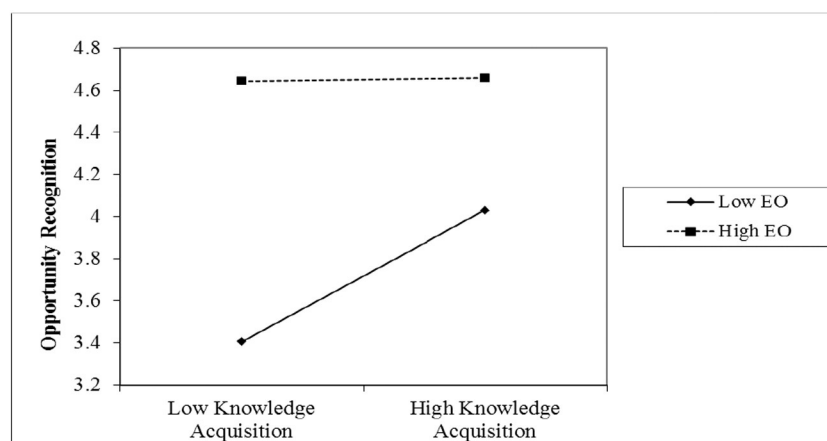


Fig. 3. Cross-level moderating effects of entrepreneurial orientation.

**Table 4**  
Result of moderated mediation effect.

Predictor	B	SE	t	p
Knowledge acquisition				
Constant	−0.012	0.063	−0.191	0.849
Network reliance	0.532	0.101	52.84	0.000
Opportunity recognition				
Constant	4.184	0.061	68.253	0.000
Knowledge acquisition (M)	0.129	0.059	2.214	0.027
Entrepreneurial orientation (Z)	0.450	0.054	8.276	0.000
M × Z	−0.141	0.033	−4.273	0.000
Entrepreneurial orientation	Boot indirect effect	Boot SE	BootLLCI	BootULCI
Moderated mediation effect	−0.075	0.029	−0.130	−0.018
Conditional indirect effect at Z = M ± S.D.				
−1 S.D. (−0.56)	0.110	0.042	0.040	0.207
M (0.00)	0.068	0.035	0.015	0.156
+1 S.D. (0.56)	0.027	0.035	−0.033	0.05

orientation is low. The result of the moderated mediation effect has been shown to be similar, i.e., the mediation effect is stronger when entrepreneurial orientation is low. These outcomes show that the entrepreneur's perception of acquiring business-related knowledge is more important to those with low entrepreneurial orientation. We speculate that those with high entrepreneurial orientation are not easily dependent on knowledge or networking when making decisions. They are reasonably autonomous and prefer to leverage their own resources, including cognitive biases or heuristics, implying that those with high entrepreneurial orientation adhere to their values in lieu of networking or business information acquisition. This is consistent with previous studies claiming that in uncertain situations, which almost all entrepreneurs may face, some entrepreneurs tend to make decisions based on bias rather than rationality (Busenitz and Barney, 1997). Hence, the level of knowledge may not be very influential in opportunity recognition for those with high entrepreneurial orientation. In contrast, those with low entrepreneurial orientation appear to be heavily dependent on their perception of the amount of knowledge that they possess. This is because those with low entrepreneurial orientation try to lean from external factors rather than internal resources when pursuing entrepreneurial activities. Therefore, they may achieve better opportunity recognition when they believe themselves to have abundant knowledge.

### 5.1. Implications

This study makes meaningful theoretical and practical contributions to the entrepreneurship literature by substantiating and extending prior findings.

Although an entrepreneur's network reliance is critical to attaining valuable resources for venture success, previous research has mainly focused on a large firm's structural network characteristics. In this study, we designated entrepreneurs whose business experience is less than five years as our research subjects, and showed for the first time that their network reliance could meaningfully improve their initial entrepreneurial process of opportunity recognition. Furthermore, our study presents a novel and rich model, where both the direct effect of knowledge acquisition and the indirect effect of network reliance are positively related to opportunity recognition, conditional on the value of entrepreneurial orientation.

Second, the present study contributes to the research on the process of opportunity recognition by focusing on interaction perspectives. This study deals with the formation of opportunity as a social process by highlighting network reliance as a key factor that fosters the initial step for entrepreneurial success. This concept is aligned with Shepherd (2015), who suggested that opportunity recognition was a

part of social interactions rather than an outcome of personal thought. Business models are repeatedly verified and improved by networking with trustworthy people until an entrepreneur is sufficiently convinced to recognize opportunities. Moreover, the results also show that reliable networks have immediate effect on knowledge acquisition and indirect effect on opportunity recognition. Hence, an entrepreneur is better at recognizing business opportunities by acquiring critical knowledge through trustworthy networks.

Finally, as opportunity recognition continually functions as a vital component of entrepreneurial success, our results provide substantial implications for policy makers in terms of training programs for those with low entrepreneurial orientation. Based on the present findings, the effect of knowledge acquisition, regardless of whether it is attained from business networks or autonomously, is more powerful for those with low entrepreneurial orientation. This is very significant because success at the initial steps of entrepreneurship is highly dependent on personal orientation. Those with high entrepreneurial orientation are likely to achieve an entrepreneurial career under any circumstances. In contrast, those with low entrepreneurial orientation may recognize opportunities better when they believe that they have built up enough business knowledge. Hence, in contrast with the high entrepreneurial orientation group, entrepreneurship education for “regular people” to expand their business knowledge could be very useful and practical for venture initiation.

### 5.2. Limitations and future directions

As described in Section 5.1, the current study has several implications. Nevertheless, the following limitations should also be considered.

First, because of the difficulty in data collection, we mainly sampled entrepreneurs who registered in or graduated from accelerators or incubators. Our sample is also limited to a specific country, i.e., South Korea. Hence, the results of the present study should be validated with entrepreneurs outside of accelerators or incubators and in a different country.

Next, we only measured startups' network reliance, even though we are aware of a variety of network characteristics, such as network diversity. An entrepreneur's network has been discussed as an important determinant in the process of entrepreneurial success. Therefore, future studies should investigate how an entrepreneur's various networks influence opportunity recognition.

Finally, more efforts should be made to explore moderators since the entrepreneurial process is highly context-dependent. The present study investigated entrepreneurial orientation as a moderator. However, other factors, such as economic conditions, culture, or emotion, could moderate the strength of the effects on entrepreneurial success and warrant further investigation.

## 6. Conclusion

This study promotes theory and research on entrepreneurial literature by examining the relationships between network reliance, entrepreneurial knowledge acquisition, entrepreneurial orientation, and opportunity recognition. In particular, we confirm that knowledge acquisition mediates the relationship between entrepreneurial network reliance and opportunity recognition. Furthermore, we find that knowledge acquisition and the indirect effect of network reliance affect the opportunity recognition of individuals with low entrepreneurial orientation. We hope that this study provides directions for future research on the entrepreneurial process.

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## Appendix A. List of items by construct

### A.1. Network Reliance

1. If our relationship was discontinued with these business networks, there would be difficulties which would impact future growth.
2. The resources attained from business networking is crucial to our future performance.
3. We are dependent on knowledge gained from our business networks.
4. Resources acquired from business partners are important to our business.
5. Resources gained through business networking are essential to development and advancement of business items.
6. If our relationship is discontinued, we will face difficulties in replacing them.
7. Our business network is trustworthy.
8. Our business networks are reliable.
9. We believe our business networks will not act in an opportunistic manner.
10. Our business partners will not leak critical information generated from our business networking.

### A.2. Knowledge acquisition

1. I gained new knowledge of different technologies important for my forthcoming business.
2. I gained new knowledge of a specific technology important for my forthcoming business.
3. I gained new knowledge of technologies that were central to the forthcoming business.
4. I gained new knowledge of a technology not known to the general public.
5. I gained new hands-on experiences with a technology that is important for my forthcoming business.
6. I gained new knowledge about how the market would function in forthcoming business.
7. I gained new knowledge of suppliers in the primary market of my forthcoming business.
8. I gained new knowledge of manufacturers or developers in the primary market of my forthcoming business.
9. I gained new knowledge about the market of my forthcoming business not known to the general public.
10. I gained new first-hand experiences from within the primary market of my forthcoming business.

### A.3. Opportunity recognition beliefs

1. Degree of alignment between focal means of supply and target market demand.
  - 1.1. My business item can be used to solve the problems of the targeted market.
  - 1.2. The proposed business solution has the capabilities to answer the needs of the market described.
  - 1.3. There is a 'match' between what the proposed business solution does, and what the targeted market demands.
2. General feasibility of the opportunity
  - 2.1. Applying my business item with individuals/firms constitutes a feasible opportunity.
  - 2.2 The proposed business solution is sufficiently developed to be applied with individuals/firms in the targeted markets.

### A.4. Entrepreneurial orientation

1. Innovativeness
  - 1.1. R&D, technological leadership, and innovations are very important.
  - 1.2. I am willing to use unconventional strategies in order to increase competitiveness.
  - 1.3. I try to enhance business performance by introducing innovative management strategies.
  - 1.4. I strive to develop creative marketing methods.
  - 1.5. Original ideas are vital in the acquisition and utilization of resources.
  - 1.6. I utilize unreserved and horizontal conversation to bring about productive output.
2. Risk-taking
  - 2.1. I have a strong preference for carrying out high-risk, high-reward project.
  - 2.2. When confronted with situations involving uncertainty, I am decisive in my decision-making.
  - 2.3. I usually search for and seize opportunities in a high-risk, rather than low-risk, environment.
  - 2.4. My management philosophy places more emphasis on growth rather than stability.
  - 2.5. I establish and implement risk management strategies for coping with environment changes.
3. Proactiveness
  - 3.1. I am typically the first to take action, ahead of my competitors.
  - 3.2. I am typically an early adapter when it comes to implementing and accepting new ideas, rather than my competitors.
  - 3.3. I try to outpace my competitors in the development of new products.
  - 3.4. I am alert to seizing new opportunities in the market.
  - 3.5. I provide strong incentives to employees who launch market-leading products/services.

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