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When venture capitalists are attracted by the experienced

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Abstract

This article tries to find when the experience plays a key role in investment decisions by venture capitalists (VCs) investment decisions. First, we analyze the relative importance of the decision-making criteria that VCs have in mind. Then, the relationship between uncertainty and entrepreneurs' experience is investigated. The conjoint analysis and the multiple regression analysis model are applied to sets of hypothetical scenarios to assess the relative importance of the decision-making criteria of the 263 South Korean VCs. VCs generally value entrepreneurs' education and industry experience in making the investment decision. However, when uncertainty is very high, the newness of the product is high and the completeness of the product is low, VCs focus on entrepreneurs' managerial experience of entrepreneurs. These findings indicate that environmental uncertainty changes the relative importance of the VC investment criteria. Our research enhances the understanding of how VCs chose to invest, thus helping start-up companies receive VC funding and, ultimately, fostering the growth of high-risk-high-return companies.

Keywords: Venture capital investment, Entrepreneurial experience, Managerial experience, Uncertainty

Introduction

Startups are characterized by high returns and are high growth, and also key drivers of economic growth, because they lead to increased productivity, the creation of new jobs, and the promotion of corporate innovation and internationalization (Carayannis & Rakhmatullin, 2014; Mason & Brown, 2014; Santos et al., 2021). In particular, the introduction of innovation in various fields and the emergence of new industries, such as biotechnology, the Internet, medical information technology, and new materials industries, has largely been driven by startups, in which venture capitalists (VCs) play a significant role (Baum & Silverman, 2004; Chang, 2004). Although startups need capital throughout the process of founding and growth, the high level of uncertainty, high-risk, and potentially high-reward business, leads to financing difficulties for venture companies (Gompers & Lerner, 2001). Since entrepreneurs without evidence of performance or collateral have limited access to traditional financial institutions, such as banks, high-risk startups with high growth potential can instead acquire the necessary funding from VCs (Berger & Udell, 1998).

Studies of VC decision-making have initially derived from the question of startup success. VCs are investors who select startups with a high probability of success, so investigating VCs' investment decisions may provide a clue to understanding the key success factor of startups (Zacharakis & Meyer, 2000). Accordingly, the main focus of previous studies was the decision-making process and the criteria of VCs in relation to the evaluation of venture companies (Hall & Hofer, 1993).

Another complementary stream of VC research focuses on the factors that influence the relative weight and importance of decision-making criteria (Franke et al., 2008). The studies in this stream have generated some interesting insights. First, the human resources of the startup—the founder and the team, are the most valued in VCs' decision making (Muzyka et al., 1996; Silva, 2004). Second, the level of uncertainty regarding products, services, the market, and the industry affect VCs' decisions (Kollmann & Kuckertz, 2010). However, little is known about how the uncertainty and human resources interact with VCs' decisions. This paper stems from here; its purpose is to investigate the importance of the entrepreneur's human and social resources in VCs' investment decision making and understand the relative combined importance of uncertainty and the experiential factors of entrepreneurs based on human capital theory and social capital theory. We utilize a conjoint analysis (Shepherd et al., 2003), which enables experiments on the mutual influence of entrepreneurs' experiences and uncertainties on the decision-making process of VCs. The sample of this study consists of 263 Korean VCs, the largest number in VC decision-making studies to date.

This paper proceeds as follows. After reviewing extant knowledge about VCs' investment decisions, the paper introduces uncertainty as a theoretical concept. Then it explores the relationship between the experience and uncertainty. Next, this article presents the methodology and results of an experimental study among 263 VCs in South Korea. Finally, the findings and theoretical and practical implications are illustrated.

Theoretical background

VCs' decision making

Since VCs aim to generate high profitability by investing in high-risk ventures (Berger & Udell, 1998), they collect information about ventures and entrepreneurs and make decisions using a multi-step process for making the best choice (Silva, 2004). Several studies have focused on the decision-making process through the use of various models. All of those models share one element—the multi-step decision making (Silva, 2004).

Tyebjee and Bruno (1984a) proposed the basic structure of the investment decision-making process as a five-step model: (1) the deal origination stage that discovers a potential venture; (2) a deal screening stage to review proposals in technology, market products, and scope; (3) a deal evaluation stage to evaluate and analyze the business plan; (4) a deal structuring stage in which investment terms are negotiated and transactions are clarified; and (5) a post-investment activity stage that prepares for the future exit (initial public offering or sale) by supporting the management of the company's portfolio and adding to its value.

In early studies, the VCs' decision-making process was characterized by a small number of steps (Fried & Hisrich, 1994; Tyebjee & Bruno, 1984b). However, as the environment surrounding ventures becomes more complex, innovation and risk increase, the

decision-making process was divided into more complex steps, of which the names and numbers vary among scholars (Boocock & Woods, 1997).

Alongside VCs' decision-making process, the criteria VCs apply to select companies to invest in has also received constant attention (Andrieu, 2013; Woods et al., 2020). It is well-known that VCs' decisions are difficult due to the significant information asymmetry that exists between VCs and entrepreneurial firms without observable track records (Kollmann & Kuckertz, 2010). To cope with information asymmetry, VCs utilize various investment criteria, some of which are tacit and not codified. Studies of decision-making criteria are important not only from an academic perspective but also from a practical perspective, for they could help startups to secure funding, which is the most important determinant of venture performance (Chrisman et al., 1998). They could also help VCs make better decisions (Hall & Hofer, 1993; Zacharakis & Meyer, 2000).

VCs invest based on the human and social capital of the entrepreneur, as well as the technological and market potential of the proposed products (Zacharakis & Shepherd, 2005). Beim and Lévesque (2004) suggested that VCs consider a wide range of criteria during the valuation process, including the quality of business management, product uniqueness, market opportunity, and the potential for increasing the value of the ventures. The criteria that influence the decision-making of VCs can be categorized into five groups: (1) characteristics of the entrepreneurial team, such as management skills and experience (Hsu, 2007; Miloud et al., 2012); (2) characteristics of the products, such as their newness and completeness (Macmillan et al., 1985); (3) market/industry characteristics, such as market growth and market size for products (Mason & Stark, 2004; Zutshi et al., 1999); (4) financial characteristics, such as expected returns and payback periods for invested funds (Muzyka et al., 1996); and (5) additional criteria, such as deal factors, network effects and geographical location (Boocock & Woods, 1997; Miloud et al., 2012).

However, there is no agreement among scholars on the relative importance or weight of these criteria. A few recent studies have emphasized the characteristics of entrepreneurs as a decisive factor in VCs' decision making (Muzyka et al., 1996). Since VCs invest in high-risk startup companies, they pay more attention to the characteristics of the entrepreneurs than to uncertain external environmental characteristic. In a similar vein, Vinig and De Haan (2005) found that in the US, VCs regarded certain criteria related to entrepreneurs' characteristics, such as track record, leadership skills, and knowledge of the market and industry, as the most important. Silva (2004) noted that in Portugal, the primary focus was to evaluate entrepreneurs' qualities of the entrepreneurs during the investment decision-making process, such as their personal and professional characteristics and their commitment to the business idea. Furthermore, experience was found to be the most important factor, suggesting that financial considerations were not a priority in the evaluation process.

However, there are some contradictory results. Mason and Stark (2004) compare the importance of decision-making criteria by dividing investors into VCs, bank experts, and angels in the south of England. The results of the study show that VCs give a low ranking to the characteristics of entrepreneurs in decision making and concluded that they placed greater emphasis on market characteristics and financial considerations. In an 11-year longitudinal data set from a European-based VC firm, Petty and Gruber

(2011) found that the characteristics of the product or service and the characteristics of the market were considered important decision criteria when rejecting investment in a startup company. These studies show contradictory results from previous articles stating that entrepreneurial characteristics are the most important investment criteria.

To shed new light on these controversies, the study attempts to determine whether the characteristics of entrepreneurs are highly valued in VC decision making.

VCs' decision making and entrepreneurs' experience

As reviewed in the previous section, many studies found that VCs invest in entrepreneurs. However, there is little research on how entrepreneurs' characteristics affect VC investment decisions of VC, which is the focus of this study.

Human capital theory was developed to determine the income distribution of workers and the value of an investment in human resources. Individuals with higher levels of knowledge, skills, and other competencies produce higher performance outcomes than those with lower levels (Ployhart & Moliterno, 2011). Similarly, the elements of the human capital of entrepreneurs, such as education, experience, knowledge, and skills increase entrepreneurial alertness, which prepares them to discover specific opportunities that others cannot see (Shane & Venkataraman, 2000) and is the essence of the entrepreneurial process (Marvel, 2013; Vuong et al., 2015). Therefore, it is argued that human capital has a positive impact on entrepreneurial success by helping in planning and establishing strategies (Robert Baum et al., 2001). In addition, human capital facilitates the acquisition of resources, such as financial capital, that are essential for the establishment and operation of venture companies (Wiklund & Shepherd, 2008). Human capital is also a source of financial capital (Chandler & Hanks, 1998). Therefore, human capital is an important decision criterion that VCs use most frequently when evaluating the potential performance of venture companies (Zacharakis & Meyer, 2000).

Social capital is defined as the sum of all the resources available to a person or organization through a social network (Sanchez-Famoso et al., 2014). It includes embedded resources from the bonds between individuals, communities, networks, and societies (Nahapiet & Ghoshal, 2009), in contrast to human capital, which exists only in individuals as the accumulation of expertise. Social capital enables the identification of entrepreneurial opportunities (Bhagavatula et al., 2010), mobilizes resources (Batjargal, 2003a; Lechner et al., 2015), and can help external stakeholders establish the legitimacy of the firm (Elfring & Hulsink, 2003). Social capital creates links with external networks to strengthen the trust of internal organizations through the connections of network members' connections and provides resources needed by the organization (Adler & Kwon, 2002). A wide range of social networks will help entrepreneurs utilize their knowledge and resources. Furthermore, social capital increases the likelihood of success (Batjargal, 2003b), underpins the competitive advantage, and improves the survival rate (Singh et al., 1986) of entrepreneurial firms.

VCs' decision making under uncertainty

VCs face difficulties in decision making due to severe information asymmetry with respect to venture firms (Baum & Silverman, 2004). While VCs should efficiently identify firms suitable for investment by examining the possibilities of the firm (Kirsch et al.,

2009), they have challenges related to constraints, biases, and heterogeneity of available information in the decision-making process (Zacharakis & Shepherd, 2001). As found in behavioral decision theory, VCs rely on heuristics and bias owing to their bounded rationality either by limited alternatives or information and resources (Simon, 1955). Scholars found that the accuracy of decision is often limited by overconfidence (Zacharakis & Shepherd, 2001), and similarity bias with which VCs prefer entrepreneurs with similar backgrounds (Franke et al., 2008).

The most difficult challenge for VCs is that the entrepreneurial firms to invest in are in their early stages, meaning that the organizational resources, activities, and business models of the firms are premature and liquid (Petkova et al., 2013). Baum and Silverman (2004) found VCs often pay high investment costs by failing in the prediction of the early stage startups and missing crucial investment opportunities. Amit et al. (1998) argue that uncertainty also stems from information asymmetry between the two parties. However, uncertainty may derive from the nature of entrepreneurial firms. For example, the newness of the firms' products is the source of uncertainty. Since the products (or services) are not yet in the market, whether new markets are formed and products are accepted involves a high level of uncertainty. Interestingly enough, whether the newness of products is beneficial to the firm is a venue of dispute. Although some studies positively demonstrate the relationship between products newness and market performance (Calantone et al., 2003), other scholars found a U-shaped relationship (Cooper & Kleinschmidt, 1991), reverse U-shaped relationship (Goldenberg et al., 2001), or more complex relationship (Steenkamp & Gielens, 2003) relationship.

The degree to which a venture's products have been developed also serves as an uncertainty factor. Audretsch et al. (2012) argue that entrepreneurial firms are more likely to receive investments from VCs if their products and prototypes thereof are patented. As the degree of development of the venture's products approaches the completion stage, the uncertainty of the investment is reduced, and the possibility of investment may be increased.

In this study, we focus on the uncertainty at the level of product newness and the degree of development of the product.

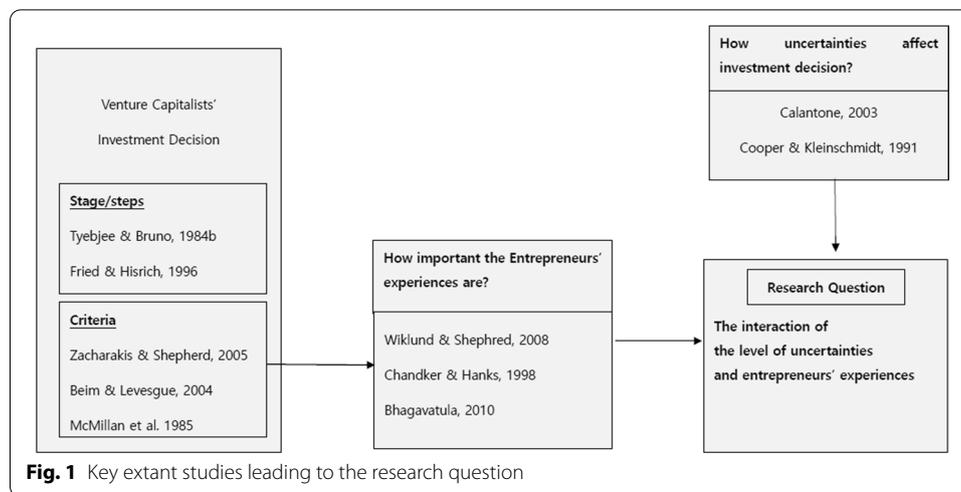
Figure 1 shows representative articles discussed above, and the flow of research.

Research objective, methodology and data

The purpose of this study is to empirically verify the effect of the newness and readiness of products, on the relative importance of the experiences of founders in venture capitalists' decision-making. Conjoint analysis is applied to a hypothetical scenario to assess the importance and priority of venture capitalists' decision-making criteria. Then, the relationship between the uncertainties of venture companies' uncertainties (in terms of the newness and completeness of products and services) and the relative importance of the decision-making criteria of venture capitalists is analyzed.

Uncertainty and entrepreneurs' industry experience

As discussed, the most important criteria VCs use in the investment decision-making process are the expertise and experience of entrepreneurs (Franke et al., 2008; Muzyka et al., 1996). Industry experience tends to increase awareness of industry trends and



business opportunities. Therefore, the industry experience of entrepreneurs reduces risk and uncertainty and eventually affects the survival rate and turnover of startups (Delmar & Shane, 2006). Studies have found that entrepreneurs with industry experience are better at assessing opportunities within the industry (Cassar, 2014), which positively correlates with VCs' valuations (Dimov & Milanov, 2010). VCs believe that the founder's industry experience would help the firm's survival and consider it as one of the most important decision-making criteria (Franke et al., 2008). We suggest that VCs may place more value on the industry of entrepreneurs in cases of severe uncertainty. When a product is novel and far from completion, entrepreneurs should remain alert to changes in the industry, for which industry experience is very useful.

Hypothesis 1 The higher the uncertainty—the newer the products are, and the lower the completeness of the products, the more VCs consider the industry experience of entrepreneurs.

Uncertainty and the entrepreneurs' managerial experience

Managerial experience is a set of skills and knowledge about management practices that are crucial in making decisions about the operations of a company and defining a long-term strategy (Shane, 2003). Managerial experience is acquired in a management position by studying the processes within an organization and understanding the organization's routines in management-related decision making (Cooper et al., 1994). Through managerial experience, entrepreneurs can develop the ability to prioritize ideas and actions (Gifford, 1992). Experience not only strengthens the network and reputation of entrepreneurs, but it can also be applied to innovatively use firm resources (Parker, 2009).

Entrepreneurs with managerial experience have the cognitive frame and capacity to absorb knowledge from their environment (Eisenhardt, 1989), thus making them aware of the activities that must be done according to the company's circumstances. Gimeno et al. (1997) found that managerial experience, such as team management and

management within a firm, was significantly and positively related to return on investment. In other words, when investors make investment decisions, firms found by entrepreneurs with substantial managerial experience have a higher value than those found by entrepreneurs without managerial experience (Miloud et al., 2012). When VCs have confidence in the entrepreneurs, the chance of investment increases, even without enough confidence in the firm itself (Payne et al., 2009).

Therefore, we suggest that VCs may resort more to managerial experience with greater uncertainty.

Hypothesis 2 The higher the uncertainty—the newer the products are, and the lower the completeness of the products, the more VCs consider the managerial experience of entrepreneurs.

Uncertainty and educational background of the entrepreneurs

From a cognitive perspective, individuals with a high level of academic ability can quickly recognize and identify complex phenomena and have an excellent ability to process information (Wally & Baum, 1994). Individuals with a high level of academic achievement also have an innovative tendency (Wiersema & Bantel, 1992) and are well-formed in cooperative relationships with others (Palmer & Barber, 2001).

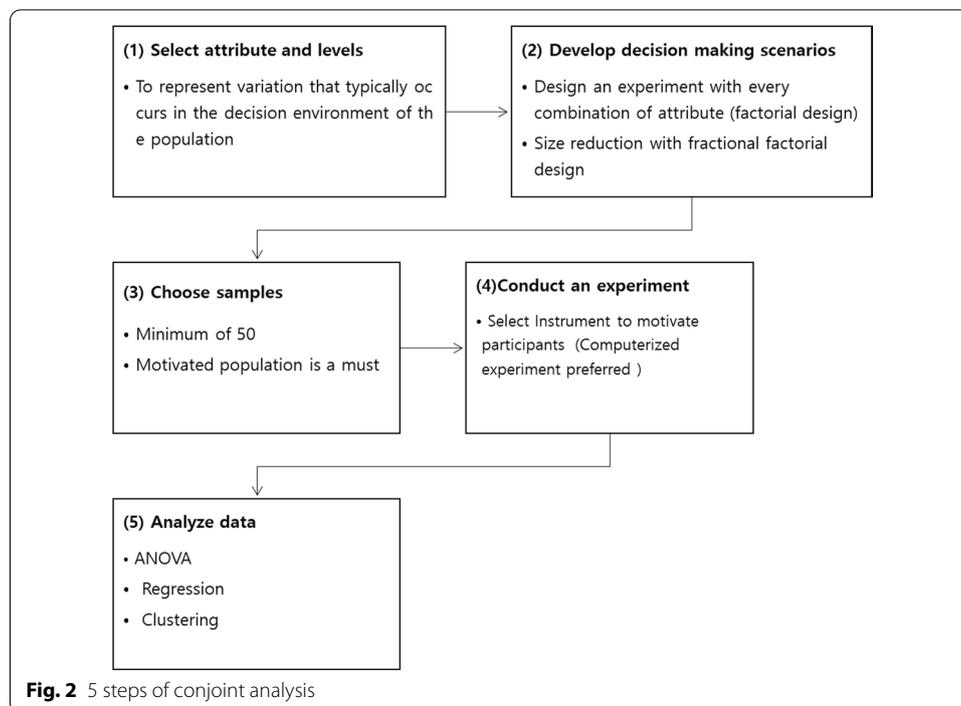
The educational background—also an element of human capital, may also create social capital. Entrepreneurs with a high level of education tend to form external social networks and develop social capital. Education received from prestigious universities is considered high social capital by itself (Lechner & Dowling, 2003), as the socially embedded network links of founders constitute an important resource base (Belliveau et al., 1996).

There are a few studies linking the academic achievement of entrepreneurs to the financial performance of the entrepreneurial firms (Birley & Norburn, 1987). A venture founded by a scholar has a high survival rate (Criaco et al., 2014) and is likely to hire new employees to create more jobs, apply for a patent, and conclude a contract (Siegel & Wessner, 2012). According to Hsu (2004), a high level of academic achievement (e.g., a doctoral degree) among entrepreneurs has a positive effect on the evaluation of ventures in Internet-related industries. Therefore, we hypothesized that the educational background of entrepreneurs will be an important criterion in VCs' decision-making process.

Hypothesis 3 The higher the uncertainty—the newer the products are, and the lower the completeness of the products, the more VCs consider the educational background of the entrepreneurs.

Methodology

To investigate the relative importance and priority of investment decision-making criteria, a five-step process has been developed. The five steps are, according to (Shepherd & Zacharakis, 1999), to (1) select attributes and levels; (2) develop decision-making scenarios; (3) choose samples; (4) conduct an experiment; and (5) analyze data, as illustrated in Fig. 2.



The experiment is designed for conjoint analysis. The results of the experiment are also analyzed with a multiple linear regression analysis, which illustrates the relationship between the uncertainties of the venture's products and the importance of entrepreneurial experience.

Conjoint analysis is an analytical method that requires respondents to form a series of judgments based on attributes. Its purpose is to investigate the basic structure of the cognitive systems (Shepherd & Zacharakis, 1999). In this analysis, the general preferences for the various attributes presented can be examined to determine the relative value and importance of the individual attributes for the respondents. The Choice-Based Conjoint (CBC) method adopted in this paper is an experimental method to select one of the alternatives given in a hypothetical scenario constructed by experimental design. The key advantage of this method is that the respondent makes decisions in an environment similar to that in which he/she would make actual decisions (Natter & Feurstein, 2002). The validation and accuracy of predictions made this way are higher than those of traditional conjoint ranking at the individual level (Karniouchina et al., 2009).

This paper focuses on the VCs decision criteria used in the preliminary screening stage. In the screening stage, VCs make decisions mostly based on the business plan of the ventures. Therefore, the decision making at this stage is relatively similar to the decision making in conjoint analysis (Franke et al., 2008).

To measure the entrepreneurs' experiences and the uncertainty concerning the product's newness and completeness—the concepts in this study—a focus group interview was conducted with seven VCs. Subsequently, a set of questionnaires was administered to reflect another group of experts—10 VCs and professors. Through this process, seven attributes were defined to describe the experience of the entrepreneurs and uncertainty concerning the products, as well as their correlating levels to be used in the conjoint

analysis. After determining the attributes of the analysis, the operational definition was made in a way that the level belonging to each attribute could be coded in the conjoint analysis. For example, the period of industrial experience of the founder can be known in the process of reviewing the business plan, but it is difficult to assess the level of industrial experience that the founder possesses. Therefore, the level was operationally defined in a way that can be measured quantitatively by expressing industrial experience as an objective and quantitative characteristic rather than a subjective and ambiguous method of expression, such as 'the founder has a lot or little industrial experience'. In this process, it was divided into two or three levels according to the characteristics of the attributes. The level for each attribute was determined through discussions and interviews with an expert group at FGI. The operational definitions are shown in Table 1.

Sample and data

This study is conducted with Korean VCs. Korea has the characteristics of being a very active country in VC investment, such as not only having the highest VC investment as a percentage of GDP among major countries, but also possessing the largest number of unicorns outside the US and China. In addition, compared to the vitalization of the VC industry, the number of VCs was relatively small, so the number of VCs at the time of the study was only about 600. Therefore, it can be said that it is a very attractive country in that it can study the meaningful ratio of VCs in a specific country.

The survey was conducted using a web-based conjoint analysis by sending email with the URL address for the survey. Respondents were presented with an alternative combination of several attributes from the survey site linked in the e-mail and chose the most preferred combination of these attributes. We sent e-mails to 400 randomly selected VCs registered in the Korean Venture Capital Association, and ultimately received responses from 263 VCs (response rate 65.3%). The 263 responses were collected and used in the final analysis. It is worth emphasizing that the size of the respondents is quite large compared to the existing VC studies (Franke et al., 2008; Gompers et al., 2020; Rin et al., 2013). Table 2 summarizes the sample demographics.

Results and discussion

The relative importance of decision-making criteria: a conjoint analysis

In conjoint analysis, the relative importance is the ratio of the importance occupied by an attribute within the entire attribute, and the sum is 100. Part-worth is the respondent's relative preference for the level of attribute, and the sum is 0 (Shepherd & Zacharakis, 1999). The higher the importance value (%) of an attribute, the higher the preference of the respondent. Therefore, it can be understood that attributes with high importance values (%) are decision criteria that VCs consider to be more important in decision making. The highest part-worth of a level within an attribute indicates that the level is more favorable than the other levels. The analysis shows that the educational background of entrepreneurs is the most important decision criterion for VCs by 22.44%. The relative importance of other decision criteria is industry experience (19.24%), newness of product (14.04%), completeness of product (13.55%), entrepreneurial experience (12.60%), and experience in attracting investment (11.64%). The managerial experience of entrepreneurs (6.49%) was found to be the least important decision criterion. These results

Table 1 Operational definitions and references

Attribute	Levels	Operational definitions	References
Industry experience of the entrepreneur	High	The entrepreneur has more than 5 years of experience in the related industry	Miloud et al., (2012), Zacharakis and Shepherd (2001)
	Moderate	The entrepreneur has less than 5 years of experience in the related industry	
	Low	The entrepreneur has no experience in the related industry	
Managerial experience of the entrepreneur	High	The entrepreneur has previous managerial experience at least as a team leader in a corporation	Muzyka et al. (1996), Miloud et al. (2012), Shane (2003)
	Low	The entrepreneur has no managerial experience in a corporation	
Entrepreneurial experience of the entrepreneur	High	The entrepreneur has significant experience in the establishment of a startup	Hsu (2007), Miloud et al. (2012)
	Moderate	The entrepreneur has experience in the establishment of a startup	
	Low	The entrepreneur has no experience in establishing a startup	
Educational background of the entrepreneur (degree and university prestige)	High	The entrepreneur has a doctorate degree from a prestigious university	Hsu (2007)
		The entrepreneur has a bachelor's degree from a prestigious university	
		The entrepreneur has a doctorate degree from a non-prestigious university	
Entrepreneur's experience in attracting investment	High	The entrepreneur has experience in receiving investment from formal investors	Drover et al. (2017), Hsu (2007)
	Moderate	The entrepreneur has experience in receiving investment from informal investors	
	Low	The entrepreneur does not have experience receiving investment	
Product (or service) newness	High	There are no products (or services) in overseas markets or domestic markets	Hyytinen et al. (2015)
	Moderate	There are products (or services) in overseas markets, but not in domestic markets	
	Low	There are products (or services) both overseas and domestically	
Product (or service) completeness	High	Products (or services) are ready to be launched in the market	Macmillan et al. (1985)
	Low	Products (or services) are under development	

Table 2 Sample demographics

Division	Frequency	Division	Frequency
Gender		Industry experience	
Male	243	Technology Plan	35
Female	20	R & D	80
Age		Production Management	3
Under the age of 35	18	Sales and Marketing	24
Age 35–under the age of 40	52	Management	17
Age 40–under the age of 45	54	Finance	64
Age 45–under the age of 50	77	Accounting	8
Age 50–under the age of 55	49	Other	32
Over the age of 55	13		
Field of examination		Years of experience	
Less than 3 years	24	ICT manufacturing/Manufacturing/ Chemical/Material/Electricity/Machinery/ Equipment	120
3–< 5 years	35	IT Service/Distribution Service	68
5–< 10 years	69	Bio/Medical	52
10–< 15 years	42	Game/Digital Content	12
15–< 20 years	73	Visual/Performance/Record	2
Over 20 years	20	Others	7
Degree possessed		Startup experience	
Bachelor's	113	Absence	220
Master's	124	Presence	43
Doctor's	26		263
	263		

are consistent with previous research that suggests that the strong human capital of entrepreneurs, such as degrees from higher education institutions, has a positive impact on corporate success and is, therefore, an important criterion in VCs' decision making (Hsu, 2007). Table 3 summarizes the results of the conjoint analysis, showing the importance of the attributes and the part-worth value of each level.

Entrepreneurs' experience under uncertainty

To analyze the importance of entrepreneurs' experiences under uncertainty, a multiple linear regression is conducted with the results of conjoint analysis.

Dependent variable

To test the suggested hypotheses, dependent variables are selected as follows: (1) the importance of the industry experience; (2) the importance of the managerial experience; and (3) the importance of the educational background of entrepreneurs (degree and university prestige).

Independent and control variables

Uncertainty can be used as an independent variable. As discussed earlier, uncertainty is high when:

Table 3 Results of the conjoint analysis

Attribute	Level	Part-worth	SD	Relative importance (%)
Industry experience of the entrepreneurs	High	25.467	21.339	19.24
	Moderate	− 1.021	12.871	
	Low	− 24.447	21.63	
Startup experience of the entrepreneurs	High	8.097	17.462	12.60
	Moderate	4.982	12.147	
	Low	− 13.079	14.058	
Educational background of entrepreneurs (degree and university prestige)	High	18.355	19.988	22.44
		16.266	22.481	
	Low	− 21.727	20.606	
Managerial experience of the entrepreneurs	High	7.503	8.125	6.49
	Low	− 7.503	8.125	
Entrepreneurs' experience in attracting investments	High	9.068	15.538	11.64
	Moderate	− 1.445	13.454	
	Low	− 7.622	15.769	
Newness of product	High	0.629	21.242	14.04
	Moderate	9.506	13.479	
	Low	− 10.135	19.478	
Completeness of product	High	− 17.332	17.365	13.55
	Low	17.332	17.365	
				100

SD Standard deviation

Newness of the product is high.
 Completeness of the product is low.

We control the sex, age, investment field of VCs, degree obtained, industry experience before VCs, total experience as VCs, and prior entrepreneurial experience of VCs.

Results of the regression and discussion

The regression results are depicted in Table 4. First, we tested the hypothesis that VCs would regard entrepreneurs' experience as important when uncertainty is high—where the level of products completeness is low, and the newness of products is high. The results showed that newness ($t=0.1.358, p>0.05$) and completeness ($t=0.348, p>0.05$) were statistically insignificant in relation to the importance of entrepreneurs' industry experience. The results of our conjoint analysis are consistent with the existing research that the entrepreneur's industrial experience is a factor that positively affects the survival and performance of ventures, so it is an important criterion for investment decisions of VCs (Franke et al., 2008). However, the results of regression analysis indicate that VCs do NOT consider more the importance of the entrepreneur's industry experience under uncertainties related to the product. Therefore, Hypotheses 1 was rejected.

In terms of entrepreneurs' managerial experience, the effect of uncertainty on the importance of managerial experience in VC decision was statistically significant for both newness ($t=2.760, p<0.01$) and completeness ($t=0.5.349, p<0.01$). In the conjoint

Table 4 Regression results

Dependent variable	Independent variable	B	SE	Beta	t	p	VIF	DW	R ²	F
Industry experience	Newness (high)	0.046	0.034	0.099	1.358	0.176	1.504	1.732	0.171	1.726* (.016)
	Completeness (low)	0.013	0.038	0.023	0.348	0.729	1.288			
Managerial experience	Newness (high)	0.039	0.014	0.187	2.760	0.006**	1.504	1.825	0.284	3.313** (.000)
	Completeness (low)	0.085	0.016	0.336	5.349	0.000**	1.288			
Educational background The entrepreneur (degree and university prestige)	Newness (high)	- 0.163	0.027	- 0.405	- 5.935	0.000**	1.504	1.736	0.276	3.182** (.000)
	Completeness (low)	0.119	0.031	0.242	3.838	0.000**	1.288			

*p < 0.05, **p < 0.01

analysis, entrepreneurial experience was the least considered investment decision criterion for VCs. However, as uncertainty increases, VCs seem to give more importance to the managerial experience of entrepreneurs. Therefore, Hypothesis 2 was *fully supported*.

Analyzing the relationship between uncertainty and entrepreneurs' educational background showed that the newness of ventures ($t = -5.935, = 0.000 < 0.01$) has a significant, negative effect on the importance of entrepreneurs' degree and university prestige. However, the effect of the completeness of the products on the importance of entrepreneurs' educational background of the entrepreneurs was positive and statistically significant, so Hypothesis 3 was partially supported. These results show that VCs consider the educational background of the entrepreneurs to be more important when the products are incomplete but less important as the newness of the products increases.

Here, we summarize the test results of the hypothesis (Table 5).

Conclusions

Findings of the study

This empirical study investigates the relative importance of the criteria used in the investment decision-making processes of Korean VCs' investment decision makings by applying conjoint analysis. Thereby, the effect of uncertainties on the importance of entrepreneurs' experiences, which are the core decision criteria of VCs, is given explicit consideration. To date, very few empirical studies on VC decision criteria of VCs have been conducted due to the complexity of the work of VCs, the confidentiality of decision-making procedures, and the difficulty of accessing investment-related data. This is the first empirical study to gather a large and unique sample of VCs and thus show the relationship between uncertainty and entrepreneurial experience in VC investment decisions. The primary theoretical significance of this study is the development of a debate on the role of the diverse experience of entrepreneurs in VCs' decision making. Although entrepreneurs' experience is considered to have a positive impact on VC decision making (Zacharakis & Meyer, 2000), this study asserts that the impact of each experience on VC investment decisions is different.

Table 5 Summary of hypothesis test

Hypothesis	Test results	Means
The higher the uncertainty—the newer the products are, and the lower the completeness of the products, the more VCs consider the industry experience of the entrepreneurs	Rejected	Although VCs consider entrepreneur's industry experience in investment decision, its importance does not change with increasing uncertainty
The higher the uncertainty—the newer the products are, and the lower the completeness of the products, the more VCs consider the managerial experience of entrepreneurs	Supported	VCs seem to attach more importance to the managerial experience of entrepreneurs with a high level of uncertainties
The higher the uncertainty—the newer the products are, and the lower the completeness of the products services, the more VCs consider the educational background of the entrepreneurs	Partially Supported	that VCs consider the educational background of the entrepreneurs to be more important when the products are incomplete but less important as the newness of the products increases

We identify that VCs' most important criteria for investment decisions are entrepreneurs' educational background and industry experience (Hsu, 2004). But that in an uncertain environment, where the newness of the products is high, the entrepreneur's academic background of the entrepreneur becomes less important. In contrast, VCs care more about the managerial experience when there is a high level of uncertainty. This result is in line with the results of an earlier study in which the relationship between entrepreneurs' academic achievement and firm performance is positive in a stable environment, and when uncertainty is high, the entrepreneur's academic ability is negatively related to firm performance (Hmieleski et al., 2015). Through our paper, we have improved our understanding of the relative importance of the characteristics of entrepreneurs' experience characteristics, and the factors of startups under uncertainty, which are important criteria in the decision-making of VCs.

Implications and limitations

The result of this study may have some managerial implications. Entrepreneurs without enough experience may need to recruit more members of the executive team members with managerial and industrial experience rather than focus on members with higher educational backgrounds. In fact, many startups are composed of so-called elite teams with good academic backgrounds, but in a high-uncertainty situation, the value of that academic background needs to be supplemented with members with managerial experience.

From a theoretical point of view, this study also has some implications. In the meantime, studies have been conducted on which criteria are more important in decision making of VCs, but there have been few studies that have captured the fact that the weight of each criterion can change dynamically depending on environmental changes. This article shows that the relative importance of each criterion can be changed by environmental factors, such as uncertainty, suggesting the need for further study.

The study would also be beneficial for VCs to review their decision criteria and not to be attracted by superficial aspects of entrepreneurs. Furthermore, this study conducted a process to investigate the opinions of VCs and expert groups on attributes and levels derived from previous studies and analyzed large-scale data on VCs that may be useful for following studies.

This study focuses only on the decision criteria used in the screening phase, which is the initial stage of the VC investment process. Therefore, the varying criteria, depending on the stage of the decision-making process (Shepherd & Zacharakis, 1999), could also be considered. The source of uncertainties that affect the evaluation of entrepreneurial firms may vary more, although our study investigated deals mainly with the newness and completeness of the product.

The methodology used in this study also has limitations. Although the VIF value was found to be appropriate, this does not completely deny the possibility of multicollinearity, and it should be considered that the sample size limit still exists. The study suggests venue for further development. We have considered such decision criteria for VCs as entrepreneurs' industry experience, managerial experience, entrepreneurial experience, educational background, investment attraction experience, and newness and completeness of venture products. However, we have not considered market and competition.

Characteristics, such as market size and market growth rate, and financial considerations, such as rate of return and investment payback period, surely play an important role in the investment decision and should be considered in future studies.

Authors' contributions

Conceptualization, methodology, and revision, DK; formal analysis and original draft preparation, SYL. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

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