Research Article

An Empirical Study on the External Environment, Brand Expansion Strategy, and Core Competence of Business

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Abstract: In the global economy led by the Fourth Industrial Revolution (4IR), innovation is taking place in all fields around the keywords of Internet and digital. It is changing from an information society to a precisely connected network society. The knowledge and skills that have been accumulated over the years are becoming the basis for creating new values and competitiveness on companies. These movements have a great influence on a company's marketing strategy and core competencies. With a new paradigm, brand expansion strategies are rapidly emerging from value-oriented and consumer-oriented management. Global companies should have a deep understanding of the new corporate management direction of comprehensive brand strategy management. In the era of the 4th industrial revolution, companies are constantly required to change a paradigm suitable for environmental changes. In a business environment that values network based on the Fourth Industrial Revolution, the satisfaction of various consumers should be achieved by considering individuality and cultural value rather than the nature of the product. A company with core competencies and marketing expansion strategies that share with consumers in real time will succeed. Therefore, it is possible to define the factors of the external environment of the company and suggest a strategic paradigm for brand expansion strategies and core competencies in the era of the 4IR. Based on empirical research, the implications for companies in this era of the 4th industrial revolution and the measures to secure core competencies were analyzed together. For the empirical analysis of the collected data, basic statistics were conducted using SPSS 22.0, and hypothesis testing was performed using the Smart PLS 2.0 statistical package. The results can be summarized as follows. First, industrial competitiveness had a significant influence on brand expansion strategies. Second, environmental uncertainty had a significant influence effect on brand expansion strategies. Third, the technology structure had a significant influence on brand expansion strategies. Fourth, brand expansion strategies had a significant influence effect on core competencies. In conclusion, we draw implications on the effects of the external environmental factors on brand expansion strategies and core competencies in the Fourth Industrial Revolution.

Keywords: Industrial competitiveness, Environmental uncertainty, Technology structure, Brand expansion strategy, Core competence

1. Introduction

The Fourth Industrial Revolution has gone beyond the industrialization of the manufacturing industry, starting with Industry 4.0 in Germany. It is the technology that hyper-connectivity and AI will bring, and the industries triggered by those technologies. The Fourth Industrial Revolution refers to major industrial, economic, and social changes and its meaning has been expanded [1]. These changes have already begun in a wide variety of areas, including robotics, finance, manufacturing, personal assistants, and content.

In the era of the 4IR, the competitive environment is progressing with the rapid development of convergence technology and a global competitive landscape based on technology platforms. Marketing strategies and core competencies among global companies to preoccupy business competitiveness from the development stage of next-generation technologies are becoming essential requirements for company survival. With the development of the network, global competition and sustainable growth of companies are emerging as the biggest issues.

The industrial revolution is showing a very fast pace in the development and commercialization of advanced technologies. Therefore, effective brand strategy and key direction are the main tasks for industrial development in enterprises.

Furthermore, global companies are progressing industrial development centered on 5G Internet and artificial intelligence based on innovation-led development strategies. With the aim of creating new growth engines based on 5G infrastructure and creating an industrial ecosystem, 4IR is revitalizing the e-commerce, internet, and financial industries by combining cloud computers, big data, and IoT with manufacturing. It is focusing on R&D and commercialization of artificial intelligence linked to robots, wearable devices, unmanned systems, and future cars.

Korean companies are also very willing to continuously promote global exports by fostering new industries related to the 4th industrial revolution such as artificial intelligence, 5G, and future cars [2]. It can be further activated only when the core competencies of companies and the related systems and investment environment for fostering the ICT industry, which is the core of the 4IR, develop together.

The Internet of Things, artificial intelligence, and mixed reality are realized through platform technology. It will provide opportunities for the upgrading of existing industries, the convergence between industries, and the creation of new industries. Artificial intelligence based on the IoT will provide user accessibility and expandability of service space. The Fourth Industrial Revolution is combined with more human-friendly and immersive interface technologies and content technologies. Things that are difficult for a person to realize will be made possible in technology. The Internet of Things, where everything is connected, is not driven by operators that produce or sell things. Operators who manage user access to objects or to intelligence and services will take the initiative. Portals, telecoms, or cloud platform companies with global markets are likely to be the main characters. Representatively, GE transforms its business structure from a manufacturing company to a data and analytical company, with varying performance. This re-structuring of global companies shows insights into the future industrial society. Data produced from various objects will be shared, providing an open government of business and social actors. Armed with a variety of user-friendly analytical tools, many citizen analysts will produce and sell creative content and quality data based on increased user accessibility.

This paper studies the influence of external environmental factors of the Fourth Industrial Revolution on brand expansion strategies and core competencies. To this end, the background literature on external environmental factors, brand expansion strategies, and core competencies were reviewed along with empirical studies focused on companies leading the Fourth Industrial Revolution. Industrial competitiveness, environmental uncertainty, and technology structure were set as external environmental factors. We conducted a questionnaire survey that targeted managers and practitioners related to companies implementing the Fourth Industrial Revolution. For the empirical analysis of collected data, basic statistics were performed using SPSS 22.0, and hypothesis testing was performed using the Smart PLS 2.0 statistical package.

The purpose of this study is summarized as follows. First, the impact of external environmental factors on brand expansion strategies was examined. Second, we examined the impact of brand expansion strategies on core competencies. Third, based on the results of the empirical analysis, implications for external environmental factors, brand expansion strategies, and core competencies in Fourth Industrial Revolution companies were derived.

2. Theoretical Background

2.1 External Environment

In various studies, external environmental factors were considered as important variables such as technology volatility, industrial competition intensity, and market growth. Technological volatility and industrial competitiveness were found to have a significant impact on the business performance of a company. International experience, company size, marketing strategy, and differentiation advantages also partially influence business performance. An important component of uncertainty in the external environment is a change in the environment. The primary reasons for the uncertainty in the environment are the diversity of the environment and the fierce competition.

Industrial competitiveness: A representative study on industrial structure and competitiveness examines the regional economic structure and industrial relations using regional industry association analysis [3]. Research to derive regional leading and strategic industries is dominated. The regional industry-related analysis has a limitation in that it has not been able to directly grasp the exact contribution to the relevant industry and regional economic growth. In addition, principal component analysis is used to diagnose the possibility of forming a cluster linkage system at the level of the regional economy. There is a method to analyse the interrelationship of the related structure of the leading and strategic industries. There is also a method of examining industrial competitiveness based on three evaluation criteria: productivity, robustness, and innovation.

In many cases, the industrial structure is analysed catering on the manufacturing industry, which has a high proportion of the economy. It is trying to find out which industries are relatively competitive among the manufacturing industries through comparison of the industrial structure. It is an analysis method of location quotient used to define the regional base/main manufacturing industry including the regional growth rate analysis, which is an analysis methodology to determine the contribution of industries to regional growth and their relative competitiveness. Based on these analysis results, it is possible to confirm the contribution to regional growth by each industry and to identify industries with relatively competitive competitiveness.

Industrial competitiveness can be defined at the level of countries, industries, companies, products, etc., depending on the target of interest. In terms of determinants, it can be defined in terms of price, non-price, technology, quality, and export [4]. The concept of competitiveness is a concept corresponding to competitive advantage. Originally, it was used as a concept to evaluate a company's management capability and performance at a micro level. Later, the scope of discussion and analysis expanded to the national level. The meaning and usefulness of each concept approach, and the interrelationships between them, are not clearly summarized. Accordingly, it is pointed out that the method of defining the competitiveness of the comprehensive concept as an indicator is too fictitious. Industrial competitiveness is also very diverse in concepts and approaches. An industry experiences a process of survival or extinction in the domestic and international markets depending on the level of competitiveness of many companies constituting the industry. Therefore, industrial competitiveness is the overall capability of the industry. Industrial competitiveness can be defined as the ability to maintain a market position superior to competitors if a specific industry in the global market acquires a certain level of profit and promotes continuous growth [5]. The ultimate purpose of industrial competitiveness analysis is to identify the outcome and cause of competitiveness in the marketplace.

The Industrial Competitiveness Analysis Methodology two mainstreams are as follows. First, M. Porter's diamond model is a model that combines traditional economics and business theories. The determinants of competitiveness inside and outside the company were systematized according to four interrelated factors (elemental conditions, related and supported industries, demand conditions, and internal factors). It emphasizes the balance of components and considers the differences in national development stages or historical and cultural characteristics. This industrial competitiveness analysis model is based on the diamond model and the concept of the value chain. It is characterized by conducting quantitative or qualitative analysis of competitiveness in the context of changes in the global economic environment and industrial structure. Second, there is a competitive analysis model targeting local industries. The degree of industrial competitiveness is judged based on the degree to which a specific industry contributes to regional growth in a region [6]. It is differentiated from M. Porter's competitiveness analysis model in that it conducts empirical analysis based on regional economic analysis techniques. If a particular industry in a region made a high contribution to economic growth in that region, that industry is evaluated as having a comparative advantage in that region over other regions. Regional economic analysis methods that evaluated the competitiveness of industries based on this concept include shift-share analysis and lag analysis of regional growth rates.

In this study, the degree of industrial competition is defined as accelerating the introduction of technology for a competitive advantage in an industry. In previous studies, the degree of industrial competition was found to be an important factor in the introduction of information technology. The introduction of new technologies to survive competition from other companies will ease the barriers to entry into the industry. Industry competition pressures accelerate the corporate adoption of information systems. The degree of industrial competition, social pressure, and the introduction of technology by other firms all have a positive effect on the introduction of new technologies [7].

Environmental uncertainty is the change in the uncertainty of technology, industrial environment, and market and customer needs. Environmental uncertainty is being studied as an important external environmental factor. It cannot accurately predict changes in the company's external environment. Environmental factors such as short product life cycles, changing customer preferences and technological changes are unclear. The greater the environmental uncertainty, the more complex and changing the environment becomes.

Market change is an important environmental factor that affects the business strategy of a company. In a market environment where competition is accelerating and policy uncertainty increases, the survival of a company depends on the company's rapid response. The environmental uncertainty factor, which means such a situation, is a term that includes a multidimensional concept. It is used in various ways according to the research purpose or approach.

Environmental uncertainty is classified into static and dynamic, simplicity and complexity standards in terms of information uncertainty [8]. In terms of resource dependence, it can be divided into a favourable environment and a hostile environment. It can be said that companies in a hostile market environment face greater uncertainty. These companies should reduce their dependence on resources and strengthen their controls to improve management performance. For businesses that are very sensitive to changes in the market environment, changes in customer demands and corporate competition strategies have a great influence. Environmental uncertainty is divided into internal and external environmental uncertainties. Internal environmental uncertainty is divided into seller uncertainty and technical uncertainty. External environmental uncertainty is subdivided into customer uncertainty and competitor uncertainty.

From the perspective of a company's response to environmental changes, sources of uncertainty can be found in the external environment. And environmental uncertainty can be explained using dynamics, complexity, and abundance. Dynamics are mainly decision-making factors such as changes in customer preferences, changes in competitor strategies, changes in products and services, and changes in demand. It also includes the concept of instability of marketing factors. Complexity is a concept similar to diversity and includes the diversity of customer needs, the complexity of the product and service development process, and the complexity of the distribution chain and sales channels. Abundance is a concept of the resources needed to grow a business.

In the face of high uncertainty, companies need to be able to accurately predict environmental changes and respond flexibly to such changes to improve their performance. The external environment in which a company does business affects its innovation capacity. Companies are more interested in the innovative part of technology innovation when the business environment is unstable and confusing. Environmental uncertainty has a positive effect on the relationship between organizational structure and organizational innovation and the adoption of new technologies. Uncertainty in demand increases the motivation for an organization to introduce new technologies [9]. High uncertainty speeds up demand for technology change and adoption. Companies in uncertain environments will be highly motivated to adopt supply chain technologies to manage such environments and improve information sharing with other companies.

The definition of technology is to understand innovation around the economic performance of technology [10]. Technology is the creation of new products and services or creating new markets by changing markets, organizations, products, and production processes. Various factors related to product production are newly combined to create a completely new product or change in production technology. These technologies include new products or services that aid in the development of technical knowledge in an environment surrounding technical knowledge. Ideas, action plans, and actions can be broadly understood. Factors that affect technical performance can be divided into internal and external competency factors. The internal competency factors include managerial characteristics, organizational structure and general characteristics, and strategies of the organization. The competency factor outside the organization is the close interaction around the company.

As the external environment of a company, an important factor that broadly affects not only the company's management activities but also technology innovation is the characteristics and changes of the technology environment [11]. Technology is a practical and concrete technique that is connected with the means of production of a company. It is a combination of the knowledge and equipment required to produce a product. These technologies become a source of competitive advantage through corporate R&D and innovation activities. Therefore, companies must actively embrace technological changes in the external environment to develop technologies for effective new product development and production. It is necessary to transform the technological change actively accepted into the skills and knowledge required by the company. By using it to implement technological innovation, it can continuously secure a competitive advantage.

Technology structure means that a company has the technical resources and foundation necessary to operate technology. Whether the new technology to be introduced fits well with the technology already implemented in the organization is an important element of the technical characteristics. Innovative technologies are cumulative. The technology existing in the organization becomes an important technology base by introducing new technology. The technology or application to be introduced may have a wealth of experience in the technology involved, or a solid infrastructure will show a higher capacity for technological innovation [12]. The successful organizational adoption of new technologies requires the ability to create sufficient infrastructure. New technologies carry risks, so companies need to have a solid technical infrastructure to decrease these risks.

2.2 Brand Expansion Strategy

The concept of brand extension is to use an existing brand or parent brand recognized by consumers in the marketing field. This is to reduce marketing costs and increase consumer awareness and purchase rates. As such brand expansion attracted attention as a strategic means of many companies, retail companies also began to implement various brand expansions. The most representative of the theories that support the traditional concept of brand expansion is the categorization theory. According to this theory, when a consumer evaluates an extended branded product, a consumer evaluates a specific object based on similarity and correspondence with the parent brand. When evaluating a brand-extended product, the product characteristics of the parent brand, brand association, brand affinity, and knowledge are considered and evaluated comprehensively. The more favourable the evaluation of the brand extension product is, the more positive attitude toward the brand extension product is formed. However, as the modern retail environment becomes more complex and more dynamic, the categorization theory has limitations in providing the basis for expanding the brand of retailers.

Brand expansion strategy can reduce advertising and public relations costs. In addition, there is an advantage that can increase the awareness of new products [13]. Brand expansion strategy is less risky than launching a new brand from a corporate standpoint. Since it can induce positive consumer reactions, many companies try to improve their business areas and sales through brand expansion. The most frequently used form of expansion by companies when expanding a brand can be divided into line expansion, which expands to new products within the same product category, and category expansion, which expands to other product lines. When a company's personal brand is expanded, the brand expansion using the parent brand, or the attributes or functions of existing products are changed. The approach of brand expansion strategy shown in most previous studies is focused on brand expansion from the perspective of manufacturers. However, in the case of private brands, the distribution company has the authority to own and design the distribution channels. Therefore, before classifying the type of brand extension based on product, it is necessary to make decisions about the distribution channel.

In the recent research, when establishing a brand expansion strategy in the retail industry, a different perspective from the existing approach is needed [14]. It is important to prioritize retail brand expansion based on customer or market rather than product basis. Accordingly, the type of expansion for distribution channels is classified before the type of product expansion. In the retail industry, distribution channels mean sales stores, so channel expansion is regarded as horizontal market expansion. The expansion of the retail distribution channel is based on similarity with the parent brand, and the product expansion is usually based on product attributes.

The concept of brand extension is to use existing or parent brands recognized by consumers in the field of marketing. It aims to reduce marketing costs and increase high consumer awareness and purchase rate. As brand expansion has attracted attention as a strategic means for many companies, retail companies have begun to implement various brand expansions. The most representative of the theories supporting the traditional concept of brand extension is categorization theory.

Consumers evaluate extended branded products based on their similarity and correspondence with the parent brand. Brand extension product evaluation is judged comprehensively based on the characteristics of the parent brand, brand association, brand appeal, and knowledge. The more favorable the evaluation of brand extension products, the more positive the attitude toward brand extension products. The concept of brand extension can be defined in various ways and from a variety of perspectives, and there are various types of brand extensions [15]. The formation of positive attitudes towards extended products by consumers is of paramount importance to the perceived similarity between the parent brand and the extended products. A brand expansion strategy has the advantage of reducing advertising and promotion costs and improving the awareness of new products. A brand expansion strategy is less risky than launching a new brand from a corporate viewpoint. Many companies try to improve their business area and sales through brand expansion because they can induce a positive consumer response [16]. When developing a brand expansion strategy in retail, a different perspective from traditional approaches is needed. Rather than categorizing retail brand extensions on a product basis, it is first necessary to categorize them by customer or market.

2.3 Core Competence

Companies need comprehensive capabilities, including cutting-edge technology, internal technology and know-how, to maintain and develop corporate competitiveness. The internal capacity of the company is important to maximize the ability of the members of the organization. Core competencies are important for corporate management, strategic industrial infrastructures, strategic alliances and networks, and companies cannot preempt a competitive advantage without them [17]. A company's core competencies are achieved by interacting with human, technical and knowledge resources that can be applied in new areas. Core competence refers to the ability of a company to effectively combine the resources it possesses and to use them productively. Core competencies that can lead to new opportunities should be strategized through pre-development. Core competencies are the knowledge or know-how to effectively deploy and utilize management resources. Companies establish and execute strategies with the efficient combination of unique tangible and intangible capabilities and resources. The intellectual, technical, and human resources that the core competency can apply to new areas are achieved through interaction. The core competencies that create new opportunities should be continuously developed. Product innovation and business model innovation are both based on core competencies as future means of competition. Companies should strive to strategically select and foster core competencies. The traits that core competencies must possess should have the potential to reach a wide variety of markets, and the benefits from them should be recognizable to consumers and difficult for competitors to follow [18]. Core competence should be presented as an approach that applies to all employees and needs to be looked at from a variety of resource perspectives.

A company's core competencies are the resources and competencies that a company possesses, becoming a fundamental source of superiority in competitive strategies. It is a theoretical framework for analyzing the growth of a company in a dynamic environment. Among various theories explaining the competitiveness of a company, it has been emphasized from a resource-based perspective. The core competency of a company is the ability to effectively perform the process of delivering and delivering value to customers. It is the ability or process to make a company perform better than its competitors. In addition, core competencies play a root role that can be the basis for competitiveness of various businesses operated by the company from the past to the present. It is the company's ability to allocate or change resources to improve productivity or to achieve strategic goals. Core competencies can increase value to customers or appear in a more efficient way in the process of delivering that value. This ability can be defined as the ability of a company to enter a new industry [19].

Product innovation and business model innovation are both based on core competencies as future means of competition. Companies should strive to strategically select and foster core competencies. Core competence, thus, refers to the ability of a company to effectively combine the resources it possesses and to use them productively. The traits that core competencies must possess should have the potential to reach a wide variety of markets. Benefits from core competencies should be recognizable to consumers and difficult for competitors to follow [20]. It should be presented as an approach that applies to all employees and needs to be looked at from a variety of resource perspectives.

3. Research Design

3.1 Research Model

This study empirically measured and analyzed how external environmental factors influence core competencies through brand expansion strategies in the Fourth Industrial Revolution. External environmental factors were divided into industrial competitiveness, environmental uncertainty, and technology structure based on previous research. Thus, the model shown in [Figure 1] was obtained.

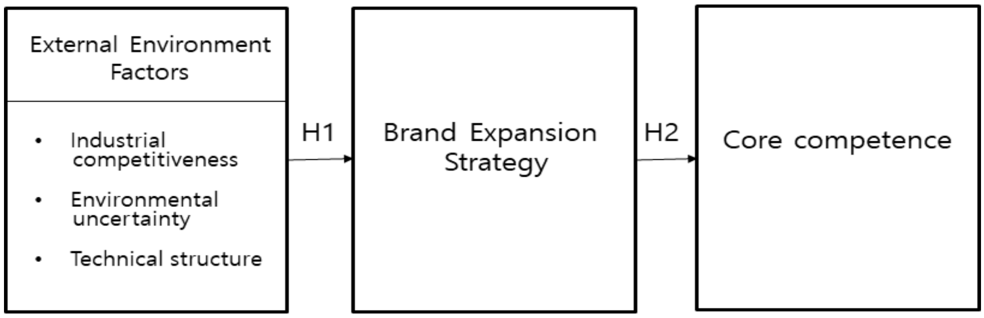

Fig. 1 Research model

3.2 Research Hypothesis

There are many studies on external environmental factors and strategies. However, research on the Fourth Industrial Revolution is rare. The definition of external environmental factors varies among researchers, and this study defines them as industrial competitiveness, environmental uncertainty, and technology structure. The following hypotheses were set.

Hypothesis H1: In the Fourth Industrial Revolution, external environmental factors will affect brand expansion strategies.

Hypothesis H1-1: Industrial competitiveness will affect brand expansion strategies.

Hypothesis H1-2: Environmental uncertainty will affect brand expansion strategies.

Hypothesis H1-3: The technology structure will affect brand expansion strategies.

The more favorable the evaluation of brand extension products, the more positive the attitude towards brand extension products [8]. Core competencies are knowledge or know-how to effectively deploy and utilize management resources. Companies establish and execute strategies through the efficient combination of unique tangible and intangible capabilities and resources. There are many studies on brand expansion strategies and core competence. The hypothesis below was set.

Hypothesis H2; In the fourth industrial revolution, brand expansion strategies will affect the core competence.

3.3 Empirical Analysis And Results

3.3.1 Data Collection And Sample Characteristics: A total of 255 relevant managers and practitioners participated in the survey. The survey was conducted for 30 days starting June 15, 2018. A total of 270 copies were distributed, and 255 faithful responses were used for the empirical analysis of the hypothesis test. The ratio of males and females were 69% and 31%, respectively. Most respondents were in their 30s with 38%. Employment was the highest in big data analytics with 33%. Monthly average income was 1.5 ~ 1.99 million won at 33%. Academic achievement was highest with college graduates at 51%.

3.3.2 Data Analysis Method: Reliability analysis and validity analysis were conducted for the internal consistency of the questionnaire used. Fundamentally, reliability is Cronbach's Alpha 0.7 or higher. Feasibility is divided into intensive validity and discriminant validity. Concentration validity checks the factor loading, compositional reliability (CR)s, and variance extraction index (AVE) of each factor. In general, the factor loading value is 0.6 or more, configuration reliability value is 0.7 or more, and variance extraction index value is 0.5 or more. There was no problem with discriminant validity since the square root value of the variance extraction index is compared with the correlation coefficient. In Table 1, reliability and concentration validity are not a problem. Table 2 shows that there is no problem in discriminant validity.

Table I. Reliability and Internal Consistency

Variables		**Factor loading**	**C. R.**	**Cronbach α**	**AVE**
External Environment	Industrial Competitiveness	0.783	0.897	0.827	0.745
		0.930			
		0.832			
	Environmental Uncertainty	0.858	0.887	0.829	0.664
		0.846			
		0.689			
		0.853			
	Technology Structure	0.901	0.882	0.806	0.882
		0.806			
		0.824			
Brand Expansion Strategy		0.841	0.821	0.779	0.607
		0.659			
		0.824			
Core competency		0.783	0.886	0.809	0.724
		0.930			
		0.832			

Table II. Correlation and Discriminant Validity

Variables	**AVE**	**1**	**2**	**3**	**4**	**5**
Industrial Competitiveness	0.745	0.863				
Environmental Uncertainty	0.664	0.233	0.814			
Technology Structure	0.882	0.158	0.182	0.939		
Brand Expansion Strategy	0.607	0.678	0.648	0.478	0.779	
Core Competence	0.724	0.269	0.231	0.179	0.591	0.850

3.3.3 Verification of the Research Model: For structural model analysis, Smart PLS 2.0, which is a partial differential method, was used. Path coefficients, hypothesis tests, and coefficients of determination (R^2) were derived. If the R^2 value is 0.26 or more, the goodness of fit is high. If the value of R^2 is 0.26 to 0.13, it can be expressed as middle, and if it is less than 0.13, it is low. The component value can be evaluated as high with brand expansion strategy (0.807) and core competence (0.350).

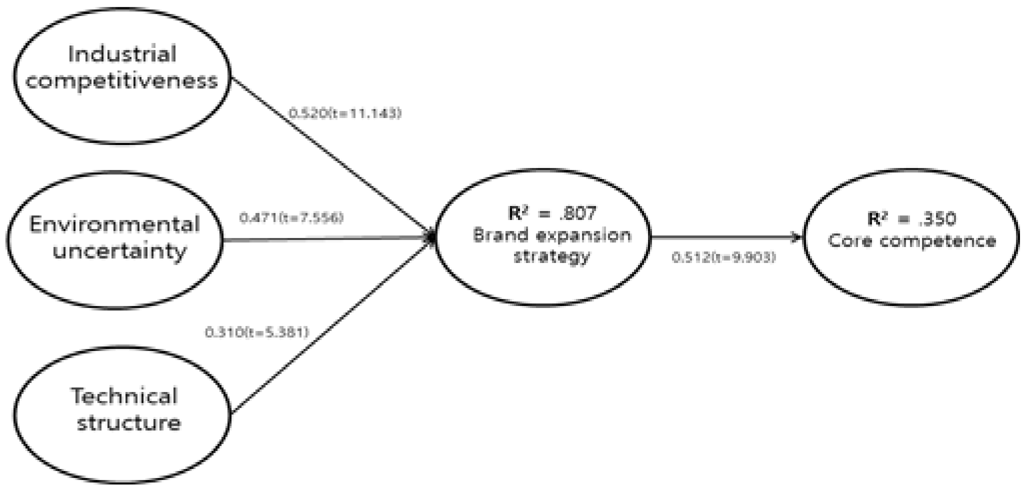

Fig. 2 The results of research model

The model analysis results are as follows. Hypothesis H1-1 is statistically significant (β=0.520, t=11.143, p<0.05) at the 95% significance level. Therefore, hypothesis H1-1 was adopted. Industrial competitiveness is concerned with brand expansion strategies. The stronger the industrial competition, the more the brand wants to expand. Industrial competitiveness means that there are many competitors, competition in major product markets, risk factors from outside, and difficulty in cost competition. Hypothesis H1-2 is statistically significant (β=0.471, t=7.556, p<0.05) at the 95% significance level. Therefore, hypothesis H1-2 was adopted. Environmental uncertainty means that brand expansion strategies are important. The more the environment changes, the more a company wants to expand their brand. Environmental uncertainty refers to the degree of environmental predictability, the sudden change of the environment, the taste of customers, and the launch of new products. Hypothesis H1-3 is statistically significant (β=0.310, t=5.381, p<0.05) at the 95% significance level. Therefore, hypothesis H1-3 was adopted. The technology structure is concerned with brand expansion strategies. The higher the skill level, the more a company wants to expand their brand. The technology structure refers to the degree of technological change and the difficulty of predicting technological change.

Hypothesis H2 is statistically significant (β=0.512, t=9.903, p<0.05) at the 95% significance level. Therefore, hypothesis H2 was adopted. Brand expansion strategies focus on core competencies. The better the brand expansion strategies, the more it affects the core competencies of the company. Brand expansion strategies refers to the expansion of existing product brands, the expansion of new product brands, and advertisements to inform people about the brand. Core competencies refer to the technical resources, human resources, and brand resources of a company.

Table III. Hypotheses Testing Results

Hypotheses Path	**Coefficient(β)**	**t-value**	**Result**
H1-1; Industrial competitiveness -> Brand expansion strategy	0.520	11.143	Accept
H1-2; Environmental uncertainty -> Brand expansion strategy	0.471	7.556	Accept
H1-3; Technology structure -> Brand expansion strategy	0.310	5.381	Accept
H2W; Brand expansion strategy -> Core competencies	0.512	9.903	Accept
t=1.97** (p<0.05)			

4. Conclusion

In the Fourth Industrial Revolution, external environmental factors were carried out in the empirical analysis on brand expansion strategies and core competencies. The existing literature was compiled to derive industrial competitiveness, environmental uncertainty, and technical structure as external environmental factors. Based on the existing research, a research model was established, and empirical studies were conducted using Smart PLS 2.0, a partial differential structural equation, to test the hypothesis.

A summary of the empirical analysis of this study is as follows. First, the hypothesis that "industrial competition intensity will affect brand expansion strategies" was adopted. Second, the hypothesis that "environmental uncertainty will affect brand expansion strategies" was adopted. Third, the hypothesis that "technology structure will affect brand expansion strategies" was adopted. Fourth, the hypothesis that "brand expansion strategies will affect core competencies" was adopted.

The implications of this study are as follows. First, commercial competitiveness, environmental uncertainty, and technology structure, which are factors of the corporate environment, influence brand expansion strategies. This means that a brand expansion strategy is necessary for companies to settle in the Fourth Industrial Revolution. In order to cope with the development trends and demands of the times, a brand expansion strategy is needed. Since the environment and technology are changing at a rapid pace, constant monitoring is needed to cope with the changes. Competitive brand expansion strategies are essential to understand the Fourth Industrial Revolution and actively respond to environmental changes. Second, brand expansion strategies affect core competencies. This suggests that a brand expansion strategy is an important factor for core competencies today. Therefore, in the Fourth Industrial Revolution, companies should enhance their core competencies and increase their competitiveness in accordance with the direct management environment. With various strategies in place, it means that companies should strive to secure competitive advantage in a changing environment. In the Fourth Industrial Revolution, the external environmental factors of a company directly affect its core competencies through a brand expansion strategy. Therefore, companies need to study various strategies. Although this study aimed at brand expansion strategies, it is necessary to study various strategies. The implication of this study is to use a brand expansion strategy with an external management environment as a leading variable to increase core competencies.

Reference

- **a.** Kim M, Son D. "The Effect of Privacy and Trust Factors in Fintech Service." Korea Internet Electronic Commerce Association 20.2 (2020): 87-98.
- **b.** Choi Ji-Hoi, Kim Myoun, "The Effect of Familiarity and Brand Attitude of Mobile Character Products on Consumers' Purchasing Behavior - Focusing on Kakao Friends Characters-." Asia-pacific Journal of Convergent Research Interchange 4.4 (2018): 1-10.
- c. Joo Eun-Ha, Kim Dong-Il, Lee Mi-Na, "A Study on the Direction of Christian Home Education in the Fourth Industrial Revolution." Asia-pacific Journal of Convergent Research Interchange.6.12 (2020): 49-59
- **d.** Hong Y. G., "Trend of IoT standardization and Suggestion for securing patents." Korea Institute of Intellectual Property.", 26 (2016): 50-61.
- **e.** Grant R. M., "Prospering in Dynamically - Competitive Environments: Organizational Capability as Knowledge Integration." Organization Science 7.4 (1996): 375-387.
- **f.** Son J, Narasimhan S, Rigins F. "Effects of Relational Factors and Chanel Climate on EDI Usage in the Customer Supplier Relationship." Journal of Management Information Systems 2.1 (2005): 321-353.
- **g.** Premkumar G, Roberts M. "Adoption of New Information Technologies in Rural Small Business." International Journal of Management Sciences 27.4 (1999): 467-484.
- **h.** King N, Anderson N. R. Innovation and Change in Organizations, London: Routledge, 2005.

2. Zhu K, Weyant J. P. "Strategic Decisions of New Technology Adoption under Asymmetric Information: A Game-Theoretic Model." Decision Sciences 34.4 (2003): 643-675.

- **a.** Yujin Im, Jeongwon Baik, Heeeun Nam. "Fourth Industrial Revolution and the Direction of Social Welfare Education." Asia-pacific Journal of Convergent Research Interchange 6.3 (2020): 11-19.
- **b.** Tornatzky L. G, Fleischer M. The Process of Technological Innovation Lexington, MA: Lexington Books, 1990.
- **c.** Lee J. "Changes in Society According to Facial Recognition Technology." Magazine of the SAREK 49.3 (2020): 90-91.
- **d.** Kim, I.W., Kim, D.H., Jung, H.C., Lee, S.E. & Kim H.K. "The Influence of External Corporate Environment Factors on the Core Competencies of Business in the Fourth Industrial Revolution." Journal of Digital Business System and Management (JDBSM) 1 (2021): 11-18.
- **e.** Aaker D. A, Keller K. L. "Consumer Evaluations of Brand Extension." Journal of Marketing 54 (2004): 27-41.
- **f.** Yen H, Nhung N, Tam, L. "Brand Image on Intention of Banking Services Using: The Case of Vietnam Banks." International Journal of Substantiality Management and Information Technologies 3.6 (2018): 63-74.
- **g.** Barone M. J, Miniard P. W, Romeo, J. B. "The Influence of Positive Mood on Brand Extension Evaluations." Journal of Marketing Research 28 (2000): 16-28.
- **h.** Torkkeli M, Tuominen M. "The Contribution of Technology Selection to Core Competencies, International Journal of Production Economics." 77.3 (2002) 271-284.

i. Prahalad C. K, Hamel G. "The Core Competence of Corporation, International Library of Critical Writings in Economics." 163.32 (1990): 210-222.

j. Mahoney J. T. "The Management of Resources and The Resource of Management, Journal of Business Research." 33.2 (1995) 91-101.

k. Sohn Sungpyo. "Corporate Management Paradigm Research on 4IR - Focus on the Brand Value Improvement as Business Strategy." Journal of Corporation and Innovation 41.4 (2018): 49-59.

l. KANNADHASAN, M., S. ARAMVALARTHAN, and DEEPAK TANDON. "PERCEIVED ENVIRONMENTAL UNCERTAINTY & COMPANY PERFORMANCE: EFFECT ON STRATEGIC INVESTMENT DECISIONS.", International Journal of Accounting and Financial Management Research (IJAFMR), Vol. 3, Issue 4, pp, 107-118

m. A.Umamaheswari & P. Kumari, “Multi-Criteria Decision Making under Hesitant Fuzzy Environment”, International Journal of Mathematics and Computer Applications Research (IJMCAR), Vol. 4, Issue 2, pp, 89-102

n. Narmania, Davit. "Economic Policy Uncertainty and Risk Management in Regulated Sectors." International Journal of Business and General Management 7.4 (2018): 19-28.

o. Oti Robinson Chibu, “Improving Maintenance Strategy through Corporate Culture”, International Journal of Business and General Management (IJBGM), Vol. 7, Issue 3, pp; 61-84

p. Ashish Tamrakar & Vishnu Kumar Mishra, “Natural Language Query Processing Based on Fuzzy Logic”, International Journal of Computer Science and Engineering (IJCSE), Vol. 3, Issue 2, pp, 105-110

q. V.Dhivyasree & E.N.Ganesh, “Real Time Analysis of Software Assessment of Recycling Products”, IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL), Vol. 7, Issue 2, pp, 569–574