THE RELATIONSHIP BETWEEN INNOVATION COMPETENCE AND PERFORMANCE AS AN EFFECT ON THE SUSTAINABILITY OF SMEs

Kim S-S.*

Abstract: Overcoming the failures of SMEs worldwide in the aftermath of COVID-19 in 2020 is an essential issue for countries and SMEs. A research question was raised that there will be variables that affect the sustainable growth of SMEs. This study aims to find out the relationship between performance and necessary competencies according to industry classification for sustainable growth of SMEs. 205 CEOs of SMEs in Korea were surveyed and verified using Smart PLS. The findings are, first, the difference in the performance of SMEs by industry through the mediating effect of technological capabilities. Second, variables that influence the performance of SMEs were management and technology, technology marketing and technical competence in technology innovation. Third, variables affecting the industry's performance were different, with the most significant increase in the IT/SW industry.

Key words: SME; innovation competency; performance; sustainability; technology innovation.

DOI: 10.17512/pjms.2021.23.2.12

Article history:
Received December 29, 2020; *Revised* February 15, 2021; *Accepted* February 26, 2021

Introduction

Overcoming the failures of Small and Medium-sized Enterprises (SMEs) worldwide in the aftermath of COVID-19 in 2020 is an important research question. Studies on the performance of SMEs in the industrial sector have not been conducted in previous studies, and this topic is a remarkable feature and a necessary study. Validating the relationship between SME competency variables, competencies and performance will contribute both academically and industrially. Factors influencing the performance of SMEs for sustainable growth should be reviewed both internally and externally. However, external factors cannot be controlled by SMEs. Therefore, this study focused on internal factors. The researcher has reviewed previous studies to identify problems and limitations and to select variables. Previous studies have studied success variables in various ways, but in this study, technology, management, commercialization, and exit strategy ability were selected as success variables. The mediation variable is the technology marketing capability and technological innovation capability of SMEs, affecting performance and verifying the effectiveness of mediation on performance. The

* **Seok-Soo Kim**, Hansung University, Dr. Graduate School of Knowledge Service Consulting, Korea
✉ corresponding author: ssjm4475@gmail.com

dependent variables are financial performance, non-financial performance and technical performance. As a result of summarizing the analysis results of previous studies, the researcher established a hypothesis that the ability of SMEs as a performance factor will affect the competence and eventually the performance. The goals of this study are as follows - first, the causal relationship between the success variables of SMEs on competence and performance; second, the effect of success variables on performance through mediating effects of SME capabilities; Third, the effect of SME competency on performance; fourth, the impact on the performance of six industries including electricity/electronics, machinery/parts, IT/SW, chemicals/textiles/materials, life/food, crafts/etc. The researcher selected 6 industry categories because, since 2001, Korea's Startup Promotion Agency has been operating a business support policy by designating 6 industry categories for SMEs. The study surveyed 205 CEOs of SMEs in six industries. Basic statistics were analyzed with SPSS 22. Measurement and structural models were evaluated using Smart Partial Least Square Structural Equation Modeling (PLS-SEM).

Literature Review

The results of researching previous studies on the performance of SMEs can be summarized as follows. The SMEs' effect of manageability on management performance, such as financial performance and non-financial performance, was studied (Jeon and Kim, 2018). The effect of management ability on financial performance was studied (Kim and Seo, 2017). The effects on technology competency, technical performance and management performance were also studied (Lee, 2017). However, the previous studies were limited to each of the influence variables. Also, only the success variable's management performance was studied in part, and there was no study on the mediating effect of SMEs' competency. Overall, the previous research only identified success variables for management performance and individual relationships of competencies. Therefore, some problems and limitations cannot determine the causal or dynamic relationship between variables. As we looked at the effect of success variables on the SMEs' competency and performance in the theoretical background: it has been found that previous studies have failed to comprehensively study potential influence variables, such as management ability, technical ability, exit strategy, technology commercialization competency and technical marketing competency. Therefore, in this study, the success variables were studied not only on the effect on corporate competency and business performance but also on SMEs' competency in management performance. Technical expertise and management skills were learned to influence SMEs' innovation capability and competitiveness (Hwang, Choi, and Shin, 2020). Kim, Cho and Lee (2020) suggested that the research model technological competence will positively (+) affect small and medium-sized entrepreneurs' core competencies. Prohorovs, Bistrova, and Ten (2019) studied start-ups’ six success factors. Therefore, the success variables expected to affect the entrepreneurs' ability to be studied sporadically in previous studies were

summarized. External factors, such as entrepreneurship education, government support and investment, were excluded. This study was necessary to review the entrepreneurs' success and technical factors as factors that influenced entrepreneurs' success, excluding external factors. This study was required to study the entrepreneurs' success and technological factors as factors that influenced entrepreneurs' success, excluding external factors. Therefore, entrepreneurs affect SMEs' competency in technology and management. For this reason, the following hypothesis was proposed.

Hypothesis 1: SMEs' Entrepreneurial abilities have a positive impact on competency.

As an independent variable, the effect of corporate competencies on the success of business incubators was studied (Pauceanu, Alpenidze, Edu, and Zaharia, 2019). The dynamic competencies positively impact start-ups' business performance (Seo and Lee, 2019). An empirical study on the effect of technology commercialization competency on management performance, technology competency and marketing competency as a control variable for technology commercialization competency as independent variables was studied (Park and Yang, 2018). An empirical research model on the impact of performance and technology commercialization competency was presented (Bae, Song, and Kim, 2018). Technology innovation and commercialization competencies studied the effect of management performance (Kim and Park, 2018). Therefore, the necessary competencies that affect performance as the number of mediating success variables need to focus on technological competencies and verify their effectiveness (Suryani, & Pirzada, 2018). The reason was that it needed to test the hypothesis that in order to create business results, there would be necessary variables that mediate success factors (Rudyanto, & Pirzada, 2020). External factors, such as entrepreneurship, government support and investment, were excluded. As a mediator of entrepreneurs' success, excluding external influences, it was necessary to focus and study the technical factors. Therefore, there is a need to verify the technical side's performance impact. For this reason, the following hypothesis was proposed.

Hypothesis 2: SMEs' competencies have a positive impact on performance.

The effect of SMEs' CEO technology competency on management performance was studied (Lee, 2017). A research model was presented on the impact of technological competency on management performance (Yoon, 2018). Knowledge and networks in the global start-up process study suggested a network's necessity (Englis, Wakkee, and Van Der Sijde, 2007). An empirical study was conducted on network competency and marketing competency on management performance (Kim, 2016). The effect of core competencies and network competencies on SMEs' management performance was studied (Kim and Bang, 2017). The network entrepreneurship on technology start-ups on business performance was studied (Hwang, 2017). Furthermore, network competency on technological innovation capability and innovation performance was studied (Kim and Bang, 2017). Therefore, it was found that the success variables affecting business performance

were studied from various perspectives. This study was divided into a management perspective and a technical perspective. Regarding management, it is necessary to categorize it into four sub-factors: management ability._and exit strategies, technical ability and technical commercialization ability, to verify the effectiveness. The reason is that to create business results, and it is difficult to identify the effect factors without excluding external factors. As a variable of success for entrepreneurs, it was necessary to study focusing on technology and management factors, excluding external influences. Therefore, the following hypothesis was proposed.
Hypothesis 3: SMEs' Entrepreneurial abilities have a positive impact on performance.

Research Methodology

The data was collected from 205 CEOs (response rate is 62.1% from 330 CEO) using the online questionnaire method. Youth start-up entrepreneurs are less than 5 years after start-up. The industry sector is 6 fields defined in Korean start-up company classification standards: electrics/electronics, machinery/parts, IT / SW, chemicals/textiles/materials, life/food, and crafts/Other. The 5-point scale was used to measure. The data was verified and analyzed with SPSS 22 and Smart PLS 3.2.9, basic statistical analysis and measurement models, and structural models. The model of this study is composed of a reflective measurement model composed of only reflective indicators. The collected data first analyzed the basic statistics using SPSS. After removing the insignificant measurement indicators through factor analysis, the PLS Algorithm verifies the reliability and validity required to evaluate the reflective measurement model. The reliability of internal consistency, concentration validity and discriminant validity was evaluated by performing it. The internal consistency reliability was evaluated by Cronbach's Alpha, Dijkstra-Henseler's rho_A, and Composite Reliability (CR), and the convergent validity was evaluated by external placement, measurement variable reliability, and AVE. Hair et al. (2017) evaluated discriminant validity using Fornell-Larcker Criterion, Cross-Loadings. Cronbach's α, Dijkstra-Henseler's rho_A and Composite Reliability (CR) of internal consistency reliability evaluation are criteria for evaluating internal consistency reliability, and Average Variance Extracted (AVE) is a criterion for evaluating intensive validity. Fornell-Larcker Criterion, Cross Loadings and HTMT are presented as criteria for determining discriminant validity in a reflective measurement model. Fornell-Larcker Criterion was used for the evaluation results and interpretation of the reflective measurement model for external placement, measurement variable reliability, AVE value, Cronbach's α, rho_A, Composite Reliability (CR) and discriminant validity. PLSE-SEM performs multicollinearity, determination coefficient (R^2), effect size (f^2) and predictive suitability (Q^2) by performing bootstrapping and blindfolding to evaluate and structural models. The significance of the path coefficient and the model's suitability were evaluated by finally confirming that the structural model was suitable. Finally, by introducing

industry variables, the difference in influence by industry was confirmed. Verifying the effect on the moderating effect on business performance as a dependent variable confirmed that this study's model was suitable and could be identified as moderate.

Table 1. Characteristics of the demographical dataset(N=205).

		Frequency	Percent
Business type	Private business	124	60.5
	Corporate business	81	39.5
Industry sector	Electrics/Electronics	38	18.5
	Machinery/Parts	30	14.6
	IT/SW	36	17.6
	Chemicals/Fiber/Material	36	17.6
	Life/Food	26	12.7
	Craft/Others	39	19
Founding years	Less than 1 year	15	7.3
	Less than 1–2 years	66	32.2
	Less than 2–3 years	66	32.2
	Less than 3–5 years	48	23.4
	More than five years	10	4.9
Sales volume ($)	Less than $0.1 million	72	35.1
	Less than $0.1–0.3 million	66	32.2
	Less than $0.3–0.5 million	45	22
	Less than $0.5–1 million	19	9.3
	More than $1 million	3	1.5
Manufacture	Outsourcing	47	22.9
	Outsourcing and self	127	62
	Itself	31	15.1
Employees	Less than three people	95	46.3
	3 or more (less than 5)	80	39
	5 or more (less than 10)	28	13.7
	More than 10	2	1
Gender	Male	137	66.8
	Female	68	33.2
CEO’s age	20s	18	8.8
	30s	82	40
	40s	79	38.5
	Over 50s	26	12.7

Management ability.

A study on the manager's psychological characteristics means that creative innovation enables the development of new products, technologies, and procedures through new ideas, development, and research and development through innovation of management characteristics (Franco, Hope, and Lu, 2017). Research on management ability is significant because it can explain the relationship between the manager's differences and management performance more systematically and concretely than research based on its characteristics. The evaluation of observable management ability can give the company's manager a direction for the company's development. Early-stage SMEs are not precisely

organized, so there is a limit to creating results based on the organization's capabilities. Although management abilities vary from time to time in each study, technical competence, strategic thinking ability, and organizational competency are considered to be very important in common (Andreou, Karasamani, Louca, and Ehrlich, 2017).

Technical ability.

Technical ability is a vital resource for promoting and supporting a company's innovation strategy and the sustainable success resulting from innovation activities (Burgelman and Sayles, 2004). The company's technical ability was presented in six categories: learning ability, R and D ability, resource allocation ability, production ability, organizational ability, and strategic planning ability (Yam et al., 2004).

Technology commercialization ability.

In a narrow sense, technology commercialization is limited to cases in which products or services are created after the primary research or development stage, a technology development activity. The new technologies acquired through own research and development or external procurement can be defined as a continuous process from prototype manufacturing, pilot production, mass production system construction, marketing, and sales activities to link actual production and sales (Nevens, 1990). It has been reported that systematic technological innovation ability and technology commercialization ability affect management performance by revealing that a long-term strategic plan is being made (Booz, Allen, and Hamilton, 1982).

Exit strategy ability.

A study was conducted on SME managers' exit strategies (Kim, 2014). The venture company's EXIT strategy and cases by type were studied (Kwon, 2009). An empirical study was conducted on business commercialization and technological innovation on management performance (Bae, Song, and Kim, 2018).

Technology innovation competency.

Technology innovation competency is critical that leads to a company's continuous growth. At the same time, it is a characteristic of a comprehensive company that promotes and supports technological innovation (Burgelman, Christensen, and Wheelwright, 2008). On the other hand, it was analyzed that the relationship between R and D investment level and business performance was negative or not at all (Coombs and Bierly, 2006). In a study of the technological innovation system framework and the entrepreneur's view of innovation, the technological innovation system generated valuable insights into the processes that need stimulation for the successful development and implementation of innovative sustainability technologies (Planko, Cramer, Hekkert, and Chappin, 2017). It has been shown whether innovation capacity positively affects its performance (Saunila,2017).

Technology marketing competency.

The analysis results of success or failure of technology development and marketing's importance are reduced. In other words, 20 ~ 40% of the technical failures are due to defects in the technology itself (Miller and Power, 2005). The rest is due to the lack of marketing competency, especially in high-tech products; the ratio due to the lack of marketing competency reaches 75% (Clugston, 1995). The concept of technology marketing is interpreted differently depending on the researcher and expressed in two ways. As a unique research area of marketing, it is a high-tech product marketing that sells or purchases products with technology-typed products through marketing techniques.

Financial performance.

Despite the diversity in selecting indicators for management performance, profitability and growth are mainly used for empirical analysis (Pirzada, Mustapha, & Alfan, 2017). There are also quantitative and qualitative methods for measuring performance based on the financial statements' numerical values. Financial performance indicators show past management results but have limitations in predicting future management performance. One of the newly emerged performance indicators to respond to these problems is the Balanced Scored Card (BSC), which is not short-term goal management centered only on financial indicators to achieve its vision and strategic objectives. Long-term and comprehensive balance management of indicators from four perspectives: financial perspective, customer perspective, internal process perspective learning, and growth perspective (Kaplan and Norton, 1996).

Non-financial performance.

The traditional method of measuring business performance was mainly based on financial perspectives, but only financial indicators were used. According to the corporate strategy, the recent performance measurement method uses environmental performance and various non-financial performances (Alaa, 1996). Research has shown that for non-financial performance, investors prefer decisions based on corporate ethical behavior over short-term profits; it was suggested that a company's positive image substantially affects investment decisions' business performance (Epstein and Freedman, 1994).

Technical performance.

Technical performance has a significant effect on technological and technical management competency, production support, marketing competency, research and development competency and new product development competency. It has a substantial impact on market information and business performance. It is said that the securing of superior technology can directly act as a determinant of investment by venture capital or other investment companies because it is directly related to the growth or profits of venture companies (Johannisson, 1986).

Results and Discussion

The PLS Algorithm of Smart PLS 3.2.9 was executed to analyze and evaluate internal consistency reliability, concentration validity and discriminant validity. The reliability of internal consistency was assessed by Cronbach's Alpha, Dijkstra-Henseler's rho, and Composite Reliability (CR). Table 2 shows the results of the PLS Algorithm execution.

Table 2. Evaluation Results of Reflective Measurement Models

Latent Variables	Convergent Validity			Internal Consistency Reliability			Discriminant Validity
	Outer Loadings	Measurement Variables Reliability	AVE	Cronbach's Alpha	Dijkstra-Henseler's rho_A	Composite Reliability (CR)	Cross Loadings
	>0.7	>0.5	>0.5	0.5~	>0.7	0.5~	
EX-A	0.951	0.905	0.905	0.895	0.896	0.950	Yes
FPF	0.933	0.870	0.870	0.851	0.851	0.931	Yes
MG-A	0.937	0.877	0.877	0.860	0.863	0.935	Yes
NPF	0.935	0.873	0.873	0.855	0.858	0.932	Yes
TCC-C	0.925	0.856	0.857	0.834	0.848	0.923	Yes
TC-A	0.912	0.831	0.831	0.797	0.801	0.908	Yes
TEC-A	0.914	0.835	0.835	0.901	0.903	0.938	Yes
TECH-P	0.940	0.883	0.883	0.867	0.867	0.938	Yes
TIC-C	0.924	0.854	0.854	0.829	0.832	0.921	Yes
TM-C	0.948	0.899	0.899	0.887	0.889	0.947	Yes

The average variance extracted (AVE) value, another criterion for concentration validity, was also confirmed that all the measurement variables were above the threshold value of 0.5, as shown in Table 2. Fornell-Larcker Criterion and Cross Loadings are criteria for determining discriminant validity in a reflective measurement model. Since the AVE square root of the diagonal line is greater than the correlation between the study variables below the diagonal line, it is evaluated that discriminant validity is secured between the study variables. Table 3 shows the results.

Table 3. Evaluation of Reflective Measurement Models (Fornell-Larcker Criterion)

	EX-A	FPF	MG-A	NPF	TCC-C	TC-A	TEC-A	TECH-P	TIC-C	TM-C
EX-A	0.952									
FPF	0.702	0.933								
MG-A	0.749	0.728	0.937							
NPF	0.756	0.849	0.769	0.935						
TCC-C	0.628	0.668	0.663	0.741	0.926					
TC-A	0.609	0.579	0.632	0.655	0.759	0.912				
TEC-A	0.704	0.673	0.641	0.742	0.637	0.633	0.914			
TECH-P	0.715	0.757	0.669	0.797	0.682	0.597	0.796	0.940		
TIC-C	0.654	0.699	0.670	0.734	0.750	0.709	0.695	0.684	0.924	
TM-C	0.609	0.695	0.616	0.706	0.608	0.568	0.701	0.765	0.656	0.948

The structural model's evaluation can be considered a procedure that finally confirms the research model and confirms that the structural model is suitable. When the structural model is reasonable, then it is possible to perform hypothesis verification. For the evaluation of structural models in PLSE-SEM, this study evaluated multicollinearity, coefficient of determination (R^2), effect size (f^2) and predictive fit (Q^2). Table 4 shows the results of determination coefficient R^2 to evaluate endogenous research variables' explanatory power. The effect size (f^2) is used as the criterion to assess the impact of exogenous research variables (or predictors, independent variables) on endogenous research variables. If f^2 is 0.02, it is evaluated as a small effect size, 0.15 as a medium effect size, and 0.35 as a large effect size. Table 5 shows the results of confirming the effect size (f^2). Evaluate whether the structural model has predictive suitability for specific endogenous research variables.

Table 4. The results of determination coefficient R^2

f^2	FPF	NPF	TCC-C	TECH-P	TIC-C	TM-C
EX-A	0.030	0.052	0.006	0.039	0.009	0.004
MG-A	0.076	0.089	0.045	0.003	0.042	0.035
TCC-C	0.022	0.069		0.045		
TC-A	0.012	0.003	0.352	0.012	0.167	0.014
TEC-A	0.006	0.040	0.024	0.183	0.093	0.192
TIC-C	0.027	0.012		0.000		
TM-C	0.076	0.042		0.174		

Table 5. The results of confirming the effect size (f2).

f^2 R^2	R Square	Adjusted R Square
FPF	0.681	0.669
NPF	0.767	0.759
TCC-C	0.648	0.640
TECH-P	0.757	0.749
TIC-C	0.637	0.630

Since the structural model's evaluation has been confirmed, it is possible to conduct hypothesis verification through bootstrapping. The significance and suitability of the path coefficients are evaluated using the T-value. Through this, hypothesis verification was performed. Basic Bootstrapping of Smart PLS 3.2.9 performed the significance and suitability evaluation of the path coefficient. The T-value, P-value, and confidence interval required for hypothesis verification at a significance level of .05. Table 6 and Figure 1 show the results.

Table 6. Hypothesis Verification Results

	Original sample	Sample mean	Standard deviation	T statistics	P-value	Confidence interval		Significance
	(O)	(M)	(STDEV)	(|O/STDEV|)		2.50%	97.50%	(p<0.05)
EX-A → NPF	0.188	0.192	0.090	2.084	0.037	0.012	0.367	Accept
MG-A → FPF	0.262	0.255	0.099	2.657	0.008	0.038	0.453	Accept
MG-A → NPF	0.242	0.239	0.088	2.749	0.006	0.070	0.410	Accept
MG-A → TIC-C	0.200	0.201	0.087	2.286	0.022	0.030	0.361	Accept
TCC-C → TECH-P	0.186	0.177	0.084	2.228	0.026	0.018	0.334	Accept

TC-A → TCC-C	0.496	0.499	0.072	6.839	0.000	0.350	0.629	Accept
TC-A → TIC-C	0.346	0.347	0.084	4.126	0.000	0.191	0.507	Accept
TEC-A → TECH-P	0.358	0.354	0.086	4.188	0.000	0.181	0.519	Accept
TEC-A → TIC-C	0.280	0.277	0.093	3.016	0.003	0.091	0.463	Accept
TEC-A → TM-C	0.449	0.440	0.122	3.692	0.000	0.193	0.665	Accept
TM-C → FPF	0.237	0.234	0.079	2.994	0.003	0.076	0.385	Accept
TM-C → NPF	0.150	0.146	0.071	2.116	0.035	0.007	0.286	Accept
TM-C → TECH-P	0.313	0.317	0.086	3.633	0.000	0.140	0.487	Accept

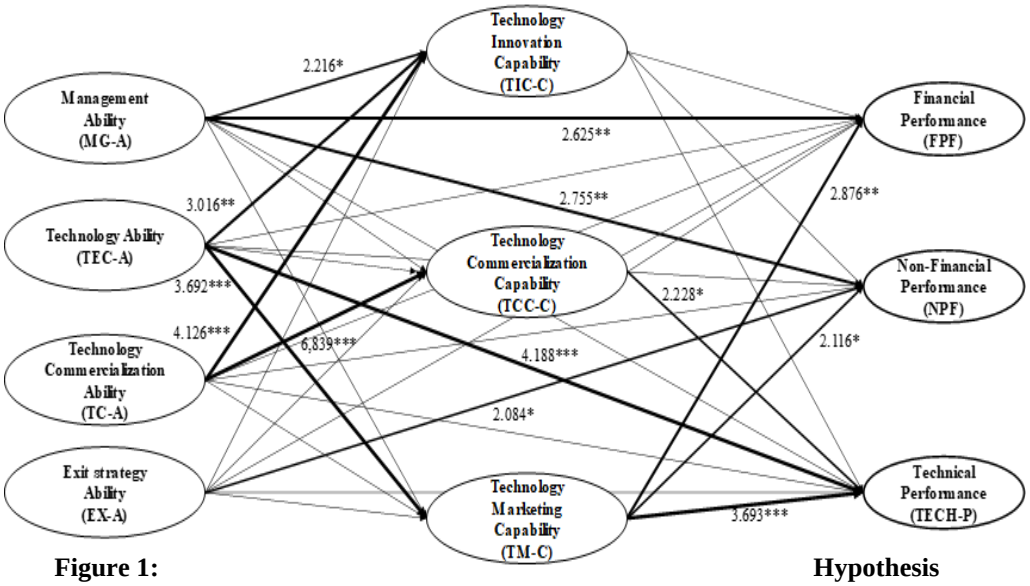

Figure 1: Hypothesis Verification Result (T-value, P-value)

*; p < 0.05, **: p < 0.01, *** p < 0.001

As a result of significant hypothesis verification of the start-up ability's effect as a parameter on the business performance, bootstrapping was executed to confirm the start-up's specific indirect effect (parameter effect) as a parameter. Table 7 shows the results. The mediating effect was verified by checking the t-value, p-value, and confidence interval required for hypothesis verification at a significance level of .05.

Table 7. Special Indirect Effect (Mediating Effect)

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P-value	Significance (p<0.05)
TEC-A → TM-C → FPF	0.107	0.104	0.050	2.127	0.034	Accept

TC-A → TCC-C → TECH-P	0.092	0.088	0.045	2.069	0.039	Accept
TEC-A → TM-C → TECH-P	0.141	0.139	0.055	2.547	0.011	Accept

As shown in Table 7, the mediating effect on the technical performance (TECH-P) showed a significant mediating effect by the technology commercialization ability (TC-A) mediating the technology commercialization capability (TC-A) (T-value 2.0 69, P-value .039). The technical ability (TEC-A) showed a significant mediating effect on the technical marketing competency (TM-C) (T-value 2.547, P-value .011). As for the mediating effect on financial performance, the technical competency (TEC-A) mediated the technical marketing competency (TM-C) and showed a significant mediating effect (T-value 2.127, P-value .034).
According to the industry, the difference between adjusted R^2 and f^2 values was compared to confirm business performance. The 6 sectors have analyzed the CEO's business responding to the survey Overall: Results obtained by analyzing the entire industry without distinction by industry, DIV 1: electrics/electronics, DIV 2: machinery/parts, DIV 3: IT/SW, DIV 4: chemicals/textiles/materials, DIV 5: life/food, DIV 6: crafts/others. The adjusted R^2 value was compared with the R^2 value for 3 sub-factors and 3 sub-factors in the initial overall condition without industry distinction—the changes in R^2 values after analyzing the PLS Algorithm of 6 individual industries. The R^2 value for the entrepreneurship capability was also examined, and the results are shown in Table 8.

Table 8. Adjusted R Square Result of Performance Impact by Industry Sectors

R^2	Overall	DIV 1	DIV 2	DIV 3	DIV 4	DIV 5	DIV 6
FPF	0.669	0.655	0.792	0.855	0.589	0.911	0.747
NPF	0.759	0.750	0.877	0.743	0.719	0.935	0.780
TCC-C	0.640	0.484	0.586	0.663	0.645	0.921	0.785
TECH-P	0.749	0.549	0.871	0.858	0.741	0.958	0.722
TIC-C	0.630	0.617	0.612	0.666	0.689	0.893	0.716
TM-C	0.538	0.590	0.711	0.723	0.421	0.585	0.471

Overall R^2 for financial performance (FPF), non-financial performance (NFP), and technical performance (TECH-P) were .669, .759, and .749, respectively. DIV 1 decreased to .655, .750, .549, and DIV 4 also decreased to .589, .719, and .741. On the other hand, DIV5 increased significantly to .911, .935, and .958. DIV2 also increased significantly to .792, .877, and .871. DIV4 increased to .630, .729, and .903 only for TECH-P, and DIV5 increased significantly to .930, .952, and .959. It was confirmed that DIV6 increased to .860, .809, and .899. The results showed that DIV5 (life/food) contributed the most to the business performance, and DIV3 (IT/SW) increased the next. It was also confirmed that DIV2 and DIV6 increased.
Compared with the result that technological competency has a significant effect on business performance (Lee, 2017), this study confirmed that it affects technological

performance among business performance. Compared with the hypothesis that corporate core competency has a positive (+) effect on the business performance of start-ups (Kim, Cho, and Lee, 2020), technical ability, management ability was confirmed to have an impact on business performance, but that the exit strategy affects non-financial performance is the only result confirmed in this study. According to the industrial sector, the research on the impact of business performance presented was not conducted in the previous study and is considered a distinguishing characteristic. Providing research results to government policymakers and government support organizations to foster youth entrepreneurship will help create business results without failure by supplementing and strengthening each sector's success factors even when starting a business. In detail, it was checked whether there is a causal relationship between the degree of influence on the success factor and the entrepreneur's success factors' business performance. Small and medium-sized entrepreneurs' entrepreneurship ability was analyzed and verified to have a mediating effect on success factors and business performance.

Managerial Implication

The author verified and confirmed how the factors affecting business performance differ according to the six industries and the degree of impact. First, as a result of the hypothesis verification on the measurement model 1) The significant variables influencing the financial performance (FPF), which are dependent variables, were the management capacity (MGC-A), which is an independent variable, and technical marketing capability (TM-C), which is a parameter. Non-financial performance (NPF) had a significant influence on management capability (MGC-A) as an independent variable and technical marketing capability (TM-C) as an exit strategy (EX-A) parameter. The significant influence variables on the technical performance (TECH-P) were the independent variables, the technical capability (TEC-A), the parameters, the technical commercialization capability (TCC-C), and the technical marketing capability (TM-C). 2) Independent variable that significantly affects technology innovation competency (TIC-C) are management competency (MG-A), technology competency (TEC-A) and technology commercialization capability (TC-A). The technology commercialization competency (TCC-C) influence factors were the technology commercialization capability (TC-A), and that the technology marketing competency (TM-C) influence factor was the technical capability (TEC-A). Second, the verification result of the mediating effect 1) One of the success factors, which is an independent variable, the technical competence (TEC-A), is based on the mediating effect of the technology marketing competency (TM-C), which is the start-up competency. (TECH-P), Furthermore, 2) Technology commercialization ability (TC-A) was confirmed to affect technology performance (TECH-P) through the mediating effect of technology commercialization capability (TCC-C). Third, according to six industries, different factors affect business performance:

electrics/electronics, machinery/parts, IT / SW, chemicals/fibers/materials, life/food, and crafts / other, and the degree of impact is somewhat different. As a result of verifying whether there is a change in the R^2 value, it was found that, in particular, DIV 5 (life/food) showed the most significant increase in the R^2 value for business performance. It is interpreted that life/food companies are most influenced by success factors and entrepreneurial competency to increase business performance. In the Life industry, it is difficult to succeed in business only with technological superiority. It is a significant result by proving that it is essential to improve technology marketing capabilities and technology commercialization capabilities. This result can be analyzed to apply in the same context to DIV 3 (IT / SW), which significantly increases technical performance and financial performance. In the life/food industry, information technology industry, and software industry, socio-economically meaningful results prove that entrepreneurship and success factors must be continuously learned and applied to business to create business results.

Conclusion

This study will provide the results to the government policymakers to promote youth entrepreneurs and the staff in charge of the government support organizations to create business and technical results without failure even when starting a business. This future research project can be divided into the following three categories. First, it is said that it is necessary to research the subdivided technology field and the future technology field's materialization. The researcher intends to carry out future research as an advanced research subject following this study. Second, expand the scope of this research to include a wide range of start-up entrepreneurs, early entrepreneurs, re-challenged entrepreneurs, etc. Also, it aims to expand the youth entrepreneurs in countries around the world to perform national and industrial journeys. Third, in the future, it is said that it is necessary to conduct additional research by dividing the technical field into a whole frame and dividing it into manufacturing, non-manufacturing, IT, Industry 4.0, Smart Farm and Smart Factory, etc. Based on the above results, as an essential research topic in the future, the government and industry will focus on digital transformation, digital entrepreneurship, digital innovation, data-driven innovation, new business models, new venture creation and technology ventures for start-up entrepreneurs from around the world, through intensive cooperation with academics. Based on the results of the above research, collaboration with the government, industry, and academia under the theme "Research on Start-up Entrepreneurs and Digital Transformation, Digital Entrepreneurship, Digital Innovation, Data-Driven Innovation, New Business Models, New Venture Creation and Technology Ventures" Therefore, it will be conducted as critical research in the future.

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ZWIĄZEK POMIĘDZY KOMPETENCJAMI W ZAKRESIE INNOWACJI A WYDAJNOŚCIĄ JAKO WPŁYW NA ZRÓWNOWAŻONY ROZWÓJ MŚP

Streszczenie: Przezwyciężenie niepowodzeń MŚP na całym świecie w następstwie COVID-19 w 2020 r. jest zasadniczą kwestią dla krajów i MŚP. Postawiono pytanie badawcze, czy będą zmienne, które wpływają na zrównoważony rozwój MŚP. Niniejsze badanie ma na celu ustalenie związku między wynikami a niezbędnymi kompetencjami zgodnie z klasyfikacją branżową dla zrównoważonego rozwoju MŚP. 205 dyrektorów generalnych MŚP w Korei zostało przebadanych i zweryfikowanych za pomocą Smart PLS. Ustalenia dotyczą, po pierwsze, różnicy w wynikach MŚP w poszczególnych gałęziach przemysłu poprzez pośredniczący wpływ możliwości technologicznych. Po drugie, zmienne, które wpływają na wyniki MŚP to zarządzanie i technologia, marketing technologiczny oraz kompetencje techniczne w zakresie innowacji technologicznych. Po trzecie, zmienne wpływające na wyniki branży były różne, z najbardziej znaczącym wzrostem w branży IT/SW.

Słowa kluczowe: MŚP; kompetencje innowacyjne; występ; zrównoważony rozwój; innowacje technologiczne.

创新能力与绩效之间的关系对中小企业可持续性的影响

摘要：克服 2020 年 COVID-19 之后全球中小企业的失败是国家和中小企业的一个基本问题。提出了一个研究问题，即存在影响中小企业可持续增长的变量。本研究旨在根据中小企业可持续增长的行业分类找出绩效与必要能力之间的关系。使用 Smart PLS 对 205 名韩国中小企业 CEO 进行了调查和验证。研究结果是，第一，通过技术能力的中介作用，不同行业的中小企业表现的差异。其次，影响中小企业绩效的变量是管理与技术、技术营销和技术创新的技术能力。第三，影响行业表现的变量不同，IT/SW 行业增长最为显着。

关键词：中小企业；创新能力；表现；可持续性；技术创新。