

Assessment of Competitiveness Improvement on Multinational Enterprises based in Korea*

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Abstract

Purpose – This study's the ultimate goal is to analyze competitiveness improvement on multinational enterprises as firstly providing which factors are to strengthen or weaken competitiveness, secondly investigating if hypotheses development and research design is correct and thirdly finding significant implications for research and practices across country specific advantage.

Design/methodology – Using feedback data provided by 250 firms, we extracted variable factors and hypotheses, which were empirically carried out by reliability and validity testing, correlation analysis, path analysis, and confirmatory factor analysis to prove which factors are to make the positive effect on the improvement of overseas subsidiaries' management performance and competitiveness.

Findings – Through proceeding empirical analysis study, we found out that technology management capability, knowledge management capability, and local management capability had a statistically significant effect on the improvement of overseas subsidiaries' competitiveness, while linked activity capability revealed a negative effect.

Originality/value – During business globalization, overseas investments and establishment of overseas subsidiaries have been essential. It is anticipated that this study results would be meaningful for analysis on multinational enterprises' competitiveness and helpful in promoting their entry into Korean market and enhancing their competitiveness. This paper would also help Korea government develops new FDI model and induce more investment from global major companies to Korea region.

Keywords: Knowledge Management Capability, Local Management Capability, Linked Activity Capability, Technology Management Capability

JEL Classifications: F5, F23, M16

1. Introduction

A multinational enterprise is a business entity which conducts business operations in more than two countries with its subsidiaries, and its business activities are controlled by a central decision-making center. In general, multinational enterprises are studied under the following categories: managerial approach, politico-economic approach and economic approach. From the managerial approach, how efficiently businesses in foreign direct investment (FDI) would be able to manage their international business is examined. In the politico-economic approach, on the contrary, the effects on international specialization between advanced and

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developing countries or economic development of the local state under capitalism or dependency is analyzed. From the economic approach, the phenomena of multinational enterprises are investigated from the perspective of international economics, industrial organization (IO) or industrial economics.

Along with the acceleration of globalization, increasing numbers of multinational firms are operating foreign business by directly investing in their own affiliates in the distribution countries. A success of multinational firms' FDI depends on the performance of its foreign affiliates that is largely affected by the host country characteristics (Kim Sung-Ryong and Lee Seung-Rae, 2019). The effects of R&D investment thru setting up joint venture in target region is to increase multinational firm's profit & sales revenue and to enhance company's overall competitiveness globally and locally (Yang Il-Seok, 2019). The empirical results show the market diversion effect significantly depends on technology & local management's capability in multinational firms based in China (La Jung-Joo and Shin Won-Kyu, 2019).

The World Economic Forum (2019) is introducing the new Global Competitiveness Index 4.0 that international competitiveness ultimately depends upon linkages between a firm's unique, idiosyncratic capabilities (firm-specific advantages, FSAs) and its local country assets (country-specific advantages, CSAs). In this paper, we present a modified FSA/CSA matrix building upon the competitiveness as focusing on how to strengthen the competitiveness of multinational enterprises' overseas subsidiaries by referring to the managerial approach. In multinational enterprises having their subsidiaries around the globe, the effects of FDI on management performances as a part of their global strategies are huge. Due to the trend of globalization, overseas subsidiaries' roles have become more important. Multinational enterprises need to make a priority for strategic purposes in addition to the implementation of two key propositions – global integration and enhancement of overseas subsidiaries' competitiveness. In previous studies, multinational enterprises' global integration and FDI were mostly examined. Recently, however, the role of their overseas subsidiaries has become more important. In addition, management performances and reinvestment have emerged as key issues in international management. Under these circumstances, this study attempted to investigate the factors enhancing the competitiveness of such overseas subsidiaries of multinational enterprises in the Republic of Korea and analyze their effects on the improvement of competitiveness through empirical analysis.

This paper is structured with introduction, theoretical review, methodology, empirical results, and discussion & conclusion. Especially this report was as follows: multinational enterprises' competitiveness was examined. Through this previous study, hypotheses were formulated, and key variables were derived. Based on such variables, study models were developed, and operational definition and questionnaire items on key components were prepared. For empirical analysis, hypotheses were tested through confirmatory factor analysis (CFA) based reliability & validity testing and a structural equation model which includes correlation analysis and path analysis. Furthermore, the key elements of technology management capability, knowledge management capability, local management capability and linked activity capability which are the independent variables in this study were derived through the related theories and previous studies. The operational definition of multinational enterprises' competitiveness, which is a dependent variable, was measured with annual R&D investment rates, annual sales growth rates and annual income growth rates. In particular, the linked activity capability having the largest number of common variate was used as a parameter by taking advantage of the strength of the structural equation model.

This study's major purpose is to verify what are the improvement areas of competitiveness of multinational enterprises in Korea and help Korean government attract investments from the world's renowned multinational enterprises continuously. This study also relate to make

the basic framework for Korea government to lead global companies' firm investment into Korea region as providing empirical evidence to the demonstrate the merits and usefulness of competitiveness in the country specific advantages.

2. Theoretical Review and Hypotheses Development

A multinational enterprise greatly differs from domestic firms which operate business within a single country and exporting firms in that it manufactures products or promotes marketing in several countries by crossing a national border. In particular, multinational enterprises are equipped with great economic power & advanced technology, global value chain & organization, remarkable mobility and local subsidiaries. In economics and related disciplines, a transaction cost, game theory, and organizational learning theory are deeply related with multinational enterprises' localization execution and technology transition strategy into target regions. In a global knowledge-based economy era, a strategy to create and strengthen multinational enterprises' global competitive advantage is a key issue, and there have been continued studies on it.

Global company's critical factors to enhance the competitiveness and maintain global leadership position would be technology deployment execution on time, knowledge management skill, solid local presence, and socially linked activity in addition to CEO's skillful management and leadership capability (Adler et al., 2001). Under this previous study and idea, this paper performed literature review to examine and select the factors strengthening competitiveness. This study finally made choice of technology management capability, knowledge management capability, local management capability and linked activity capability as major determinants thru discussing with professors and managements of multinational enterprises in Korea as well as referencing previous studies. Especially linked activity capability in multinational enterprises was unique factor to be researched at regional practices, not global phenomenon.

The main subject of this study was titled 'Assessment of Competitiveness Improvement on Multinational Enterprises based in Korea'. This report researches on figuring out how the variables are correlated each other and intends to establish the meaningful findings through the process of empirical analysis including correlation analysis, pass analysis, and hypothesis testing by selecting technology management capability, knowledge management capability, local management capability, and linked activity capability factor as major variables. In theoretical review, this study is focused on reviewing previous studies and setting up hypothesis among factors.

2.1. Technology Management Capability

From the standpoint of traditional management strategy, organizational management has focused on adaptation to new environments and current trends by predicting future environments in advance. Entering the 1990s, globalization and digitalization were rapidly promoted. Then, management strategies were reorganized through multinational enterprises' R&Ds. To meet changing customer needs, the establishment of joint R&D strategies with overseas subsidiaries would be further accelerated to strengthen corporate competitiveness. In particular, will for R&D-first strategy by the management of a multinational enterprise's overseas subsidiary, expertise of local R&D staff, R&D & work experience and education & training can be a decisive factor for the success or failure of technology management.

R&D staff reveals professionalism and is goal-oriented to strengthen unique value, code of conduct and corporate competitiveness and achieve a goal (Miller, 1986). To set an innovative

goal for the management of technology and R&D in a job satisfaction & performance assessment model for R&D staff and enhance organizational performances, it is important to have creative, autonomous and challenging research environments and make an efficient investment in R&Ds. They also suggested the establishment of information structure and improvement of flexibility in R&D organization and use of manpower (Yun Jong-Seol and Ha Young- Ja, 2001). Technological capability building in local sites is one of key roles to enhance multinational enterprise's overall competitiveness (Rasiah, 2008).

In analysis on the competitiveness of R&D centers of the IT multinational enterprises in the Republic of Korea and their case studies, subsidiaries' size of R&D staff and equipment development knowhow, head office's technical support and differentiated R&D strategies have a critical effect on the improvement of multinational enterprises' competitiveness and their performances (Kim Jae-Kyung and Lee Bong-Soo, 2012). Technical capability advantage is a necessary condition to make difference of competitiveness of multinational enterprise (Hashai and Buckley, 2014). Innovation capability is one of key areas to maintain global enterprise which has R&D Center globally (Akhavan and Mahdi, 2016). Efficient R&D investment is one of key factors to improve performance of Multinational Enterprises (Kim Jun-Hyun, 2016). Both management and employee should have innovative mind to achieve higher performance on technology management capability of international company (Saunila, 2017). Government intervention is key reason to define R&D competition through international process (Yang Il-Seok, 2019).

H1: Technology management capability would be positively related to linked activity capability?

H4: Technology management capability would be positively related to multinational enterprises' competitiveness?

2.2. Knowledge Management Capability

To study knowledge management capability, it is needed to thoroughly examine knowledge transfer between the head office and subsidiaries, studies on their technology innovation and creation of intellectual property rights. Furthermore, this study targets to analyze management knowhow who can enhance organizational management activities, not just technical knowledge relating to R&D. I also found out many previous studies of Intellectual Property Right. The generation of intellectual property rights by a multinational enterprise's head office or subsidiary can ultimately strengthen its competitiveness by securing technology innovation and new technology in advance. In fact, it is important intangible asset that companies can hold a dominant position in technology disputes. Entering a new millennium, technology competition among multinational enterprise has become more intense. Under these circumstances, the creation of intellectual property rights has increased royalty revenue and market share and generated profits with virtuous cycle effects.

With respect to Knowledge Transfer theory, Knowledge is a fundamental resource for businesses to simultaneously generate and maintain competence which can help them stay superior in competition (Grant, 1996). The KBV (Knowledge-Based View) capability development of global firms is excellent tool to make positive impact for company competitiveness improvement and maximize resource utilization effectively (Spender, 1996). Regarding Technology Innovation study, knowledge competition became fiercer since the 1980s. At the same time, the conventional mechanism in which the needed knowledge was dependent upon a parent company only started to show its limitation. In order for multinational enterprises to enhance and maintain their competitiveness, in particular, exploratory innovation

which totally differs from conventional technologies as well as exploitative innovation which is done within the scope of current technologies becomes more important (Yamin, 2002). This kind of knowledge attribute was considered as an important factor for keeping multinational enterprises competitive and securing core competence. The head office transfers the knowledge it accumulated to the subsidiaries to maintain global competitive advantage. For this, the head office sorts out the knowledge which can be shared with such subsidiaries (Ambos et al., 2006).

According to studies on the technology innovation initiative of the subsidiaries in the Republic of Korea against multinational enterprises, there has been a shift from the vertical to horizontal relationship in a parent company-subsidiary relationship as knowledge competition becomes fiercer in overseas subsidiaries' technology innovation based on the parent company's capability, parent company-subsidiary network and local market environments. In other words, there has been a necessity that subsidiaries should evolve into creative ones which can learn and create knowledge in an active and aggressive manner, instead of being dependent upon their parent company for technology and management knowhow (Lee Eung-Sok, 2007).

Therefore, this study investigated key factors affecting management performances, focusing on management knowledge and knowledge transfer between a parent company in the Republic of Korea and its overseas subsidiaries. In particular, such overseas subsidiaries' absorptive capacity was considered as a key element for enhancing management performances (Park Ji-Hoon, 2011). The emergence of technology protectionism and improvement of competitiveness in knowledge assets, multinational enterprises have fought hard each other over patent and intellectual property rights. As the number of converged products (e.g., smartphone, hybrid vehicle, etc.) increases, especially, there has been a rising demand for the intellectual property rights needed for product development. More enterprises started to believe that a company having key intellectual property rights is advantageous in getting industrial initiative, and profit was generated more aggressively by using such intellectual property rights as a business tool (Kim Jong-Ho, 2013). Intellectual Property protection mechanism has developed by multinational enterprises to maintain their exclusive position and core competency in R&D capability (Kim Sang-Kee, 2019).

H2: Knowledge management capability would be positively related to activity capability?

H5: Knowledge management capability would be positively related to multinational enterprises' competitiveness?

2.3. Local Management Capability

In a study on international management, it is important for multinational enterprises to localize their subsidiaries when entering into emerging market. In particular, it is no wonder that multinational enterprises' fate is dependent upon their success or failure in emerging market. From this standpoint, it is required to review previous studies on local management capability including empowerment to local subsidiaries, localization of products & services, local marketing strategy including customer satisfaction, understanding of local culture & environments and degree of the localization of the staff.

Studies on the reflection of subsidiaries' opinions on management policymaking for the localization of products and services and customer satisfaction under equal relationship between the head office and subsidiaries (Young and Tavares, 2004). Local organization's human resource and team-work capability would define success or failure of multinational enterprises (Miner et al., 2009). Information disclosure, human rights, employment-labor relationship, environment, consumer protection, science & technology, competition and tax

as requirements for local subsidiaries through the ‘OECD Guidelines for Multinational Enterprises’, and it was chosen by 42 states which have followed the International Investment and Multinational Enterprise Declarations (OECD, 2011).

The effects of multinational enterprises on the policies of local state and strategies of local firms in monopolistic advantage-less market despite location advantage through case analysis from a dynamic viewpoint. In other words, multinational enterprises’ growth slowed down after their market entry was limited due to local government’s check and local firm protection policy. Therefore, there was a necessity to examine the systems and policies of local states (Yang Ji-Yeon, 2012). The effects of differences in environments when multinational enterprises operate overseas subsidiaries on the operation of business by such subsidiaries. According to empirical analysis, the differences in political and cultural environments between the head office of overseas subsidiaries and local state have made their employees difficult in handling their job, which has again confirmed the importance of studies on cultural differences between countries, which have been overlooked under the recent trend of globalization (Kim Chang-Geun and Choi Soon-Gwon, 2012).

The importance of localizing the staff of the subsidiaries of the multinational enterprises in the Republic of Korea based on social identity theory. In particular, as the percentage of employees residing at the head office increased, the organizational citizenship behavior (OCB) of the subsidiaries’ staff decreased, and cohesion between employees declined (Bae Jun-Young, 2012). The success and failure of localizing the subsidiaries of the multinational enterprises in the Republic of Korea with a balanced viewpoint. Especially, they examined the localization of subsidiaries in emerging market, focusing on head office, subsidiaries, local market and industrial characteristics from an integrated perspective and derived a localization model based on internal (head office, subsidiary) and external (local market, industry) factors (Kim Jang-Hoon and Kim Joo-Tae, 2013). Relationship between subsidiaries’ autonomy and their performances against the multinational enterprises in the Republic of Korea, and the autonomy revealed a positive effect on the performances (Shin Hyung-Deok et al., 2013).

Empirical analysis on a total of 276 Korean multinational manufacturing firms having their subsidiary in the U.S. as of 2012 taking the employment rates as a dependent variable and discovered that as the size of subsidiaries and firm age increased, the local employment rates rose as well (Yoon Woo-Jin and Won Jun-Hee, 2013). Report was released that what is multi-scalar localization and capability transference thru case study of Tesco (Wood et al., 2016).

H3: Local management capability would be positively related to linked activity capability?

H6: Local management capability would be positively related to multinational enterprises’ competitiveness?

2.4. Linked Activity Capability

Multinational enterprises’ overseas subsidiaries accumulate new technologies and secure intellectual property rights through technology transfer with their head office. In addition, they keep working hard to create new knowledge as well as technology transfer through active exchanges with colleges, local firms, and government agencies. This study attempted to investigate previous studies on linked activity capability which has been used as an independent and mediating variable. On former studies related with joint operation with colleges, the multinational enterprises in the Republic of Korea launched academia-industry cooperation focusing on talent cultivation in the 1960s. During the 1970-80s, joint R&D was accelerated. Entering the 1990s, linked activity was promoted.

With respect to previous studies cooperating with local firms in the 2000s, it is common to observe it from internal (head-subsidary study) and external (collaboration with other firms or other actors) perspectives from multinational enterprises' viewpoint and for analysis of 'overseas spatial network' (Zanfei, 2000). Innovation-driven technology development and talent cultivation with colleges were initiated. In addition, technology transfer has been actively promoted (Sohn Byung-Ho et al., 2006). Regarding advanced studies of mutual cooperation with government agencies, multinational enterprises are important to strengthen their competitiveness with differentiated knowledge and management knowhow, and that networking with local authorities would have a significant effect on the improvement of competitiveness. Especially, it could be a win-win strategy to promote a joint project in a promising industrial sector based on the government's financial aid or cooperation with the government-funded R&D center from the selection of the R&D Center's location and to the employment of R&D staff (Shin Geon-Cheol et al., 2011). Due to small market size and fierce competition, the multinational enterprise in the Republic of Korea have focused on developing their own technology and increasing market share through marketing instead of strategic partnership with local firms. In other words, they were reluctant to transfer their technology to possible rivals. Entering a new millennium, however, they have actively sought for collaboration such as merger, technical alliance and patent exchange to survive in an era of boundless competition (Kim Jae-Kyung and Lee Bong-Soo, 2012). Social influence and linked activity management skill in local subsidiary company present company's dynamics, attitude, and culture in industry (Friedkin, 2014).

The cases of industrial alliance for innovation cluster between multinational enterprises and government and local authority by region and suggested a promotion plan. In particular, they focused on regional industrial development and cultivation of R&D staff and encouraged the development of a system which can return back to a local community (Tseng et al., 2016). Recently, all academic spheres have been converged. Under these circumstances, success factors for effective academia-industry partnership in R&D, the concept of success was divided into three categories: i) research subject technically succeeded, ii) commercially succeeded, iii) strategic success (Jelier, 2017).

H7: Linked activity capability would be positively related to multinational enterprises' competitiveness?

H8: Linked activity capability would play a mediating role positively between technology management capability and multinational enterprises' competitiveness?

H9: Linked activity capability would play a mediating role positively between knowledge management capability and multinational enterprises' competitiveness?

H10: Linked activity capability would play a mediating role positively between local management capability and multinational enterprises' competitiveness?

3. Methodology

The ultimate goal of this study is to prove that efficiency maximization strategies such as technology management capability, knowledge management capability, local management capability and linked activity capability would have a positive effect on the improvement of local subsidiaries' management performances and competitiveness. Prior to the empirical analysis, the followings were performed: hypothesis setting based on previous studies, operational definition of variables and survey design, testing of the study model's goodness of fit. What is the major difference of this study vs. existing researches? How this report shows interesting result? What is the best method of empirical analysis?

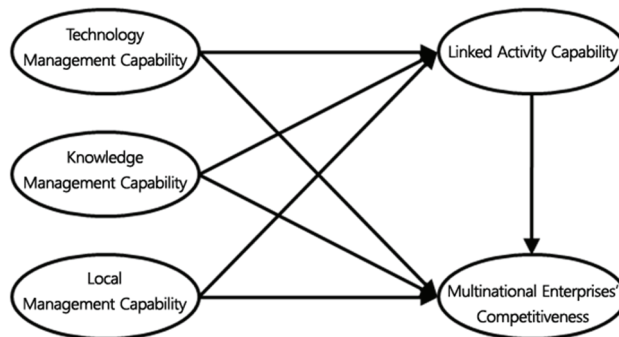
Total of 10 hypotheses in our paper were considered and are shown in Fig. 1. We figured out 7 hypotheses between dependent variable factor and independent factors.

- H1: Technology management capability would be positively related to linked activity capability.*
H2: Knowledge management capability would be positively related to linked activity capability.
H3: Local management capability would be positively related to linked activity capability.
H4: Technology management capability would be positively related to multinational enterprises' competitiveness.
H5: Knowledge management capability would be positively related to multinational enterprises' competitiveness.
H6: Local management capability would be positively related to multinational enterprises' competitiveness.
H7: Linked activity capability would be positively related to multinational enterprises' competitiveness.

With linked activity capability as a parameter, in particular, the relationship between multinational enterprises' competitiveness and technology management capability, knowledge management capability and local management capability was analyzed. Considering mediating variable's importance, this paper carried out subtle test to know what is different on indirect effect of the independent variable on dependent variable via mediating variable.

- H8: Linked activity capability would play a mediating role positively between technology management capability and multinational enterprises' competitiveness.*
H9: Linked activity capability would play a mediating role positively between knowledge management capability and multinational enterprises' competitiveness.
H10: Linked activity capability would play a mediating role positively between local management capability and multinational enterprises' competitiveness.

Fig. 1. Study Model



3.1. Research Design

This study's ultimate goal is to analyze competitiveness improvement on multinational enterprises. This paper aims to provide which factors are to strengthen or weaken competitiveness. Based on this study's objectives and operational definition of variables, the variables designed to test the hypotheses proposed in this study were extracted through review on current literature records and previous studies. Then, the questionnaire items were

designed to meet the purposes of the survey by performing a review with professors, survey experts and statistics professionals several times for almost 3 months, and content validity also was tested with *t*-test. Since this study targeted experts and managers in each field and performed advanced analysis, a 7-point Likert scale, not a 5-point was developed, considering that it would be better to have more categories in order for this study to carry out firm reliability and validity test procedure later.

In terms of operational definition on major variables, as examined in previous studies, multinational enterprises' competitiveness was measured with annual R&D investment rates, annual sales growth rates and annual income growth rates (Kim Sung-Ryung and Lee Seung-Rae, 2019), while technology management capability was assessed with the expertise, experience and length of service of the technical staffs (Kim Jae-Kyung and Lee Bong-Soo, 2012). Knowledge management capability was measured with the degree of business innovation, knowledge sharing and intellectual property right holding (Park Yang-Byung et al., 2018). In contrast, local management capability was assessed with the degree of customer satisfaction, localization of products & services and endowment to local subsidiaries (Yang Ji-Yeon, 2012). Lastly, linked activity capability was measured with the degree of cooperation with the government & related authority, domestic firms and colleges (Tseng et al., 2016) according to Table 1.

Table 1. Operational Definition of Variables

Category	Variable	Measurement Item
Dependent Variable	Multinational enterprises' competitiveness	Annual R&D investment rates & amounts
		Annual sales growth rates & amounts
		Annual income growth rates & amounts
Independent Variable	Technology management capability	Degree of Technical expertise
		Work experience periods
		Length of service periods
	Knowledge management capability	Degree of corporate innovation
		Degree of knowledge sharing
		Degree of intellectual property right sharing
Local management capability	Degree of customer satisfaction	
	Degree of product & service localization	
	Degree of empowerment to domestic subsidiaries	
Mediating Variable	Linked activity capability	Degree of cooperation with government and related authorities
		Degree of cooperation with domestic firms
		Degree of cooperation with colleges

Note: All contents of operational variables were collected by authors through expert interviews and previous studies.

In this study, enterprises were extracted based on Korea Investors Service's KIS-Value and business data and database published by the Ministry of Trade, Industry and Energy, KOTRA, Korea International Trade Association (KITA) and Korea Foreign Company Association. A total of 632 firms were randomly selected through proportional allocation by business size, business type and business period against nearly 1,100 companies with at least

50% investment ratio, and a questionnaire survey was performed against about 250 firms which participated in a phone interview. According to frequency analysis, the respondent enterprises (finally 250) were divided by nationalities, industry, size of company, and entry year according to Table 2. Especially the nationality of them are followed by USA (32.0%), Japan (19.6%), China (19.2%), EU (18.0%) and Industry type by high-tech (30.9%) and non high-tech (69.1%). In the size of company, the majority of samples are medium and above group with number of above 200 employees (74.0%). The business entry year is about 18.2 on the average with matured localization experience. The respondents were limited to the managers who understand business operation. The data collected for empirical analysis were processed, using SPSS V21.0 and AMOS V18.0.

Table 2. Descriptive Statistics of Respondent's Character

(Unit: %, Export Similarity Index)

Nationality		Industry		Size of Company		Entry Year		
USA	32.0	High-Tech	Chemicals	10.5	below 50 persons	4.0	below 5 years	4.4
			IT	20.4				
EU	18.0		Food	2.0	51 to 100	5.6	6 to 10	18.0
			Paper	1.6				
			Non-Metals	6.4				
Japan	19.6				101 to 200	16.4	11 to 15	24.4
							16 to 20	23.2
China	19.2	Non High-Tech	Metals	9.6	201 to 300	25.6	21 to 25	10.4
			Machinery	20.4				
Asia	10.0						26 to 30	9.6
							Transportation	2.0
Australia	1.2		Others	27.1	above 300	48.4	over 31	10.0

Note: data surveyed by 250 firms based in Korea.

3.2. Study Model's Goodness of Fit

3.2.1. Reliability and Validity Testing

Hypothetical concepts used in this study are measured by respondents' subjective assessment. Therefore, it is needed to examine how exactly they are measured. Reliability testing includes the stability, consistency, predictability and accuracy of measurement. It refers to how consistently the results are measured or if there exists an error in such results. To figure out how reliable the questionnaire items, Cronbach's α was adopted as a reliability coefficient. All variables were measured with Cronbach's α in the range of 0.745-0.899 showing a reliable level in Table 3. This data is no reliability issue in general if its scale is over 0.6.

Validity testing is to measure accuracy, and it is needed to test how well the measurements show the concept to be studied. The exploratory factor analysis which reduces and simplifies variables by binding a lot of variables with homogenous elements by examining multi-item

common factors and minimizing the loss of information was performed, and principal component analysis (PCA) and varimax rotation were adopted. The number of extraction factors was chosen based on Eigen Value (1) which showed no problem between 2.004 and 2.535, which is generally deemed acceptable along with factor loadings between 0.702 and 0.901. The results found that a total of five factors were extracted, and total cumulative variance was relatively good with 79.3% in Table 3.

Table 3. Reliability and Validity Testing Results

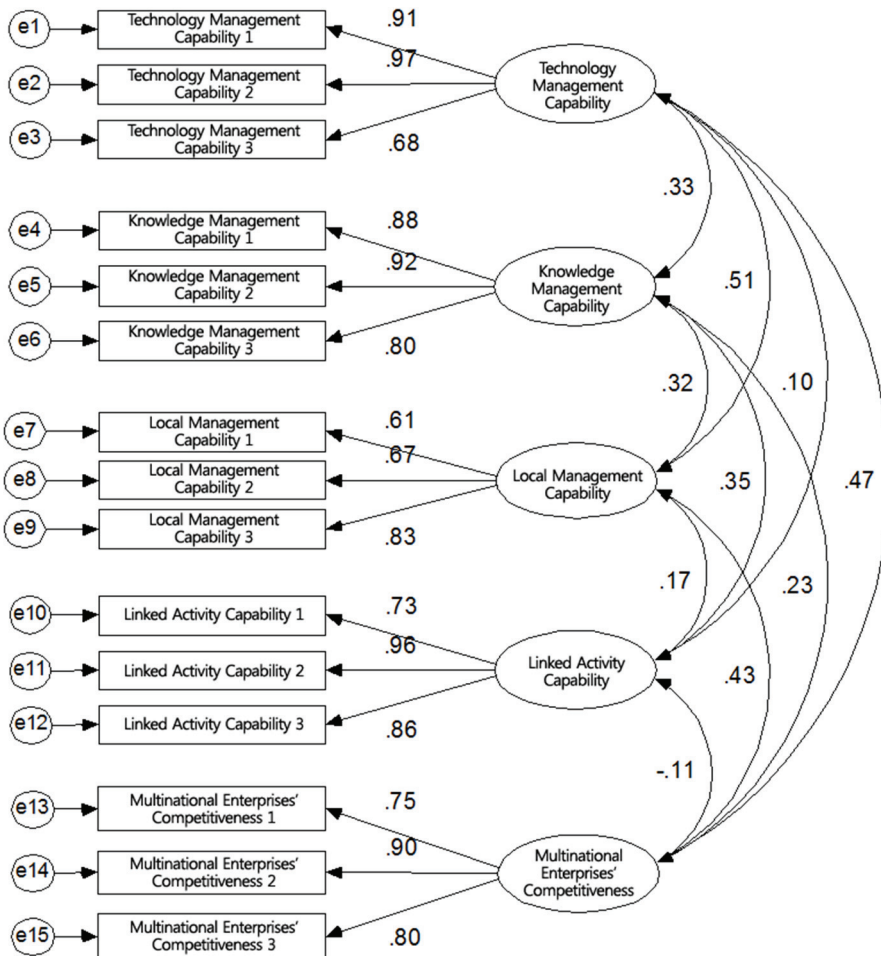
Factor	Question	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Technology management capability	Technical expertise	0.839	0.261	0.069	0.120	0.221
	Work experience	0.879	0.184	0.072	0.251	0.196
	Length of service	0.838	0.202	0.091	0.095	0.124
Knowledge management capability	Convenience of information acquisition	0.141	0.895	0.325	0.087	0.342
	Easiness in securing research facilities	0.166	0.922	0.289	0.093	0.229
	Protection of intellectual property rights	0.019	0.808	0.198	0.072	0.298
Local management capability	Degree of R&D expense assistance	0.257	0.062	0.849	0.323	0.072
	Degree of R&D Center's support intention	0.121	0.079	0.702	0.255	0.061
	Degree of the differentiated strategies of domestic R&D centers	0.299	0.032	0.775	0.128	0.097
Linked activity capability	Degree of cooperation with college R&D centers	0.104	-0.048	0.142	0.841	0.218
	Degree of cooperation with corporate R&D centers	0.092	0.083	0.272	0.900	-0.041
	Degree of cooperation with government-funded R&D centers	0.201	0.095	0.151	0.901	0.129
Multinational enterprises' competitiveness	Satisfaction with R&D activity	0.227	0.098	0.272	0.107	0.842
	R&D usefulness	0.083	0.122	0.181	0.074	0.886
	Contribution to profit generation	0.113	0.064	0.219	0.086	0.805
Eigenvalue		2.484	2.486	2.004	2.535	2.391
Variance (%)		16.559	16.576	13.360	16.900	15.938
Total variance (%)		16.559	33.135	46.495	63.395	79.333
Cronbach's α		0.880	0.899	0.745	0.882	0.854

3.2.2. Confirmatory Factor Analysis

Before path analysis in a structural equation model, it is needed to check the model's goodness of fit. According to the confirmatory factor analysis, standardized coefficients, standard error, test statistic, average variance extracted (AVE) and construct reliability (CR) were examined, and it was confirmed that the measurements of all items adopted were good in Fig. 2. In particular, there was no problem for latent factors to represent observed variables.

Since causality among such latent factors was 0.5 so that inter-independence among major variables was secured. In other words, it can be said that operational definition was well done. According to the goodness-of-fit index, the followings were obtained: $\chi^2(df, p)=110.388$ ($df=80, p=0.014$), $\chi^2/df= 1.380$, $GFI=0.885$, $AGFI=0.828$, $CFI=0.966$, $IFI=0.967$, $TLI=0.956$, $RMSEA =0.060$. Even though χ^2 was slightly lower than the reference, other assessment indexes (CFI, IFI and TLI) were 0.9 or higher. The RMSEA was even lower than the recommended level (0.080), showing a relatively good level. The standardized coefficients were all 0.6 or higher, and AVE was good with the range of 0.771-0.938. The construct reliability of latent variables was high with 0.909-0.978. Therefore, it can be concluded that a hypothetical causal model is acceptable.

Fig. 2. Study Model's Goodness of Fit



Note: $\chi^2(df, p)=110.388(df=80, p=0.014)$, $\chi^2/df=1.380$, $GFI=0.885$, $AGFI=0.828$, $CFI=0.966$, $IFI=0.967$, $TLI=0.956$, $RMSEA=0.060$.

4. Empirical Results

In empirical analysis, hypotheses were tested through correlation analysis and path analysis to figure out how the variables were correlated to each other.

4.1. Correlation Analysis

To figure out if there is any multicollinearity among variables and to judge the connection among the variables before verification of the hypothesis testing, correlation analysis was performed. As stated in Table 4, we found out that correlations among all variables were statistically significant at 5%, 1% and 0.1% mostly. In addition, correlations between constructs revealed a positive direction as stated in hypothesis testing except for linked activity capability.

In terms of relevance with the linked activity capability, technology management capability ($r=0.200, p<0.05$), knowledge management capability ($r=0.351, p<0.01$) and local management capability ($r=0.195, p<0.05$) all revealed a positive relation with statistical significance. Regarding relevance with multinational enterprises' competitiveness, technology management capability ($r=0.415, p<0.001$), knowledge management capability ($r=0.254, p<0.01$) and local management capability ($r=0.326, p<0.01$) showed a positive relation with statistical significance. However, the linked activity capability ($r=-0.137, p<0.05$) revealed a negative relation with multinational enterprises' competitiveness with statistical significance as unexpected.

Table 4. Correlation Analysis

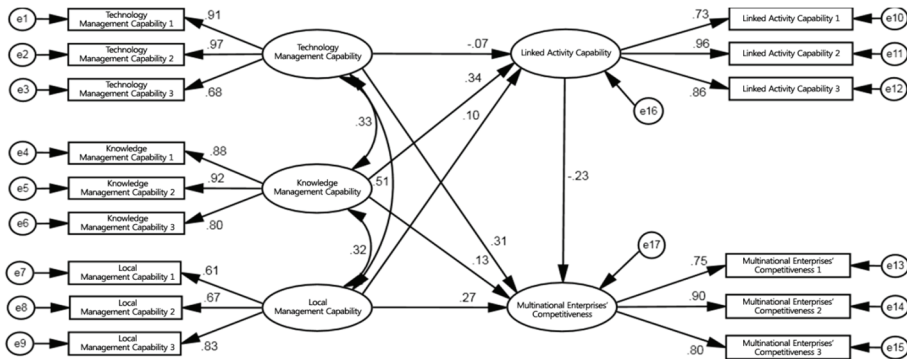
Variable	1	2	3	4	5
1. Technology Mgmt Capability	1				
2. Knowledge Mgmt Capability	0.302**	1			
3. Local Mgmt Capability	0.404***	0.266**	1		
4. Linked Activity Capability	0.200*	0.351***	0.195*	1	
5. MNEs' Competitiveness	0.415***	0.254**	0.326**	-0.137*	1

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

4.2. Path Analysis

Based on the results of CFA (Confirmatory Factor Analysis), we were able to take next step to proceed with path analysis of structural equation model as using all factors of each variable. Fig. 3 reveals the results of the path analysis which predicted a causal model among technology management capability, knowledge management capability, local management capability, linked activity capability and multinational enterprises' competitiveness by combining observed variables against latent variables. A testing on an overall structural model revealed the followings: χ^2 (df, p)=110.388 (df=80, $p=0.014$), $\chi^2/df= 1.380$, GFI=0.885, AGFI=0.828, CFI=0.966, IFI=0.967, TLI=0.956, RMSEA =0.060. Even though χ^2 is slightly lower than the reference, other assessment indexes (CFI, IFI, TLI) were all 0.9 or higher. In addition, GFI and AGFI were over the recommended level (0.8) while RMSEA was lower than the recommendation (0.080). Therefore, it appeared that it would be acceptable at a relatively decent level, and hypothesis testing was performed.

Fig. 3. Path Analysis



Note: χ^2 (df, p)=110.388 (df=80, p=0.014), $\chi^2/df=1.380$, GFI=0.885, AGFI=0.828, CFI=0.966, IFI=0.967, TLI=0.956, RMSEA=0.060.

4.3. Hypotheses Test

In this study, mediating effects through a structural equation model was tested as well. It was confirmed that all variables in this study were correlated to each other with statistical significance. In other words, they were fully ready for the analysis of mediating effects. All paths such as the effects of independent variables on dependent/mediating variables and mediating variables on dependent variables should be statistically significant as a single factor on the predicted direction. Provided that a mediating effect exists, if it appears without statistical significance when a mediating variable is considered, the path in which an independent variable has an effect on dependent variables is named 'full mediation'. If it shows up with statistical significance in all paths, it is called 'partial mediation'.

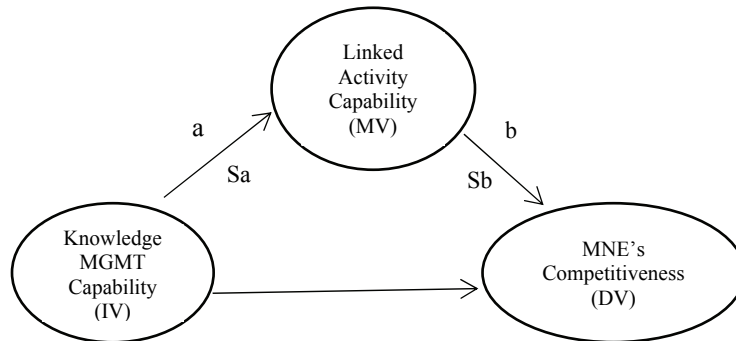
According to analysis on indirect effects through a bootstrap test, the linked activity capability revealed full mediation (direct: 0.126, indirect: -0.079(p<0.05), full effect: 0.047) between knowledge management capability and multinational enterprises' competitiveness. Therefore, hypothesis H9 was supported. In other words, in terms of the effects of knowledge management capability on multinational enterprises' competitiveness, the linked activity capability revealed mediating effects with synergy, not from an inhibiting standpoint. On the contrary, H8 (technology management capability) and H10(local management capability) were rejected due to the absence of indirect effects.

In conclusion, H1, H3, H8, and H10 were rejected, while H2, H4, H5, H6, H7, H9 were passed by empirical study of Path Analysis as well as Correlation Analysis.

4.4. Mediating Variable Test

It would be meaningful for this paper to get what is different value of meditating variable through testing Sobel, Aroian, and Goodman among Independent Variable (Knowledge Management Capability), Dependent variable (Multinational Enterprise's Competitiveness), and Meditating Variable (Linked Activity Capability). Using an interactive calculative tool for meditation tests in Fig. 4, we found out that critical ratio, as a test of whether the indirect effect of the Independent Variable on Dependent Variable via Mediating Variable, is significant different from zero as making meaningful impact on empirical test result passed by Meditating Variable.

Fig. 4. Soble Test



Note: a (0.257), b (0.273), Sa (0.006), Sb (0.011), Sobel test value (24.425), Aroian test value (24.418), Goodman test value (24.435), standard error (0.005), p -value (0).

5. Discussion and Conclusion

Multinational enterprises which run the business around the globe keep working hard to explore core competence and strengthen their competitiveness. The subsidiaries of the multinational enterprises in the Republic of Korea have also strengthened their competitiveness through increase in sales and profits after the following activities with a goal of enhancing management performances under systematic communication with the head office, reinforcement of subsidiaries' power, differentiation with domestic firms, exploration of competitive advantage factors & improvement of efficient management activities, maximization of customer satisfaction, expansion of patent & intellectual property rights, technical staff retraining, enhancement of cooperation with the related firms and authorities, promotion of new business, M&A, reinforcement of local marketing. Furthermore, paradigm shift in global economy and overseas subsidiary's competitiveness reinforcement strategy would continue for the time being. In this context, a study on the determinants of competitiveness improvement of multinational enterprises in the Republic of Korea is meaningful. Therefore, this study reached the following conclusions based on the results of diverse empirical analysis such as reliability & validity testing, confirmatory factor analysis, correlation analysis and path analysis.

First, knowledge management capability only revealed a positive effect at the testing through path analysis with linked activity capability and structural equation. In other words, as local subsidiaries are more advanced in technology innovation, knowledge sharing and intellectual property rights, synergy effects through the linked activity with domestic firms, colleges and government agencies would be maximized and promoted for co-prosperity.

Second, even though technology management capability, local management capability and linked activity capability had a statistically significant effect on the improvement of overseas subsidiaries' competitiveness, linked activity capability revealed a negative effect. From the multinational enterprises' perspective, in other words, it could weaken competitiveness due to the transfer and spread of advanced technologies to domestic firms. In terms of knowledge management capability, no statistical significance was found with the subsidiaries' competitiveness according to empirical analysis through structural equation.

Third, this paper tested mediating effects. In other words, all paths such as the effects of

independent variables on dependent & mediating variables and mediating variables on dependent variables should be statistically significant as a single factor on the predicted direction. The statistical analysis found that all paths were statistically significant in knowledge management capability, linked activity capability and multinational enterprises' competitiveness. In other words, 'full mediation' through linked activity was confirmed.

Especially, what is the major difference of this study comparing with existing studies is mainly to draw the result thru mediating variable of linked activity capability on competitiveness improvement of multinational enterprises and show all positive effects between linked activity capability and technology management capability & knowledge management capability in a structural equation model and empirical analysis. Another interesting point is this report divided three major factors like dependent variable, independent variable, and mediating variable in research design. Another differentiated one is linked activity capability is comparatively not positive factor that affect which multinational enterprises based in Korea strengthen overall competitiveness improvement rather than that previous studies believe.

Through this study, our findings have significant implications for research and practices across country specific advantages to take into account the multi-faced problems and improve competitiveness. This study also suggests important implications in practical and policy aspects as well as in academic aspect based on empirical analysis because multinational enterprises launch their business at commercially advantageous places and move on to the next step depending on local management performances. Therefore, a study on the improvement of the competitiveness of domestic multinational enterprises' subsidiaries would develop a model which could help Korean government attract investments and carry out strategic decisions from the world's renowned multinational enterprises. Actually Korea's global competitiveness ranked #13 following Singapore (#1), Hong Kong (#3), Japan (#6), and Taiwan (#12) according to The Global Competitiveness Report in 2018. It would help Korea government boost multinational companies' competitiveness progress to encourage Korea region's competitiveness development in the long run.

Despite the demonstrated performance of the proposed model, this study has two limitations. First, this study was performed against the multinational enterprises stationed in the Republic of Korea only. That is reason why this report has limitation to prove and explain across multinational enterprises' overall competitiveness improvement phenomenon. Second, there is another limitation in reaching an agreement with a questionnaire survey through phone interview. To solve these problems, there would be further studies based on case analysis and diverse descriptive statistics as well as different level's research and practices globally at next time.

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