

Effect of International Trade and Business for Approval Mediated by Relationship Capabilities on Korea's Export Growth*

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Bong-Ju Kang

Department of International Trade, Pusan National University, Busan, South Korea

Yang-Kee Lee[†]

Department of International Trade, Pusan National University, Busan, South Korea

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Abstract

Purpose – This study analyzed the effect of obtaining international products and qualification certification on exports according to the suitability evaluation system. Recently, non-tariff barriers have emerged as technical barriers, and the Biden administration is trying to achieve export growth and economic growth by utilizing the demand for conformity assessment following the Fourth Industrial Revolution and the free trade system from the perspective of Korea.

Design/methodology – This study analyzed the effect of a manufacturer's product certification acquisition on a company's export performance using Resource-Based View-based multiple regression analysis. To this end, concentration validity was confirmed through Factor analysis and Cronbach's alpha, and correlation analysis was performed to verify discriminant validity.

Findings – Product certification and qualification have a positive impact on the company's export performance. In particular, technological dynamism and relationship control have had a significant impact.

Originality/value – Considering that the Conformity Assessment Management Act will take effect in earnest in 2022, this study is believed to suggest that companies that have been certified to meet international standards may improve their export performance and increase their value in the future. International market.

Keywords: Dynamic Capability, Export Performance, International Certification, Qualification Certification, Recognition of Certification, Relationship Capability, Technology Capability

JEL Classifications: K20, K23, L25, L50, M10, M53, O30, O34

1. Introduction and Purpose of Research

An international system, product certification, and qualification mean that a product, qualification, service, system, etc. meets international requirements such as technical regulations, and specific standards, standards, and finally guarantees reliability or stability. Accordingly, an international product and qualification certification system applying different technical applicable code and standardizations from various countries around of the world is being operated, and a certification system is newly established or expanded as

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[†] Corresponding author: yangkee21@pusan.ac.kr

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necessary. As free trade expands, national certification through FTAs is mutually recognized, and information exchange between member countries is promoted when changing national technical regulations and regulations on certification under the WTO/TBT agreement. Product and system approval has become very main topics and an important issue in international trade and GVC(Global value chain) to save time and money, and the quality infrastructure can be reliable through the assessment by the conformity assessment agency. This relates to technical regulations or standards, and the entity must meet the specific requirements of the importing country to export the product to overseas markets. Assessing conformity to technical regulation and applicable code is called International conformity assessment(From the following article, conformity assessment is referred to as “CA”) process, and a CA has grown and changing rapidly in recent. In addition to a recent enactment of the CA Management Act, interest in the conformance evaluation industry is increasing.

Last year at the NITS(National Institute of Technology and Standards) established the WTO/TBT Comprehensive Support Center. CA and Qualification activities include inspecting, testing and certification is particularly important for obtaining international certification. Testing and certification are regulations on the quality, health, environment and safety of services and products that support the export-oriented Korean economy in particular. The CA system of Inspecting Certification is to determine whether a product or service meets the technical regulations and standards required by the government for national safety and benefit, and the testing, inspecting, certification and qualification bodies acting and taking on behalf of a Technical applicators and Regulators (Lee Kwang-ho, Mok Eun-Ji, 2019). Korean companies have also recently broken away from processing and product structure and are producing and selling in overseas markets.

In many cases, cooperation with local companies is possible when entering overseas markets, and whether to get international qualification is an important factor in increasing reputations and global partnerships. In particular, the quality of manufacturing, production, or service is reviewed through international business certification, so companies strive to obtain international certification. For Korean companies aiming to enter the global market to expand their business areas overseas, strategies are needed to explore new markets and respond to customer needs. The key to the company's strategy is to gain and maintain a competitive edge and respond to rapidly changing market conditions with dynamic capabilities. The theory is that dynamic capabilities continue to improve the capability to adapt to changing market conditions (Kleinshmidt, 2007), as well as utilize and maintain the key resources held by a enterprise, and acquire new resources and capabilities to ensure long-term competitiveness. Benefits (Luo, 2000).

2. Theoretical Background

As of October 2022, the global economy's production network continues to strengthen between the Russian-Ukrainian War and the Biden-led U.S. administration versus rivals from powerful one-man leaders such as Putin in Russia and Xi Jinping in China.

And the competitive advantage of the domestic market alone created a business environment where the survival and growth of the company were not certain. In addition, as competition in the domestic market intensifies, the global market has become an essential requirement for corporate management.

In particular, the acquisition of international certification for products and licensing that

directly give affect export results and performance among international qualifications affects the contract and performance of a company, which is an important factor in corporate management.

Dynamic Capability Theory complements resource-based theories while emphasizing the several dynamics of corporation with company's innovation activities, refers to a company's ability to integrate, build, and reorganize internal and external capabilities to adapt to rapidly changing environments (Tece et al., 1997). Dynamic Capabilities will be built, integrated, and reorganized to cope with rapid environmental and economic changes, such as the current neo protectionist environment in 2022. It refers to the ability to 'reorganize'. Dynamic is a capability to proactively respond to rapidly changing environments by planning and improving the production and supply capabilities of an enterprise. Capability refers to the key role in strategic management that can meet changing national and market needs through the restructuring, suitability and integration of technologies and resources.

The dynamic capabilities inherent in processors and resources are ultimately an important source of determining a competitive advantage and a firm's trade expansions (Bornhart; Yoon Young-don, 2015). Dynamic capabilities have incorporated success since the 1990s. Although related studies have been actively conducted and are attracting attention, their studies are limited to general definitions and there is no consensus on specific competency factors (Barreto, 2010; Dixon et al., 2014). In addition, various opinions have been suggested among scholars on the impact of dynamic capabilities on corporate performance. Nevertheless, studies on dynamic capabilities lack sufficient research to develop systematic concepts, categories, integrated and empirical analysis studies related to performance in dynamic environments are very insufficient (Barreto, 2010; Cepeda and Vera, 2007; Winter, 2003; Kang, 2021).

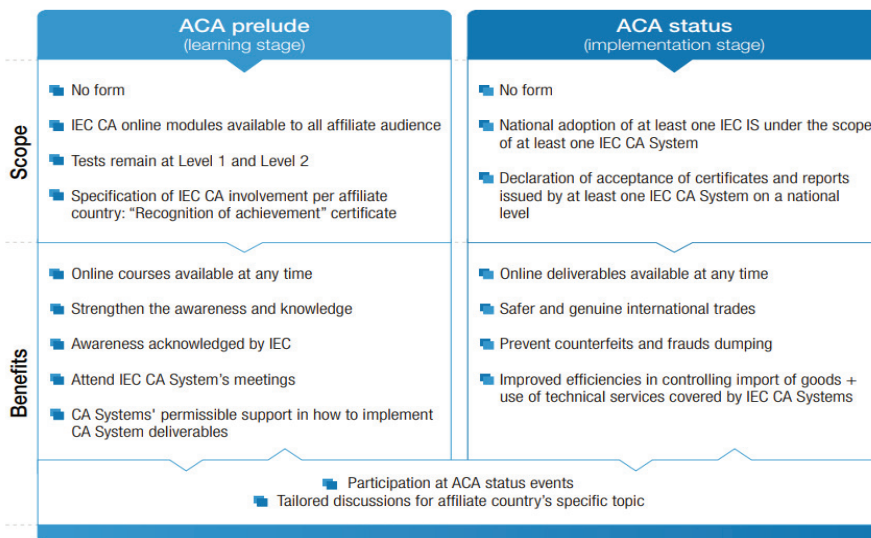
One of the non-tariff barriers, the technical barrier to WTO FTA trade, is a trade barrier that prevents the free movement of products by applying different compliance evaluation procedures, procedural standards, and technical regulations. In, 2018).

Prahalad et al. (1990) presented the concept of core competency as a competency that must be kept for the success of a company regardless of external factors and a unique competency that can do better than other organizations. It has been argued that organizational learning ability that combines various and complex technologies is necessary for the development of core competencies.

ISO is working on standardization with its affiliated governments and non-governmental international organizations. For all matters relating to electrical technology, standards relating to the manufacturing industry with the International Electro technical Commission (IEC) generally define conformity assessment as an act of proving that the requirements specified about the product, procedure, system personnel, and organization under evaluation are met.

A certification system that punishes exporters can be viewed as a trade barrier, rather than simply exercising national rights to protect people's health, safety, and the environment (Vertinsky and Zhou, 2000). Issue of international qualification and certification, which is acting as a new technical barrier to international trade, must be preceded as a prerequisite for a company's product export. The exporting company must be able to understand the standards of the other country and obtain the necessary international certification to export and produce products that meet the qualification conditions. Certification refers to objectively and independently evaluating and proving that a certification body with international standards or standards has appropriately reviewed and evaluated the products or services of a specific company (Jinwoo Park, 2013).

Fig. 1. A two-stage process in IEC CA prelude



Source: IEC Report to WTO TBT Committee, February – December 2021.

The knowledge-based theory has emerged as an evolved form of the resource-based view (RBV). Knowledge-Based View (KBV) identifies knowledge as the most important resource for an enterprise. Knowledge is especially important for small and medium-sized enterprises that lack or have limited resources for management. In rapidly changing global markets, KBV observes corporate globalization through a lens of knowledge (Gassmann and Keup, 2007; Cavuşgil and Knight, 2004). Therefore, while the transition from protectionism to liberalism started in 2021, the possession of intellectual property such as the acquisition of international certification is an essential factor for growth and survival. It is more prevalent than ever (Mohsen Selfi et al., 2017).

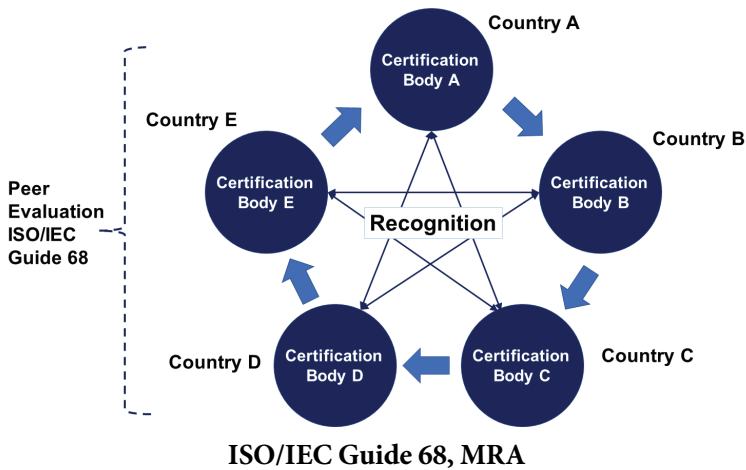
Product certification refers to procedures in which third parties document and guarantee that a product, process, or service meets specified requirements. The entity that performs this authentication operation is called the certification authority. The certification authority may independently perform testing and inspection tasks or supervise tasks performed by other agencies.

Product certification in Korea is implemented to ensure the safety of people, the environment, and goods, and is divided into mandatory certification and voluntary certification, which are legally mandatory certification, and is implemented for support and encouragement, not an obligation. However, the international certification of Frota and Ticona (2006) is an official certification ("certificate") that, unlike Korean certification, meets the specifications or customer specifications required by international standards for inspection or laboratory test reports. Cleto and Giovanetti (2018) grant producers the right to use certification marks on approved products or packages. Mandatory or voluntary, because product (or process) characteristics are evaluated by specific standards. In the case of product certification, macroeconomic reform was promoted worldwide as the fourth industry and globalization began in earnest (Cleto and Giovanetti, 2018). Product certification, if verified

by the government or certification authority, may affect the industrial sector determined. Despite the obligation to spread to all products and manufacturing certification are applicate differently depending on the characteristics of technology, standards, infrastructure, and personnel (INMETRO, 2007).

Therefore, it is justified in terms of its use of standards and patterns and its relevance to organizations and governments, and product certification (Blind, 2013; Egyedi, 2012; Foukaki & K̄rreman, 2013; Khudina, 2012; Swann, 2010). Koo Yoon-Chul(2017). The relationship between the use of international qualifications and the business management performance of domestic import and export companies was empirically analyzed. As a result, it was found that companies that have improved management capabilities and flexibility through obtaining international certification have a positive effect on strengthening relationships between companies as well as establishing partnerships with suppliers and supply chains.

Fig. 2. Mutual Recognition Arrangement (MRA): Process Chart : ISO/IEC Guide 68



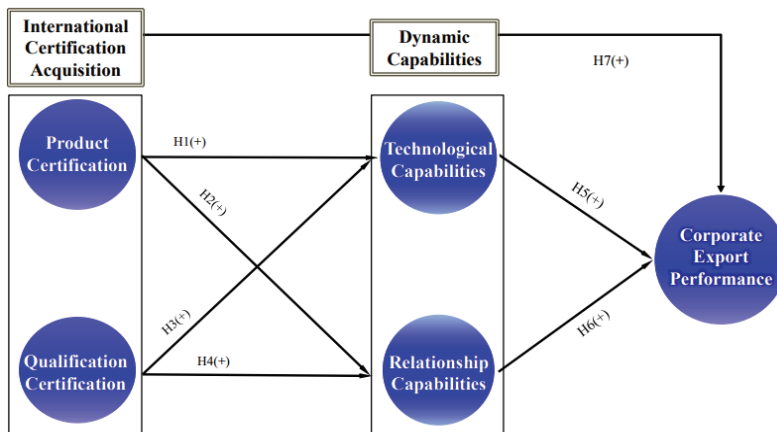
Source: ISO/IEC Guide Instructions 2022

3. Hypothesis Setting and Research Method

3.1. Research Model

This study includes the following analysis and hypothesis. The purpose of this study is to analyze and understand the performance of product and manpower qualifications and certification for manufacturers' international export performance through multiple regression analysis. In this study, in order to verify the validity of the measurement variables and items, the measurement items constituting each variable are discriminated against and converged. To this end, the convergence validity is verified through factor analysis, Cronbach's alpha, and correlation analysis is performed to verify the discriminant validity. The variables were set as technical competencies and resources, which are believed to have the greatest influence on dynamic competency manufacturers. In addition, the product qualification and certification acquisition variables were set as independent variables.

Fig. 3. Research Model



3.2. Hypothesis Setting

Based on the above research model, this section established a research hypothesis focusing on the causal relationship between related variables. The research hypothesis was set in the order of technology capabilities, overseas market entry, technology capabilities, and resources to obtain certification for direct export products, overseas market entry, and direct export.

Here are some of the details.

Table 1. Research Hypothesis Synthesis

| Concept | Hypothesis |
|--|--|
| Relationship between products certification and marketing & technological capabilities | <p>【H1】 Product certification acquisition will have a positive (+) effect on a company's technological capabilities.</p> <p>【H2】 Acquisition of product certification will have a positive (+) effect on a company's marketing capabilities.</p> |
| Relationship between qualification certification and marketing & technological capabilities | <p>【H3】 Qualification certification acquisition will have a positive (+) effect on a company's technological capabilities.</p> <p>【H4】 Acquisition of Qualification certification will have a positive (+) effect on a company's marketing capabilities.</p> |
| Relationship between dynamic capability and export performance | <p>【H5】 A company's technological capabilities will have a positive (+) effect on export performance.</p> <p>【H6】 A company's marketing capabilities will have a positive (+) effect on export performance.</p> |
| Relationship between products and qualification certification acquisition and export performance | <p>【H7】 Product and Qualification certification acquisition mediating dynamic capabilities will have a positive (+) effect on the export performance of a company.</p> |

3.3. Research Method

In order to conduct this study, a total of 316 valid questionnaires were collected and used for the study as a result of distributing the questionnaire online and offline. First, looking at the sample group in <Table 2>, Busan/Ulsan/Gyeongnam area showed the highest ratio with 79.7% (252 companies) (127 companies), and machinery/equipment showed the highest ratio with 30.4% (96 companies).

Table 2. Principle Factor for Sample

| Items | Division | Number of responses (persons) | ratio (%) |
|------------------|---|----------------------------------|--------------|
| Area | Metropolitan area | 27 | 8.5% |
| | Daegu/Gyeongbuk | 20 | 6.3% |
| | Busan/Ulsan/ Gyeong-nam | 252 | 79.7% |
| | Daejeon/Chungcheong/Gangwon | 4 | 1.3% |
| | Honam/Jeju | 13 | 4.1% |
| Position | International certification officer, Person in charge | 127 | 40% |
| | Quality management, quality assurance, quality management manager, person in charge | 95 | 30% |
| | Corporate sales manager, person in charge | 25 | 8% |
| | Head of company affiliated research institute, person in charge | 38 | 12% |
| | Corporate production manager, person in charge | 13 | 4% |
| | Corporate procurement officer, person in charge | 9 | 3% |
| | Management planning, other responsible person, person in charge | 9 | 3% |
| | | | |
| Industry Sectors | Machinery/equipment | 96 | 30.4% |
| | Electric/electronic | 49 | 15.5% |
| | Chemistry | 39 | 12.3% |
| | IT | 38 | 12.0% |
| | Glass/optics | 34 | 10.8% |
| | Ship | 32 | 10.1% |
| | Car | 25 | 7.9% |
| | Cultural contents | 1 | 0.3% |
| | IT, Electric/electronic | 1 | 0.3% |
| | Machinery/equipment, IT | 1 | 0.3% |
| | Total | 316 | 100.0% |

The descriptive statistics of the variables used in this study are shown in <Table 3>. According to the analysis, R&D sales accounted for 6.1% of sales, 37.3% of exports over three years, 73.0% of exports through international certification, 8.3% of sales over three years, and 51.0% of exports through licensing.

In this study, to verify the validity of the measurement variables and metrics, the convergence validity, and the discriminant validity of the metrics constituting each variable were verified. To this end, the convergence validity was verified through factor analysis, Cronbach's alpha and, and correlation analysis was performed to verify the discriminant validity.

Table 3. Descriptive Statistics of the Measurement Items

| Items | | Average | Standard Deviation |
|---|--|---------|--------------------|
| Control variable | Share of marketing expenses over 3 years | 8.3% | 7.4% |
| | Licensing share | 51.0% | 18% |
| Products Certification | | 4.40 | 0.63 |
| Recognition of International Qualification | | 4.30 | 0.64 |
| Technological capabilities | | 4.17 | 0.59 |
| Enterprise export performance | | 4.24 | 0.68 |

Table 4. Definition of Type by Product Certification Area

| Certification Type | Definition | Prior research |
|------------------------------------|---|---|
| Products (mandatory) Certification | <p>1. It is a comprehensive procedure that is in charge of the conformity determination procedure related to product quality, and is certified by a trusted third party through a series of conformity assessment procedures leading to test inspection, safety certification, and certification mark whether or not product quality-related requirements are satisfied.</p> <p>2. It sets the parameters to be confirmed and compared with the exact quantifying reference document to demonstrate the suitability of the nature of the product, service, or system.</p> <p>3. It contributes to the normalization imposed by the state and supported by social interests.</p> <p>4. It is associated with the increasing need to develop standards compatible with globalization, and the large amount of currently available statistical data for usage patterns allows us to measure its effectiveness.</p> | <p>Juliano(2018) Iapmei(2015) Kärreman(2013) Blind(2013) Egyedi(2012) Haimowitz & Warren (2007) Abreu (2005) Barzel (2003) Yuncheol Koo(2018) Jinyoung Jeong(2016) Bongju Kim(2005)</p> |
| Qualification Certification | <p>1. Qualification of equipment and personnel to be engaged; Use of specific procedures and records</p> <p>2. Standardization of the test methods and specifications can be viewed as an enabler for efficient and robust certification process.</p> <p>3. Training programs are currently developed and updated by specialists on the Job Role Committees) and certification programs dedicated to specific professions.</p> <p>4. Being a relatively new manufacturing technology, the specific testing procedures still need to be developed</p> | <p>H. Kogure(2003) Mohsen Seifi(2017) Quintino L (2007) Anca Draghici(2014) Michael Reiner(2014)</p> |

Source: Based on prior research, the writer reorganizes.

Table 5. A Study on the Definition of each type of Dynamic Capabilities

| Division | Variable | Operational definition | Prior research |
|----------------------|----------------------------|--|---|
| Dynamic capabilities | Technological capabilities | Resources, knowledge, and skills necessary to create new products or services based on the technological capabilities of the company and the level of technology it possesses. | Burgelman et al. (2004) Romijin and Albaladego, (2002) Knight and Cavusgil (2004) Aw and Batra(1998) Schoenecker and Swanson (2002) Jinwoo Jeong and others (1998) Namshin Cho (2003) Dong-seok Lee and Rak-chaе Jeong (2010) Sooncheol Bae-Byeonggeun Kim (2016) Jae-il Jeon (2016) |
| | Relationship capabilities | The company acquires or acquires a sustainable competitive advantage Resources that expand the scope and characteristics of resources that can be developed. A business is made up of networks and connections or relationships with other social resources. | Wernerfelt (1984) Barney (1991; 2001; 2007; 2010) Newbert (2007) Chrisholm & Nielson (2009) Locket, Thompson, & Morgenstern (2009) Anderson, Dood, & Jack, in press; Ellis (2010) Yanqing Duan (2013) Nuyakin & Elia Ardyan (2018) Lee Kun-bong (2019) Park Chul-soon (2015) |

Source: Based on prior research, the writer reorganizes.

4. Data Analysis and Results

4.1. General Characteristics of the Sample Collective Enterprise

Table 7 shows the descriptive statistics of the variables to be used in this study. The results are as follows. The proportion of R&D sales was 6.1%, the proportion of exports to sales for three years was 37.3%, the proportion of exports through international certification was 73.0%, the proportion of sales for three years was 8.3%, and the proportion of license sales was 51.0%.

4.2. Feasibility Analysis of Metrics

In this study, in order to verify the validity of the measurement variables and measurement items, the convergence validity and discrimination validity of the measurement items constituting each variable were verified. To this end, the convergence validity was verified through factor analysis, Cronbach's alpha and correlation analysis was performed to verify the discriminant validity.

Table 6. Characteristics of the Sample Group

| Items | Division | Number of responses (persons) | Ratio (%) |
|---------------------|---|-------------------------------|-----------|
| Area | Metropolitan area | 27 | 8.5% |
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| | Daejeon/Chungcheong/Gangwon | 4 | 1.3% |
| | Honam/Jeju | 13 | 4.1% |
| Respondent Position | International certification officer, Person in charge | 127 | 40% |
| | Quality management, quality assurance, quality management manager, person in charge | 95 | 30% |
| | Corporate sales manager, person in charge | 25 | 8% |
| | Head of company affiliated research institute, person in charge | 38 | 12% |
| | Corporate production manager, person in charge | 13 | 4% |
| | Corporate procurement officer, person in charge | 9 | 3% |
| | Management planning, other responsible person, person in charge | 9 | 3% |
| Industry Sectors | Machinery/equipment | 96 | 30.4% |
| | Electric/electronic | 49 | 15.5% |
| | Chemistry | 39 | 12.3% |
| | IT | 38 | 12.0% |
| | Glass/optics | 34 | 10.8% |
| | Ship | 32 | 10.1% |
| | Car | 25 | 7.9% |
| | Cultural contents | 1 | 0.3% |
| | IT, Electric/electronic | 1 | 0.3% |
| | Machinery/equipment,IT | 1 | 0.3% |
| Total | 316 | 100.0% | |

Source: Statistics prepared based on the results of questionnaires distributed online and offline.

Table 7. Descriptive Statistics of Metrics

| Items | Average | Standard Deviation |
|-------------------------------|--|--------------------|
| Control variable | Share of marketing expenses over 3 years | 8.3% |
| | Licensing share | 51.0% |
| Product Certification | 4.40 | 0.63 |
| Technological Capabilities | 4.17 | 0.59 |
| Relationship capabilities | 4.32 | 0.64 |
| Enterprise export performance | 4.24 | 0.68 |

In order to verify the validity of the research variables used in this study, the convergence validity procedure was first performed. In general, the first thing to do when verifying convergence validity in social science is to check whether the metrics consistently describe the variables. Therefore, the reliability test was performed and the Cronbach's alpha coefficient was used. In general, if the coefficient is 0.5 or more, it is judged that there is

reliability. Therefore, based on this, the validity of the measurement items was verified in this study. As a result of the verification, as shown in <Table 8>, it was determined that it could be used for research if all measurement items were 0.5 or more.

Table 8. Results of Reliability Analysis of Measurement Items

| Variable name | Number of metrics | Reliability factor (Cronbach's alpha) |
|-------------------------------|-------------------|--|
| Product Certification | 14(2 deleted) | .979 |
| Recognition of Qualification | 8(3 deleted) | .952 |
| Technological Capabilities | 8 | .977 |
| Enterprise export performance | 11 | .988 |

Table 9. Factor Analysis results

| Item | Relationship competency | Product Certification | Export performance | Marketing competency | Qualification certification | Technical competency | Management system certification |
|----------------------------|-------------------------|-----------------------|--------------------|----------------------|-----------------------------|----------------------|---------------------------------|
| Product Certification 1 | .183 | .550 | .110 | .059 | .262 | .111 | .172 |
| Product Certification 2 | .213 | .638 | .189 | .053 | .253 | .106 | .074 |
| Product Certification 5 | .223 | .570 | .191 | .201 | .287 | .182 | .101 |
| Product Certification 6 | .158 | .482 | .053 | .013 | .065 | .246 | .328 |
| Product Certification 7 | .255 | .612 | .185 | .148 | .221 | -.044 | .176 |
| Product Certification 9 | .278 | .625 | .138 | .275 | .149 | -.008 | .105 |
| Product Certification 10 | .028 | .578 | .024 | .146 | .114 | .312 | .090 |
| Product Certification 11 | .291 | .580 | .110 | .259 | .154 | -.021 | .198 |
| Product Certification 12 | .101 | .616 | .075 | .091 | .041 | .276 | .130 |
| Product Certification 13 | .170 | .524 | .105 | .072 | .079 | .180 | .348 |
| Product Certification 14 | .185 | .558 | .080 | .108 | .044 | .261 | .157 |
| Management Certification 1 | .203 | .349 | .069 | .158 | .236 | .123 | .464 |
| Management Certification 6 | .082 | .350 | .038 | .153 | .070 | .220 | .478 |
| Management Certification 7 | .121 | .128 | -.025 | .067 | .074 | .299 | .641 |

| Item | Relationship competency | Product Certification | Export performance | Marketing competency | Qualification certification | Technical competency | Management system certification |
|-------------------------------|-------------------------|-----------------------|--------------------|----------------------|-----------------------------|----------------------|---------------------------------|
| Management Certification 8 | .080 | .312 | .067 | .150 | .119 | .057 | .602 |
| Management Certification 11 | .170 | .356 | .160 | .140 | .101 | .045 | .584 |
| Qualification certification 1 | .273 | .217 | .213 | .203 | .710 | .046 | .116 |
| Qualification certification 2 | .138 | .201 | .108 | .043 | .647 | .241 | .130 |
| Qualification certification 3 | .243 | .143 | .149 | .184 | .735 | .097 | .086 |
| Qualification certification 4 | .132 | .228 | .123 | .154 | .692 | .042 | .042 |
| Qualification certification 7 | .210 | .189 | .238 | .184 | .681 | .033 | .134 |
| Technical competency 1 | .066 | .204 | .002 | .043 | .015 | .705 | .129 |
| Technical competency 2 | .116 | .195 | .110 | .093 | .047 | .646 | .065 |
| Technical competency 7 | .030 | .167 | .038 | .161 | .126 | .620 | .031 |
| Technical competency 8 | .193 | .088 | .111 | .107 | .110 | .621 | .176 |
| Relationship competency 1 | .662 | .269 | .222 | .305 | .176 | .139 | .067 |
| Relationship competency 2 | .740 | .126 | .075 | .134 | .103 | .124 | .152 |
| Relationship competency 3 | .722 | .228 | .215 | .193 | .212 | .055 | .173 |
| Relationship competency 5 | .666 | .207 | .218 | .378 | .217 | .076 | .065 |
| Relationship competency 6 | .710 | .246 | .101 | .249 | .226 | .079 | -.012 |
| Relationship competency 7 | .530 | .123 | -.024 | -.014 | .043 | .433 | .202 |
| Relationship competency 8 | .498 | .150 | -.016 | .081 | .100 | .375 | .190 |
| Relationship competency 9 | .720 | .244 | .164 | .245 | .164 | .091 | .102 |
| Relationship competency 10 | .701 | .307 | .150 | .236 | .217 | .028 | .052 |
| Marketing 1 | .212 | .109 | .126 | .574 | .174 | .146 | .265 |
| Marketing 2 | .290 | .161 | .208 | .514 | .141 | .174 | .159 |
| Marketing 3 | .273 | .122 | .160 | .701 | .199 | -.040 | .047 |
| Marketing 4 | .062 | .034 | -.048 | .454 | .052 | .414 | .288 |
| Marketing 5 | .348 | .156 | .133 | .657 | .094 | -.028 | .033 |
| Marketing 6 | .129 | .220 | .046 | .540 | .145 | .231 | .065 |
| Marketing 7 | .174 | .231 | .164 | .565 | .099 | .242 | .080 |

| Item | Relationship competency | Product Certification | Export performance | Marketing competency | Qualification certification | Technical competency | Management system certification |
|----------------------|-------------------------|-----------------------|--------------------|----------------------|-----------------------------|----------------------|---------------------------------|
| Export performance 1 | .020 | .164 | .675 | .022 | .084 | .267 | .069 |
| Export performance 2 | -.006 | .054 | .715 | -.011 | .117 | -.057 | -.051 |
| Export performance 3 | .146 | .133 | .815 | .067 | .135 | .009 | .036 |
| Export performance 4 | .084 | .147 | .816 | .114 | .149 | .002 | -.003 |
| Export performance 5 | .075 | .025 | .677 | .253 | .010 | .077 | .027 |
| Export performance 6 | .208 | .138 | .790 | .106 | .113 | .004 | .116 |
| Export performance 7 | .249 | .099 | .776 | .127 | .149 | .066 | .129 |

4.3. Hypothesis Test Result

After that, multiple regression analysis was used to verify the research hypothesis established in this study. To control external factors, path analysis was performed by setting the proportion of R&D sales, the proportion of export sales, the proportion of export through international certification, and the license cost as control variables.

First, the relationship between product certification and technical capabilities corresponding to Hypotheses 1-1 and 2-1 was verified. As shown in <Table 9>, product certification is $\beta = .417$, $t = 7.194$, and $p = .000$ showed a positive (+) relationship with technology at the significance level of 99%. Therefore, hypothesis 1-1 was adopted in this study. The certification is then $\beta = .280$ at the 99% significance level. It was found that $t = 4.780$, and $p = .000$ had a positive (+) relationship with technical capabilities. Therefore, hypothesis 2-1 was adopted in this study. On the other hand, in this study, the effect of the control variable was not confirmed at the 95% significance level. In addition, multicollinearity showed a value of less than 10, which is the VIF (Variance Inflation Factors) reference value, in all measurement variables, and the Durbin-Watson value was 2.028, so there was no multicollinearity.

The relationship between product certification and qualification and marketing dynamics corresponding to Hypotheses 1-3 and 2-3 was verified. As a result of the verification, product certification is $\beta = .490$ as shown in Table 10. Hypothesis 1-3 was adopted as $t = 9.036$, and $p = .000$ showed a positive relationship with marketing dynamics at the significance level of 99%. Since then, the certification rate is $\beta = .229$, $t = 4.169$, and $p = .000$ showed a positive (+) relationship with marketing dynamics at the 99% significance level, adopting Hypothesis 2-2. Meanwhile, the proportion of marketing expenses for 3 years among the control variables ($\beta = .153$). It was found that $t = 3.463$, $p = .001$ affected marketing capabilities. In addition, multicollinearity showed a value of 10 or less, the VIF reference value, in all measurement variables, and the Durbin-Watson value was 1.937, which was close to the standard value. 2. Therefore, it was confirmed that there was no multicollinearity.

Table 10. Results of Hypothesis Verification Results of Reliability Analysis of Measurement Items

| Model | Non-standardization factor | | Path coefficient (standardization) | t | Significance probability | Collinearity statistic | |
|--|----------------------------|----------------|------------------------------------|-------|--------------------------|------------------------|-------|
| | B | Standard error | β | | | Common difference | VIF |
| (Constant) | 1.094 | .215 | | 5.092 | .000 | | |
| Share of marketing expenses over 3 years | .063 | .036 | .082 | 1.747 | .082 | .828 | 1.208 |
| Licensing share | .003 | .042 | .003 | .070 | .944 | .841 | 1.189 |
| Product Certification | .392 | .055 | .417 | 7.194 | .000*** | .545 | 1.834 |
| Recognition of Qualification | .257 | .054 | .280 | 4.780 | .000*** | .534 | 1.871 |

Note: + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ (Adj. $R^2 = .424$, $F = 59.037$, $p = .000$, Durbin-Watson 2.028) (Products Certification \rightarrow Technological capabilities).

Table 11. Hypothesis Test Result (Product Certification \rightarrow Marketing capabilities)

| Model | Non-standardization factor | | Path coefficient (standardization) | t | Significance probability | Collinearity statistic | |
|--|----------------------------|----------------|------------------------------------|-------|--------------------------|------------------------|-------|
| | B | Standard error | β | | | Common difference | VIF |
| (Constant) | .505 | .213 | | 2.369 | .018 | | |
| Share of marketing expenses over 3 years | .123 | .035 | .153 | 3.463 | .001** | .828 | 1.207 |
| Licensing share | .010 | .041 | .011 | .250 | .803 | .841 | 1.189 |
| Product Certification | .488 | .054 | .490 | 9.036 | .000*** | .548 | 1.823 |
| Recognition of Qualification | .222 | .053 | .229 | 4.169 | .000*** | .537 | 1.861 |

Note: + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ (Adj $R^2 = .493$, $F = 77.214$, $p = .000$, Durbin-Watson 1.937).

Subsequently, the relationship between technology dynamics, corporate export performance, marketing dynamics, and corporate export performance corresponding to Hypotheses 3, 4, and 5 were verified. As shown in Table 11, the technical capability is ==. With 315, $t = 4.822$, and $p = .000$, there was a positive (+) relationship with a corporate export performance at the significance level of 99%, and hypothesis 3 was adopted. Meanwhile, ==. At the 90% significance level with 061, $t = 0.829$, and $p = .408$, hypothesis 5 was rejected because marketing capabilities were not related to the company's export performance. Meanwhile, the proportion of marketing expenses for 3 years among the control variables (==).291, $t = 5.525$, $p = .012$) and the percentage of licenses (==-.129, $t = -2.515$, $p = .000$) affects

the export performance of a company. In addition, multicollinearity was found to be less than 10 VIF reference values in all measurement variables, and Durbin-Watson values were also 1.814. It is close to the standard value of 2. Therefore, it was confirmed that there was no multicollinearity.

Table 12. Hypothesis Test Result (Technological, Marketing Capabilities→Enterprise Export Performance)

| Model | Non-standardization factor | | Path coefficient (standardization) | t | Significance probability | Collinearity statistic | |
|--|----------------------------|----------------|------------------------------------|--------|--------------------------|------------------------|-------|
| | B | Standard error | β | | | Common difference | VIF |
| (Constant) | 1.174 | .273 | | 4.301 | .000 | | |
| Share of marketing expenses over 3 years | .255 | .046 | .291 | 5.525 | .000*** | .801 | 1.248 |
| Licensing share | -.133 | .053 | -.129 | -2.515 | .012* | | 1.192 |
| Technological Capabilities | .363 | .075 | .315 | 4.822 | .000*** | .519 | 1.928 |

Note: + p<.10 *p<.05 **p<.01 ***p<.001 (Adj R2=.303, F=28.328, p=.000, Durbin-Watson 1.814).

4.4. Hypothesis Test Result (total)

1. H1 adoption: Positive (+) relationship at 99% significance level
2. H2 adoption: Positive (+) relationship at 99% significance level
3. H3 adoption: Positive (+) relationship at 99% significance level
4. H4 rejection: No relationship even at the 90% significance level
5. H1 adoption: Positive (+) relationship at 99% significance level

4.5. Analysis of Mediating Effects of Dynamic Capabilities

According to the verification results of Hypothesis 3 and Hypothesis 4, in the verification of Hypothesis 6, the relationship between product certification and qualification technology dynamics was analyzed, and only the related dynamic competency-company export performance was analyzed. For analysis, the Aroian Verification proposed by Baron and Kenny(1986) was performed among social science research methods to analyze the indirect effect and analyzed as shown in Figure 4. As shown in <Table 12>, at the 99% significance level (t=3.674, p=).000), technology dynamics were found to mediate the relationship between product certification and corporate export performance. On the other hand, as shown in <Table 13>, it is determined whether a complete arbitration or partial arbitration is carried out by conducting an area test (product certification =) between product certification, technical competency, technical competency, marketing capability, and corporate export performance. 283, t=4.486, p=.000/corrate ==.214, t=3.362, p=.001). A positive (+) relationship was shown.

Therefore, the mediating effect of technological dynamism was judged as “partial mediation”.

Table 13. Analysis Result of Mediating Effect of Technological Capabilities

| Parameter (C) | Variable (A) | Variable (B) | Path | Path | T-value |
|-------------------------------|---------------------------------|----------------------------------|----------------------------|----------------------------|---------|
| | | | coefficient (A→C) | coefficient (C→B) | |
| | | | Standard Error (A→C) | Standard Error (C→B) | P-value |
| Technological capabilities | Product | Enterprise export | .417 | .315 | 3.674 |
| | Certification | performance | .055 | .075 | .000*** |
| | Recognition of Qualification | Enterprise export performance | .280 | .315 | 3.264 |
| | | | .054 | .075 | .003** |

Note: +p<.10 *p<.05 **p<.01 ***p<.001.

Table 14. Path Verification Result for Mediating Effect Analysis (product certification, qualification certification → company export performance)

| Model | Non- standardization factor | | Path coefficient (standardization) | t | Significance probability | Collinearity statistic | |
|--|-----------------------------------|-------------------|--|--------|-----------------------------|---------------------------|-------|
| | B | Standard error | β | | | Common difference | VIF |
| (Constant) | 1.117 | .271 | | 4.128 | .000 | | |
| Share of marketing expenses over 3 years | -.132 | .053 | -.128 | -2.502 | .013* | .841 | 1.189 |
| Licensing share | .274 | .045 | .313 | 6.100 | .000** | .828 | 1.207 |
| Product Certification | .307 | .069 | .283 | 4.486 | .000*** | .548 | 1.823 |
| Recognition of Qualification | .227 | .068 | .214 | 3.362 | .001** | .537 | 1.861 |

Note: + p<.10 *p<.05 **p<.01 ***p<.001 (Adj R2=.314, F=36.937, p=.000, Durbin-Watson 1.790).

4.6. Analysis of the Role of Marketing Capabilities

In this study, to analyze the role of marketing competency, technical competency, related competency, and export performance variables were set as variables that set them as parameters. Therefore, after confirming the relationship between technical capabilities and marketing capabilities, the relationship between marketing capabilities and the company's export performance was analyzed to confirm whether there was a mediating effect. As a result, as shown in <Table 14>, the 99% significance level (==). At 344, $t=7.350$, $p=.000$, there was a positive (+) relationship between marketing competencies. As a result of verifying the relationship between marketing capabilities and corporate export performance as shown in <Table 14>, the 99% significance level (==).473, $t=10.112$, $p=.000$. Therefore, it was found that marketing competency had a mediating effect.

Table 15. Path Verification Result for Mediating Effect Analysis (technological capabilities → marketing capabilities)

| Model | Non-standardization factor | | Path coefficient (standardization) | t | Significance probability | Collinearity statistic | |
|--|----------------------------|----------------|------------------------------------|-------|--------------------------|------------------------|-------|
| | B | Standard error | β | | | Common difference | VIF |
| (Constant) | .272 | .193 | | 1.407 | .160 | | |
| Share of marketing expenses over 3 years | -.011 | .038 | -.012 | -.301 | .763 | .839 | 1.192 |
| Licensing share | .094 | .032 | .117 | 2.908 | .004** | .823 | 1.215 |
| Technological Capabilities | .363 | .049 | .344 | 7.350 | .000*** | .609 | 1.642 |

Note: + p<.10 *p<.05 **p<.01 ***p<.001 (Adj R2=.587, F=110.131, p=.000, Durbin-Watson 1.853)

Table 16. Path Verification Result for Mediating Effect Analysis (Marketing capabilities → Company export performance)

| Model | Non-standardization factor | | Path coefficient (standardization) | t | Significance probability | Collinearity statistic | |
|--|----------------------------|----------------|------------------------------------|--------|--------------------------|------------------------|-------|
| | B | Standard error | β | | | Common difference | VIF |
| (Constant) | 1.927 | .252 | | 7.651 | .000 | | |
| Share of marketing expenses over 3 years | -.124 | .056 | -.120 | -2.228 | .027* | .843 | 1.186 |
| Licensing share | .254 | .048 | .290 | 5.256 | .000*** | .803 | 1.245 |
| Marketing Capabilities | .387 | .056 | .354 | 6.920 | .000*** | .935 | 1.070 |

Note: + p<.10 *p<.05 **p<.01 ***p<.001 (Adj R2=.230, F=32.326, p=.000, Durbin-Watson 1.598)

Therefore, in order to accurately understand the mediating effect of marketing competency (part of each variable, whether it is completely mediated), multiple regression analysis was performed between variables identified to be related to marketing competency. The results are as follows: Product Certification ($=.344, t=7.350, p=.000$), technical skills ($=.344, t=7.350, p=.000$). Therefore, looking at the results of <Table 16>, it was found that marketing capabilities partially mediated the relationship between product certification and corporate performance. According to the verification results of Hypotheses 3 and 4, it was found that the relationship between technology, relationship competency, and corporate performance was also partially mediated.

Subsequently, Hierarchical Regression Analysis (HLM) was performed to determine whether marketing capabilities have a moderating effect between dynamic capabilities (technical capabilities) and a company's export performance. For analysis, the first step was to enter the control variable (three-year marketing cost ratio and license ratio). In the second stage, independent variables (technical skills) were input according to the analysis order, and in the third stage, control variables (marketing capabilities) were added. Finally,

interaction terms (technical skills \times marketing capabilities) were added according to the analysis order. Build the model. At this stage, the presence or absence of a moderating effect is determined based on the increase in R2 and the significance of the interaction term.

Table 17. Path Verification Result for Mediating Effect Analysis (Product certification, qualification certification, technological capabilities, related capabilities \rightarrow marketing capabilities)

| Model | Non-standardization factor | | Path coefficient (standardization) | t | Significance probability | Collinearity statistic | |
|--|----------------------------|----------------|------------------------------------|-------|--------------------------|------------------------|-------|
| | B | Standard error | β | | | Common difference | VIF |
| (Constant) | -.004 | .196 | | -.021 | .983 | | |
| Share of marketing expenses over 3 years | -.008 | .037 | -.008 | -.211 | .833 | .836 | 1.196 |
| Licensing share | .094 | .031 | .117 | 2.986 | .003** | .819 | 1.221 |
| Product Certification | .199 | .056 | .200 | 3528 | .000*** | .388 | 2.576 |
| Recognition of Qualification | .079 | .049 | .081 | 1.605 | .110 | .487 | 2.052 |
| Technological Capabilities | .275 | .051 | .261 | 5.350 | .000*** | .526 | 1.900 |

Note: + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ (Adj R2=.615, F=82.028, p=.000, Durbin-Watson 1.901)

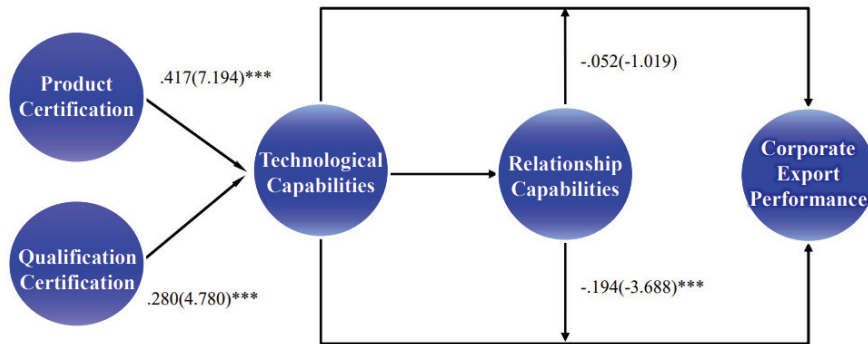
Table 18. Analysis Result of the Moderating Effect of Marketing Capabilities Between Technological Capabilities and Corporate Export Performance

| | Technological Capabilities \times Marketing Capabilities | | | |
|--|--|---------------------|---------|---------|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| Share of marketing expenses over 3 years | -.107+ | -.121* | -.123* | -.116* |
| Licensing share | .375*** | .303*** | .286*** | .278*** |
| Technological Capabilities(IV) | | .429*** | .350*** | .341*** |
| Marketing Capabilities(MV) | | | .126* | .117+ |
| IV \times MV | | | | -.052 |
| R ² | .120 | .299 | .307 | .310 |
| Δ R ² | | .124 | .009 | .003 |
| Adj R ² | .115 | .292 | .298 | .298 |
| F | 21.340 | 44.116 | 34.370 | 27.707 |
| p | .000*** | .000*** | .000*** | .000*** |
| Remarks | | Durbin-watson 1.719 | | |

Note: + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$

As a result of the analysis, as shown in Table 17 and Figure 4, the adjustment effect of technology and marketing capabilities only increased by 0.9% and 0.3% in Models 3 and 4, and in the case of Variant R, Nos. 3 and 4 were the same. Interaction terms also show corporate export performance and a 90% significance level (=--It was determined that there was no moderating effect because it did not satisfy 052, $t=-1.019$, and $p=.309$.

Fig. 4. Regulatory Effects of Marketing Capabilities Between Enterprises Export Performance of the Product Certification.



5. Conclusion

Quality control systems for products or services cover design, development, and manufacturing as a whole and are closely related to conformity assessments and international certification. In this study, the effect of increasing exports and enhancing international value was investigated by certifying products in all industrial fields using iron and non-ferrous metals. In this study, the impact relationship on corporate exports and international value improvement was investigated by certifying products in all industrial fields using iron, iron, and non-ferrous metals. In the empirical analysis, large Korean companies and SMEs, and companies that obtained product certification such as CWB/CSA, International Shipping, CE, and JIS in Canada were targeted.

First, as a result of correlation analysis, product certification mediates technology and shows a significantly positive (+) correlation with exports.

Second, product certification mediates marketing capabilities and has a significant positive correlation with exports.

Therefore, according to the results of this study, the acquisition of product certification has a positive effect on the export performance of a company, and in particular, the effect of technological dynamics and marketing control is large. Considering that the Conformity Assessment Management Act will be enforced in 2021, it can be judged that the export performance of companies that have received international standard certification will improve and the company's value in the international market will increase.

Compared to previous studies, the differences in this study are as follows.

First, many studies related to international certification analyze the effect of management system certification on corporate performance or management performance. However, this

study analyzed the effect of product certification and qualification acquisition on corporate management performance among international certifications related to manufacturing, including quality management system certification. It also explained the necessity and effect of product certification and qualification, the most important international certification in the manufacturing industry, and management system certification for quality, energy, environment, safety, and health. The importance of product certification cannot be overemphasized because even the best SMEs cannot win orders without product certification.

Second, research on the necessity and performance of product certification is absolutely insufficient in the industrial field that requires product certification and has the greatest employment impact. In this study, it was difficult to find a study that analyzed the effect of obtaining product certification on export performance. This study not only summarizes previous studies, but also identifies the intention of manufacturing companies to use international standard certification with the greatest employment ripple effect, and conducts a survey and evaluation of the export status of technical personnel. It is meaningful in that it presented a specific role and efficient plan to support professional technical personnel.

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