

Article

Overseas Market Expansion Strategy of the Global Electronic Components Company Based on the AHP Analysis of Factors in Technology, Organization, and Environment Context: A Case of Samsung Electro-Mechanics

Won Chang Cho ^{1,2}, Erdal Atukeren ^{1,*}  and Hyosook Yim ² ¹ Business School Lausanne (BSL), CH-1022 Chavannes (VD), Switzerland; wonchang.cho@bsl-lausanne.ch² Seoul Business School, aSSIST University, Seoul 03767, Republic of Korea; hsyim@assist.ac.kr

* Correspondence: erdal.atukeren@bsl-lausanne.ch

Abstract: The overseas market expansion strategy is important for achieving competitive advantage and sustainable growth of global electronic component companies. Although the global electronic component market has grown rapidly recently, research focusing on the innovation strategy of global electronic component companies' expansion into overseas markets is scarce. This paper defines the key factors that influence the success of a global electronic component company's overseas market expansion strategy based on the Technology, Organization, and Environment (TOE) framework and quantitatively identifies the relative importance of factors at the technology, organization, and environmental levels through Analytic Hierarchy Process (AHP) analysis. As a case study, we analyze Samsung Electro-Mechanics, which has grown as a global electronic components company through an overseas market expansion strategy in recent decades. As a result of the analysis, among the three top factors defined as key factors, the technology factor was evaluated as the most important factor, and among the subfactors of the technology factor, "R&D Availability", and "Production Availability" were analyzed as the most important influencing factors. These analysis results suggest that global electronic component companies can achieve successful results when they pursue overseas market expansion strategies by prioritizing technology development and focusing on growth strategies suited to the market environment. This study is meaningful as an academic study focusing on the overseas market expansion strategies of global electronic component companies and makes a practical contribution by providing management implications that can be taken by electronic component companies seeking to expand overseas markets.

Keywords: Technology, Organization, and Environment (TOE) framework; Analytic Hierarchy Process (AHP) analysis; business environment analysis; electronic components industry; Multilayer Ceramic Capacitors (MLCC)



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1. Introduction

The electronic components industry grows along with the development of all industries, including home appliances, IT, aviation, space, and medical care. In particular, as IT and electronic products such as smartphones become more multi-functional and provide further high performance, miniaturization, multi-function, and modularization of electronic components are required, and demand for related electronic components is expected to increase due to the development of the Internet of Things (IoT) and 5G communication technology. In addition, due to the increasing demand for convenience functions such as Advanced Driver Assistance Systems (ADAS) and Autonomous Driving (AD) for automobiles, and the rapid growth of the new electric vehicle industry, the demand for high-reliability and high-performance automotive electronic components that require high durability is rapidly increasing [1].

In recent decades, along with the growth of global industries, the size of the global electronic components market has also grown significantly. According to The General Electronic Components Global Market report (2023), the global general electronic components market size has grown to USD 466.61 billion in 2022 and is expected to grow even further to USD 500.85 billion in 2023, recording a compound annual growth rate (CAGR) of 7.3%. In addition, the market's growth is expected to continue and grow to USD 643.93 billion by 2027 [2].

Among the companies that have led the growth of the global electronic components industry, the largest proportion includes countries in the Asia Pacific region, which is centered on the manufacturing industry [2,3]. For example, looking at the Multilayer Ceramic Capacitor (MLCC) product market, which is the most widely used general-purpose component in all industries, global leading companies such as Murata Manufacturing, Samsung Electro-Mechanics, Taiyo Yuden, and Yageo have competed fiercely to dominate the global market in recent decades. These companies adopt a differentiation strategy to achieve technological superiority over competitors by developing cutting-edge products using the latest technology or have sought to expand overseas markets with a cost-leading competitive strategy through Foreign Direct Investment (FDI), which involves establishing production bases in low-wage countries such as China and Southeast Asia [4].

Meanwhile, because the factors that enable a company's sustainable growth are different for each industrial sector, changes or innovations in business models for sustainable growth require strategies and directions appropriate to the characteristics of the industry [5]. Regarding sustainable growth, electronic component companies have pursued a sustainable growth strategy while protecting the global market they have dominated by proactively developing and competitively supplying innovative, cutting-edge electronic components needed by large electronic components customers such as mobile phones and IT, focusing on the consumer market. At the same time, recently, leading electronic component companies such as Murata and Samsung Electro-Mechanics tend to focus on investing in research and development of high-performance, high-reliability, innovative electronic components for automotive applications and the launch of cutting-edge products for which market demand is increasing [6,7]. Such technological innovation is a strategic move to maintain sustainable growth by preoccupying new growth markets while protecting the existing mobile phone and IT market share.

Electronic component companies leading the global market have competed fiercely in recent decades to expand the global market through various strategic policies to achieve competitive advantage and sustainable growth in the market [8]. In particular, overseas market expansion has been promoted as an important strategy for electronic component companies to maintain competitive advantage and expand markets [9]. Nevertheless, research on the success of global electronic component companies' overseas market expansion strategies is not active.

Some previous studies have explained the various purposes for which companies adopt the overseas market expansion strategy [10,11]. Companies can adopt an overseas market expansion strategy when they need to improve their ability to respond to large customers in overseas markets, and they also adopt an overseas market expansion strategy when they need to utilize low wages or abundant resources overseas to reduce product costs [10,11]. In addition, overseas market expansion strategies are sometimes adopted to strengthen specific capabilities, such as when advanced technology is required, or to monitor the global market and competitors [10,12,13]. As such, although research has been conducted on the purpose of a company's overseas market expansion strategy, it is difficult to find research focusing on global electronic component companies' overseas market expansion strategy.

Many key factors can influence the overseas market expansion strategy of a global electronic component company in the context of the company's technological capabilities, organizational capabilities, and environmental factors, and an efficient overseas market expansion strategy can be established based on the understanding of the relative importance

among these factors [9,14]. The segment of electronic components is generally divided into active components, passive components, electro-mechanical, among others, and includes various product groups. Therefore, the key factors related to the overseas market expansion strategies of global electronic component companies are depending on the industrial field to which the electronic component product line produced by each company is applied and the technical characteristics of that product line, the items, and relative influence and importance of key factors may act differently.

In this situation, the Technology, Organization, and Environment (TOE) framework, which suggests innovation adoption methods in three dimensions for companies to gain competitive advantage in the global market, provides a theoretical framework. Tornatzky & Fleisher's (1990) Technology, Organization, and Environment framework is a framework that theoretically explains how the process of explaining and implementing innovation adoption in organizations is influenced by factors at the technological, organizational, and environmental dimensions [15]. The TOE framework has been applied in various technology and business fields, and Olivera & Martins (2011) summarized numerous cases of application of the TOE framework [16]. Additionally, scholars have identified each dimension of the Technology, Organization, and Environment framework in the literature as important influencing factors on the adoption of innovation in organizations [17–21]. Based on these previous studies, if adopting a global electronic component company's overseas market expansion strategy is viewed as organizational innovation, the TOE framework can be used as a key axis to configure important factors that influence the success of such innovation.

Accordingly, this study attempts to define and analyze key factors that influence global electronic component companies' overseas market expansion strategies based on the TOE theoretical framework. In addition, among the global electronic components group, we focus on the MLCC product line, which is general purpose in many industries, has relatively sensitive market demand, and is used in a high proportion compared to other electronic components. The study was conducted using Samsung Electro-Mechanics, which has successfully adopted the overseas market expansion strategy, as a case study. In recent decades, Samsung Electro-Mechanics has expanded into the global market and become a leading global electronic components company based on cutting-edge products and core technologies. Hence, using Samsung Electro-Mechanics as a target case, we define the key factors influencing the overseas market expansion strategy into three dimensions: technology, organization, and environment, and identify the relative importance of these key factors through AHP analysis.

This study aims to identify the core driving force of innovation that led global electronic component companies to enter and succeed in overseas markets and contributes to the establishment of strategies for many companies aiming to enter overseas markets, especially electronic component companies seeking to grow into global companies. The research question can be summarized as "What are the key component factors of a successful overseas market expansion strategy that led a global electronic component company to achieve sustainable growth through innovation, and what is the relative importance of these key factors?" To find answers to these research questions, we used the TOE framework as the theoretical basis for the study and conducted an AHP analysis using Samsung Electro-Mechanics, a global electronic component company, as a case study. This study is significant as it is conducted in a situation where there is a lack of research focusing on the overseas market expansion strategies of global electronic component companies despite the rapid growth of the global electronic component market. Additionally, the results of this study will provide practical implications for future global electronic component companies seeking sustainable growth through overseas market expansion.

2. Theoretical Background and Literature Review

2.1. Technology, Organization, Environment (TOE) Framework

In order to succeed in the overseas market expansion strategy of a global electronic component company, organizational innovation in three dimensions technology, organization, and environment is important. As a theory to explain this, there is a Technology, Organization, and Environment (TOE) framework. The TOE framework suggests that the analysis of success strategy factors for global electronic component companies' overseas market expansion is closely related to the company's innovation capabilities. Therefore, our study is based on the Technology, Organization, and Environment (TOE) framework designed by Tornatzky & Fleischer (1990) among several theories.

Tornatzky & Fleischer (1990) designed the Technology, Organization, and Environment (TOE) framework to explain the organizational components that affect a company's decision to adopt various technology innovations [15] (Figure 1). The TOE framework is the most widely applied theory when it comes to research adopting new technological innovations at the organizational level [22]. In addition, the TOE framework is an organization-level theory that explains that different factors of the three dimensions affect the decision to adopt an innovation in an enterprise situation. These three factors are the Technology dimension, Organization dimension, and Environment dimension, and all three have been argued to significantly impact technological innovation significantly [15,18,21,23]. The TOE framework has proven that the three factors of technology, organization, and environment in all research models influence how organizations identify the need to seek out and adopt new technologies [24]. In addition, the TOE framework, which uses a combination of three main dimensions, is more advantageous than other theories in the analysis of factors influencing new technology innovation decisions [25]. The TOE framework analyzes new technology implementation at the organizational level and is the most traditional theory that deals with the subject of new technology implementation, emphasizing the characteristics of technology, organizational context, and external environmental factors [26]. Therefore, the TOE framework is recognized as a solid foundation for research as it provides a broader view of the case [27].

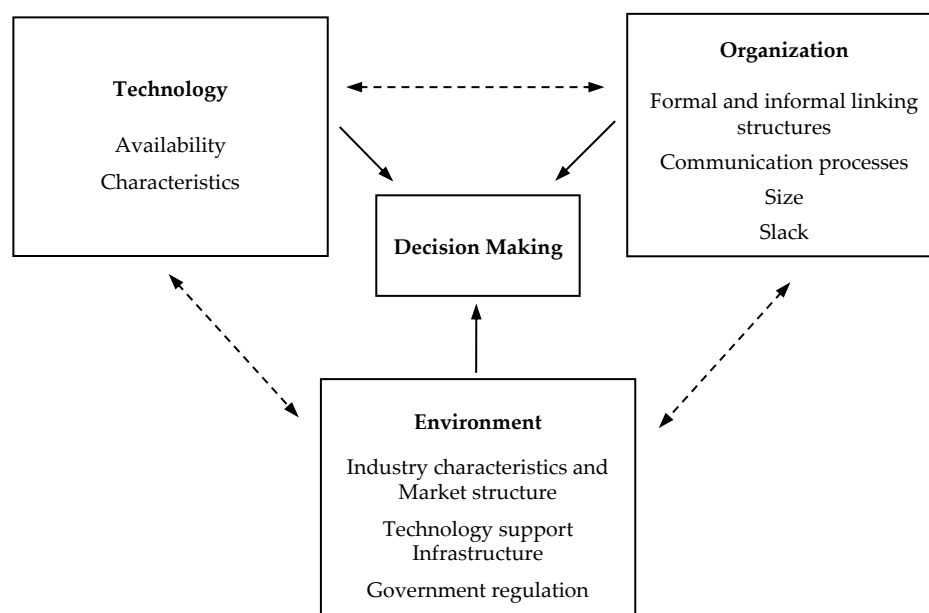


Figure 1. The Technology, Organization, and Environment framework (Tornatzky & Fleischer 1990) [15]. The TOE framework is a conceptual framework to explain key elements of the technology, organization, and environmental dimensions that influence an organization's decision to adopt innovation.

On the other hand, the TOE framework has a solid theoretical foundation, consistent empirical support, and applicability to the information system (IS) innovation domain, but the specific elements identified in the three contexts may differ from study to study [16]. Also, the variables for each dimension are different depending on industry and technology [28]. Oliveira and Martins (2011) emphasize that the TOE framework has a strong theoretical foundation and solid empirical support and provides a useful analytical tool for studying innovative technology adoption in which determinants within three dimensions are investigated [24,29,30]. The TOE framework can be used to examine different technologies in different fields, thus identifying key factors influencing the successful strategy of global electronic components expansion into foreign markets within different organizational dimensions, including the composition of different research approaches [31].

The Technology dimension describes the influence of internal and external technology factors on innovation adoption [15]. According to scholars, this includes both the impact of relevant internal technology and equipment in use in the company and the influence of available external technology and equipment [16]. In addition, related, key technology variables explain adoption in terms of complexity, compatibility, relative advantage, and perceived usefulness [32,33]. Complexity was defined as the degree to which technological innovation is perceived as difficult to understand and use [21,34]. Organizations are less likely to use technology if they find it difficult to understand and adapt to organizational processes [35]. Thus, complexity can be measured as the number and variety of relationships and the number and variety of given elements [36].

The Organization dimension refers to the formal and informal relationship between employees and existing organizational mechanisms within a company [15]. On the other hand, the Organization dimension represents the relevant characteristics of the company: organizational structure, company size, management structure, degree of centralization and organizational readiness (human and spare resources), and communication processes among employees [23,37]. According to Na et al. (2022) [38], the Organization dimension is explained as the meaning of organizational structure and organizational culture that affect the adoption and support of new technologies. Organizational structure is a factor that influences the process of adopting new technology. In addition, organizational culture is explained as an important factor in the acceptance and adoption speed of new technologies [39]. Researchers argue that decentralized organizations are best suited for the innovation stage. On the other hand, centralized organizations are described as best suited for the implementation phase of the innovation process [37].

The Environment dimension includes everything within the business environment surrounding a firm's business operations domain [15]. In addition, the Environment dimension relates to operational promoters and inhibitors. Important factors include competitive pressure, industry pressure, trading partner pressure, government regulation, business environment, and technical support infrastructure [15,23]. Competitive pressure is the effect of a competitive environment in which organizations use technology to maintain or enhance competitiveness [40–42]. In other words, competitive pressure refers to any pressure a firm feels from competitors in its industry [43–45]. In competitive business markets, competitive pressures on organizations due to the influence of new tools, technologies, and providers are identified as important influencers of innovation [30,46]. In other words, pressure from competitors has been confirmed in research results to play a decisive role in the adaptation of new tools and technologies [47,48]. Therefore, competitors' pressure to obtain competitive advantage acts as an important factor in the diffusion of innovative technologies [49,50].

2.2. Status of Prior Research Applying the TOE Framework

The TOE framework is an analytical model that can be used to identify which factors have played a major role in the adoption of innovation, which has been the driving force of a company's growth, in three aspects: technology, organization, and environment. Studies using the existing TOE framework are focused on information technology (IT)-

based innovation cases centered on SMEs. In particular, there are many studies on the adoption of IT-based technologies. Premkumar & Roberts (1999), used the TOE framework to identify the use status of various communication technologies such as the information superhighway, Internet, and National Information Infrastructure (NII) and analyze the key factors influencing the adoption of these technologies in small businesses in a rural community of the US [35]. Abed (2020) used the TOE framework to analyze key factors influencing Social Commerce adoption for 181 SMEs in Saudi Arabia [29]. Stjepić, Pejić & Bosilj (2021) utilized the TOE framework to analyze the factors of Business Intelligence Systems (BISs) innovation projects of Croatian SMEs [21], and Park & Kim (2021) used the TOE framework to analyze key factors influencing the adoption of Big Data by domestic companies in Korea [51]. Gómez, Salazar & Vargas (2022) used the TOE framework to analyze the factors influencing the adoption of e-business by Spanish manufacturing companies [52]. As such, the TOE framework is being used for corporate innovation case studies in many countries around the world. In particular, it has been used to analyze the factors influencing the adoption of IT technology that led to the growth of SMEs at the Technology (T), Organization (O), and Environment (E) dimensions.

Meanwhile, the TOE framework can be used to analyze not only the adoption of specific IT technologies but also the adoption factors related to IT-based business innovation. Kumar & Krishnamoorthy (2020) utilized the TOE framework to analyze the key factors influencing the successful adoption of Business Analytics (BA) by Indian companies [53]. Awa, Ukoha & Emecheta (2016) utilized the TOE framework to analyze the key factors for enterprise resource planning (ERP) software adoption by SMEs in Nigeria [23]. Also, Babu et al. (2021) utilized dynamic capability theory, institutional theory, and TOE framework to analyze the key factors for the application of the Data-Driven Innovation (DDI) innovation process in UK manufacturing companies [54]. In addition, the TOE framework has been used by UK companies for industrial Augmented Reality (AR) experts to analyze key factors affecting the implementation success of industrial augmented reality [28]. And, it is applied and utilized in various contexts such as the key determinants of smart contracts in the context of Austrian companies' Internet of Things (IoT) technology and the purpose of analyzing the key factors of the spread and success of the IoT [30].

In the same way as these preceding studies, this study intends to conduct research focusing on the factors of innovation that led to the growth of companies. Existing preceding studies mainly focused on small- and medium-sized enterprises, and most of the subjects of innovation were focused on specific IT-based innovation projects. In other words, previous studies of various companies using the TOE framework attempted to analyze the key factors that influenced strategic decision making in adopting innovation. However, the companies analyzed were mainly SMEs, and the content of innovation was also limited to IT technology adoption or IT-based innovation. Although the TOE framework is a framework that can be applied to more comprehensive corporate innovation and growth strategies, these studies are limited to a small number.

Within this flow of research, this study uses the TOE framework to identify key influencing factors in the context of technology, organization, and environment in the innovation process of Samsung Electro-Mechanics, a large company, expanding the global electronic components market, and wants to analyze the relative importance of each factor. This is a study aimed at global large corporations, not small- and medium-sized enterprises (SMEs). At the same time, it is differentiated from existing studies in that the TOE framework is applied to the success factors of innovation and business innovation strategies throughout the company, rather than analysis focusing on specific IT-based innovation projects.

3. Research Design

3.1. Research Methods and Procedures

This study performs an analysis based on the TOE theoretical framework presented in Figure 1. In other words, technology, organization, and environment are assumed to be

mutually independent, and a downward hierarchical decision-making situation is assumed. Based on these assumptions, a study using the AHP method was conducted.

The Analytic Hierarchy Process (AHP) statistical analysis technique is a pairwise comparison decision-making method developed by Thomas L. Saaty (1970s) [55]. The characteristics of AHP can be used to derive ratio scales in both discrete and continuous pairwise comparisons, and actual measurements can be made, but these pairwise comparisons can be made through a fundamental scale that reflects the relative strength of preferences or feelings [56,57].

The method and procedure of this study proceeded in the following 4 steps.

Step 1: Literature review

From the perspective of a company's core competitiveness for a successful strategy for entering and expanding overseas markets, the TOE theoretical framework and previous research cases on the Technology, Organization, and Environment dimensions, which are key factors, are reviewed.

Step 2: AHP model design

Design an AHP analysis model and describe the definition of each key factor by dimension.

Key factors selected through the literature review are confirmed through expert review for each business field of Samsung Electro-Mechanics.

Step 3: The AHP Survey

The AHP survey (Appendix A) is conducted according to a research design prepared in advance targeting experts selected in advance among employees of Samsung Electro-Mechanics.

The Analytic Hierarchy Process (AHP) is a measurement theory based on pairwise comparisons and relies on expert judgment to derive a priority scale [58]. In order to collect the survey data for the AHP pairwise comparison analysis, an expert invitation procedure was conducted among employees at Samsung Electro-Mechanics using the purposive sampling method. The basic selection criteria were the average working period of more than 10 years at Samsung Electro-Mechanics and a Bachelor's degree or higher. In addition, considering work relevance and diversity, work departments were limited to R&D, Technology, Management, and Sales and Marketing. In order to select experts, a total of about 60 prospective experts were contacted in advance through face-to-face interviews, phone calls, or e-mails with employees who were judged to have high expertise in each department. Among them, the same questionnaire form prepared in advance was delivered by e-mail to 31 people who finally expressed their intention to participate in the survey. Looking at the characteristics of the final 31 participating experts, the business department is R&D and Technology 51.6%, Sales and Management 48.4%, and most of them have more than 20 years of work experience, 71%. In terms of education, 48.4% have master's or doctoral degrees, and the rest are bachelor's degrees. To the participating experts, the purpose of the survey and the contents of the survey were explained face to face or over the phone to compare the relative importance of TOE dimensions, and the interview was conducted in a standardized interview method. In the AHP questionnaire, the score standard for pairwise comparison for each item was prepared by writing on a 5-point Likert scale (Table 1).

Table 1. Scores and meaning of 5-point Likert scale.

Scale	Description
5	Extreme Importance
4	Very strong Importance
3	Strong Importance
2	Moderate Importance
1	Equal Importance

Step 4: Analyzing AHP Results

Based on the data of the survey results, proceed with the AHP analysis procedure and analyze the results. Analyze and objectify the priorities of the dimensions and factors related to the company's core competitiveness for the successful strategy of overseas market expansion. The AHP analysis procedure first configures the decision-making goal in a step-by-step hierarchical structure and then obtains weights through pairwise comparison matrix construction among the factors. Then, after measuring the consistency ratio, it is a method of evaluating the overall priority by calculating the cumulative weight among the factors in each stage [58,59].

All values obtained through the survey are weighted in the pairwise comparison matrix for each layer using the AHP statistical technique, and the consistency index (CI) and consistency ratio (CR) are calculated according to Equations (1) and (2).

$$CI = (\lambda_{max} - n) / (n - 1) \quad (1)$$

$$CR = CI / RI \quad (2)$$

Here, λ_{max} is the maximum eigenvalue, n is the matrix dimension, and RI is the Saaty random consistency index that varies according to the matrix dimension [60]. In this questionnaire, the matrix size is 3, so the RI is equal to 0.52 [61] (Table 2).

Table 2. Random Index.

Order	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

Among all the experts invited to the AHP survey, twenty-four measured values that meet the criteria of consistency ratio $CR < 0.2$, which is an acceptable level in the AHP analysis result, are selected, and finally, the relative importance priority of key factors by class is evaluated [62–64] (Table 3). The characteristics of the experts who participated in the survey are as follows.

Table 3. Demographics of Survey Expert.

Category	Class	Invited Experts	Accepted Experts
Experience	More than 20 years	22 (71.0%)	17 (70.8%)
	10 to 20 years	6 (19.4%)	4 (16.7%)
	Less than 10 years	3 (9.7%)	3 (12.5%)
Specialty	R&D, Technology	16 (51.6%)	15 (62.5%)
	Sales, Management	15 (48.4%)	9 (37.5%)

3.2. Samsung Electro-Mechanics Market Expansion Related, TOE-Level Influencing Factors

This study analyzed the relative importance of three key influencing factors of technology, organization, and environment from the perspective of Samsung Electro-Mechanics' successful strategy for entering and expanding overseas markets. These key factors are based on the Technology, Organization, and Environment (TOE) framework through literature research and the three factors, technology, organization, and environment, are explained as important dimensions that affect the adoption decision for corporate innovation [15,18]. Based on the TOE theoretical framework through literature research, considering the characteristics of electronic component companies, we tried to increase the validity of the factors selected through expert review.

3.2.1. Technology

From the perspective of a successful strategy for entering and expanding overseas markets, technology is one of the key dimensions that support a successful strategy through improving the competitiveness of company products. Technology refers to all internal and external technologies related to the company's R&D and production, including the company's internal technology experience, equipment, and all technologies available in the market [16,48,65]. Technical capabilities constitute physical assets and intangible resources where technology and know-how complement physical assets and have a higher competitive advantage [66]. Therefore, companies with high technological prowess will have a higher chance of success in expanding overseas markets [48]. In the success strategy of overseas market expansion, the sub-key factors of technology are composed of R&D Availability and Production Availability (Table 4).

Table 4. Technology dimension.

Key Factor	Sub-Factors	Description	Related
Technology	R&D Availability	R&D Availability for Product Competitiveness	[16,48,65,66]
	Production Availability	Production Availability for Product Competitiveness and Response to the Market	

3.2.2. Organization

From the perspective of a successful strategy for entering and expanding overseas markets, the Organization factor is a key foundation that composes the overall organizational frame of the company, including research and development, production, sales and marketing, and related supply chains, including the company's head office and overseas branches. The Organization factor represents the company's characteristics and resources, including the structure of connections between organizations, communication processes within the company, company size, and amount of slack resources [18]. This represents the internal factors of an organization that influence innovation adoption [65]. For successful overseas market expansion, organic and efficient operation through a network between all organizations is required. In the success strategy of overseas market expansion, the sub-key factors of the organization consist of Global Production Network Structure, Global Sales and Marketing Structure, and R&D Organization Structure (Table 5).

Table 5. Organization dimension.

Key Factor	Sub-Factors	Description	Related
Organization	Global Production Network Structure	Global Production Network Structures for Cost and Speedy Customer Response	[18,65]
	Global Sales and Marketing Structure	Global Sales and Marketing Structures to Satisfy Customer demands	
	R&D Organization Structure	R&D Organization Structures for New Product Competitiveness	

3.2.3. Environment

For a successful strategy for pioneering entry and expansion into the fiercely competitive global market with cutting-edge products and innovative technologies, it is important to understand market conditions and environmental factors related to customer requirements. Environmental factors are related to the type of industry in which a company conducts business and its competitors [16]. It also includes industry structure, technology service provision, and regulatory environment and a dominant firm within a value chain can influence other value chain partners [18,23,29,67]. Therefore, competitive pressures,

partner pressures, government roles, and technical support infrastructure are influencing factors [67]. The sub-level key factors of the Environment consist of Industry Characteristics, Market Structure, and Supply and Demand Structure (Table 6).

Table 6. Environment dimension.

Key Factor	Sub-Factors	Description	Related
Environment	Industry Characteristics	Industry Characteristics related with Global Products demands	[16,18,23,29,67]
	Market Structure	Market Structure related with Global demands of Product and Technology	
	Supply and Demand Structure	Supply and Demand Structure of Products at Global Market	

3.3. The AHP Analysis Model

The AHP research model used in this study is as follows (Figure 2). This study defined eight sub-dimensional factors for the three top-level factors of technology, organization, and environment that influenced Samsung Electro-Mechanics' decision making for its global market expansion success strategy. Through a pairwise comparison of each of these top-level and low-level factors, it was pursued to identify the relative importance of key factors that influenced the strategic decision-making process for the success of Samsung Electro-Mechanics' global market expansion.

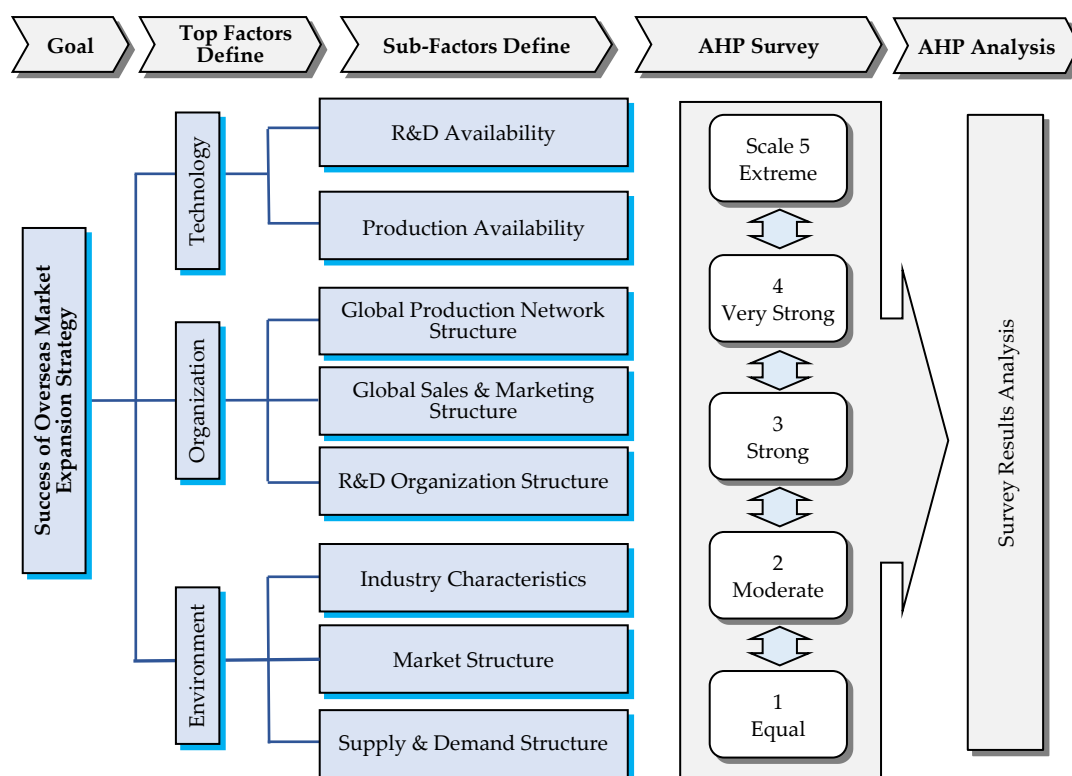


Figure 2. Research modeling. “Research modeling” summarizes the entire research process from defining top factors and sub-factors to the AHP survey and AHP analysis regarding the success of overseas market expansion strategy.

4. Analysis Results

4.1. Result of Relative Importance Analysis in Top-Level Technology, Organization, and Environment

The results of analyzing the relative importance of technology, organization, and environmental dimensions through AHP analysis are as follows (Table 7). Among the three factors (technology, organization, and environment) selected as the core factors of the top-level, the weight of Technology is analyzed to be relatively the highest at 0.462. The next most important factors are Environment and Organization, with weights of 0.320 and 0.219, respectively. Our findings suggest that the technology factor was considered first and foremost in the strategy for the success of Samsung Electro-Mechanics' overseas market entry and market expansion. However, when comparing the weights of these three factors (technology, organization, and environment), each factor has a weight of importance with a slight difference of about 10%. This can be interpreted as meaning that Environment and Organization factors are also external factors and internal competency factors that have a non-negligible weight and importance in terms of success strategies for entering and expanding overseas markets compared to Technology.

Table 7. AHP Result for Dimensional Top-Level Factors.

Top-Factor	Weight	Rank
Technology	0.462	1
Organization	0.219	3
Environment	0.320	2

Source: Authors' own calculations.

In addition, as a result of the analysis of these top-level factors, Technology, an internal competency related to R&D Availability and Production Availability, is the most important key factor in a successful strategy for market expansion. However, at the same time, environment factors with sub-level factors such as Industry Characteristics, Market Structure, and Supply and Demand Structure are interpreted as relatively significant key factors to be considered together (Table 7).

4.2. Result of the Relative Importance Analysis of Sub-Level Key Factors

After calculating the weights of the top-level factors and the Sub-level factors, the weights of the top-level factors and the sub-level factors are multiplied by each other to calculate the cumulative weight for all the sub-level factors. Through this, the relative importance ranking for all sub-level factors is analyzed (Table 8).

Table 8. AHP Result for Top-Level Factors and Sub-Level Factors.

Top-Factors	Weight	Sub-Factors	Weight	Global Weight	Global Rank
Technology	0.462	R&D Availability	0.569	0.263	1
		Production Availability	0.431	0.199	2
Organization	0.219	Global Production Network Structure	0.297	0.065	8
		Global Sales and Marketing Structure	0.365	0.080	5
		R&D Organization Structure	0.338	0.074	6
Environment	0.320	Industry Characteristics	0.310	0.099	4
		Market Structure	0.222	0.071	7
		Supply and Demand Structure	0.468	0.150	3

Source: Authors' own calculations.

It is analyzed that the weight of the R&D Availability factor in the Technology dimension is the highest among all sub-level factors. In addition, the Production Availability factor in the Technology dimension was analyzed to be ranked second in weight, which means that Production Availability and R&D Availability is a very important key factor in a successful strategy for expanding overseas markets. In addition, the weight of the Supply and Demand Structure factor in the Environment dimension ranked third. In addition, the weight of the Supply and Demand Structure in the Environment dimension ranked third.

This means that efficient and agile customer response capabilities are very important for Supply and Demand Structure in an overseas market environment where demand forecasting from global customers is difficult and volatility is high.

In this study, the cumulative weights of R&D Availability, Production Availability, and Supply and Demand Structure were 0.263, 0.199, and 0.150, respectively, out of the total weight of 1.000, ranking first, second, and third. The three factors of these upper groups show a particularly large difference in weight comparison from the five factors of other subgroups. This means that they are particularly significant and important factors differentiated from the other five factors in terms of Samsung Electro-Mechanics' successful strategy for entering and expanding overseas markets (Table 8).

5. Discussion and Conclusions

5.1. Discussion

This study conducted an AHP analysis based on the TOE framework using Samsung Electro-Mechanics as a case study to identify the importance and priority of key influencing factors in a global electronic component company's success strategy for overseas market expansion. As a result of the analysis, the priority of importance of influential key factors in the upper class in the global electronic components company's successful strategy for expanding overseas markets was confirmed in the order of (1st) Technology → (2nd) Environment → (3rd) Organization. In other words, this is interpreted as an essential aspect of an electronic components company and suggests that technology factors are the most critical element in a company's success strategy to expand its global market. In other words, core technology development and cutting-edge new product development are characteristics that serve as the basis for securing competitiveness in global electronic component companies, suggesting that among TOE factors, the technology factor is the most important factor for overseas market expansion.

Looking at the contents of previous studies that presented similar research results, Pillai et al. (2022) have shown that Technology dimension factors such as Perceived Compatibility and Perceived Benefits are very important influential factors through a study on the adoption of Industrial Robots (InRos) by Auto Component Manufacturing Companies (ACMCs) [68]. This suggests the common importance of technological factors as ACMCs are characteristic businesses of multi-product production, such as electronic component companies. In addition, it can be considered that many SMEs around the world have pursued innovation and sustainable growth through the introduction of new IT-related technologies, and are evaluating the factor of Technology dimension as a very influential and important factor in innovation [69,70].

In addition, looking at the results of the global weight analysis of the TOE dimension, the final importance of the lower-level sub-factors was confirmed in the order of (1st) R&D Availability → (2nd) Production Availability → (3rd) Supply and Demand Structure. In particular, these top three key sub-factors are mostly related to the Technology dimension, and are analyzed to be of very high importance as a group with a relatively large difference in weight compared to the remaining five sub-factors. This is interpreted as a result that shows the characteristics of a global electronic components company like Samsung Electro-Mechanics that pursues a business strategy centered on leading R&D and cutting-edge product technology.

In particular, the fact that the Environment dimension's Supply and Demand Structure factor was ranked 3rd out of all sub-factors suggests the importance of the Supply and

Demand Structure factor for responding to customers in the global market along with Technology factors in the overseas market expansion strategy. This is meaningful content that electronic components companies seeking to expand overseas markets should consider with great importance from a strategic point of view. In addition, in the case of Gómez et al. (2022) on the adoption of Supplier-to-Business (S2B) and Business-to-Business (B2B) e-commerce methods in manufacturing companies, Supply and Demand Structure provides implications as an influential factor in innovation [52].

Today, in a situation where the global electronic components market is growing rapidly, research focusing on the overseas market expansion strategies of global electronic component companies is needed, but related research is severely lacking. Therefore, this study is significant in that it conducted academic research focused on establishing a successful strategy for global electronic component companies to expand their overseas markets. In addition, the analysis results of this study go beyond academic significance and provide practical management implications that can be taken from the perspective of electronic component companies seeking to adopt overseas market expansion strategies.

5.2. Managerial Implication

In the case of Samsung Electro-Mechanics, a global electronic component company, in the early stages of business, the MLCC product line among the electronic components group was a latecomer, ranking in the top 10 in the world. However, overcoming adversity amid fierce competition in the global market in recent decades, the company has grown into a leading electronic components company with the second largest global market share, competing with Murata Manufacturing for the lead through a global market expansion strategy. Research on the key factors of a company's growth strategy that has grown from a latecomer to a leader in the global electronic components market has important significance from a management perspective.

Until Samsung Electro-Mechanics grew into a global electronic components company, it continuously implemented various world-leading strategies at the company's management level to successfully expand into overseas markets. Representative examples include (1) an R&D strategy to develop the world's highest-performance cutting-edge products and internalize core raw materials, (2) a cost competitiveness strategy and market securing strategy through establishing local factories (Foreign Direct Investment) in low-wage global regions such as China and Southeast Asia, and (3) a Global Sales and Marketing strategy and a Global Supply Chain strategy for rapid customer response by organizing sales and supply networks in regions around the world. In implementing this success strategy, various key factors in it may have contributed to success. However, the specific items of the key factors that had a significant impact on the success of the overseas market expansion strategy and the relative importance among the key factors have never been evaluated in specific quantification. First of all, it is significant that through this research process, the eight key factors judged to be most important were specifically classified and defined through interviews and reflection of opinions of experts with decades of experience in related fields. At the same time, quantifying and objectifying the relative importance of the key factors selected through the AHP analysis technique will serve as the basis for management strategy.

As a result of global weighting in the study's AHP analysis, R&D Availability = 0.263 and Production Availability = 0.199 were analyzed as 1st and 2nd in importance, respectively, and both items are key factors in the Technology dimension. This means that key elements at the technology, organization, and environment levels are all important for the success of a global overseas market expansion strategy, but among them, the Technology dimension is the most important. In other words, from a management perspective, it shows that R&D strategies such as the development of competitive cutting-edge products with the world's best performance and the development of internalization of core raw materials have contributed to the most important success factors. It suggests the strategic direction that must be focused on at the management level for sustainable growth.

In addition, the key factor items specifically defined in this study and the relative importance results analyzed will provide practical direction and implications for implementing a successful strategy through selection and concentration among the core capabilities of many electronic component companies seeking to enter the global market through overseas market expansion strategies.

5.3. Academic Implication

During this research process, there was an attempt at a new research method that had not been applied so far in literature research, and discoveries were made through this. It is a research method for the concept of the reverse (modified) TOE framework or post-innovation TOE framework through new interpretation and application of the existing TOE framework. In other words, Tornatzky & Fleisher's (1990) Technology, Organization, and Environment framework is a framework that theoretically explains how technological, organizational and environmental factors influence the process of explaining and implementing an organization's innovation adoption [15] (Figure 3). On the other hand, the reverse (modified) TOE framework or post-innovation TOE framework, a new concept applied in this study, is a framework that theoretically explains what level of importance the key factors at the technological, organizational, and environmental levels have influenced the implemented process for the results of an organization's innovation success or innovation failure (Figure 4). In other words, this study is a reverse concept and analyzes the relative importance of key influencing factors on the process of successful organizational innovation. From the viewpoint of the innovation success of global electronic component companies' overseas market expansion and corporate growth, the level of the relative importance of key factors in the technological, organizational, and environmental levels in the innovation process was analyzed and objectified using the AHP technique. In addition, through the new approach of this study, it was discovered that it is possible to analyze the empirical importance of influencing factors on the results of successful or failed innovations. Therefore, based on the results of this study, the company can contribute to the company's sustainable growth by strengthening the influencing factors with high importance and supplementing the insufficient influencing factors. In addition, it is possible to identify the main cause for failed innovations and take supplementary measures through the importance analysis of the influencing factors.

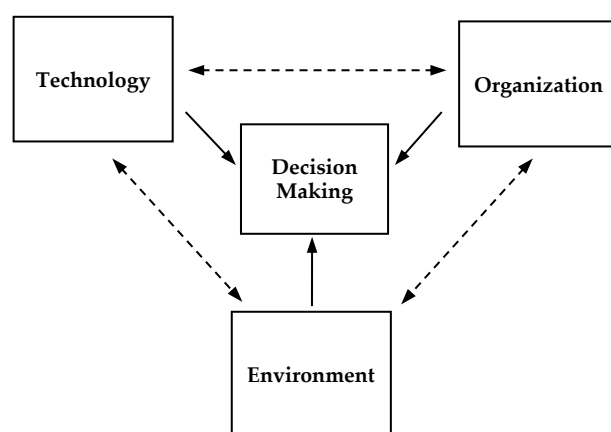


Figure 3. TOE framework (Tornatzky and Fleischer, 1990) [15]. TOE framework is conceptual framework to explain key elements of the Technology, Organization, and Environment dimensions that influence an organization's decision to adopt innovation.

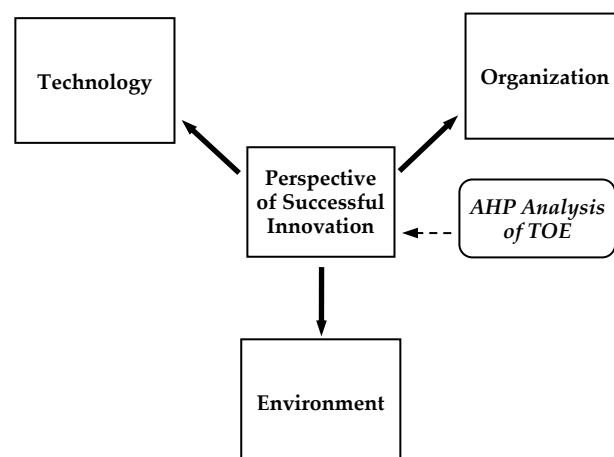


Figure 4. The reverse (modified) TOE framework (authors’ own construction based on the empirical research results). The reverse (modified) TOE framework is a conceptual framework for analyzing the relative importance of key factors at the Technology, Organization, and Environment dimensions from the perspective of the results of successful innovation.

Moreover, this research method has not been able to find any similar cases in previous studies through a lot of literature research and is a new research concept that is based on the existing TOE framework but has a opposite approach. Therefore, this reverse (modified) TOE framework or post-innovation TOE framework research method can be extended to the analysis of failure cases as well as success cases of innovation in real situations. In addition, it can be applied to research reviews for innovation in the business fields and technology fields of all companies.

5.4. Concluding Remarks

This study provided an important framework and implications for global electronic component companies to consider in recognizing the importance and priority of key factors in the process of establishing and executing strategies for continuous growth and market expansion and efficiently pursuing successful strategies.

On the one hand, despite its meaningful implications, this study has limitations. This study focused on Samsung Electro-Mechanics, a global electronic component company, and did not cover the diversity of all global electronic component companies. In addition, due to the nature of global electronic component companies, product lines are diverse and complex, so the study was conducted focusing on the Multilayer Ceramic Capacitors (MLCC) product line, which is the flagship product with the largest global market size and high sales proportion and importance. Therefore, from the perspective of small- and medium-sized electronic component companies or other industries, there are limitations in which the meaning of the criteria and relative importance of key factors may be different or limited. However, in the case of businesses of similar industry and size, they can be used as reference data. Future research is interested in comparative analysis of core competencies at the global level for various electronic component companies, including MLCC products from the perspective of expanding overseas markets, and it is considered that it will be a meaningful study if given the opportunity.

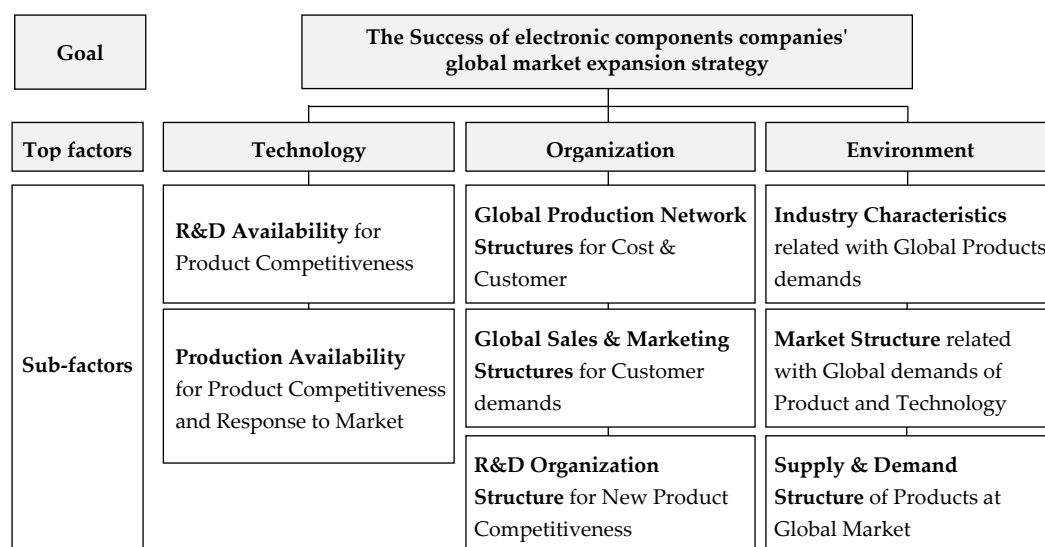
Author Contributions: Conceptualization, W.C.C.; methodology, W.C.C.; software, W.C.C.; validation, W.C.C.; formal analysis, W.C.C.; investigation, W.C.C.; resources, W.C.C.; data curation, W.C.C. and H.Y.; writing—original draft preparation, W.C.C.; writing—review and editing, W.C.C., H.Y. and E.A.; visualization, W.C.C.; supervision, H.Y. and E.A. All authors have read and agreed to the published version of the manuscript.

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Appendix A. Questionnaire Sheet for the AHP Survey

This survey is based on the TOE theoretical framework of Tornatzky and Fleisher (1990) [15] and consists of questions about the relative importance of the top factors in the Technology, Organization, and Environment dimensions and the sub-factors for each dimension. Descriptions of each factor are provided in each question section.

[illegible]

1. Importance comparison question among the three Top factors.

Q1. Concerning the Overseas market expansion, when comparing the top three factors in pairwise comparison, which criteria do you think is much more important?

Criteria	Extreme	Very Strong	Strong	Moderate	Equal	Moderate	Strong	Very Strong	Extreme	Criteria
Technology										Organization
Technology										Environment
Organization										Environment

- (1) **Technology:** At the technological level, R&D Availability for product competitiveness, and Production Availability for product competitiveness and market response.
- (2) **Organization:** At the organizational level, Global Production Network Structures for cost competitiveness and customer response, Global Sales and Marketing Structures for rapid response to customer needs, and R&D Organizational Structure to develop cutting-edge products and secure product competitiveness,
- (3) **Environment:** At the environmental level, Industry Characteristics related to global product demand, Market Structure related to global demand for products and technology, and Supply and Demand Structure in the global market.

2. Importance comparison questions among the eight Sub-factors.

Q2.1. When comparing the two following pairwise as a sub-factor of “Technology”, which criteria do you think is how much more important?

Criteria	Extreme	Very Strong	Strong	Moderate	Equal	Moderate	Strong	Very Strong	Extreme	Criteria
R&D Availability										Production Availability

- (1) **R&D Availability** for Product Competitiveness: Availability of all assets inside and outside the company, such as researchers, R&D equipment, systems, technical knowledge, and R&D processes that can be used for R&D of cutting-edge products and cutting-edge technologies that are competitive in the global market.
- (2) **Production Availability** for Product Competitiveness and Response to Market: An indicator that describes the ratio of planned and actual production over a specified period through owned global production facilities, the ratio to reference levels, or the ability to meet delivery demand.

Q2.2. When comparing the three following pairwise as a sub-factor of “Organization”, which criteria do you think is how much more important?

Criteria	Extreme	Very Strong	Strong	Moderate	Equal	Moderate	Strong	Very Strong	Extreme	Criteria
Global Production Network Structures										Global Sales and Marketing Structures
Global Production Network Structures										R&D Organization Structure
Global Sales and Marketing Structures										R&D Organization Structure

- (1) **Global Production Network Structures** for Cost and Customer: An organizational arrangement comprised of interconnected economic and non-economic entities coordinated by a leading global corporation that produces goods or services across multiple geographic locations for global markets.
- (2) **Global Sales and Marketing Structures** for Customer demands: A global sales structure is a set of organizational structures through which produced products and services are sold in countries around the world. A global marketing structure is an organizational structure of coordinated and integrated marketing activities across global markets, a process that focuses a company's resources and goals on global market opportunities.
- (3) **R&D Organization Structure** for New Product Competitiveness: R&D organizational structure is an organizational structure in which a company conducts a series of innovative R&D activities to develop new products, technologies, processes, services, etc., and improve existing products.

Q2.3. When comparing the three following pairwise as a sub-factor of "Environment", which criteria do you think is how much more important?

Criteria	Extreme	Very Strong	Strong	Moderate	Equal	Moderate	Strong	Very Strong	Extreme	Criteria
Industry Characteristics										Market Structure
Industry Characteristics										Supply and Demand Structure
Market Structure										Supply and Demand Structure

- (1) **Industry Characteristics** related with Global Products demands: Industry characteristics include the geographic scope of the industry, industry boundaries, and the dominant economic characteristics of the industry, as well as various other industry characteristics such as capital-labor ratios, quality of labor, economies of scale, and concentration.
- (2) **Market Structure** related with Global demands of Product and Technology: Market structure is related to the global demand for products and technologies, and broadly refers to the number of companies in the market, their size, and the dynamics of supply and demand for the products they offer, or competitive relationships within the industry.
- (3) **Supply and Demand Structure** of Products at Global Market: Demand is defined as the willingness of economic entities to purchase goods or services within a certain period, and supply is defined as the willingness of producers to provide goods or services to the market by the demand of economic entities. The supply and demand structure is a variable relationship structure between supply quantity and demand mediated by the price of the product formed between sellers and buyers of products in the global market.

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