

# The Business Effects of Standardization for SMEs

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## ABSTRACT

Standardization activity is a type of open innovation, specifically an outbound-revealing open innovation. Through standardization activities, a given technology spreads, its effects extend to the market, and the market expands. However, in many cases, competition intensifies, and price competition occurs. To succeed as global businesses, SMEs should take a strategy known as “Niche Top” in Japan. Standardization activities are more likely to constitute a risk for SMEs. However, the Japanese government has established a system that actively encourages SMEs to standardize. The authors of this manuscript conducted interviews with companies that are targets of this standardization system and investigated how these companies expand their businesses through standardization activities while still securing profits. The results show that standardization by SMEs does not cause the dissemination of technology and the expansion of markets; rather, it helps such SMEs erect barriers to market entry through the creation of standards and plays a large role in securing shares in niche markets.

## KEYWORDS

Global Niche Top Strategy, Innovation, JIS, JISC, METI, Monopolization, National Standard, Open Innovation, Outbound, Small and Medium Sized Enterprise

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## INTRODUCTION

The government of Japan actively supports standardization activities as part of its activities to encourage open innovation and expand the market for new products. Although the term open innovation was coined in the United States, it is widely used among Japanese companies and treated like a magical concept that will reform their innovation systems. The term open and closed strategy is also commonly employed in Japan. Both terms encompass common and long-running activities for many Japanese companies; thus, they are not a new type of strategy. Japanese companies have thus far not clarified the meaning of these terms; however, these concepts are actively used in corporate activities as they involve simplified technology management methods previously based on expertise.

The Japanese government assumes that standardization helps expand markets for new products; therefore, it has established a system to encourage small and medium-sized enterprises (SMEs) to proactively standardize. For SMEs, does open innovation always lead to profit? Are there any technical areas in SMEs that can be standardized and used by other companies? Is open innovation, in fact, a trap for SMEs? To answer these questions, the author and the collaborator (the authors) interviewed the system's users and compiled the results.

## LITERATURE REVIEW

It is easy to organize standardization activities as part of an innovation program that involves standardization to promote the dissemination of a technology. There is no doubt that standardization promotes the dissemination of technology. However, it is equally clear that there is network externality in standardized technologies, and as market monopolization progresses, it hinders the rise of technologies that are incompatible with the standard. Moreover, since a market monopoly will increase the switching costs from the old to the new technology, a long-term market oligopoly is likely to emerge, which may hinder the development and diffusion of new technologies.

Thus, standardization activities can both promote and inhibit innovation, and their effects significantly differ depending on the standardization method, field of application, technique, and so on.

“The Economics of Standardization” by G. M. Peter Swann (2000), a research report prepared at the request of the UK Department of Trade and Industry (DTI), stated that in order for standardization to narrow down the number of research and development (R&D) items, R&D has to effectively progress. Furthermore, a report jointly issued by DTI and the British Standards Institution (BSI) in 2005 stated that “standardization narrows the R&D area, and promotes innovation in order to have the effect of concentrating R&D funds on necessary areas” (DTI, 2005).

Following these publications, many studies were conducted on the relationship between standardization and innovation, including Andersen (2014) and De Vries (2019), who also classified that relationship. Blind et al. (2017) analyzed the

influence of regulation and standards on innovation; however, there is little research on the business impact of standardization on SMEs. While there are papers on the benefits of standardization for SMEs using the ISO 9000 standards, none analyze the impact of self-standardization. Blind (2012) explores SMEs' decision to participate in official standard setting; however, he does not discuss the direct benefits of such standardization activities for SMEs.

Open innovation was popularized by Chesbrough (2003). He classifies open innovation into inbound open innovation that creates or acquires value by introducing and expanding external technologies, knowledge, and ideas; and outbound open innovation that creates or acquires value by providing and disseminating technologies, knowledge, and ideas to the outside (Chesbrough & Crowther, 2006). Dahlander and Gann (2010) classify open innovation into four categories: acquiring, sourcing, selling, and revealing. These four categories are interesting in that open innovation is classified from the perspective of not only whether value is “created,” but also by whether that value can be “acquired.” Among inbound open innovations, those that acquire technology for a fee such as technology introduction and parts purchase through a patent license agreement are “acquiring,” and those that acquire technology free of charge through joint research and patents information search are “sourcing.” Among outbound open innovations, those that provide technology to the outside for a fee, such as providing technology based on patent license agreements and selling parts using new technology are “selling”, and those that provide technology to the outside free of charge in the form of papers or publications are “revealing.” Standardization basically allows anyone to use created plans, free of charge. For this reason, standardization activities can be considered as a revealing-type open innovation. Regarding the relationship between outbound open innovation and standardization, in *Open Innovation: Researching a New Paradigm* (Chesbrough, Vanhaverbeke, & West, 2006), Simcoe (2006) discusses open standards and intellectual property (IP) rights. However, the discussion focuses on the role that IP rights such as standard-essential patents play in standardization. This corresponds to the “selling” form of open innovation. Although this problem of standard-essential patents is often taken up when discussing the business implications of standardization, it cannot be considered a pure form of standardization activity.

Of the four classifications of open innovation forms from Dahlander and Gann (2010), standardization corresponds to the revealing form. Furthermore, the low likelihood that profit will be generated for the supplier of the resources has already been identified as a challenge for the outbound-revealing form of open innovation (Helfat and Quinn, 2006). Specifically, outbound technology is often associated with negative financial returns, as seen in Michelino, Caputo, Cammarano, and Lamberti (2014).

These studies imply that outbound open innovation is a strategy for the needy.

Ogawa (2015) and Tatsumoto (2017) connect this kind of revealing open innovation to profit and label it an open-closed strategy, which differentiates between the use of

open and closed technical information so that publicly available information expands the market and lowers costs while confidential information is used to obtain profits. This is not a particularly new strategy and can be implemented by any type of company.

However, it is difficult for SMEs to implement this kind of open–closed strategy.

Porter (1980) describes three types of generic strategies that firms must follow: cost leadership, differentiation, and segmentation. These three types of competitiveness strategies are now classic, and researchers have subsequently proposed several new types of competitiveness. However, Porter’s strategies are still considered valid as a basic concept. Segmentation leads firms to focus on a narrow but profitable market niche. Porter notes that if the company focuses on small markets, it would be profitable.

Companies competing in a market can usually be classified into four categories: market leaders, market challengers, market followers, and market niche players (Kotler, 2000). Competitive intensity impedes organizational growth. Crowding harms, while status enhances, an organization’s chances of survival, especially for firms in uncrowded niches (Podolny et al., 1996). Thus, too many competitors decrease the survival rate.

Some SMEs occupy niches that are profitable enough to survive but small enough to avoid major competitive forces. A company that survives in a niche market must be specialized. Harrigan (1985) emphasized the value of holding a strategically distinctive position in an industry. Such strategic approaches are part of niche marketing.

The book *Hidden Champions* is popular as a guide for SME business strategy. The term “hidden champions” was coined by Hermann Simon (2009). According to his definition, a company must meet three criteria to be a hidden champion: (1) being one of the global top three or being number one in the company’s continent, as determined by market share; (2) having a revenue of below \$4 billion; and (3) being low-key in terms of public awareness of the business.

In Japan, the Global Niche Top strategy is similar to that of the “hidden champion.” Namba (2013) and Hosoya (2014) have made notable contributions to this research. Both concepts emphasize that for SMEs to succeed as global businesses, it is important to focus on a specific, narrow market, and to supply high-performance products that other companies cannot produce. Typical SMEs have a few proprietary technologies limited to a specific area and cannot be expected to have other technologies that can be made publicly available to expand their market.

Against this backdrop, Japan’s Ministry of Economy, Trade, and Industry (METI) launched the New Market Creation Standardization System in 2015. METI aims to increase confidence and encourage differentiation, thereby promoting the sale of exceptional products and new technologies that SMEs have developed for domestic and foreign customers. It does so by supporting the standardization of aspects such as performance evaluation methods or special product types.

However, can SMEs expand their profits by using standardization to create new markets? In this study, the authors interviewed SMEs that have formulated Japanese Industrial Standards (JIS) or are in the process of doing so, and that are participating in the New Market Creation Standardization System. Through these interviews,

the authors understood the assumed business models and actual conditions for these enterprises and summarized the business effects of the New Market Creation Standardization System on SMEs.

## **CASE BACKGROUND**

### **METI's New Market Creation Standardization System**

The New Market Creation Standardization System was launched in 2015; however, its roots can be traced to 2013.

At that time, METI had significant concerns regarding standardization, because there were few proposals for international standards from Japan despite the government's efforts, in addition to delays in the speed of international standardization.

Under the domestic rules at the time, proposing new standards to the International Organization for Standardization (ISO) first involved discussing a draft of the standard in industry groups. If the industry groups reached consensus, the standard would be taken up by the Japanese Industrial Standards Committee (JISC), a member of the ISO, for review, and the JISC would submit the proposal to the ISO. However, as each industry in Japan consists of several companies, arranging discussions was time-consuming.

As an additional significant problem, if all member companies of the industry group were unable to implement the technology in question, it was often impossible to reach a consensus on the standardization proposal. Ultimately, the level of standardized technology reflected the lowest common denominator among the participating companies. Therefore, there was concern that proposals were lacking for standards regarding high-level technologies that had been painstakingly developed in Japan. At this point, the JIS mark system was already unable to guarantee that a product was of "high quality," and could instead only guarantee a level of quality that any company within a given domestic industry could attain. Therefore, the system had become completely useless in differentiating between products. Furthermore, Japan proposed only low-level quality standards in its international standards proposals.

To cope with these issues, the METI created a new standardization process in 2013, or the "top standard system." Under this system, it became possible to achieve standardization of specific technologies that only a small group of companies can implement—and the proposal of such standards to the ISO—without having to participate in the consensus process in the domestic industry. Instead of passing through the two separate barriers of domestic and international discussion, the proposing company, having submitted an international proposal, carries out a simultaneous discussion with both domestic and foreign stakeholders to achieve consensus. This process halved the two- to three-year period that was the norm for domestic coordination when proposing international standards.

Under the original system, companies with limited technical abilities were able to impede the progress of technologically capable companies. Therefore, the new system was created to reduce the time required for domestic coordination in

proposing international standards. That is, under this system, domestic coordination and international coordination occur simultaneously, and consensus is reached on both fronts at the same time, making it the obvious choice when proposing international standards. The author had recommended this system while working at the JISC, and it was implemented after the author had left JISC.

However, unfortunately, not enough companies have made use of this system. Although there were a few examples of success, most large companies did not try to use the system as they were wary of the backlash from other companies in the same industry if they made international proposals without coordinating with domestic industry groups first. As the number of companies using the system was unsatisfactory, METI attempted to actively encourage companies to use the system. This resulted in new standards proposals; however, it also led to the creation of unnecessary standards. In addition, since METI strongly demanded the use of the system, there were cases in which the relationship between METI personnel and individual companies took a turn for the worse.

For this reason, METI decided to make significant changes to the system and changed it so that the targets of standards proposals were not only international standards groups such as the ISO and IEC, but also the domestic Japanese standards or JIS. In 2015, when the new system began operation, its name was changed to the New Market Creation Standardization System.

It is possible to use this new system in several different situations: (1) if a company has difficulty with coordination within an industry; (2) if an SME has difficulty creating the draft of a standard; or (3) if a standard extends over a number of different industries. While the system is certainly usable for international standards, the point of the expansion is the creation of JIS standards. As a result, even for cases that fulfill (2), the “top standard system” has rapidly transitioned into a standardization system that supports SMEs targeting standardization through the JIS.

Furthermore, to ensure the expanded use of the New Market Creation Standardization System, METI organized a standardization support partnership system that designates partners such as regional banks and regional public testing organizations as part of a wider ecosystem to address the JIS standardization needs of SMEs. Furthermore, for SMEs that lack the ability to document standards, the Japanese Standards Association (JSA) has arranged for standardization advisers, and organized a system consisting primarily of advisers to help organize and establish domestic committees and prepare drafts. METI aims to formulate 100 new JIS standards in five years, using this system. The government wants to set numerical targets irrespective of how many times it fails.

## **Possible Problems with Standardization for SMEs**

Under this new system, there are many instances of JIS standards that were created for testing methods or product standards that differentiate between the performance of products made primarily by SMEs. Since the system began operations in July 2017, 31 cases of new standards creation were initiated. However, the majority of these involved either “testing method standardization” or “product performance and characteristics

standardization.” This is because METI endorses performance standards or evaluation method standardization as an effective method of differentiating between products.

This kind of standardization has a low risk of technology leaks in comparison to product specification standards that establish detailed product specifications. It also appears to allow the easy development of new markets by allowing consumers to differentiate between products at a glance. However, there is a big risk in standardizing testing methods and evaluation methods. By standardizing testing methods, researchers focus on research that yields good values with that testing method. Since the testing method is clearly defined, research becomes easier, and many businesses enter the fields, and competition intensifies. If the objective of a company is to “make good products,” comprehensive research is necessary; however, if the objective is to “get a good value with this testing method,” research naturally becomes easier. As a result, R&D becomes easier, the number of producers in the market for the relevant product increases, and companies rapidly catch up with the level of technology stipulated by the standard (Eto, 2017).

Establishing performance standards is also risky. By deciding on a performance standard for a given product, poor-quality products are excluded from the product marketplace, and it becomes possible to plan for the healthy expansion of the market. However, differentiation between products also becomes more difficult, the probability of a price war increases, and it becomes highly likely that domestic SMEs will be driven into unprofitable competition.

Nevertheless, METI was not aware of this kind of risk and did not explain it. Furthermore, METI’s explanation advertises a past case in which the “creation of new markets” failed to create new markets through differentiation (in this case, a company issued new ISO standards through the top standard system).

In that case, the company was highly successful from a business perspective; yet, this success was not attributable simply to the market expansion effect caused by standardization. This company created a new standard in ISO. As a company that developed advanced technology that could not be measured without creating a new standard, it was highly evaluated for its R & D capability, which raised the company’s brand value. However, the company was unable to develop a market that required such advanced technology simultaneously, the low-level technology markets were captured by other companies. If an SME uses the New Market Creation Standardization System in this way, standardizing the evaluation process for a company’s own products involves significant risks for said company’s products, even though the company’s name became famous (Eto & Washida, 2017).

For this reason, in this study, many of the cases have been surveyed through interviews and, along with understanding the possible risks involved in the creation of each standard, the methods by which each company has endeavored to respond to these risks have been summarized.

## RESEARCH METHODS

An interview survey was conducted with companies that formulated JIS standards using the New Market Creation Standardization System. This system was launched in May 2015, and 31 projects were adopted by July 2017. Of these 31 companies, 26 are SMEs as defined by Japan's Small Business Basic Law—that is, firms with a capital of 300 million yen or less, or 300 employees or less. The authors planned to interview these 26 companies and were able to interview 13 companies by March 2018. The author interviewed nine companies and the collaborator interviewed four companies.

The authors interviewed the president or business manager of each company. Presidents responded in 11 cases. Each interview lasted for approximately two hours. However, several firms were interviewed again, and the total time exceeded four hours per firm.

Table 1 shows the basic questions and the standardization strategy information expected to be obtained during the interviews. The authors conducted detailed interviews on points that seemed important and clarified the standardized business strategies of each company.

## FINDINGS: CASES

The authors have compiled elements with respect to the development of standards for each of the 13 companies selected for the study. These elements include the circumstances in which the companies enacted standardization, their business models, and how they secured their profits.

### Case 1

This company possesses a solid-coating technology for metal parts that are used in harsh conditions. They produced a coating of their own in the past; however, using JIS standards, they have developed regulations for a coating that uses carbon nanotubes. The company developed this technology in-house, and owns the patent rights. The management recognizes that because of the product's lengthy period of use, patent rights alone are not enough to protect their interests.

The standards the company created are product standards, and many include testing methods to ensure that performance targets are being met. Among these testing methods is a harsh-environment (e.g., high deep-sea pressures) reproduction test. The high costs of replicating such conditions makes it difficult to manufacture products that fulfill all product standards, and new market entries further complicate the issue. Moreover, to limit the scope of use of these JIS standards, the company has limited the coating's ingredients in accordance with the standard and companies that lack the technology for handling raw materials are difficult to newly enter the market.

### Case 2

This company has aimed to cultivate a foreign market by developing, and obtaining approval for, their own product regulations for their proprietary dust-measuring tool.

Table 1. The basic questions of the interview

Question	Objective
What is the technology that will be standardized?	By determining the technology to be standardized, it is possible to grasp the overall picture of the market that can be targeted by standardization.
What is the market size for this technology?	The range of markets targeted by companies can vary greatly depending on how the standards are created. This question helps understand the niche market range that the company is trying to focus on using the standard.
What is your technical advancement in this field?	Understand the level of differentiation that can be achieved by creating a new standard in the “market range focused on (as mentioned above).”
What kind of patents do you have for this technology?	Understand whether a company has secured its technical advantage such that it can be maintained for a long time through patents, etc.
What are the business risks you anticipate, as associated with standardization?	Understand how quickly a company can recognize the risks, such as the increase in market participants and the price competition that might occur after publishing a standard; and how the company will take the relevant countermeasures.
What kind of internal discussions did you have?	Understand how well standardization is recognized as a company’s strategy and how it is turned into a strategy.
Who are your rivals?	Find out how much the companies know about existing competitors, how much they know about the competition that could increase after standardization, and what they perceive as their unique advantages.
What are the sources of profit?	Understand the relationship between the parts that will ultimately benefit from standardization and the products to be standardized. Rather than direct profit, such as an increase in sales due to the market expansion of the product, there may be a case where profit is obtained in the upstream area or downstream area due to standardization, or a profit is obtained in a complementary product, manufacturing equipment, etc. In some cases, the company is only thinking about gaining profit in the form of brand value for the company.
How much profit are you anticipating?	Knowing the scale of profits that a company expects through standardization leads to understanding how many niche markets the company is willing to focus on.
What is the name of the originally planned standard or the name of the final, created standard?	If there is a difference in the responses to these two questions, it is possible to know whether the company was trying to limit the market while considering a standardization strategy.
What are the points devised within the standard?	By devising the standard, it is possible to grasp strategies such as differentiating in a targeted market and monopolizing a narrow market.

They sought to create a product standard using their dust-measuring tool, which utilizes a light-scattering method developed in-house. However, due to opposition from rival companies, the standard was established as a “dust concentration measurement tool testing standard” which does not limit measurement method. Although they could not obtain approval, the performance of their JIS-standardized methods was lauded. The company is aware that this creates hurdles for other companies to join the market;

however, this is a possible case of failure, as they were not able to realize their initial objective.

### **Case 3**

This company aimed for product distinction and the creation of a new market by standardizing high-temperature testing methods for regular paints, specifically heat-resistant white paint. However, since there is much competition from other companies to standardize heat-resistant white paint, they devised a way to minimize entry by rival corporations by creating a standard called “ceramic white paint for lighting.” The goal was to prevent the yellowing of light-emitting diode (LED) foundations. By setting restrictions on the standard, they were able to shrink the market’s size and deflect opposing companies’ interests by specializing in paints used for LED foundations. Additionally, the establishment of JIS standards was expected to improve corporate branding.

### **Case 4**

This company manufactures emergency automobile accident escape tools (e.g., seat belt cutters and safety hammers that break glass); its aim was to tackle defective, foreign-made goods. This kind of standardization is supposed to lead to defective goods being expelled from the market, allowing only products that fit the standard to remain. This would render the effect of product distinction null; however, the company’s JIS-standard product can be differentiated due to its high quality because of the following. (1) Conformance to the JIS standard is optional and not compulsory for this particular product. (2) Competing products are mostly foreign-made, and since Japan is not the main market, there is very little incentive to obtain JIS-standard approval. (3) The product is specialized, rendering cases of actual use rare. Defective products are less prone to detection with such limited use; thus, they remain on the market without being culled.

Furthermore, the company has created a testing method to obtain JIS standard approval. However, because they possess a patent on the testing equipment, other companies find it difficult to obtain JIS standard certification.

### **Case 5**

This company has developed an oxygen densitometer that uses fluorescent paint. Due to the lack of testing methods for this type of product, they have developed testing standards due to the difficulty in gaining credibility as compared to other methods. Existing oxygen densimeters can only be used with batch systems; however, this company has the potential to create a new market, because its densimeter can be used in continuous manufacturing systems. The existing market has been monopolized by large firms, making it difficult to enter the market. It is possible, however, that the company can expand its market if it can secure the reliability of its measurement results, as continuous measurement is a field that large businesses cannot easily encroach. They standardized the testing method, because the market is new. They placed importance

on creating a market and increasing newcomers instead of monopolizing. However, they have secured patents related to this field, making them confident that they can also secure market share.

### **Case 6**

This company aimed for product differentiation by standardizing evaluation methods for assessing mixtures, because it is in the business of developing components for producing emulsions, which are solutions created by blending components that do not normally mix, such as oil and water. The existing market is dominated by methods created by large firms; however, the company's technology has proven superior in specific fields, creating potential for a monopoly. While this technology has been patented, it is easily circumvented. After the creation of the standards, they recognized that the product does not possess enough business value because of its low unit cost. If this trend continues, the business will fail. Therefore, they are currently changing their business model.

### **Case 7**

This business has created liquid packaging that helps retain product quality by preventing the product from coming into contact with oxygen. Due to other major companies entering the market with a lower version of this technology, the company has developed testing methods to clearly demonstrate that its technology is of high quality. Revenue does not come from the packaging but from the mechanism that seals the liquid inside the packaging. Since the standards were developed to be public, reliability in comparison to other companies is high, and the company hoped that the market would rate its products highly due to the publication of the test results using these standards. However, as competing companies that had developed lower-level products do not publish test results using these test methods, direct differentiation has not been achieved. Nonetheless, they have succeeded in gaining market trust and regard for leading the way in creating public standards.

### **Case 8**

This company has developed an automatic inspection system for the coating of special metal parts such as the interior of an engine cylinder. The company aimed to ensure uniformity in the testing apparatus' results due to user feedback regarding a lack of clarity as to the degree of damage detectable by the testing equipment. The company has since created and standardized a testing method that detects damage and holes. It is now easier to accurately explain the machinery to companies, increasing its adoption. Subsequently, the company is investigating the standardization of a testing method that quantifies the testing method's capabilities. It is now exploring which testing method would allow it to maintain its dominance in the market.

### **Case 9**

This company standardized the capabilities of hydrogen containers used in hydrogen stations to prevent the domestic diffusion of cheap foreign-made hydrogen containers.

There are four types of hydrogen containers: metallic (Type 1), resin (Type 2), metal and liner (Type 3), and resin and liner (Type 4). Type 1 is made by Japanese Steel Works, Ltd. Type 4 is made by car manufacturers (e.g., Toyota). Type 2 lacks a domestic manufacturer. The sole domestic competitor for Type 3, which this company produces, is JFE Container Co, Ltd. Expecting an influx of cheap, foreign-made versions of Types 2-4, the company has preemptively developed standards to maintain its share in the market and prevent inferior goods from being imported. They have only standardized Type 3, because it is the only type that this company produces.

### **Case 10**

This company has created standards with respect to the safety of robots that aid human activities. Similar standards exist in Europe; the company's products have received European certification. Further, there are no current competitors for this product. Thus, while there would be little reason to create a new standard in Japan, the company has created JIS standards in response to the user demand for public standards which has, in turn, increased user trust. This standard is expected to contribute to the removal of inferior goods from the market.

### **Case 11**

This company has developed light, inexpensive, and portable microscopes with the same capability as that of existing products. They have standardized performance testing methods so that users would not equate their affordability and diminutiveness with shoddy performance. Expecting that portability will lead to the product being used in various environments, they have also set a standard for humidity resistance. However, there are numerous standards for portability as well as numerous rival companies; the company has standardized the product as a so-called bacteria self-checker instead, so that they will not face rejection upon standard creation.

### **Case 12**

This company manufactures specific gas generators. The motive behind standardization was not business considerations; rather, the company hoped to gain industry credibility in academic circles. As such, the standardization document was drafted by university researchers. This standard unified the industry, and their cooperation led to an increase in trust. The company contributed to the JIS standardization of academic circles, increasing their familiarity in the industry and enabling rebranding; however, they are not focused on the merits of product differentiation via standardization.

### **Case 13**

The company created a JIS standard for a fine-glass powder that is purified through a volcanic ash classification technology. Developing this JIS was not a significant goal of the endeavor. Ultimately, they aim to use volcanic ash that is larger than fine powder as a construction material. As the first step, they standardized a limited set of usable products. Now, after having received the approval of the Ministry of Land,

Infrastructure, and Transport to use the powder as a building material, they are setting a course to receive approval for other sizes.

### Summary of Cases

Table 2 is the analysis result of the 13 case studies above. Two companies are examples of failure; they could not create standards, or their business models did not coincide with standardization. Of all the cases, company branding via JIS creation was expected by nine companies; however, only two conducted standardization activity with the sole aim of branding. Hence, standardization was not directly connected to the business interests of the target products.

**Table 2. Standardization activities of 13 companies**

Activities	Companies												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Success/failure	○	×	○	○	○	×	○	○	○	△	○	△	○
Branding of the company	○		○	○	○		○	○		○	○	○	
Market monopoly	○		○	○			○	○	○		○		
Limited standard range	○		○		○				○		○		○
Difficult testing method	○			○			○	○					

○ : Succeeded △: Succeeded but non-contributing to business ×: Failed

Seven companies created standards to monopolize their markets. The other two standardized not for monopolization but for market expansion and the removal of public regulations. To monopolize their markets, five companies limited the range of standards, and four increased the difficulty of testing methods to obstruct market entry. The two companies that aimed for market expansion and the removal of public regulations also limited the range of standards and defined their markets.

## DISCUSSION

### Assumed Business Effects

It was possible to divide the assumed business effects of standardization into three broad categories.

The first is the advertising effect. Many companies did not think they would increase profits using the technology standardized through the JIS. Rather, they hoped to increase the technical strength of their brand through the achievement of JIS, a national standard. There were also many companies that expected the creation of a JIS standard to be very useful in advertising that the standardized technology was highly capable within a specific niche.

The second assumed effect was the securing of profits using technology other than the standardized technology. In this case, there were two strategies employed as profit-securing methods. The first type made profits by exclusively selling manufacturing equipment for standardized products. Large profits can be expected with this strategy. The second type was acquiring patents on testing equipment and increasing profits through the sale of this testing equipment. As is shown later, this should not actually be thought of as a strategy to increase profit through testing equipment but rather as a strategy to increase the costs of test implementation.

The third type of assumed effect was the one most widely expected to raise profits through standardization activities for SMEs. This was the limited monopolization of a market using standards. By standardizing the functions necessary for a specific area, standards could work as barriers to market entry in that area. Of the 12 SMEs targeted in this study, the standards obtained by seven companies achieved this.

## **Success Factors**

Standards are documents that are created with the goal of allowing others to achieve the same level of performance. For example, product standards will stimulate competition in the market as other companies can manufacture and sell similar products. Testing standards also allow users to compare the performance of the products so that products with the capabilities appropriate for each market will expand the market. For this reason, standardization of testing methods often activates the research and development of competitors seeking to gain market share and stimulates market competition. Similarly, standardization of manufacturing methods and standardization of management methods usually lead to an increase in market participants. Based on this principle, if the creation of standards is connected to the monopolization of a market, then that standard is not accomplishing the purpose of a standard. Why, then, does the creation of standards cause market monopolization?

The interview subjects consisted of companies whose proposals had been shortlisted under the system and that had begun the work of creating standards. Of these, one company was not able to create the expected standard, and since the scope and requirements of the standard changed, the expected business effects did not occur. Furthermore, many examples exist of companies with standards proposals that applied to the system but were not adopted. That is, not all SMEs succeed in monopolizing markets using standards. What are the differences between companies that are successful in monopolizing markets through standards created using this system and companies that are not?

In the interviews, information was obtained on this topic from different points of view, enabling the authors to understand the conditions that successful standardization attempts share.

The first point is whether the market is monopolized by a specific large company or by a foreign company, that is, whether there is one domestic competitor or none. Depending on the answer, there will be either one rival company or none participating in the national committee that decides on the creation of standards. If there are few rival

companies, then the creation of standards that are advantageous for a given company is easy. For large companies, the creation of standards in a specific area is not important at the business level. Therefore, only few companies oppose the creation of such standards. Microsoft, for example, spent considerable time and money on standardizing OOXML, which can be compatibly used with several of its applications, and provides a wide range of applications (Egyedi & Koppenhol, 2010). However, although OFX, an information exchange format used as the company's financial software, participated in standardization, it had a strong character as a "user;" and thus lost interest in it at the same time as the business failure of Microsoft Money. The company will not be interested in narrower standards, such as the standardization of personal household accounting software formats. In such a market environment, the issuance of standards that monopolize a specific area of the market for a high-performance product made by a given company is a simple matter.

A second point is the balance between the height of the barriers to market entry and the size of the market. Once test specifications are established, assembling the necessary testing equipment and implementing the tests as required by the standard becomes costly. Furthermore, if the standard is a product standard, an increase in performance may be required to meet the requirements set forth, demanding additional expenditure on R&D.

Whether to invest to cover these additional costs is determined by the size of the market that can be obtained (or potentially lost, if the standards are not met), that is, whether barriers to market entry are sufficiently high and the profit that can be expected from market entry is less than the cost of overcoming those barriers; competitors will not enter the market as a matter of course.

The standards created by the companies in this survey include product standards with testing methods that involve exceptionally high costs or those protected by patents, thereby making testing difficult. Some companies also created standards by narrowing the scope of application while keeping an eye on the movements of rival companies. The scope of the market was then restricted using standards, until rival companies lost interest.

### **Consistency With the Established Purpose of National Standards**

As seen above, many SMEs that used this system monopolized markets while considerably growing their business. However, how were they able to monopolize markets using the JIS, which are national standards? How do these kinds of standards become established despite being inconsistent with the stated goals of the national standards?

Clearly, the answer is strongly related to the circumstances under which the new system began. As noted above, this system was significantly changed because its predecessor, the "top standard system," lacked users.

As explained in the "METI's New Market Creation Standardization System" under the "Case Background" section, to expand the user base of the system, METI decided to use JIS, the national standard of Japan, as the target standard. However,

large companies are not interested in JIS, the domestic standard. For this reason, METI has determined that only SMEs can be expected as users of this system.

METI had to increase the number of users of the new system to recover from the failure of the previous policy (“Top Standard System”). Therefore, METI announced the numerical goal of creating 100 standards by 2020. As a result, the operations goal for METI and JIS became “increasing the number of users,” and aspects of standards such as their versatility and diffusion effects were neglected.

Initially, many SMEs participated in government systems without being aware of the business value and risks of standardization. As JSA has introduced know-how to establish domestic standards, many cases arose in which the application scope in the draft of a standard was gradually narrowed if it faced opposition from rival companies. As a result, many SMEs realized that this system could be exploited to monopolize a particular niche market; however, they did not inform METI or JSA. METI’s standards department and JSA were not familiar with the business effects of standardization; therefore, they pushed forward to increase the number of new standards without realizing that a newly created national standard could cause a market monopoly by a specific company.

## CONCLUSION

The cases in this study demonstrate that the JIS standards system is often used by SMEs to “expand credibility” or “increase the brand profile” of companies or products. Further, the number of cases in which companies mainly aim to increase market size is small. Indeed, in many cases, companies aim to introduce market restrictions and prevent the entry of competitors through the creation of JIS standards.

The use of standards in this way is a specific case of the “business effects of standardization,” and is normally a strategy that is difficult to implement. In particular, if the standards being used are the Japanese national standards (the JIS), such actions constitute an abuse of the standards system. These efforts are not consistent with the policy goals of standardization, such as the spread of technology and enhancement of product quality within the entire market.

However, this system has been revolutionary as a promotion policy for SMEs. The government is allowing SMEs to monopolize markets through the use of the national standards. Such use of national standards is unprecedented. However, if the national standards system aims for the promotion of industry, this method offers one way to accomplish that goal.

Further, this survey was conducted just after the SMEs had created the standards. In many cases, market monopolies had not yet been realized. To confirm that SMEs can actually monopolize the market, the market must be observed for a while. Interviewing these target companies again in three years will yield better research results.

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