

The Japanese photo shop industry
and its adaptive process toward digitization

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Abstract

The purpose of this study is to determine how photo shop industry in Japan continue to exist despite the digitization of photography. In this paper, we focus the problem why digital mini-labs were diffused faster than DSCs, despite following three obstructive factors: the enormity of investment; uncertainty regarding the digitization of photography; conservativeness of the photo shop industry. We find following mechanism from case analysis: in contrast to other photo shops, Kitamura especially recognized the digitization of photography as an urgent and crucial problem, and decided to introduce digital mini-labs into all of its photo shops; Kitamura's entrepreneurial action triggered its rivals to follow suit; digital mini-labs became the standard solution for the problem of digitization for the entire photo shop industry; the emergence of standard solution changed the perspectives of other photo shops that were unaware of the threat.

1. Introduction

This study examines the Japanese photo shop industry and its adaptive process toward digitization. In this case, the term "photo shop" refers to a business that develops film, produces prints, and enlarges photographs. However, before conducting a detailed analysis, it is necessary to explain the main research problem.

The digitization of information in recent years has significantly changed not only consumer behavior but also the operating principles of home appliances. After the mid-1990s, the photo shop industry faced the advent of digital photography and the corresponding replacement of film cameras by digital still cameras (DSCs). It can be deduced that the digitization of photography has had a significantly negative effect on the photo shop industry from the viewpoint of both technology and consumer behavior.

First, from the technological viewpoint, the principles of shaping photographic images between silver halide photography (i.e., old technology) and digital photography (i.e., new technology) are fundamentally different. In addition, the requisite knowledge and skills, based on the properties of each technology, are quite different between silver

halide photography and digital photography. Silver halide photography, as the name suggests, is based on the chemical attributes of silver halide pertaining to light sensitivity. Hence, the core technology in this industry—processing silver halide photography—can be abstracted as controlling the conditions of chemical reactions on photographic film and paper. In contrast, digital photography is formed by processing the electric signals captured by the receiving elements (i.e., charge-coupled devices (CCD) or complementary metal–oxide–semiconductor (CMOS)) using computer software. In short, digital imaging is based on the electric principle.

Second, from the viewpoint of consumer behavior, the relationship between photo shops and consumers could have been significantly changed. In the era of silver halide photography, consumers had to bring images (i.e., films) to photo shops to have them developed and printed. However, users of DSCs can view the images on the monitors of DSCs or personal computers (PCs), after which they can print them using inkjet color printers. In other words, consumers no longer need to visit photo shops to develop and print their images. Thus, it can be deduced that the advent of digital photography has had a negative effect on the photo shop industry. Although the number of photo shops in the Japanese domestic market has continuously declined, as of 2010, there were still over 10,000 photo shops in existence, a figure similar to that in 1990.

Although the digitization of photography itself includes multiple aspects of change, for photo shops and mini-labs, it was the “competence-destroying technological change” that caused the decline in the value of existing technology (Tushman and Anderson, 1986). Furthermore, the digitization of photography may have been “competence-destroying” in that it may have destroyed the existing relationship between photo shops and the market. According to the aforementioned study, it was significantly difficult for photo shops to convert to digital photography, which was an entirely different technological process.

Therefore, this study aims to determine how these shops continue to exist despite the digitization of photography. This examination will include several important aspects: the emergence of digital mini-labs, of which the internal mechanism is digitized; the idea that photo shops could launch a new business for users of DSCs, i.e., the digital photo printing business; and the idea that the photo shop industry as a whole could adapt to the technological changes of photography. As we verify this later in this study, digital mini-labs were diffused earlier than DSCs, which means that the infrastructure of the digital photo printing businesses in Japan existed well before the diffusion of DSCs. As a result, similar to when consumers brought their films in for development, consumers

still bring their images to photo shops to have them printed.

2. Research question

Digitization of photography and the diffusion of DSCs

Before conducting a detailed analysis, it is important to reconfirm that digital mini-labs were diffused earlier than DSCs. Figure 1 shows the digitization of photography at the consumer level and the digitization of mini-lab equipment at the retailer level. According to the findings, the addition of digital mini-labs in photo shops occurred before the substitution of cameras.

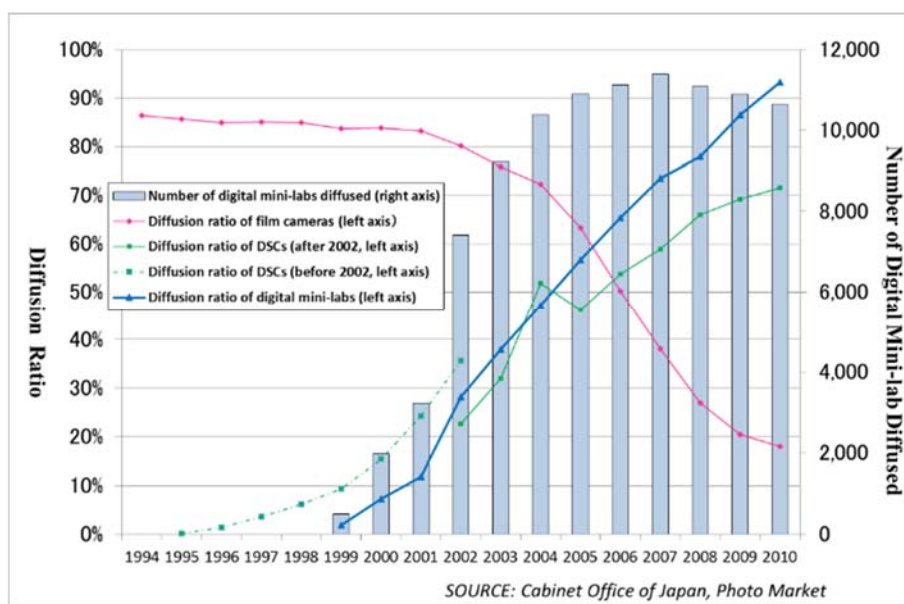


Figure 1 Diffusion of cameras and digital mini-labs in Japan

However, the fact that digital mini-labs were diffused before the digitization of photography is somewhat confusing, especially considering the environmental circumstances of the photo shop industry at that time. In addition, it is difficult to believe that digital mini-labs had become widespread despite the following obstructive factors:

- (1) The enormity of investments

Figure 2 shows the longitudinal average profit rate of the photo shop industry. In contrast to the samples in black that remain almost constant, the entire photo shop industry shows a decline over time. After the mid-1990s, the average profit rate was negative, indicating that the photo shops were facing increasing difficulties.

Furthermore, when digital mini-labs emerged (i.e., 1998), it was just after the industry was pushed to adapt to the Advanced Photo System (APS), which was

proclaimed as a new standard of photo film. However, after completing its adaptation to the APS standard, the photo shop industry faced the decision whether to renew the mini-lab equipment that was still in service. At that time, the additional investment involved in implementing digital mini-labs became a heavy burden.

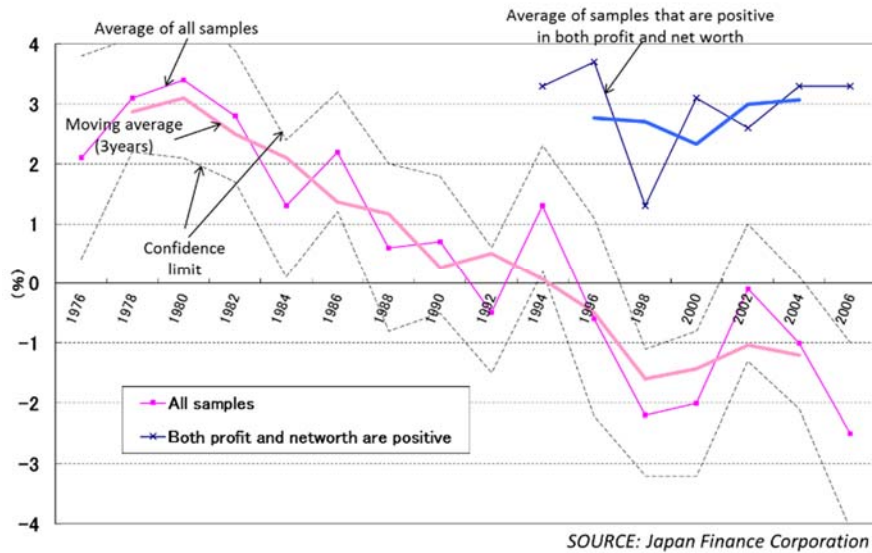


Figure 2 Average profit rate of the photo shop industry in Japan

(2) Uncertainty regarding the digitization of photography

When digital mini-labs emerged, the future of the digital photography business was unclear. For example, although the volume of shipments of DSCs was rapidly increasing, the use of film cameras was still prevalent among users. In addition, the question remained whether photography would be digitized, and the belief that silver halide photography would be robust was strongly rooted in those engaged in the photography field. Conversely, the use of DSCs was still in its infancy, the dominant design of DSCs was not fixed, and the consumption behaviors of DSC users were still obscure.

(3) Conservativeness of the photo shop industry

The overall photo shop industry, a large part of which consisted of independently operated shops, did not have the enterprising spirit of adapting to environmental changes, i.e., the digitization of photography. One owner of a photo shop in Tokyo, who held an important position in the industry group, stated the following:

“Since the photo shop industry was stuck in the mud, many photo shops downgraded the advent of DSCs... they thought it was not serious. Then, after the use of DSCs spread, they stated, ‘We have a terrible experience.’ I

wonder if they sensed a crisis.”

This statement implies that most photo shops did not take the digitization of photography as a serious or urgent threat. This statement is worth noting since this owner was a board member of an industry group of photo shops in Tokyo. In addition, this owner’s shop introduced its digital mini-lab in July 2002, which was still early in the large-scale diffusion of digital mini-labs. However, the introduction of such equipment was viewed as a short-term necessity. Thus, the motivation to invest in a digital mini-lab was rather low. In addition, the aforementioned photo shop’s decision to introduce a digital mini-lab was not made from a medium- or long-term strategic perspective but from a day-to-day viewpoint.

Finally, the fact that the diffusion of digital mini-labs occurred earlier than that of DSCs (Figure 1) suggests that digital mini-labs were not diffused because the photo shops were responding to the use of DSCs at the consumer level. Furthermore, the three aforementioned obstructive factors deny the simple explanation based on means–ends linkage; that is, the photo shop industry survived because the industry as a whole foresaw the digitization of photography.

Question and hypothesis

This research investigates why digital mini-labs were diffused faster than DSCs, despite the three obstructive factors mentioned earlier. Moreover, why were digital mini-labs being implemented in the photo shops that were unaware of such an environmental change? One possible answer can be summarized as follows. As shown in Figure 3, Kitamura, a major chain of photo shops, foresaw the problem of digitization due to its dual role of selling cameras and printing photographs and played an important role in determining the intended purpose of digital mini-labs. Furthermore, as the benefits of digital mini-labs (as a solution for the problem of digitization) became clear, the company established a standard solution for the entire photo shop industry, which in turn changed the perspectives of other photo shops that were unaware of the threat.



Figure 3 Adaptive process of the photo shop industry

Research methods

This study is a single, explanatory, embedded case study (Yin, 1994) examining the Japanese domestic photo shop industry. In this case analysis, the triangulation method is utilized, in which both primary data from interviews and secondary data from various publications and public statistics. The merits of this approach enable the subject to be understood from different perspectives. The first type of information employed in this study was obtained through 20 personal, unstructured interviews conducted with employees who are or have been associated with the Japanese photo business (six of them work or worked at a photo shop while the remaining 14 are associated with mini-lab manufacturers). The publicly available data pertaining to the photo shop industry was mainly obtained from the “Photo Market” business journal, financial reports of firms, newspaper articles, etc. Since excluding the biases of post-hoc rationalization can be difficult, the consistency of the interview data has been cross-checked with other sources whenever possible.

In the following analysis, for the purpose of uncovering how the Japanese photo shop industry has adapted to technological change, special attention has been paid to the following:

- (1) The actors' independent factors, such as foresight or intention, are considered, after which their actions are analyzed and merged into one social process.
- (2) A continuous time axis is introduced, after which a historical analysis is performed.

3. Case analysis: the diffusion of digital mini-labs

Digital mini-labs as a solution for the digitization of photography

In this section, the process regarding the diffusion of digital mini-labs is examined by

focusing on two key players: (1) Fujifilm, a manufacturer of digital mini-labs and (2) Kitamura, a chain of photo shop businesses. Fujifilm extensively contributed to the digitization of mini-lab machines by developing FRONTIER, which is the brand name of Fujifilm's digital mini-lab. Meanwhile, Kitamura contributed by interpreting the purpose of digital mini-labs and triggering the diffusion of such labs into the entire industry.

Change in the purpose of digital mini-labs

Fujifilm, which was the first company to develop digital mini-labs, did not intend for digital mini-labs to be used to adapt to the digitization of photography. FRONTIER was primarily developed for printing film photography more beautifully, i.e., to print images onto silver halide paper with outstanding quality. Hence, printing images taken by DSCs was a secondary purpose. According to Tsutomu Kimura, a chief engineer who helped develop FRONTIER:

“When I was ordered to develop FRONTIER in 1996, the digital camera (DSC) was still like a toy for me. I never expected that it would become popular among general users. In addition, when I developed FR350 (the first model of FRONTIER), I didn't aim for it to be a printer for DSCs. *My concept of the equipment was to scan the images of films, process them digitally, and print them sharply* [emphasis added]. Just after FR350 was launched, I noticed that the image quality of DSCs was not so bad... then the performance of DSCs developed quickly... astonishingly.”

Furthermore, Hirozo Ueda, Vice President of Technology at Fujifilm, stated that the goal of FRONTIER was to improve the quality of images through digital processing. Based on these statements, the purpose of digitizing the internal mechanism of mini-labs was not to prepare the diffusion of DSCs but to improve the overall quality of film photography.

In contrast to mini-lab manufacturers, who attached weight to the printers of film photography, Kitamura saw FRONTIER as a tool for DSC users. Kitamura especially recognized the digitization of photography as an urgent and crucial problem. In 1999, Kitamura decided to introduce FRONTIER into all of its photo shops. By May 2002, mini-labs had been implemented in over 500 of its shops. As Takayuki Sugawara, an executive officer of Kitamura, stated:

“We expected that if DSCs would be diffused, then the sales channel of cameras would change, and the sales of film, their development, and printing would decline. We would not be able to survive, unless we adapted to digital photography. Hence, we gave up our previous effort of opening stores at a pace of double-digit growth. We tried to include digital mini-labs in all of our existing stores... which were approximately 550, to meet the needs of the digital era. Kitamura had to do that and tried to do that... FRONTIER was... and is still the best in the business. So, we decided to introduce digital mini-labs without hesitation [emphasis added]. At the time... when the number of photo shops that were equipped with FRONTIER in Japan was only 1,500, we deployed it in all of our photo shops. We believed that if the use of film disappears, then we should shift from film cameras to DSCs and from analogue to digital printing.”

For Kitamura, the digital mini-lab was an important tool in response to the digitization of photography.

Finally, regarding the purpose of FRONTIER, there was a gap in the perceptions between the manufacturer (i.e., Fujifilm) and the user (i.e., Kitamura). However, as the trend of digitization became clearer, this gap narrowed.

Kitamura’s decision-making process in introducing digital mini-labs

In this section, the Kitamura’s decision-making process is analyzed by exploring how the company recognized and foresaw the problems related to the digitization of photography.

In 1999, when Kitamura decided to introduce digital mini-labs into its entire chain of photo shops, it was difficult to predict whether digital photography would replace film photography and whether the threat would become evident. Under such uncertainty, Kitamura’s strategy presupposed that film cameras would be replaced by DSCs. However, this raises the following question: What was the basis of this assumption? Kitamura was able to judge the future of digitization since it also sold cameras to consumers. In this case, the substitution of film cameras was a “leading indicator” that signaled the decline in film printing.

Figure 4 shows the volume of camera shipments and prints, both of which are indexed. According to this graph, the problems can be seen in two aspects: the substitution of film cameras and the decline in the volume of film printing. This was the reality that Kitamura viewed. By witnessing this continuous change, Kitamura probably noticed that DSCs would eventually replace film cameras and that its incumbent

business of film printing would be in danger, based on the sales of both types of camera in their stores.

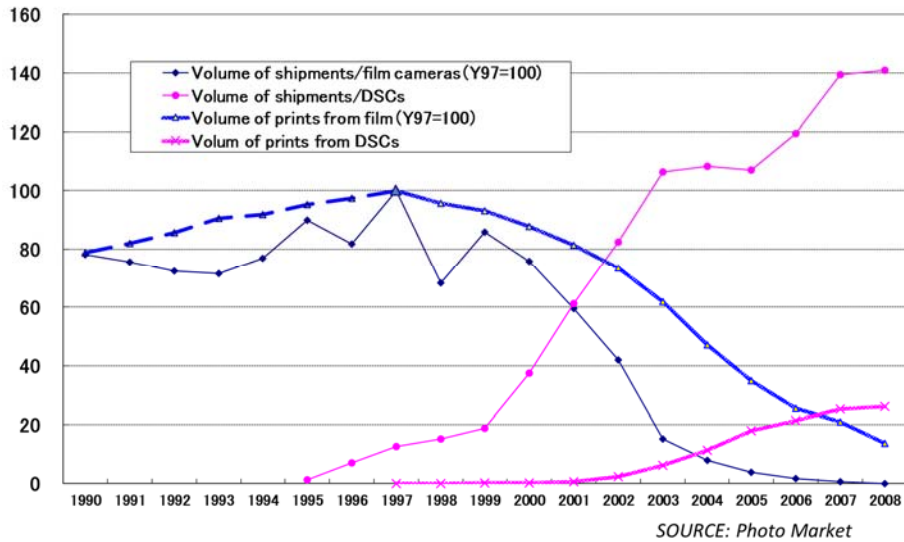


Figure 4 Volumes of camera shipments and prints

When Kitamura faced the problems of digitization, although the difficulties accrued with that were expected, there was no definitive solution. Thus, the company had to explore other options. As a consequence, its plan was to add digital mini-labs into its chain of photo shops and pioneer the new business of digital photo printing. However, for this strategic transformation, the total cost was approximately ¥7 billion (US\$58 million at that time). According to Takayuki Sugawara:

“The reason why Kitamura required courage, especially in investing in digital mini-labs, was that... in the film era, other rival photo shops were already equipped with mini-labs. Since we were in charge of so many film-processing stations, we found it necessary to focus on the demand for film processing. So, in 1994, we decided to add mini-labs into our photo shops and introduce digital film processing at each location. However, we were the first to introduce digital mini-labs. In this regard, we had to replace the analog machines, which were not fully depreciated, and deduct significant expenses since we had to terminate our lease contracts early. But still, we felt that it was extremely important to introduce digital mini-labs into our chain of photo shops, even though there were certain difficulties along the way.”

Based on this statement, both the scale of the investment and Kitamura's preparedness are apparent.

A standard solution for the photo shop industry as a whole

This solution, pioneered by Kitamura, showed the course that the photo shop industry had to pursue. At that time, Kitamura's aggressive behavior in introducing digital mini-labs triggered its rivals to follow suit. On the other hand, Kitamura cooperated with mini-lab manufacturers to establish the digital photo printing business. This was achieved by obtaining market information through market testing and holding continuous dialogues with manufacturers. As a result, mini-lab manufacturers offered the new business of digital photo printing to the entire photo shop industry. However, initially, as a solution for the problem of digitization, digital mini-labs were only introduced to a small portion of the industry that was aware of the threat. Over time, this solution was accepted by an increasing number of photo shops, and eventually, it became the "standard solution" for the entire industry.

When Kitamura decided to introduce digital mini-labs, there were several ways of printing digital photography. However, from the viewpoint of quality, cost, speed, etc., digital mini-labs were found to be the best way to conduct the photo shop printing business. As Sugawara stated:

"For the photo shops that had the will to continue their businesses, digital mini-labs were indispensable. In fact, not equipping their shops with digital mini-labs, such as FRONTIER, meant giving up their businesses. Photo shops that wanted to continue their businesses had no choice but to deploy digital mini-labs."

From the viewpoint of service quality for consumers, there was no realistic option other than digital mini-labs.

Diffusion of digital mini-labs in photo shops that were unaware of the threat of digitization

As mentioned above, some photo shops did not recognize the digitization of photography as a crucial problem, while others did not focus their attention on the digitization problem, even though they were conscious of their businesses. Why was Kitamura's solution accepted by photo shops that were unaware of the environmental change? The formation of a standard solution for the entire photo shop industry had an effect on these

types of photo shops. In other words, a specific solution for the digitization problem was proposed (presented) for photo shops that were unaware of the digitization problem. As a result, the addition of digital mini-lab was accelerated.

It is possible that the promotional activities conducted through cooperation between the manufacturers of film and photographic paper and the photo shop industry had increased the awareness of the digitization problem. For example, after 2002, when DSCs were substituting film cameras, a campaign titled, “Let us print the images that you took with DSCs,” was sent by Fujifilm to consumers. In the promotion, the superiority of digital photo printing service versus IJP (i.e., convenience for consumers and beauty and durability of images) was presented. It is interesting to note that although the promotional activities were for general consumers, the messages may have also been sent to all of the photo shops, i.e., the suppliers of photographic services. Kagono (1988) pointed out that substantive, specific examples of a new paradigm must be shown before an organization changes its paradigm. In this case, the emergence of a standard solution of digital photo printing (i.e., using digital mini-labs) had served as a specific example of the new paradigm. The warning in this standard solution was concerned with the following two threats: (1) as the digitization of photography advanced, the business of developing and printing film photography in analog mini-labs was rapidly declining and (2) in the field of digital photography, inkjet color printers were attaining advantageous positions by capturing the demands of printing. Thus, the aforementioned promotional activities increased awareness regarding the digitization issue, which the photo shops may or may not have noticed at the time.

Driving force of the transformation

Regarding the rapid diffusion process of digital mini-labs in photo shops that were unaware of the environmental change, we can provide an explanation by using the well-known framework of “self-defeating prophecy,” which is one of the variations of social mechanism brought by a prophecy (Merton, 1957; Weick, 1995). In this case, the standard solution played the role of alerting the prophecy; that is, once the type of prophecy was made (i.e., the disappearance of photo shops due to digitization), a crisis awareness was shared by the photo shops that were unwilling to adapt to digitization. As a result, what actually occurred was quite different from what the prophecy had expressed. In this case, the prophecy about the crisis had supported the addition of digital mini-labs. The driving force of the transformation process should not have been an opportunity for profit but rather the awareness of the threat that their businesses would disappear.

However, the “prophecy” could have affected the situation in a reverse manner. In other words, the “prophecy” could have influenced these photo shops to discontinue their businesses due to various reasons such as the absence of a successor, the lack of funds for replacing the mini-lab equipment or retirement. In this regard, the breakdown of the diffusion rate (Figure 5) shows that after 2007, although the number of digital mini-labs diffused (i.e., denomination of the diffusion rate) did not increase, the diffusion rate continuously increased. In fact, by 2010, more than 90% of the shops in the industry were equipped with digital mini-labs. The main reason for this growth was the reduction in the number of photo shops in denomination after 2001. The fact that the number of photo shops in Japan was decreasing over the long term can be interpreted that the industry is in a difficult situation. However, from a slightly different viewpoint, the “prophecy” not only helped the shift toward the new business of digital photography but also persuaded photo shops (especially those that were continuing their old business for existing users of film cameras) to exit the market. As a result, the industry as a whole was able to transform itself by equipping the photo shops with digital mini-labs. In other words, the emergence of the “prophecy” increased the metabolism of the industry.

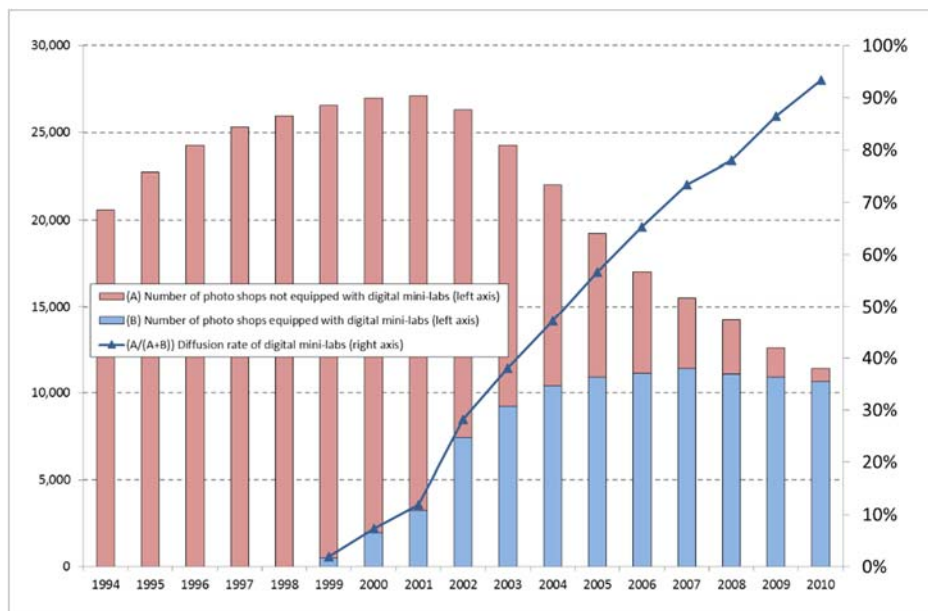


Figure 5 Diffusion rate of digital mini-labs and the number of photo shops

4. Discussion and implications

This study examined several points of contact between existing theory and this case.

Function of complementary assets

It was found that in the phase of technological change, complementary assets can do the following: (1) buffer firms that possess the assets (Tripsas, 1997; Rothaermel, 2001) and (2) influence the nature of investments (Wu, Wan, & Levinthal, 2014). In this case, the sales of cameras at Kitamura's shops functioned as a "leading indicator." In addition, complementary assets (i.e., the business of selling cameras) could have functioned as a "sensor" that detected changes in technology or the market. In this regard, complementary assets can aid absorptive capacity (Cohen & Levinthal, 1990).

Diffusion theory of new technology

The issue regarding how a new technology or product can be diffused has been examined in both theoretical and empirical research (Rogers, 2003; Mansfield, 1968a; 1968b; 1985, Teece, 1980; 1986; von Hippel, 1986; Utterback, 1994; Stoneman, 2002). The diffusion process of digital mini-labs into the photo shop industry described above can be framed according to the theory of diffusion of innovation (Rogers, 2003), which describes the diffusion of new technology or a product as an issue of communication in which the meanings about certain events converge. His theory also focuses on how information regarding a new technology becomes widespread across a social system. In this case, communication is defined as "a process in which participants create and share information with one another to reach a mutual understanding."

In this case, the fact that digital mini-labs were not developed to prepare for the digitization of photography typically implies that the "meaning(s)" of digital mini-labs did not converge from the beginning. Kitamura discovered the "meaning" of the new product (i.e., digital mini-labs) and how it could be proactively used as a tool for the new business of digital photo printing. Kitamura's concrete action increased the awareness by other rival photo shops and caused them to follow suit. As a result of the pervading view on the usability of digital mini-labs, they were established as the "standard solution" for the digitization of photography. According to the findings, the competition between firms increased the communication regarding the new technology and helped achieve the "convergence of meaning." In short, the competition process itself served as a type of "communication channel."

According to Rogers' model, Kitamura can be referred to as the "innovator" in this process. However, since Rogers categorized consumers into five groups, according to the employment of new technology, Kitamura's innovation should be based on the differences between the mentality, habits, idiosyncrasies, and attributions of each player. In this regard, by focusing the actions of Kitamura or photo shops that were unaware of

the threat of the digitization problem, we obtain a more convincing explanation about the phenomenon.

The garbage can model in the market

Rogers (2003) implicitly stated that a problem can exist in advance, after which a solution emerges. However, in this study, the events occurred in reverse order; that is, the emergence of digital mini-labs, which were not developed to adapt to the digitization of photographs, helped increase awareness regarding the threat of digitization to the entire industry. In addition, each player in the industry began sharing information, which in turn helped introduce digital mini-labs on a large scale. The order of events is partly consistent with the “garbage can model” proposed by March and Olsen (1976). This case can be framed as a decision-making process by the photo shop industry in adapting to the new digital photo printing business. Moreover, since the photo shop industry is presumed as an organization, the rapid diffusion process of digital mini-labs is partially consistent with the garbage can model.

If the garbage can model is applied to this case, then the social phenomenon (at the macro level) seems to be generated by emphasizing the contingent perspective. Concerning this point, there are some interesting facts in this case study. First, new equipment developed for a specific purpose can be a solution for another problem caused by environmental change. As stated earlier, digital mini-labs were not originally developed in response to the digitization of photography. However, Kitamura believed that it was the key to establishing the digital photo printing business. Moreover, the company equipped its shops with digital mini-labs, which, in turn, had a positive effect on the industry as a whole. Second, as mentioned earlier, a solution can emerge before a problem exists. In this regard, the emergence of the solution (i.e., digital mini-labs) made photo shop owners more aware of the threat (i.e., digitization of photography). As a consequence, many players in the photo shop industry shared this awareness, which positively affected the industry.

Finally, these two facts imply that the relationship between the means and the ends is not always fixed. Instead, it can be flexible, according to the temporal condition. In other words, the tentative solution for one problem may be diverted into another problem. This implies that there may be a possibility of survival for a business, not by the ultimate solution, but by applying some means that were not originally supposed to be performed.

ⁱ The first digital mini-lab was launched in 1998. The internal process of a digital mini-lab is as

follows. First, the analog images on the films are scanned and converted into digital signals. Then, the images are printed onto photographic paper using lasers. Thus, digital mini-labs are not only able to print images from still cameras but also print digital photographs taken by DSCs.

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