
A CONSIDERATION IN DEVELOPING STRATEGIC INFORMATION SYSTEMS THROUGHOUT BUSINESS TRANSFORMATION: A CASE STUDY OF SEIREN CO., LTD.

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ABSTRACT

This paper analyzes product development and business growth as a result of changes in information systems (IS) during a period of business transformation. Since the 1990s, management of corporate IS being made by outsourcing has become a basic business strategy, against a backdrop of theoretical motivation explained by theory of core competence and transaction cost theory. Outsourcing service providers with technical expertise have continued to grow by enjoying economies of scale produced by replicability of IT related products.

However, existing theories that explain IS outsourcing might not be valid in the transition phase of business system (i.e., business model). Instead, we think that there is a possibility in insourcing management to create strategic information system and to achieve more flexible and effective business systems transition than outsourcing management.

The purpose of this research is to find clues of theoretical hypothesis that answer the question how firms develop and maintain their IS that provide competitive advantages at business system transformation by case study. The exploratory case study shows the effectiveness of developing IS in-house. It indicates that (1) the innovative vision of top management advances accumulating business knowledge deeply and widely in organization, and (2) using accumulated knowledge and skills through insourcing management enables the firm to develop unique and effective IS.

In the view of capability-based approach, we conclude that Insourcing (Not Outsourcing) IS development that includes "IS-extensibility" could make the business system transformation more flexible and effective.

INTRODUCTION AND OBJECTIVES

One of the critical issues of any corporation is how it continues to grow and perform successfully. Among stakeholders including customer, shareholders and employees even if they have different and sometimes opposing interests, a lasting positive performance is assumed as a common goal. Under the globalization of competition, ceaseless technological innovations and

diversification of customers' needs, companies are forced to reconstruct their business system in order to survive and prosper.

In this paper, we focus on the management of corporate information systems (IS) in large companies during the period of business transformation. Some researchers pointed out that some researchers pointed out that IS is one of disablers of business transition (Allen & Boynton, 1991; Prahalad & Krishnan, 2008). The purpose of this case study is to find clues of theoretical hypothesis that answer the question how firms develop and maintain their IS which provide them with competitive advantages. IS play a critical role in the overall structure of the business system. The transformation from one particular business system to another is caused by various factors such as globalization and diversification of business, changeover of business category, restructuring and corporate reengineering. In most cases, these transformations require and entail the review of existing IS. At the same time, a review of IS also influences business system. There is interrelated influence between IS and the business system (Inoue, 1998).

LITERATURE REVIEW

One method that business undertakes in order to gain competitive advantage is to establish a review of IS. However, establishing a competitive advantage is not solely done by the introduction of new IS itself, although, in recent years, it is becoming more difficult to complete various business tasks without utilizing IS. For instance, the introduction and management of IS has flourished in human resource management and in accounting. In the same way, production planning and supply chain management also requires IS for controlling the flow of both information and goods. IS are necessary and common place, but, the question of whether IS could be a source of competitive advantages or not remain inconclusive in existing literature. On the one hand, some literature suggest that even though it is a business requirement, IS are becoming a commodity without the rarity that is a condition of being a resource of competition advantage thereby diminishing its strategic value (Carr 2003, 2004, 2005, 2008).

Since the 1990s, the effectiveness of outsourcing in order to enhance its core business has received significant attention (e.g., Quinn, 1992). Kotabe & Helsen (2008) pointed out that the cutting costs and focus on core competencies, the use of special expertise and intention to expand sales and profits as the main reason why companies outsource, and that the same is true of IS outsourcing. They also note that especially in Japan by recession, corporate is forced to explore cost savings methods by IS outsourcing.

IS outsourcing has widely penetrated as a basic strategy since 1990s (Dibbern, Goles, Hirschheim & Jayatilaka, 2004; Gonzalez Gasco & Llopis, 2006; Lacity, Khan & Willcocks, 2009). Also King & Malhotra (2000) make specific references to particular functions within IS which tend to be outsourced. Akomode et al. (1998) describes this type of outsourcing as a basic strategy for developing IS for several reasons; cost reduction, inefficiency of developing IS within a company and a lack of technological ability. Since 1990s, IS departments in many

Japanese firms have taken a less hands-on approach to IS preferring to out-source roles which includes planning, constructing, designing, developing, implementing and maintaining to outside specialized companies such as “service providers” like IBM, in whole or in part, otherwise sale the IS department or form a capital alliance with a specialized affiliate company.

Through various approaches a body of work pertaining to the outsourcing of IS has been established. While economic theories explain its efficiency in terms of scale economics and transaction costs (Coase 1937; Williamson, 1975) , diversified procurement frameworks ranging from internalization, intermediated organization (pseudo-outsourcing) and internal market within the organization have been proposed (Yoshida, Yoda and Minami 2009).

In contrast, some literatures suggests that IS are strategically important for achieving a competitive advantage for the company (Yoda, 2010). In an extensive literature review, Piccoli and Ives (2005) pointed out the existence of four barriers that serves as obstacles to replication; “IT resource barrier” including both assets and capabilities, “complementary resource barrier” including distribution channels and organizational structure, “IT project barrier” caused by rarity and complexity of technology and “preemption barrier” that consists of switching cost and relationship. Because of these four barriers, IS are not replicable. Specifically, literature on Resource Based View (RBV) regard IS as important as they endow strategic resources when created within a company. In other words, they regard IS not as commodities but as constituting “core competences” (Prahalad & Hamel, 1990). The background of this position is a perspective that knowledge created in organizational processes is an important resource for the company. Penrose (1959) who influenced the theory of Resource Based View pointed out in her book “The Theory of the Growth of the Firm”, that knowledge accumulated in organizational processes is an important resource for the growth of the firm. That is, the process of business operation itself creates new knowledge as resource with which managerial services provide ideas to link the emerged knowledge with new production services. Penrose states that this mechanism is one reason why companies grow. Richardson (1972) added the concept of “capability” to Penrose’s idea of “managerial service” which makes use of resources. Research focusing on RBV has further developed this field. Leonard-Barton (1992) also adopts a “knowledge based theory” and argues that core capability of a company is a set of knowledge that endows it with competitive advantages. According to Leonard-Barton, core capabilities are distributed along four dimensions: employees’ embodied “knowledge and skills” and “procedures and routines”, “technical systems” such as IS in which these knowledge and procedures are embedded, “managerial systems” which guide the process of knowledge creation and control, and “the values and norms” that influence all other dimensions. Thus she regards IS as a component of core capabilities strategically important for differentiation of the company. Also Day (1994) focuses on the capabilities to achieve and maintain organizational market orientation also notes that IS play a critical role in the organizational capabilities of the company. Day(1994) defined capabilities as complex bundles of skills together with accumulated knowledge, exercised through organizational process, enabling firms to make use of their assets (Day, 1994: 38). He

argues that in market-driven organizations, their mastery of “market sensing capability” and “customer linking capability” are especially important. Furthermore he maintains that information system plays an essential role in all organizational processes of acquisition, distribution as well as interpretation of market information and coordination with customers. For this perspective, IS are not positioned as commodities procurable on the market, but as a capability of the firm embedded in the organization processes of the firm.

Whether IS are commodities or conversely strategic resources, one may arrive at opposing conclusions depending on which perspective one may adopts; procuring IS as commodities in the market may cost less than developing it in-house, or IS must be developed in organizational process regardless of cost because they are strategic resources. So, integrated discussion has been required (Watjartrakul, 2005). Where and when IS become commodities to be procured at a lower cost, or as component of capabilities built up from within the company endowing it with a competitive advantage is an area we shall look at.

Previous researches indicate that when IS form reciprocal relationship with staff skill and processes within the organization, it has a possibility to bestow unique capabilities or advantages on the company. Leonard-Barton (1992) argues that because a core capability is an interrelated, interdependent knowledge system, it is difficult to separate and change any of the four dimensions which consist of the core capabilities. Even in the case of a new technical system, it will provide inimitable advantage if accompanied by new skills (Leonard-Barton, 1992: 122). Moreover, Day (1994) points out that information technology enables organizations to learn new skills and thus develop new capabilities, promoting transformation of organizational processes. IS capabilities are embedded in organizational processes, and at the same time constituting new organization processes. Because different organizational processes require different capabilities, imitating best practice of another company or procuring IS from the market may not contribute to achieve competitive advantages.

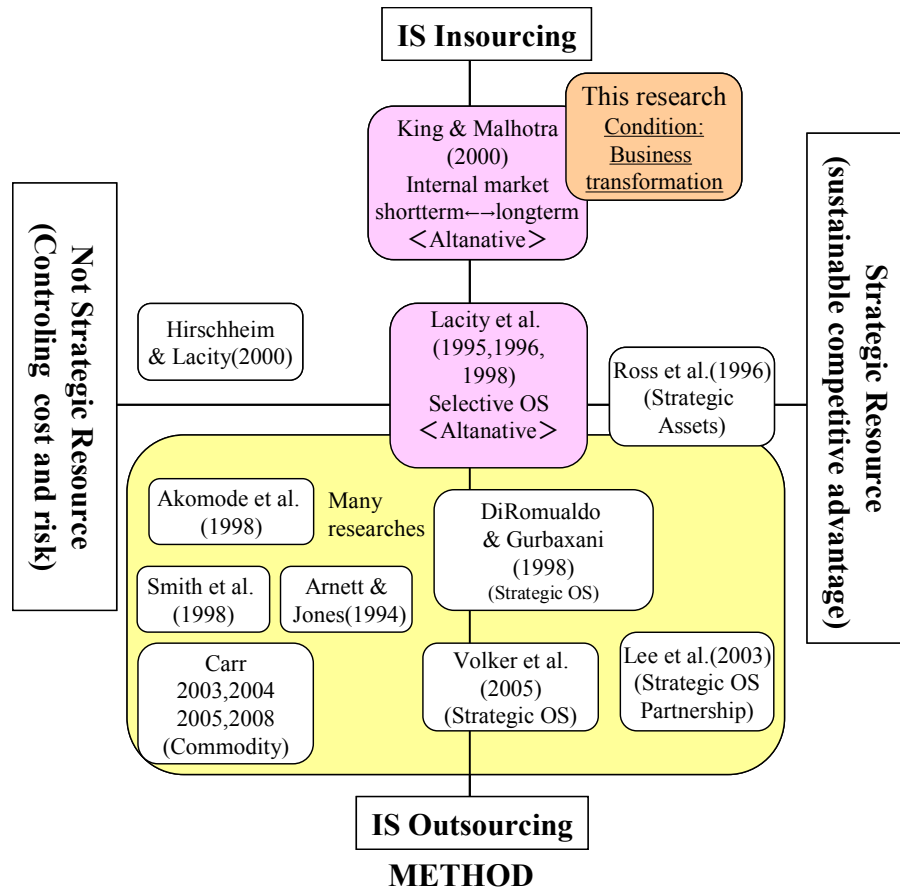
However, a guideline detailing how to develop IS as a capability of the firm, especially at the point of business’ transformation, does not yet currently exists in previous literature (Figure 1). We will presently discuss about the management of IS within the framework of business system in transformation through the aid of exploratory case study.

In this study the dominant methodology used is a case study specifically an exploratory case study, aimed at understanding management practices including business backgrounds and an analysis of management decisions. A case study is an effective method for exploratory research allowing us to ask “how” and “why” of high-context phenomena beyond the control of the researcher (Yin, 1994).

The case study approach can be conducted adhering three principles of data collection proposed by Yin (1994), vis-à-vis data correctness. In analyzing this case study, we conducted several interviews with the management¹ and examined published company documents as secondary data. This included literature published by the company, research papers about the textile industry, a company history and articles in newspapers and magazines, in order to gain an

insight into the company and also to validate the primary data by comparing it with secondary data.

Figure 1 The position of this research among previous researches



The particular area of research concentrates on SEIREN Co., Ltd. (SEIREN). Founded in 1889 SEIREN has been in business for more than 120 years. Despite its wealth of experience, it was confronted with considerable difficulties caused by the structural depression of the textile industry in the 1970s.

Tatsuo Kawada², who assumed the post of president of SEIREN in 1987, was responsible for the company's revolutionary corporate strategy. Subsequently SEIREN expanded its business over the past 20 years, a period marked by a prolonged transition within the business and centered on the development of a new strategic information system Viscotecs (Visual Communication Technology System) which later acquired a business model patent. Viscotecs, developed in-house³, integrates SEIREN's know-how in fabric dyeing by allowing quick and easy digital color fabric printing. To understand how SEIREN embarked on the design and

implementation of Viscotecs we will first examine SEIREN's objectives and management practices.

CASE STUDY: SEIREN

First we describe the prospect of this case study. This case study has focused on how this company has built up the competitive advantage throughout business change. For long-term transformation over 20 years, we construe this practice historically and meticulously. Particularly as exploratory research, we are focusing on the decisions and actions that lead to sustainable competitive advantage,

By anticipating points of this case study, we are focusing on decisions about the vision of business system transformation centered on the development of a new strategic information system and on actions of consistent "insourcing" IS management. Specifically the new vision will lead to innovative concepts of new IS, and consistent insourcing IS management lead to accumulate strategic resources and combine them in progression. Eventually they were integrated into the new strategic IS to acquire sustainable competitive advantage.

Business Background

In April 1889, during the growth of the silk production in Japan, SEIREN's predecessor, Kyoetsugumi was founded in Fukui prefecture⁴. At that time it was the first company to specialize in degumming row silk. In 1923 it diversified its business into dyeing by establishing a dedicated plant for its dyeing business.

After the prosperous years of the 1960s, the textile industry fell into a structural depression which persisted throughout the 1970s. The decline of Japan's textile industry was rooted in several factors: a voluntary export restraint to the United States, the Japan-US textile agreement, two oil crises and the rapid appreciation of the yen following the Plaza Accord. As a result, SEIREN's future in the textile industry in the early 1980s was in doubt. The textile industry of the time was marked by a host of inefficient systems; production was based on a traditional implementation of division of labor, and the distribution channel from production of row silk to marketing of the end item was overly complicated.

Corporate Transformation

Tatsuo Kawada was installed as the sixth president of SEIREN at a board meeting on August 28th 1987, having been promoted from managing director. President Kawada's vision for SEIREN was bold; his aim was to revolutionize the company's business by breaking into new markets⁵. The following year in October 1988, Kawada presented his vision of SEIREN's new corporate strategy. He conceptualized SEIREN as a "high value-added company". He defined

SEIREN's business as the creation of value-added materials and products by offering a multi stage process including planning, production and marketing. In addition, he expanded SEIREN's domain from dyeing, which consists of just one process in textile production, into broader markets related to lifestyle products that use textiles⁶. Furthermore, as the structures of production and distribution were changing from an industrial society to an information society, from mass to personal production, on-schedule to on-demand, supplier-driven to user-driven and real to virtual⁷, President Kawada embarked on four key strategies: (1) a break away from previous clothes and textiles production, (2) introduction of IT including a vertically integrated system, (3) globalization, (4) transition of corporate culture⁸. For the purpose of this research, we will examine in specific detail the first of these two strategies, namely (1) and (2). Behind the breakaway from clothes and textiles was the aforementioned decline of the domestic textile industry caused by export restraints, appreciation of the yen and the rapid growth of the textile industry in South-East Asian countries. Against this background, Kawada initiated a departure from traditional markets and business practices in a bid to diversify steering SEIREN away from the declining textile industry. The Kawada-led plan would seek instead to use SEIREN's experience and know-how, its fiber processing technologies and material development technologies fostered throughout the company's history in order to break into new markets.

Kawada was responsible for launching the company's incursion into the production of interior materials for automobiles, which subsequently became SEIREN's primary product. SEIREN's involvement in this product was total; from planning to marketing such that it resulted in the company breaking away from its mainstay business, namely the dyeing process. Kawada presented five plans for non-textile products in 1988⁹. The first was "Automotive products" or interior materials, such as aesthetic car seats and ceiling materials as well as other textile-related accessories for automobiles. The second was "High Fashion" including inner clothes, sportswear, interior related materials made from silk, cotton, wool and hemp as well as synthetic fibers like long-fiber polyesters. The third was "Electronics" such as plasma display panels, EMI shielding materials and dust protective sheets. The fourth "Bio-Medical and Industrial" composed of cosmetics and functional clothing. The fifth "Housing" included house walls and curing sheets. Under Kawada automotive products became the core business of SEIREN. This new relationship lead to new thinking practices within the company as it fostered new relationships with non-textile industries. During the mass motorization period of the 1970s most car seats were made from vinyl chloride material. Automobile manufacturers assumed that good quality textile materials had a lifespan of around 10 years, but, SEIREN believed it was possible to develop longer lasting materials using new textile related technologies. They targeted the automotive industry with prototypes of new car seats. It was at this juncture that SEIREN came face-to-face with practices in the automobile industry. Staff at SEIREN was surprised by the standards in the automobile industry: high-product quality, business systems defined by just-in-time production, and continuous requests for cost reduction and quality improvement at the heart of its business culture. Business dealings with the automobile industry resulted in the opportunity for SEIREN

to recognize the possibility to redefine the position of textile related technologies and the necessity to implement a more efficient business system¹⁰. In 1975, when SEIREN entered production of car seats, Kawada decided to build an integrated production system in order to respond to the exact requirements from the automobile industry. Kawada foresaw the necessity to assume not only control of the dyeing process but also of related processes including knitting, weaving and sewing.¹¹

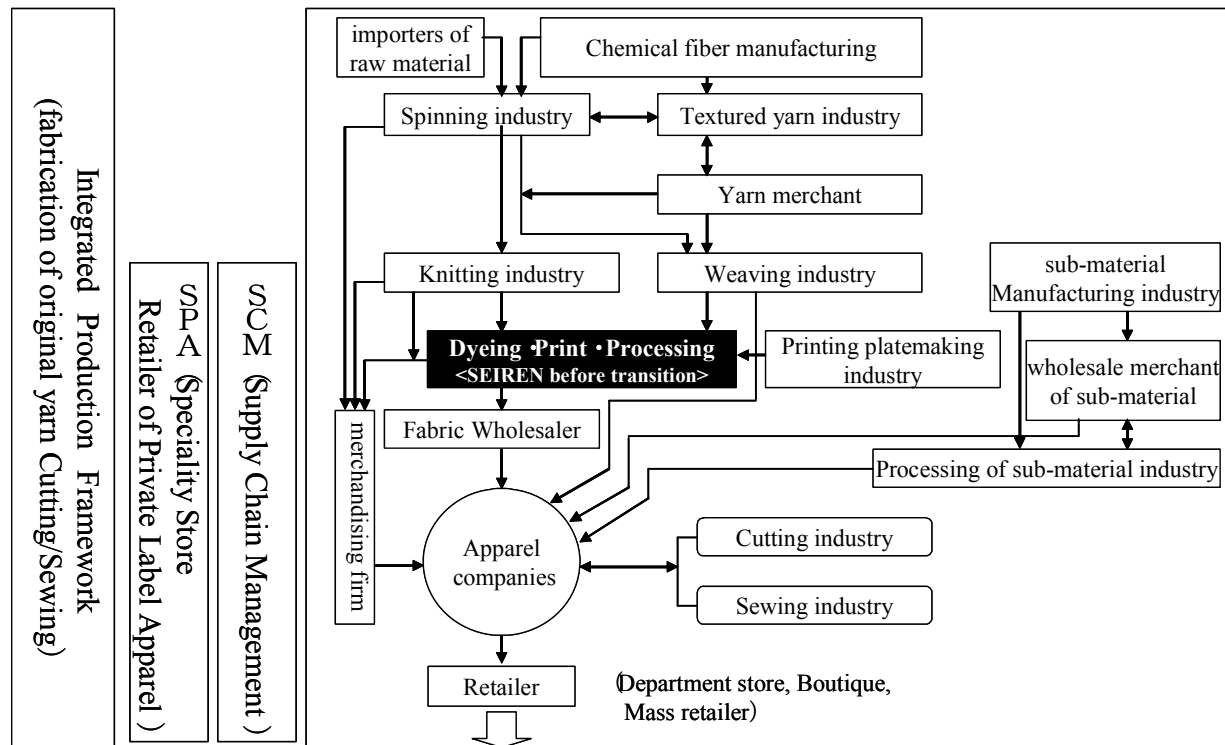
Regarding the second key strategy, SEIREN introduced a vertically integrated system using information technologies. In textile production there are high seasonal variations as raw materials and fabrics such as cotton, wool and silk are harvested during specific seasons. Additionally consumers' preferences for apparel products are constantly changing. Participants in the textile industry traditionally assumed a one year production lead time, resulting in problems such as depletion of stock, hot-selling products, and a buildup of dead stock resulting in high-priced end products. How to adjust production volume in response to various demands and how to manage stocks was a serious problem not just for SEIREN but for the textile industry at large¹².

Furthermore, Japan's textile industry was characterized by a complex division of labor in which each firm assumes piecemeal production during the various processes (see Figure 2).

Before the business transformation, SEIREN had assumed production of only the dyeing process, (see Figure 2). Its primary business was to process orders, without taking inventory risks. In such a structure marked by the proliferation of subcontractors, low risks and low returns, where responsibility for the end products resides is obscure¹³.

President Kawada saw that such a complex division of labor coupled with the traditional value chain as barriers to increasing the competitiveness of the Japanese textile industry. He believed in the necessity of introducing a vertically integrated production system in order to develop a new value chain to replace the traditional structure. This vertically integrated production system aimed to reduce losses by producing only hot-selling products during the sales season as opposed to producing the total volume in advance. To implement this system, SEIREN decided to deal with apparel companies and retailers directly, bypassing wholesalers and trading companies. This new business system required a wide variety of products in small quantities, quick delivery and stockless trading on the Net. The aim of this system was to produce only products that would sell, instead of products whose marketability was unknown. SEIREN decided to disregard traditional business practices offering instead its vision which enabled consumers to communicate with manufacturers directly and to get what they wanted when they wanted at a reasonable price.

Figure 2 The outline of the traditional Japanese fiber's business value chain



Source: Internal information by SEIREN Co., Ltd.

Barriers to Business System Transformation

As SEIREN underwent its business system transition, introducing an IT-led vertically integrated system, SEIREN's business partners changed from fabric wholesalers to apparel companies. However, the sales division struggled to procure contracts because of differences in lot sizes.

At the time, the lot size of orders from fabric wholesalers was typically for 2000 meters while the lot size orders for export was 10000 meters. But if SEIREN conducted its business with apparel companies located downstream of the value chain, the lot size of orders would have to be reduced to one-tenth, or about 200 meters. Moreover by pursuing with the traditional dyeing business, it would seem difficult to turn a profit or even emerge above the break-even point¹⁴. Additionally, one of the bottlenecks in the production of clothes which leads to dead stocks was located in the dyeing process, traditionally assumed by SEIREN. Dyeing is an essential process whereby color is added to fabric which in turn adds value. However, once a fabric has been dyed it is difficult to divert the product for an alternate use, while a fabric which has not been through the dyeing process can easily be used for other purposes¹⁵.

To resolve this problem, during a product development meeting the engineering department suggested a new method to streamline printmaking¹⁶. With the traditional method of printmaking, known as the screen system, a proof was required for each color. This was an immensely time-consuming process, during which the customer repeatedly checked the color of the test printing, suggested adjustments, before production finally started. In comparison, the method proposed by the engineering department was a streamlined process in which the customer creates the design, which is scanned and corrected by CAD. The customer-approved design was thus the only design printed on texture to be checked by the customer. By adopting this method, the production costs for test printing could be reduced. At the product development meeting, President Kawada went a step further by asking the engineering department to simplify further the entire process involved in proof-making¹⁷.

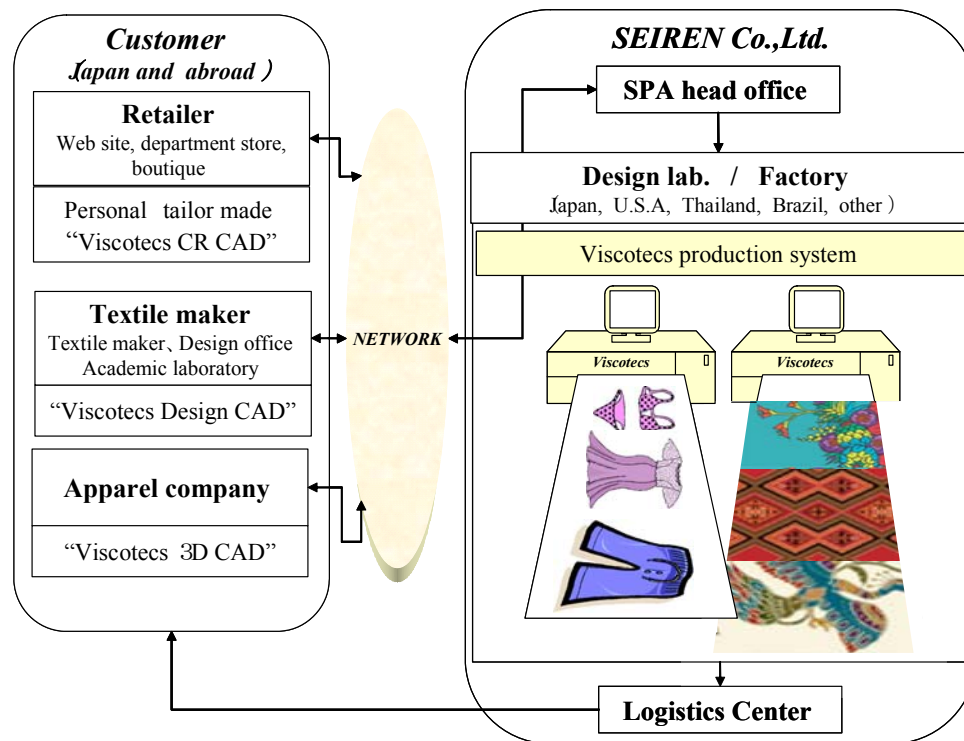
Kawada's dialogue for a streamlined color proof process was the catalyst for a new information system, latterly called "Viscotecs". At the next product development meeting in December 1987, after a demonstration by the engineering department, SEIREN decided to invest 20 billion yen, one-third of its then annual sales, in developing a new information system that would enable the production of fabrics using an axiom ink-jet printer while allowing a seamless consultative design process between the customer and the company.

New Strategic Information System: "Viscotecs"

SEIREN successfully developed "Viscotecs," an online real-time digital printing production system for fabrics. With Viscotecs SEIREN can manufacture a wide variety of products in small quantities, quick delivery, without stockless production. Viscotecs has been in operation since June 1989; in 1990 a dedicated factory was opened at the technical centre in Techno Port which lies between the cities of Fukui and Mikuni. The Viscotecs internally-developed system consists of two parts: a "3 D-CAD [Three-Dimensional Computer Aided Design] System" and a "Digital Dyeing System". This 3D-CAD System assumes the roles of designing and engineering, while the Digital Dyeing System uses an axiom ink-jet printer for the processes of dyeing, automated cutting and precision sewing.

SEIREN operates seven production bases worldwide as well those located in Japan and are all connected to a global online Intranet. The Viscotecs production system can be extended to deal with orders from the fashion industry, as well as the automotive industry (e.g., upholstery materials car seats) and interior accessories.

Figure 3 The Outline of the Viscotecs



Source: Described with reference to Internal information and Website by SEIREN Co., Ltd.

Traditional mechanical plate printing which makes form works based on a single color requires die matching before the emergence of the end design. Production lead time of conventional textile printing took between three and six months. In contrast, Viscotecs needs just five hours stretching up to two weeks during high-volume production¹⁸. With Viscotecs, the 3-D CAD captures a computer-generated design. Designers can adjust colors and patterns from their computers. Then the Digital Dyeing System dyes the design onto selected fabrics to give a finished precise product with no time lag before printing to paper using an ink-jet printer. The 3D-CAD system consists of three parts: for retailers with orders for store display, for design companies (e.g., textile makers, designers) and for apparel companies¹⁹. Next the Digital Dyeing System adds color to the design. Viscotecs has an expanded color capacity of up to 16.77 million colors without traditional form works. Viscotecs makes it possible to produce small lot sizes: from one meter for a single piece of clothing up to bigger orders of 2,000 meters per lot. This innovative information system allowed SEIREN to institute "direct to distributors" a new business model for the company.

Viscotecs is a special business system because it makes possible the ultimate in small-lot production, from a wide range of fiber type (i.e., cotton, rayon, wool, silk, nylon, polyester) and

of materials (i.e., textile fabrics, knitting, asperity, bonded textile, lace, and artificial leather) as high-volume production²⁰. Additionally Viscotecs also achieves a nonpolluting production line; with Viscotecs, energy usage is 1/5 ~ 1/10 and water usage is 1/20~1/30 of conventional systems²¹.

The Origins of the Viscotecs

During the integrated systems of production, from the procurement of raw materials through processing and transformation to the finished product, Kawada introduced the concept of adding value and accumulated know-how derived from the company's conventional business practice of "Dyeing fabrication"(e.g. dye materials, synthesis of dye, improving technical efficiency)²². This concept can be seen in the origin and operation of Viscotecs. In fact, When developing Viscotecs, SEIREN conducted primarily and accumulated business know-how from five subsidiary companies, Seiren system service (e.g., computer software), Seiren electronics (e.g., hardware), Seiren chemical (e.g., materials of dye), Seiren KP (e.g., textile fabrics), Depro(printmaking))²³.

In the case of the advanced computer-based dyeing technologies, we will illustrate the development of the Digital Dyeing System. The main component is an axiom ink-jet printer, but there are significant differences between printing to paper and to fabric. As with printing to paper, the colors on fabrics must match the colors displayed on the computer. However as fabrics are three-dimensional, unlike paper, the dye ink will penetrate and spread, thus during dyeing (printing on fabrics) infiltration and diffusion must be controlled with sophistication because of the thickness of fabrics. (i.e., printing to two different thickness fabrics using the same colors, there is a possibility that the colors will look different when compared)²⁴.

In addition the penetration rate and diffusion rate are different for each fabric as is the temperature property of each. SEIREN has developed color management software related to its dyeing business process. Individual fabrics have different stretching properties and this differs between materials. To counteract this SEIREN developed its own dedicated hardware to control the original ink-jet printer together with software to control the hardware SEIREN used in its dyeing business process since 1967 when confronted with the "SK movement". This was intended to scientifically manage the dyeing business process, especially to improve the quality of dye reproducibility. As a result this IS forms a core part of the Digital Dyeing System. Other innovations at SEIREN included the introduction of the IBM1130 which was the most advanced computer at the time. SEIREN originally developed the COCOCO (Computer Color Control) system which went in to operation in 1971.COCOCO could match colors based on color science and calculate the dye prescription²⁵. SEIREN also developed a colourway printing information system which could coordinate different color combinations. This was followed by an automated color combination system. Thus the original IS, developed from SEIREN's accumulated

knowledge, has been further enhanced through integrated insourcing resulting in continuous IS development which helped diversify and drive SEIREN's business.

RESULTS

Financial results

Beginning in 1982 in the midst of a structural depression in the textile market SEIREN recorded negative earnings. (i.e. the amount of sales was 32.4 billion yen, the current earnings minus 10 hundred million yen, and continued non dividend for 5 years from 1982 to 1987). However, in 1988 during Kawada's first year at the helm sales increased to 50 billion yen recording a profit of 15 million yen. From 1988 to 2008 SEIREN enjoyed a period of continued growth. In 2007 sales topped 112.9 billion yen, and profits rose to 7.3 billion yen. In the same year SEIREN's capital which was valued at 2 billion yen in 1987 was revised to 17.5 billion yen²⁶. When the subprime loan shock occurred in 2008, sales dropped to 98.1 billion yen, and while SEIRE still recorded a profit, at 2.9 billion yen it was significantly less than the previous year. Sales to Japanese automobile companies had fallen, but business with the automotive industry outside Japan enabled SEIREN to keep its accounts balanced and in the black. We can therefore say that the strategy of diversification and extensibility worked effectively.

An examination of the composition ratio of sales reveals that the conventional dyeing manufacturing business accounted for 51% of sales in 1987. However with the advent of new IS technological innovations and breaking into new markets, SPA (Speciality-store/retailer of Private-label Apparel) and automotive upholstery materials (e.g., car seats), the traditional dye business accounted for only 9%²⁷ of sales in 2007. Therefore we can confirm that SEIREN's business transformation had evolved.

Results of the vision “direct to distributors” and globalization

SEIREN has built the Viscotecs business system to produce and merchandise an expansive product range without time-lag within the infrastructure of a high-speed communication network. To do so it has established a global presence with a design studio in Japan (head offices in Fukui and Tokyo, other offices throughout Japan), America (New York, California) and Asia (Thailand). SEIREN produces automotive upholstery material in a number of countries including Japan(Fukui), America(North Carolina), Asia(Thailand) and South America (Brazil) giving it a global design and manufacturing basis. Viscotecs EU was established in Italy (Milan) to tap into the global fashion market²⁸. Under Viscotecs SEIREN has evolved from a supplier direct to distributors company to “direct to apparel” and “direct to retailers and consumers” company.

We will now discuss some specific cases. First let us examine SEIREN's innovations in apparel production by looking at its product development in swimwear. Swimwear is influenced by fashion tastes; consumer's tastes are notoriously unpredictable. Traditionally SEIREN produced its full swimwear product line before each sales season. However, with Viscotecs it only produces a sample of its lines before the sales season; additional stock is produced during the season in accordance with sales. As a result, for one product line, dead stock decreased from 27% to 5% while sales rose 150%²⁹ selling 32,000 units per 1 design (previously it sold between 600 and 1,000 pieces).³⁰ With the Viscotecs production system a wide variety of products can be produced in small quantities. Several countries including Japan have used the Viscotecs system to outfit athletes competing in swimming, skiing and skating events with high grade special textiles for sporting events such as the Olympics³¹. Similarly Viscotecs car seats can be also customized to each consumer's design demands. With Viscotecs SEIREN is a market leader in Japan. It is a testament to its innovation that SEIREN is entrusted with the all automotive companies in Japan and is expanding their business³².

Improving the sustainability of competitive advantage by acquiring a business model patent

Viscotecs was granted a Japanese business model patent in 2000 (No.2939908), the first business model patent in the textile industry in Japan. The patent was granted for the integration of the business model and information system which allowed for customized fabric (e.g. clothes). Conventional techniques had two problems, namely procuring and working with multiple materials and complicated designs. First the number of colors and length of repeated designs were limited. Secondly it cost a great deal of money to produce many kinds of materials using complicated designs. Manufacturers had no system whereby they could produce a wide variety of products in small quantities, quick delivery and in a short lead time, thus they were required to adapt to the preconditions as outlined by material wholesalers.

In contrast Viscotecs could convert the precise three dimensional shape of the plane into digital data, print using an axiom ink-jet printer and automate cutting and sewing under the new IS; as a result of the new business system. Viscotecs allowed SEIREN to act quickly by removing design constraints, giving it far greater control over material design and color scheme³³.

Acquiring a business model patent was an official acknowledgment of SEIREN's technical innovation as well as giving it a competitive advantage through the proprietary rules laid down in patent laws.

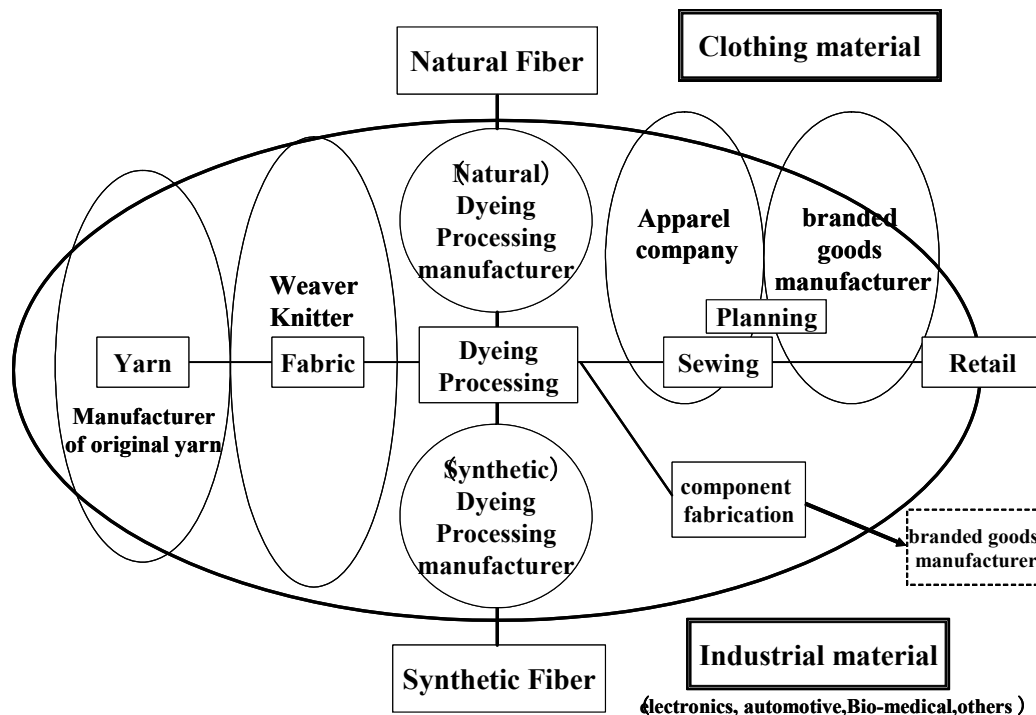
Strategic dissemination and exploit of Viscotecs

SEIREN established a fully integrated system (i.e., fabrication of original yarn, weaving, knitting, processing, cutting, and sewing) of SPA by Kanebo's fiber business transfer in 2005.

Presently SEIREN is continuing with its current business system (i.e. manufacturing of a wide variety of products in small quantities, quick delivery, and stockless production) while maintaining its tradition of diversification both to develop new business systems and create competitive advantages.

In *haute couture* or high fashion, SEIREN is creating a value-added design system using the “Viscomagic” system (e.g. fiber and textile processing for improving air permeability and elasticity). Meanwhile, yet another new business system called “Solid Viscotecs” is underway in the field of non-fibrous industrial material. For example, with it is dye processing (e.g. light resistant non fiber's materials which use pigment ink) on wall surface. SEIREN continues to build new production facilities, develop and use new IS based on the knowledge gained from Viscotecs³⁴. Similarly, with glass, metal, wood and artificial leather SEIREN has horizontally developed a new business system using non-fiber materials.

Figure 4 The outline of strategic diversification



Source: Internal information by SEIREN Co., Ltd.

DISCUSSION

Through literature review and this exploratory case study, we consider a question in theoretical and managerial aspects

This case study demonstrates the process of the business system transformation and development of strategic IS. As a theoretical aspect, in terms of strategic resources and sourcing management, why and how effectively practiced business system transformation and the development of strategic IS.

The decision-making of “business systems transformation” with information system reform

Presently SEIREN's vision is "From textile industry to information industry", as a basic strategy (i.e. (1) non clothing, non-textile (2) IT and direct (to consumers) (3) Globalization) has been mentioned since 1987, the president Kawada is basically consistent³⁵. To change large companies, it indicates that very long-term vision is important. In other words, having advanced vision to withstand long-term management is required.

However, even if the companies recognize the technology and customers trends, Companies are not always to be able to survive. Companies are required to build the competitive advantages and sustain them, however, it is practically difficult and necessary to make effort to keep and rebuild them. More specifically, president and management can make a goal as achieving the vision of change and extend competitive advantage at business systems transformation, and they need to continue to be strengthened in long term.

Taking consideration in technology trends and customer's needs, the president kawada took new vision to change the company as the information industry from the textile industry. As a way of its realization, the president Kawada regarded corporate IS as a strategic corporate asset. His decision is to develop corporate IS to be long-term the strength. This policy is considered to be based on trust in the company's long-time accumulated technologies and knowledge.

In this case study, the President Kawada's counter-proposal was about suggestions that improving the mechanism of printing and processing from technology sector, And at the same moment it made the concept of "Print production from design data". It could embody the new requirements of new IS, what is called “Viscotecs”, development. We consider it was not result from an accident, but from the president Kawada's business insight from accumulated practices, experience, strong problem consciousness (e.g. Non-textile consciousness from Kawada's practical experience at factory and sales directly to customer, To deal with the automotive industry's, clearly different from the textile industry, just-in-time business systems, Vertical integration in the automotive interior business, Recognition of future IT developments, IT and direct (to consumers) as a basic strategy). In fact convinced of the feasibility of proposed improvement of the printing and production technology has been backed from the long-term

accumulation of research and development. With very strong conscious of reform, the new IS was spun “*Viscotecs*” as a creative moment (Ishii, 2009). Thus under harsh business environment, IS was a new practice management challenges as the development of large-scale investment, “Business System Transformation” was promoted.

Insourcing management of the IS throughout business transformation

The president Kawada cognize the source of added values which are each of business practices in depth. To capture the resource of added values of the company as its point of ingenuity, they turn off the rudder and full in-house integrated production. Thus the IS were developed basically insourcing (i.e. in-house), Not using versatile products and the introduction of so-called ERP package with IT outsourcing, they built its own IS except for computer equipment and operation system software. Insourcing was not only Viscotecs, SCM (Supply Chain Management System) which supports the Viscotecs and personnel system with objectives management, rectification management system called "Seiryu-Kanri System" to optimize production control system, carefully specification in the details of SEIREN's uniqueness has been built.

Carr (2003, 2004, 2005, 2008), as shown, including a so-called business applications to enterprise IT are considered as "commodity". Under the ERP and other IT products and outsourcing of IT have become increasingly general conditions, the company's insourcing IS development is considered to have certain suggestions.

As a practical case, SEIREN's insourcing strategy is widely distinguished from many companies which select outsourcing strategy (e.g. extensive outsourcing, capital alliance, selling out the IS department to IS service provider). SEIREN has accumulated technical and business expertise in-house over a lengthy period, thus technology and business know-how which are scattered in-house, but when SEIREN had an opportunity to change the business system throughout the development of IS, they aggregated the know-how and created their own added value to be converted.

This requirement is called the introduction of generic products (such as business process and parameter setting range) in the transfer of best practices and other independent of the uncertain constraints and effects of a new high but not limited thinking in IS development will be directed to the pursuit of an ideal based on accumulated know-how. And having its own path dependency and the extreme difficulty of modeling as shown to obtain business method patents have IS built, which can be connected to the sustainability of competitive advantage.

So, insourcing managements enabled SEIREN to shape the visions toward what it should be in the future based on accumulated know-how, without constraining its thinking by requirements of general-purpose system (such as scope of business process and parametric design) and dependence on other companies best practice whose effect is uncertain (Brown & Duguid, 2000; Szulanski, 1996).

As a result, having its own path dependency, SEIREN achieved sustainable competitive advantage by developing IS with very high difficulty of imitation as shown to obtain business method patents.

FINDINGS: THE SEEDS OF “IS- EXTENSIBILITY”

The case study focused on SEIREN at its business transformation process entailing renewal of its IS. There we can see the existence of accumulated seeds of IS extensibility that helped to make the prospect of change and contributed to sustainable improvement of the extra edge after the business transition.

In SEIREN, many seeds that evolve into Viscotecs in future had been produced before the change of businesses system: the dedicated hardware for ink-jet printing with precise adjustments to different kinds of stretch fabric material and software to control it, COCOCO-System that matches the colors based on color science and calculate adequate dyeing recipe for control the color scientifically and improve the quality of dyeing reproducibility, design by the 3D-CAD, Technology that approximate the colors on monitors to the dyed colors on fabrics, response to strict Just-In-Time business process that Japanese automobile industry requires and so on. Because SEIREN accumulated these seeds in the organization, recombination of them was possible.

In addition, even after starting operations of Viscotecs, the IS of SEIREN has been extended drastically. The added IS include printing system for high value-added fabrics, car seats, non-fiber materials (e.g. glass, metal and artificial leather) used for house wall for example and build-to-order system that enable consumer to customize design at the retailers.

MANAGERIAL IMPLICATIONS

When transformation of business systems, if a firm reform its IS by introducing general-purpose system or outsourcing contrary to insourcing at SEIREN, the risk to lose the value of accumulated business know-how might be pointed out. Some people claim that general-purpose systems are beneficial to take in the best practices of other companies, however, whether the best practices of one company always can be applicable to the others or not is uncertain.

We would like to mention that in replacing existing business practices by a general-purpose system, it is difficult to assess its effectiveness from a long-term stand point, because there is need to consider the relationship with other resources that the company possesses as well as efficiency. In other words, while there is an "opportunity" for company growth through the development of IS, it cannot be even recognized as long as you believe in IS outsourcing.

This exploratory case study shows clues of theoretical hypothesis that the effectiveness of developing IS in-house to acquire sustainable competitive advantages at business system transformation. Specifically it indicates that (1) the innovative vision of top management

advances accumulating business knowledge deeply and widely in organization, and (2) using accumulated knowledge and skills through insourcing management enables the firm to develop unique and effective IS.

One of the findings in our study exploring theoretical hypothesis is that "*IS-extensibility*" and accumulated capabilities enable business transition entailing reformation of IS to be achieved more flexibly. All these success in SEIREN are regarded as the result of continuous improvement of dyeing technology and accumulated know-how about business process through insourcing management. In the view of capability-based approach, we conclude that Insourcing (Not Outsourcing) IS development that includes "IS-extensibility" could make the business system transformation more flexible and effective.

SEIREN also promoted diversification as the extension of business system and developed IS, Viscomagic and Solid Viscotecs, which have the same concept as Viscotecs for non-textile sector. This fact reflects that new design concept rooted in the company through development process of Viscotecs has spread in the organization and promoted transformation of business process continuously. That is, IS constructed through business transformation help not only to realize business systems but to drive further change of the business systems.

LIMITATIONS AND AN AGENDA FOR FURTHER RESEARCH

We conducted the case study of SEIREN in order to find clues of theoretical hypothesis that answer the question how firms develop and maintain their IS that provide competitive advantages at business change. While we found theoretical and managerial implications, this is exploratory case study of one company under the specific conditions. So as to generalize these findings and development these implications, further case study and testing are essential. In particular, in order to control the difference in terms of conditions and to build a robust theory, comparison case study of other company in different kinds of information system and industry or other country is required.

In addition, "IS-extensibility" that is one of findings of this study is required to be conceptualized clearly. The relationship to existing concepts is needed to be clarified. And to organize the similarities and differences, comparative case study with the company that is outsourcing its IS management. Addressing these agenda must be an important step to make the findings contribute to IS management.

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ENDNOTES

- 1 Research Associate, University of Marketing and Distribution Sciences; Ph.D. in Business Administration of
Kobe University
- 2 Associate Professor, Business Administration, Ritsumeikan University, Ph.D. in Commercial Science of
Kobe University
- 3 huichi, Kitagawa. Senior advisor of SEIREN Co., Ltd. since 2003. Joined a company (Fukui Seiren Kakou
: current SEIREN) in 1960, Researcher (e.g. Dye processing) at research laboratory, Manager at
Information System department, Factory manager (e.g. production management) at automotives ,
Administrator of the U.S. automotives factory, Director and administrator of “only one development”
(i.e. Supporting the produced seeds by standpoint of Business management) and general manager of
Information Planning Division, and president of Seiren System Service Co. since 1995, (current) Senior
advisor since 2003.
- 4 Tatsuo, Kawada. President of SEIREN Co., Ltd since 1987. Joined a company (Fukui Seiren Kakou:
current SEIREN) in 19662. Assigned at a Factory (5 years), chief of the sales department since 1979,
Director and general manager of Product & Sales Department since 1989, Managing Director since 1985,
(current) 6th President of SEIREN Co., Ltd since 1987.
After joined the company, he had hold prominent position of Sales Manager. He lead the development of
automotive upholstery material (i.e. current main product of this company)and construction of integrated
business process from planning to sales ,what is called, New business system “SEIREN-SPA ” in
automotive business.
- 5 Kawada,T.; discourse, (1993). Henka ni dou taisyositeikuka [How adapt the changes]. *Nihon bouseki
gekkon*, 553, 9.
- 6 The removing process of exposed sericin at the surface of silk which is twisted of original yarn. Before
dyeing, refined to complete (i.e. "SEIREN" in Japanese) makes it possible to penetrate dye compound to
yarn equally. For an example, refining, what is called "Seiren", has effect of coming intrinsic whiteness and
glossy of silk.
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[business transformation from depressed industry to growth industry, breaking down fixed thinking of the
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Co. ,Ltd, 593-597.
SEIREN keeps the key strategy “value creation company”
- 9 Kitagawa,S. (2001). Tahinshu• shouryou• tannnoukitaiou no kikaku• seizou• hanbai shisutemu
isukottekusu shisutemu nitsuite [SPA system “Viscotecs” actualizing a wide variety of products in small
quantities and quick delivery]. *Senshokukenkyuu*, 45(3), 65-68.
- 10 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.
- 11 SEIREN hyakunenshi henshuuinnkai (1990). SEIREN *hyakunenshi*[100-year company history],SEIREN
Co. ,Ltd, 593-596.
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And Nomura, M. (2007). ”SEIREN niokeru kigyokakushin[business transition of
SEIREN],”*Sennigakkaishi(Senni to Kougyou)*,63(3), 74-75.
- 13 Nomura, M. (2007). ”SEIREN niokeru kigyokakushin[business transition of
SEIREN],”*Sennigakkaishi(Senni to Kougyou)*,63(3), 74-75.
- 14 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.
- 15 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.
At that time, it was not even recognized occasionally which end-products were delivered to the customers
after dyeing processing.
- 16 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

In the case of conventional plate printing, it cost 30-50 thousand yen (i.e. it cost 300-500 thousand yen for 10 colors plates) ,thus if it cost 300-500 per 1 meter fabrics as one lot with dyeing processing, it was impossible to become profitable.

17 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

18 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

19 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

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