Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 09, September 2022

How Acquisitions Change Organizational Structures, Product Portfolio, and Market Positions

Findings from the Case of a Japanese Monitor Manufacturer

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***Abstract*—This study applies the product architecture positioning perspective to the case of a Japanese visual technology company which made a series of acquisitions. It aims to shed some light on how effective management of the acquired resources may be realized. We describe the process of internalization of the acquired targets and expansion of the product architecture, examine the different organizational structures used, and discuss how the concurrent changes in the product architecture and organizational design have contributed to profitability in a new business field. This study demonstrates that acquisitions can enable the firm to move to a more integral and closed product architecture by exploiting the acquirer's and target's resources when they are complementary.**

I. INTRODUCTION

The product portfolio approach is widely used by companies to determine their business area. This core decision-making for optimizing the product portfolio against market trend involves balancing between exploitation of existing knowledge, which brings about short-term profits, and exploration of new knowledge, which contributes to long-term growth. Thus, recent studies discuss how the state of ambidexterity affects product portfolio [1][2].

There is also a growing interest in how the practice of open innovation, namely the utilization of the inflow and outflow of knowledge to accelerate innovation and to expand the markets, affects product portfolio [3].

M&As can be seen as a means towards restructuring the product portfolios across firm boundaries alongside open innovation. However, since M&As are typically not performed with the explicit aim of changing the product portfolios, the effect of M&As on the product portfolio has been understudied in the literature.

Against this background, we investigate how acquisitions influence the product portfolio through the case study of a Japanese visual technology company which made a series of acquisitions. We analyze how acquisitions change organizational structures and market positions through changing the product portfolio. In particular, we discuss the role of acquisitions in constructing a product portfolio that crosses the company's boundary.

Although most previous studies focusing on the impacts of M&As on R&D activities discuss a single M&A, company objectives may not be achieved fully with only one M&A. In this research, we selected a company that conducted multiple acquisitions in relevant fields in line with its medium-term management plans. We conducted interviews with managers of the acquiring firm. In addition, data on the acquirer's and targets' resources and the industry were obtained from annual securities reports, press releases and Basic Survey of Japanese Business Structure and Activities.

A. Acquisition integration

Acquisitions continue to be a prominent vehicle for corporate growth and development, but not all acquisitions result in successful outcomes [4]. Acquisition integration is a pivotal factor in determining whether the objectives of an acquisition are achieved.

Problems with post-acquisition integration are an often-cited reason for the failure of many acquisitions [5][6]. Several papers have focused on incompatibilities between the acquiring and the acquired firms [7]. Some studies have treated this issue as one of organizational fit [6][7]. Dissimilarities in organizational cultures, systems, and practices may lead to dysfunctional tensions and conflicts between them. In addition, when there is a mismatch between the acquiring firm's expertise and an acquired inventor's, mismatch of expertise centrality will lead to errors in supervising, motivating, and evaluating the inventor [8].

Other works in the literature have stressed that acquisitions can exacerbate disruption of the social context by creating an aura of conquest [9], resulting in feelings of dominance and submission, and superiority and inferiority [6][10]. The disruptions that result from being integrated are expected to influence negatively post-acquisition productivity of technical personnel [11][12].

These difficulties of acquisition integration may affect knowledge transfer. The knowledge underlying a firm's technologies and capabilities may be deeply intertwined with the firm's social, organizational, and historical context. This knowledge may reside in a complex lattice of internal and external relationships, rather than in any particular individual or asset within the firm [13][14].

Existing research tends to lump all types of acquisitions together, even though they represent fundamentally different phenomena that need to be studied and managed differently [15]. Strategic management literature recognizes that mergers

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 09, September 2022

are not a homogeneous phenomenon [16]. Rather, they can lead to a range of possible outcomes contingent on the strategic fit between acquiring and acquired firms. In this research we focus on the fitness between the acquiring firm's management plan and the acquired firm's expertise.

B. Analitical framework

Architecture-positioning strategies based on combinations of positioning strategies are a key concept in resource management. This concept is useful in analyzing how firms turn the competitiveness of R&D or manufacturing sites into profit [17]. Product architecture is a basic design concept that associates a product's functions with its structure and components [18]. There are two basic types of product architectures, namely, integral and modular architectures. In the integral type, numerous compositional elements are connected through strong, mutually dependent relationships, and the optimal design of these compositional elements provides the product its overall capability. In the modular type, each function is allocated to a single compositional element, and almost no interdependence is observed among the compositional elements. Furthermore, interfaces and other parts of the basic design are either open, indicating that they are standardized throughout the industry, or closed, indicating that they are proprietary to the firm.

An example from the bicycle industry may be helpful in illustrating the importance of product architecture. Although a bicycle composed of a combination of multiple parts belongs to the open-modular type, the bicycle parts maker Shimano has succeeded in proposing a positioning that differs from the open modular type by developing closed modular components that use several parts and their points of juncture in an optimal design. The company's operations in the auto-parts business provides a relevant background. In general, the internal structure of auto-parts is of the integral type, and connections with products using these parts are often of the integral type as well. The auto-parts manufactured by Shimano are also of this type, and it has developed its manufacturing capabilities through responding to requests of highly demanding automakers. Shimano then applied the technology it had built up to bicycle parts, which led to its global competitive advantage in the bicycle business [19]. In this research we will capture the change of design supported by technology and capability of the acquiring and acquired firms within this framework.

II. CASE OF EIZO CORPORATION

We looked at Eizo Corporation, a monitor manufacturer in Japan which has accumulated technology specialized in imaging products. It was a slow starter in the medical monitor field but now has the top global market share.

A. Company overview

Eizo Corporation (hereinafter "Eizo")[1)] has its roots in Nanao Corporation founded in 1967 and originally developed and manufactured imaging-related products. Eizo, at the beginning, was an original equipment manufacturer of televisions using cathode ray tubes, and accumulated related technology and know-how. With the coming of the liquid-crystal age, Eizo rapidly turned to liquid-crystal displays (LCDs) and developed, manufactured, and sold various kinds of monitors for amusement (pachinko and pachislot) and general-use purposes. It began to produce LCD monitors for high-end computers, starting with the medical market in 2002, followed the graphics market in 2003. It then expanded into monitors for air traffic control (ATC) and special-purpose monitors in 2007. While there are strong competitors in each field, Eizo is the only company that covers all the above-mentioned fields. In medical monitors, it keeps the dominant position in Japan, exceeding 60% market share by value in 2018.[2)] It has also achieved and kept the world's top market share since FY2008 [22].

In its first and second medium-term management plans, covering the period from 2003 to 2008 [20], [21], Eizo placed enhancing its existing businesses ("overwhelming differentiation"), developing new businesses and areas, and growth at the center. Accordingly, it entered into new fields, including the medical (especially monitors for endoscopy, ultrasound, and electronic health record), graphics, and ATC fields. The focus areas in the third medium-term management plan (2009–2011, [22]) were the medical and graphics markets. In the medical market in particular, Eizo stated that it was focusing on developing "imaging display technology that takes diagnostic functionality to the next level" and "imaging display technology that revolutionizes surgical environments". Its central challenge was to develop technology that is always cutting edge, and it is working toward becoming the leading manufacturer in medical imaging technology.

In the fourth medium-term management plan (2012–2014, [23]), the major themes were the enhancement and expansion of products for operation rooms and emerging markets. In its fifth medium-term management plan announced in 2015 [24], Eizo emphasized consultation and solutions business as well as business with its core imaging technology. In addition, Eizo set the sales target for amusement monitors to be less than 15% of total sales to adapt to market contraction. In the sixth medium-term management plan, announced in 2018, Eizo emphasized the further expansion of its business areas and creation of new markets through a total solution that encompassed shooting, recording, transmitting, and displaying images [25]. Eizo currently continues to follow this business plan. Because displaying is central to all image-related functions used at medical sites, Eizo aims to have its own products (i.e., monitors) everywhere in hospitals. Eizo's next venture will be a business in which it builds and proposes its own systems.

B. Expansion of the coverage in the medical field

When Eizo initially entered the medical field, its monitors were mainly for picture archiving and communication systems (PACS)[3)] and for modality.[4)] Eizo also developed two kinds of software which calibrates for chronological change of monitors and unifies management of in-house monitors.

Eizo's first acquisition in the medical field was the monitor business of Siemens for the medical market (hereinafter Siemens AD)[5)] in 2007. Siemens AD monitors

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 09, September 2022

offered the full line from development to manufacturing, sales, and certification, and had strengths in the modality and operating room fields. Siemens AD had technology that can import data captured by different examination equipment and transmit them to a single monitor, large monitors for operating rooms that can display multiple images on a single screen, and monitors for interventional radiology where surgical operations are performed using therapy catheters and needles while surgeons look inside the body using images from X-ray fluoroscopy and CT. Eizo entered the operating room field as a result of proposals from the Siemens AD staff. Taking advantage of this opportunity, Eizo not only proposed and supplied monitors and peripheral equipment for use in operating rooms but also started a solutions business for reducing the workload and improving the performance of medical workers. Such solutions included how to combine multiple monitors, and where and how to install monitors, including whether to have suspended or standing monitors. Although EIZO and Siemens AD divide up product categories in each market, they have been in regular contact with each other by telephone and emails, and, where necessary, coordinate their activities, especially in the solutions business.

In 2016, Eizo acquired the surgical and endoscopy monitor business of Panasonic Healthcare Corporation (PHC).[7] The PHC staff had not only knowledge of the environmental requirements and electrical characteristics necessary in operating rooms but also a wealth of experience in dealing with medical standards and the display characteristics demanded of endoscopic images. Eizo was able to inherit a solid market share which PHC had built through linkages with endoscope manufacturers. Although Eizo had had the endoscopy monitor technology, it was a field that demanded an extremely high level of reliability; so this acquisition contributed significantly to Eizo's activities in the operating room field. Inventors and engineers from PHC and Eizo placed a top priority on development and commercialization of new products at the head factory, and 2D, 3D and 4K UHD monitors for surgery and endoscopy monitors were released just one year after the acquisition. PHC had not developed 4K UHD monitors before it was integrated. These are examples of R&D activities strengthened by M&A when the technologies of the acquirer and acquired are complementary [8], [9].

In 2018, Carina System Co., Ltd. became a subsidiary of Eizo. Carina System focuses on system solutions for operating rooms. The imaging system in operating rooms consists of shooting, transmitting, recording, and displaying images. There are specialist manufacturers for each of these functions, and, in most cases, products of different manufacturers are combined to make a system. Carina System provides operating field cameras (shooting), delivery and recording systems, and viewing and editing systems, as well as server management software for saving data. Therefore, it is well place to play the role of an integrator when building systems for the operating room field. By making Carina System a subsidiary, Eizo is now able to offer a full line of functions that consists of shooting, recording, transmitting, and displaying of images, and it can also build user-oriented systems that integrate these functions in a seamless manner. Provision of maintenance is also expected to become more efficient. This is in contrast with its strong rival, Barco, which does not offer recording of images in-house and depends on suppliers. Thus, offering an integrated set of services has become a source of competitive advantage for Eizo.

Because the acquisitions of Siemens AD and PHC are display-related, we refer to these as type 1 acquisitions. The acquisition of Carina System was not directly related to display, and we refer to it as type 2 acquisition. Table 1 summarizes the main technologies and functions acquired, together with the locations and markets where the products utilizing the acquired technology are used.

TABLE I. TECHNOLOGIES, FUNCTIONS, ACTIVITY SCENES, AND MARKETS BEFORE AND AFTER ACQUISITION

	Before	After	
		Type 1 Acquisitions	Type 2 Acquisition
Technology	Monitor	Monitor Transmitting	Shooting Recording Transmitting
Function	Display	Display, Solution	System integration
Field/Market	Examination (health check)	Operation room	Operation room

C. *Shift in product architecture positioning and company performance*

Eizo's objective was to introduce its own products in hospitals. Through acquisitions, it broadened the range of its activities in the medical field. The business that started with PACS and modality monitors expanded from the development, manufacture, and sale of different types of monitors used in the examination/diagnostic and operating room fields to a solutions business encompassing both fields. With the progression into the operating room field and with the expansion of its functions, in particular, Eizo's ability to absorb the resources held by the acquired organizations and to combine and utilize them with its own resources increased significantly.

PACS monitors may contain proprietary technologies inside, but they have industry-standard interfaces that allow for interconnection with high-performance PCs and workstations, so that they are open modular type products. When customers use Eizo's monitors with software for calibration and/or unified management, these are of a closed-modular type. Monitor for modality is an integral type product, because its inventors and engineers have to work closely with equipment manufactures' engineers to meet precisely the requirements of each other. The acquisitions enabled Eizo to produce monitors for operation rooms, expanding the scope of the closed architecture realized by the use of calibration and/or unified management software. Solution business and system integration for operation rooms are an integral type business, requiring close coordination with hospital workers. Figure 1 shows the Eizo's product architecture before acquisitions. And Figure 2 shows the shift in Eizo's product architecture positioning.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 09, September 2022

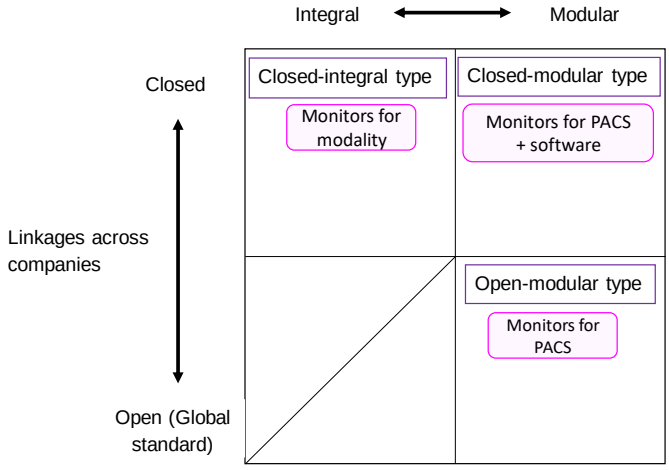

Fig. 1. EIZO's product architecture positioning before acquisitions.

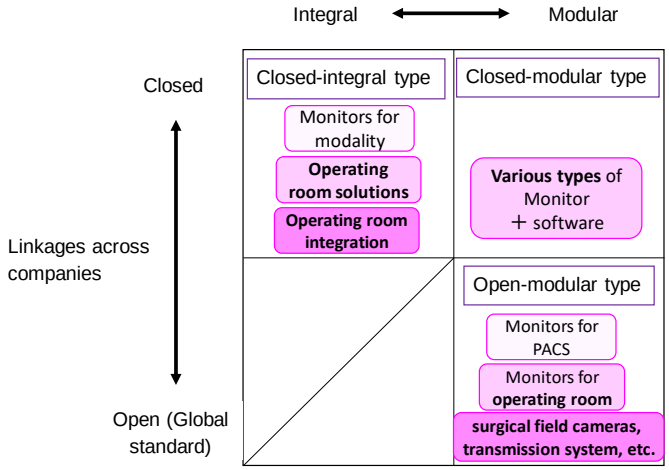

Fig. 2. Shift in product architecture positioning at Eizo.

Figure 3 summarizes Eizo's sales composition by segment from FY2001 through FY2018. It also shows how Eizo's operating profit margin changed during this period compares with the industry average. The industry concerned is manufacture of information and communication electronics equipment in the Japan Standard Industrial Classification, consisting of about 220-270 companies.[8] Eizo's profit margin has been consistently higher than the industry average. Eizo has reported a more detailed segmentation than shown in the figure since FY2014. The sales composition as of FY2014 was: B&P (financial institutions, public institutions, educational facilities, etc.) 21.5%, HC (medical, diagnostic, operating room purposes) 28.7%, CW (publishing, printing, photo editing, video production) 7.6%, and V&S (air traffic control, ships, etc.) 9.1%. Although Eizo's profit margin has not significantly increased, it has had the world's top market share since FY2008, and the sales from the healthcare field now accounts for over 40% of total sales (as of FY2018). As noted above, a series of acquisitions enabled Eizo's key business to shift from amusement to healthcare and this contributed to the company's long-term growth.

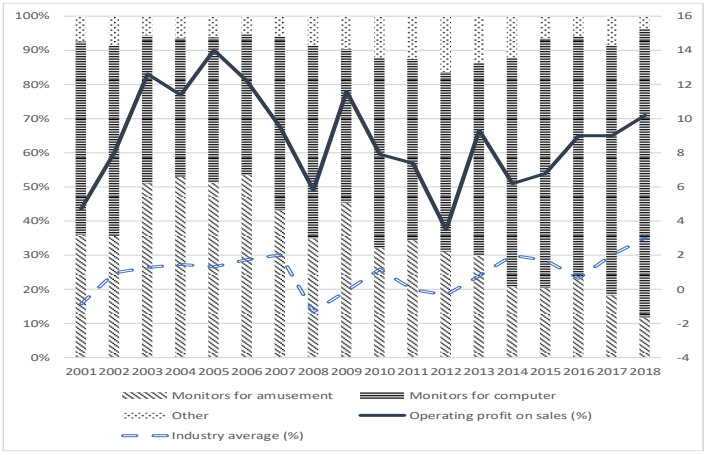

Fig. 3. Eizo's sales composition by business segment and operating profit margin.

III. CONCLUSION

Through a series of acquisitions, Eizo entered the operating room field with which it had little previous experience, and then strengthened its business in this field. It utilized the expertise and experience of the acquired organization and combined them with its own in the development of new monitors and the solution business. In the process of acquisition integration, the acquiring firm has respected the opinions and suggestions of the acquired personnel, and this has contributed to the establishment of a good relationship between the acquiring firm's and acquired organizations' personnel, enabling the division of labor or collaboration as appropriate depending on the product category. As a result of the acquisitions, Eizo can now offer a full line of monitors and a seamless system that integrates them, which helped it win new customers and lock in existing ones. Through this process, Eizo expanded its positioning to include a more integral and closed product architecture. This shift has enabled it to change its product portfolio. This study has demonstrated that acquisition to enter a field with which the acquirer has little previous experience may produce positive results when the acquirer and acquired have complementary technologies. Whether a company pursues short-time profits or long-time growth depends on its corporate strategy. This study shows that it takes the acquiring firm a certain period of time to become able to exploit technologies and capabilities obtained through acquisitions and develop them to the point of changing the product portfolio. Thus, the timing of acquisitions should be such that the acquiring firm can continue to leverage the knowledge it has in its existing product areas, while at the same time, making profitable use of the acquired organizations' technologies and capabilities over the anticipated time horizon.

Detailed analysis of the relationship between acquiring firm's core technologies and acquired technologies, and of how the technologies are utilized in post-acquisition business is left for future research.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 09, September 2022

ACKNOWLEDGMENT

The authors deeply appreciate the cooperation of interviewees at the Eizo Corporation, who are Shimura Kazuhide, Director and Executive Officer (at the time the interview); Kazuyuki Kajikawa, Sales Promotion Manager (at the time the interview); and Hiroshi Ito, Manager of the Intellectual Property Section.

This presents part of the findings of the research funded by Grants-in-Aid for Scientific Research under the Japan Society for the Promotion of Science (Fundamental research (C), Project number: 17K03881).

NOTES

[1)] Capital: approx. JPY4,425,746,000, consolidated group sales for the March 2018 period: JPY84 billion; non-consolidated sales: JPY58.3 billion; group employees on a consolidated basis: 2,325; employees on a non-consolidated basis: 1,006, including temporary workers. Source: website of the Eizo Corporation. Last accessed: September 11, 2018 http://www.eizo.co.jp/company/information/outline/index.html.

[2)] "Medical Solutions Market Survey Overview 2015" by Fuji Chimera Research Institute, Inc.

[3)] A system that digitizes images obtained from various types of imaging equipment and references and browses examination images in real time over a network.

[4)] Modality monitors are mounted on medical equipment such as X-ray CT and MRI equipment. They support the diagnostics field.

[5)] Transferred to Eizo GmbH, which was established in June 2007. Siemens AD sales: €59 million (actual sales for the September 2006 period, approx. JPY 9.8 billion, 1 euro = 167 JPY); employees: 133 (as of September 2006). Siemens AD also handled PACS monitors. However, Eizo took charge after the transfer of the business.

[6)] Two interviews were held at Eizo Corporation with Shimura Kazuhide, Director and Executive Officer, Head of the Planning Department and Kazuyuki Kajikawa, Sales Promotion Manager, Planning Department; Direct Sales Manager, Sales Department 1 (their roles at the time of the interviews). The first interview was held on November 8, 2015 (15:00–16:30) and the second was held on December 11, 2015 (10:00–12:00). In addition, a teleconference interview was held with the same two individuals on January 27, 2016 (15:00–15:25).

[7)] An interview was held at Eizo on August 23, 2019 (13:00–15:40) with Ito Hiroshi, Intellectual Property Section in the Intellectual Property Department and Kajikawa Kazuyuki, Planning Department. Sections III.B and III.C are based on the interviews and subsequent email exchanges with these individuals.

[8)] The industry data were obtained from Basic Survey of Japanese Business Structure and Activities, 2001-2018.

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