



Article Organizational Learning for Sustainable Semiconductor Supply Chain Operation: A Case Study of a Japanese Company in Cross Border M&A

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Abstract: As semiconductor usage is prevailing, sustainable growth is deemed highly dependent on the semiconductor supply chain. Accordingly, it is essential to establish robust supply chain capability for a semiconductor company. Especially for Japanese semiconductor manufacturers, it is critical to secure robust and flexible supply chain operation with the background of the experience of supply chain disruption caused by the East Japan Earthquake. So far, we identified that Japanese semiconductor manufacturers and Japanese automotive manufacturers have been in cooperation to secure the semiconductor supply chain. However, the global electronic industry environment has been significantly changed and it is not enough just to consider natural disasters. With this perspective, it is not yet fully studied how Japanese semiconductor manufacturers adapted to global operation through organizational learning. This paper examines how a Japanese semiconductor firm conducted organizational learning and adapted to environmental changes in cross-border M&A transactions. Traditionally, Japanese firms have established organizational routines for the management control systems of their overseas subsidiaries by relying on the expatriates' transactive memory systems (TMS), which is based on their personnel experiences over the countries and cultural background understanding. Japanese firms have used TMS of expats to manage their global organizations. Recently, however, not a small number of Japanese companies have accelerated their globalization through cross-border M&A, which requires organizational capabilities different from those of conventional TMS formation. In this paper, we studied a case of cross-border M&A of a Japanese semiconductor company by modeling the organizational learning structure throughout the extracted concepts summarizing semi-structure interview outcome. As a result, it has been found out that, by shifting from Japanese cultural norms to more global values in terms of management systems, benefits can be achieved. The company unlearned organizational routines that relied on TMS and created new organizational routines. This study provides direction from a practical perspective on how Japanese firms can transform their global organizations and adapt to changes in the environment for sustainable growth.

Keywords: Japanese semiconductor company; supply chain capability; globalization; management control; organizational learning; expatriates; transactive memory; organizational routines; unlearning; sustainable growth

1. Introduction

This paper is studying how a Japanese semiconductor company adopted to global environmental change through organizational learning in the context of supply chain capability. Semiconductor supply chain capability is currently one of the crucial topics, especially after the East Japan Earthquake, which disrupted the supply chain of Toyota and this experience made Toyota expedite strategic action to secure the semiconductor supply chain [1]. Not only for automotive industry, but also for all the manufacturing industry, semiconductor supply chain is the critical issue, represented by political actions taken by



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Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). multiple nations such as US, EU, China and Japan. In this environment, it is important for the sustainable growth of whole industry that semiconductor manufacturers have acquired appropriate organizational capability to control the supply chain. From this standpoint, this paper is contributing to obtain the perspective of a semiconductor company to secure competitiveness through organizational learning.

With respect to organizational globalization, it has been pointed out that Japanese firms have traditionally been inferior to other multinational firms concerning the appointment of locals [2–6]. According to Nakagawa et al. [7], with regard to management control systems of overseas subsidiaries, Japanese firms rely on control by culture among the three types of control by classification of Merchant and Van der Stede [8]: "Results", "Behavior", and "Culture". Japanese firms have been practicing flexible control, as in the "Clan-Type" organization pointed out by Ouchi [9], in which expatriates from home country, who share corporate values as well as culture, understand and carry out duties without detailed instructions.

On the other hand, according to the Ministry of Economy, Trade and Industry's "Study Group on Overseas M&A by Japanese Firms" report [10], the number of cases and acquisition value from cross-border M&A have been increasing in recent years. It can be assumed that this is because Japanese firms have been focusing on overseas acquisitions as one of their corporate strategies for sustainable growth. Under such circumstances, Japanese firms, which tend to practice "Culture" control through expats, have been forced to make various changes in their global organizational management, including the way of operation after acquisitions. This paper aims to explore the mechanisms by which acquisitions bring about changes in organizational routines, based on the efforts of semiconductor company A.

We analyze the case of the acquisition of U.S. firm B by Japanese semiconductor company A to examine, from the perspective of organizational learning, what changes occurred as a result of the appointment of locally hired employees instead of appointing a replacement from the home country after the return of the expats. The structure of this paper is as follows. First, we describe the types of management control systems in global organizations and explain how Japanese firms have adapted to their environment. We then analyze the organizational changes before and after cross-border M&A in Japanese semiconductor company A, using the perspective related to organizational learning, such as changes in organizational routines and unlearning of knowledge. Then, we will discuss how the firms dismissed the organizational routines built on the premise of having expats, and how they came to apply new organizational routines.

2. Theoretical Background and Research Questions

2.1. Semiconductor Supply Chain as a Crucial Basis for Sustainable Industry Growth

Semiconductor supply chain has gradually drawn attention as the focal electronic components for sustainable industry growth especially after the East Japan Earthquake in 2011, when many automotive manufacturers such as Toyota suffered significant impact by disrupting semiconductor supply chain of Japanese semiconductor suppliers, which factories were seriously damaged. Matsuo [1] argued this experience has made Toyota revisit the procurement supply chain in cooperation with semiconductor suppliers as a part of business continuity management (BCM). Recent semiconductor supply shortage has also made researchers work on this topic again [11-13]. However, the research was mostly done for the analysis of automotive manufacturers' management change and the supply chain operation at the semiconductor supplier was not fully studied. In a more holistic view of the semiconductor supply chain, Fowler, Mönch and Uzsoy [14–16] have reviewed the literature on modeling of semiconductor supply chain and cover the broad range of elements which consist whole process of supply chain including strategic design network, demand planning, inventory management, capacity planning, master planning, production planning and demand fulfilment. The research has provided the general view of the issues which the contemporary semiconductor industry has been confronting. It is meaningful that the study introduced that the semiconductor supply chain is an aggregation of such

individual management units in the whole process, and led the researchers to the idea of how the relationship among those will be important topic for further study.

Furthermore, semiconductor and sustainability relations have been more closely discussed from an environmental point of view. Gruber [17] clarified how Infineon, a German semiconductor manufacturer, copes with the alignment of supply chain management by three pillars, energy efficiency, mobility and security in its Corporate Social Responsibility (CSR) strategy framework. For more broader views of sustainability, many researchers elaborate on how to effectively assess semiconductor manufacturers' capability to align with environmental sustainability in the research for verifying various index catered for the measurement [18–21].

As this paper is a case study for a Japanese semiconductor company, the literature from the regional perspective is important. Except for the aforementioned Matsuo's research regarding the supply chain management between a semiconductor supplier and an automotive manufacturer [1], there are few studies concerning Japanese semiconductor manufacturers but also in the same context with the background of supply chain disruption by the natural disaster [22,23]. They did not mention the details of how the suppliers conducted the organizational learning through the experience and established optimal supply chain operation against vulnerability to disruption by natural disaster. From the point of globalization, Kamakura [24] concluded that Japanese semiconductor manufacturers will continuously proceed with global operation and have no willingness to re-shore the production in Japan even after disastrous logistics break down by the strict control of COVID-19. While it is inevitable that Japanese semiconductor manufacturers should manage their supply chain operation in scope of the globalization, it is not sufficiently mentioned in the paper how Japanese firms achieved optimal global operation. Accordingly, from next section onward, we will review the literature regarding global organization management, management control, organizational learning, organization routines and cross-border M&A.

2.2. Management Control in the Global Organization of Japanese Companies

According to Bartlett and Ghoshal [25], there are three types of organizational forms in corporate globalization: (1) "Multinational type", in which local subsidiaries have a large autonomy; (2) "Global type", in which control over overseas subsidiaries from the home country is strongly emphasized; and (3) "International type", in which overseas subsidiaries have a certain degree of autonomy and a well-balanced management structure through the employment of local management. Japanese companies are said to have a strong sense of control by the home country and often adopt the "Global type" of organization [25]. In fact, Kopp [2] and Harzing [26] show that the ratio of home country nationals as presidents in the overseas subsidiaries of Japanese firms is lower than that of Western firms. Yoshihara [4] also reports that the ratio of home-country presidents in the overseas subsidiaries of Japanese firms established from the 1960s to the 1990s shows no trend toward an increase in the ratio of locals.

One of the reasons for the lack of progress in the globalization of Japanese companies is the highly contextual nature of Japanese society, which prevents localization by placing local personnel at the top and enhancing their understanding of local business practices and general conditions. This is because the application of cultural norms meant that overseas subsidiaries were expected to respond to the needs of the local market without detailed instructions [9]. For example, Merchant and Van der Stede [8] categorized management control into three types: "Results", "Behavior", and "Culture". It can be said that Japanese firms were oriented toward control by "Culture", with employees seconded from the home country who understood the same culture. Harzing [27] and Edström and Galbraith [28] also support the view that Japanese firms have been oriented toward control by "Culture" in that the dispatch of expats from the home country facilitates understanding of the home culture.

2.3. Organizational Routines in Overseas Subsidiaries of Japanese Companies

In conducting business, a company streamlines the performance of its operations by making certain repetitive actions routine [29]. The standard practice of an overseas subsidiary of a manufacturing company is described as follows: (1) Overseas subsidiary sales company receives orders from local customers, (2) Overseas subsidiary places orders to parent company in the home country, (3) Overseas subsidiary and parent company collaboratively manage the delivery of the products to local customers. Many organizations have established procedures as organizational routines to ensure that such relatively standardized processes proceed smoothly and reliably, and they have built organizational capabilities to maintain quality [30].

According to Feldmann and Pentland [29], routines and standardized processes are presented as statically structured "Ostensive routines". All processes are processed through the same actions. However, individual situations are constantly changing. For example, problems may arise that cannot be dealt with by the standardized routine due to sudden requests for increased volume from customers or supply chain disruptions caused by unexpected disasters or accidents. Therefore, the idea of "Performative routines" is proposed as a dynamic structure to deal with such problems. The "Ostensive routines" do not necessarily prescribe who to consult in what department in the home country in the event of changes in various environmental factors. The "Performative routines" function as a mechanism to respond to such changes.

In the case of Japanese companies, expats are often assigned to oversee such "Performative routines". The reason for this is that the local staff does not have sufficient knowledge of which department in the home country is responsible for which matters in question. In addition, differences in language ability and understanding of the phenomenon make it difficult to communicate with the contact person in different culture to make them understand what is happening locally and what action needs to be taken. In such a situation, it is thought that the expats from the home country functioned in Japanese firms as a responsible person for the smooth execution of the routine [31].

Wegner [32] proposed the idea that organizational memory holds knowledge for task execution, rather than individual organizational members storing all knowledge, because in organizational routines each factor individually acquires the necessary knowledge and utilizes it in task execution. Knowledge about who is responsible for which task in the organization as the cornerstone of organizational memory, which he called the transactive memory system (TMS). TMS is defined as a memory system that relies on the memory of others [33]. In the TMS, "Who knows what" is important [34]. Japanese companies are required to utilize TMS of expats to execute performative routines for tasks that are difficult to handle with static organizational routines due to linguistic and cultural barriers. However, as mentioned earlier, in recent years, more and more Japanese firms are acquiring foreign firms. It is necessary to examine what changes have occurred in the TMS, which used to function based on the knowledge of expats regarding organizational routines in the integration of acquired firms.

2.4. Changes in Organizational Routines in Cross-Border M&A

Cross-border M&A has recently gained attention as a means of entering foreign markets and technological innovation in the global economy [35,36]. Morosini [37] finds that cross-border M&A has positive impact on firm performance by allowing access to culturally rooted organizational routines in the country where the acquired firm is located. However, it is also pointed out that reconciling cultural differences between the two firms in post-acquisition integration is costly [38], and culture clashes can lead M&As to failure [39]. In terms of organizational routines, post-acquisition organizational integration may have an impact on organizational knowledge resources [40], and expats sent from the headquarter of the acquiring company serve as a bridge between the two parties' different cultural understandings [41]. Hebert [41] reports a case in which the acquiring firm unlearned the existing organizational routines of the acquired firm and established new organizational

routines by instilling a new culture. On the other hand, the process has not been sufficiently studied, in which the acquiring firm unlearned its own organizational routines and how it established new organizational routines based on the acquired firm's knowledge.

2.5. Unlearning in Organizational Learning

Hedberg [42] pointed out the importance of dismissing (unlearning) what has been learned before and learning a new knowledge, when an organization undertakes new learning. This is because relying on old knowledge that is no longer needed can lead in the wrong direction (misleading), inhibiting the acquisition of new values and new knowledge that is necessary for the organization. Organizational unlearning is said to include norms and routines as well as knowledge, and particular attention has been paid to the unlearning of organizational routines that govern organizational behavior [43].

This unlearning, according to Rushmer and Davies [44], is triggered by specific personal experiences or externally imposed demands for change. Previous studies have been based on theoretical frameworks and literature reviews and lack empirical verification in actual organizational operations [45]. A few empirical studies include a study of individual and organizational factors that promote unlearning [46] and a study of factors that inhibit knowledge transfer in acquired firms [47]. However, these studies have not gone into the process of organizational routines themselves, which are subject to unlearning. In this paper, we focus on the process of organizational routines between headquarter and overseas subsidiaries in post-acquisition cross-border M&A of Japanese firms. The paper also discusses the mechanism of unlearning in this process.

2.6. Research Questions

Previous literature reviews have shown that global organizational management in Japanese firms tends to maintain a strong control over the home country, with expats playing a central role in forming the TMS of the organization. Specifically, we explained that the expats have formed organizational routines that can adapt to changes in the overseas environment by taking charge of the formation of the organization's performative routines. However, in hyper competitive environments [48], it may be important to establish organizational routines that utilize local staff. Prior studies are insufficient to explore and deepen the organizational routines in post-acquisition integration of cross-border M&A by Japanese firms, which have been proactively conducted in recent years. In this situation, it is necessary to study how new organizational routines can be created for sustainable operations.

In this study, we examine the mechanism of organizational routine formation in organizational globalization from the perspective of unlearning. We explore the details of TMS of expats who have played a central role in the flow of organizational routines and their processes, and how they were able to dismiss organizational routines that relied on their knowledge and establish new organizational routines. For this purpose, we set up "RQ1: Through what kind of management control do Japanese firms manage their global organizations?" and "RQ2: Through what kind of organizational routines do Japanese firms manage their global organizations?".

3. Research Method

3.1. Case

In this paper, we employ a case study. Regarding the justification of applying single case study as a research method, there has been argument over long time and R.K. Yin already mentioned in 1984 [49] that single case is suitable if,

- (1) It is a revelatory case, i.e., it is a situation previously inaccessible to scientific investigation.
- (2) It represents a critical case for testing a well-formulated theory.
- (3) It is an extreme or unique case.

Yin's guideline for research method has been referred by many researchers and it has been accepted as a method to test the well-known theory by in-depth analysis. To support this view, other researchers such as Eisenhardt [50] also referred to the important role of single case studies from rigor's point of view and Barzeley [51] demonstrated the capability of single case study to produce empirical generalizations regarding administrative rationality, professional treatment, and normative reasoning. Considering the above supportive view on single case study, we believe it is appropriate to utilize this method to study of a company in a specific condition to cope with global environmental change. Since a detailed analysis of changes in organizational routines is necessary, we thought it best to conduct a case study in a Japanese manufacturing company that has executed cross-border M&A. The research subjects are Japanese semiconductor company A and its Chinese subsidiary sales company; the case of A's acquisition of U.S. company B is taken as the theme. By this M&A completion in 2018, company A achieved significant revenue growth until CY21, and improved operation profit as shown in Table 1.

Table 1. Revenue Growth (Year on Year) CY2019-21 and Operating Profit CY2018-21, data from company A's IR announcement and percentage calculated by author.

		CY2018	CY2019	CY2020	CY2021
		January–December 2018	January–December 2019	January–December 2020	January–December 2021
Growth Rate YonY %	Company Total		-5%	0%	39%
	Automotive Business Unit		-5%	-8%	36%
	Non-Automotive Business Unit		-5%	10%	42%
Operating Profit %	Company Total	14%	13%	19%	30%
	Automotive Business Unit	4%	8%	14%	26%
	Non-Automotive Business Unit	23%	18%	25%	32%

A case study is conducted through ethnography based on the author's observation as a member of supply chain operations in a Chinese subsidiary of Company A, as well as Semi-structured interviews with the people involved.

The author has been with the Chinese sales subsidiary of Japanese semiconductor company A from January 2018 to the present (as of writing this paper) and engaged in supply chain management. The author's main responsibilities cover regional supply chain management, as well as support for sales and customer service team.

During the author's tenure, the acquisition of U.S. company B took place in 2018, and from 2019, a senior executive of company B became the head of company A's Non-Automotive business unit. Non-automotive BU underwent organizational reforms similar to those of company B's operations. To distinguish this change, the organization before the reform will be referred as a Japanese-style organization and the organization after the reform as a U.S.-style organization. As seen in Table 1, the business performance of Non-Automotive BU exceeded Automotive BU, and the study is aimed to clarify what kind of change has brought the gap between two BU from the viewpoint of organizational learning. This case study is based on data collected through interviews to explore the perceptions of the parties involved in the practical implementation of the environmental, managerial, and organizational changes that occurred during the author's tenure.

3.2. Interview Content

From the perspective of business processes, the interviewees were selected from various organization which involved in whole process of supply chain transaction in Table 2. (Non-Automotive BU, Automotive BU, Supply Chain Management Division), and from job function, title and nationality as well to secure diversified perspectives. Interviewees' compositions are as follows; 6 from Non-Automotive BU (Chinese: 1 local sales vice president, 1 local sales director, 2 local sales manager, 1 local sales staff, Japanese:

1 former expats in Japan), 3 from Automotive BU (Chinese: 1 local sales vice president, Japanese: 1 expats sales manager in China, 1 former expats operation manager in Japan), and 2 from Supply Chain Management Division (Japanese: 1 expats staff in China, 1 Supply Chain Management director in Japan). Semi-structured interviews were conducted with them in terms of their work execution process, required knowledge, changes in the environment, and value creation in their work (Table 3). The interviews were recorded, and key sentences were extracted based on the transcriptions.

Distinction	Region	Organization	Function	Job Title
Expats	China	Automotive BU	Sales	Manager
Expats	China	Automotive BU	Customer Service	Assistant Manger
Local	China	Automotive BU	Sales	Vice President
Local	China	Non-Automotive BU	Sales	Vice President
Local	China	Non-Automotive BU	Sales	Director
Local	China	Non-Automotive BU	Sales	Manager
Local	China	Non-Automotive BU	Sales	Manager
Local	China	Non-Automotive BU	Sales	Supervisor
ex-Expats	Japan	Non-Automotive BU	Sales	Manager
ex-Expats	Japan	Automotive BU	Customer Service	Manager
HQ	Japan	Supply Chain Management	Supply Chain Management	Director

Table 2. List of Interviewees.

Table 3. Questions to interviewees.

	Questions
Q1	What is your mission, value and process of your work
Q2	Issue in the process of your work
Q3	What will be the most important knowledge to enhance the value you created in your work process
Q4	Is there any change from environmental change? Mission, value and process of your work?
Q5	From above context, how do you evaluate expatriates' role and responsibility

3.3. Analysis of Qualitative Data

The qualitative data were extracted faithfully from the interviewees' words based on the Gioia Method [52]. Gioia's analysis method relies on Glaser and Strauss' [53] Grounded Theory Approach (GTA), which makes textual data from interviews into labeled single sentence as open codes in the first step [54]. The difference between Gioia's analysis method and GTA is how to eliminate bias caused by prior knowledge when conceptualizing the coded data [52]. Therefore, the words spoken by interviewees should be used as much as possible in the coding process. In the second step, based on the similarities between the codes, they are grouped into categories from the researcher's perspective and abstracted into themes. The grouped themes are then further developed into higher dimensions by considering the similarities between concepts. The data obtained from the interviews are structured through the above process. The data structure is indeed important, but as it is only a static diagram of a dynamic phenomenon [52], it is necessary to explain the process of what happened in the company under study. At the same time, it is also critical to pay attention to the relationship between the themes abstracted in the second step and the dimensions generated in the third step. The individual concepts are carefully placed based on their relationships, bringing "Behavior" by means of arrows [55] to model the data. In order to ensure the reliability of the code, it is needed to be checked from a different perspective other than that of the author, as he is deeply involved in the case as a

practitioner. Accordingly, the concepts were verified based on the elimination of jargon and consistency of coding by the co-author.

4. Results

Figure 1 shows the results of the analysis. Concepts are abstracted in the first and second rows and finally aggregated into the dimensions. Concepts in the second rows and the dimensions are numbered. First of all, the dimensions are shown as below, as this study will be developed on the basis of the dimensions.



*GAM: Global Account Manager, a regional sales manager at a global client's headquarters, responsible for negotiating with the client's headquarters, leading the client's policy towards the client, and developing the policy for each regional sales team.

Figure 1. This shows the extracted interviewee comments in 1st order concepts, which are integrated into higher level 2nd order concepts, then finally aggregated into dimensions. Abbreviation; ABU: Automotive Business Unit, NABU: Non-Automotive Business Unit, SCM: Supply Chain Management, HQ: Headquarter, VP: Vice President, Dir: Director, Mgr: Manager, Expats: Expatriates.

- 1. Knowledge transfer as a prerequisite of unlearning
- 2. Changes in the external environment that prompt value transitions
- 3. Unlearning practice through value transitions
- 4. Organizational routines defined through value vectors
- 1. Knowledge transfer as a prerequisite of unlearning.

This is abstracted from the concepts in the second rows from 1 to 4.

- 1. Effectiveness of globalization efforts
- 2. Knowledge transfer from expats
- 3. Transactive memory of expats
- 4. Difficulties in cross-cultural communication

To resolve difficulties in cross-cultural communication at Company A, English had already become the norm in global communication (1. Effectiveness of globalization efforts). In addition, the knowledge of TMS of expats has been transferred to local staff to some extent due to its importance (2. Knowledge transfer from expats). Those concepts implicated to have gradually fulfilled the conditions to move away from expats dependent organizational routines, and we abstracted 1 to 4 as "1. Knowledge transfer as a prerequisite for unlearning".

2. Changes in the external environment that prompt value transitions

This is abstracted from the concepts in the second rows from 5 and 6.

- 5. Changes in customer relationships due to market conditions
- 6. Organizational routines aimed at the U.S. model

In points 5 to 6, it is implied that the change in the market environment triggered the hiring of an executive from Company B, which Company A acquired, as the head of the Non-Automotive BU. This action changed the relationship with customers and prompted a transition in values. These points were categorized as "2. Changes in the external environment that prompt a shift in values".

3. Unlearning practice through value transitions

This is abstracted from the concepts 7 and 8.

- 7. Values that place the highest priority on the company's own profits
- 8. Differentiation by technology

In the concepts 7 and 8, it refers to the shift in values to prioritize the company's own profits rather than sacrificing its own profits for customer dedicated service. Furthermore, the value is shifted toward the differentiation through technology as the competence replacing the legacy value which prioritize customer dedication through the perfect delivery support. These ideas that support unlearning the legacy organizational routines through this value change were categorized as "3. Unlearning practice through value transitions".

4. Organizational routines defined through value vectors

This is abstracted from the concepts 9 to 11.

- 9. Organizational routines as competence
- 10. Values that make customer line retention a top priority
- 11. Organizational routines complicated by formal organizational changes

These concepts indicate that unlearning of organizational routines was not achieved due to a strong awareness of existing values in the Automotive BU. The values that place the highest priority on maintaining customer lines were still considered important. Meanwhile, in the Automotive BU, values are based on organizational routines as competence. Although formal organizational changes were made, the essence of organizational routines remained unchanged. Therefore, there was a need to strike a balance between formal organizational change and business processes based on existing values. This background has led to more sophisticated processes. These concepts were extracted as the dimension as "4. organizational routines defined by value vectors".

Figure 2 shows the results of the theorization of the mechanism of organizational globalization, which is the core part of the research questions, focusing on the relationship and continuity of the individual abstracted concepts. Among abstracted concepts in Figure 1, "1. Knowledge transfer as a prerequisite for unlearning" indicates that Company A's efforts toward global organization have gradually become effective, while Company A had already started even before it acquired U.S. firm B in response to changes in the external environment. This includes the transfer of knowledge of expats to local employees. Based on this assumption, the study indicates that "2. Changes in the External Environment Promoting Value Transition" is a major external factor influencing organizational change toward the globalization of Company A. In such an environment, different business units have their own values and approaches to globalization. Under such an environment, different business units reacted differently to the change in values and formed different organizational routines. In particular, the Non-Automotive BU has shifted from "10. Values that make customer line retention a top priority" to "7. Values that place the highest priority on the company's own profits" in the second order concepts. This led to the "3. Unlearning Practice through Transition of Values" in the dimension as described in the Section 3. On the other hand, the Automotive BU was unable to abandon the "10. Values that make customer line retention a top priority", which was originally shared in the second step, and this led

to the "11. Organizational routines that became complicated due to formal organizational changes" in the second step. From these two points, we presented the background of "4. Organizational routines defined by value vectors" in light of the fact that the values shared by the organization play a major role in the formation of organizational routines.



Figure 2. This shows the model how unlearning and re-learning work in organizational routines reconfigure by rigorously extracted concepts and aggregate dimensions.

The following is an analysis by organization.

4.1. Non-Automotive Business Unit

4.1.1. Value Transitions Due to Changes in the External Environment

In 2018, Japanese semiconductor company A, the subject of this case study, acquired U.S. company B. Company A operates two business units, one for the Automotive BU and the other for the Non-Automotive BU. Company A appointed an executive from acquired company B to the head of Non-Automotive BU. The head of the Non-Automotive BU immediately abolished the organizational routines used in the previous business unit and drastically redesigned the sales organization. As a precondition for this organization change, the idea that the company's interests were the priority was pushed to the fore, as the local sales manager said, "Company A's policy is prioritized now" (Figure 1. First row, Local manager of the Non-Automotive BU).

The dominant value system at Company A had been customer-centric, as described by a former expats manager currently in charge of sales in Japan region "slave-like situation" (Figure 1. First row). The company shifted its focus from superiority through customer service to making its own technology a competence (Figure 1. Second row, Non-Automotive BU sales manager) and profit a priority goal. In the area of parts supply, the company has changed from a customer-dominated business situation to a supplier-dominated one, for example, by giving priority to customers who are committed to long-term orders of up to two years. In the past, when faced with a sudden decline in demand for a product manufactured based on a customer's forecast, the responsibility for managing excess inventory was ambiguous, and in many cases the supplier was forced to take the responsibility due to the strong purchasing power of the customer. The new system clarifies that the customer is responsible for such ambiguity and enables suppliers to mitigate the risk and make stable investments. The customer also has the advantage of being able to secure volume of semiconductors to be supplied, given the extremely tight supply of semiconductors.

4.1.2. Unlearning Practices through Value Transitions

As described above, the sales business process changed drastically in line with the concept of placing the highest priority on Company A's profit. In order to clarify the changes that took place before and after Company B's executive took over as head of the Non-Automotive BU, this paper has classified the management approach prior to this change as Japanese-style, and the approach taken afterwards as U.S.-style. The role of sales in a Japanese-style organization can be divided into two major phases. The first is a process called "Design-In," which involves selling the product to the customer, deciding to adopt the product and obtaining the order. The second is a process called "Delivery", which supports the supply of the ordered products. In Japanese-style organizational routines, the role of sales, which negotiates with the customer, is emphasized in this process. Company A, regardless of whether it is in the Automotive or Non-Automotive BU, has traditionally emphasized "Delivery", and has gained the trust of its customers over the long term by responding flexibly to their demand fluctuation requests. Company A has traditionally focused on delivery in both the Automotive and Non-Automotive BU, and it has built long-term relationships with its customers by responding flexibly to their demand fluctuations (Figure 1. First row, Local Top Management of Automotive BU). The majority of the company's production plants are located in the home country, and the knowledge of expats from the home country has been utilized to communicate effectively with Japanese in the home country who are engaged in production planning.

In the U.S.-style organization, on the other hand, "Design-In" is the primary mission, and "Delivery" is handled by a dedicated customer service department, with a clear definition of roles. From an organizational perspective, the key capability of "Design-In" at overseas subsidiaries is the ability to understand market characteristics and customer requirements, and according to local sales management, the ability to provide optimal solutions to customers through communication with the head office. Sales and marketing were naturally considered to be the responsibility of local employees. Therefore, Japanese expat salespeople were no more necessary. Though they have spent a great deal of time communicating with the head office, mainly in the delivery process, new management thought it was unnecessary. As a result, the company decided to return Japanese expats sales members to the home country and instead expanded local sales resources to focus more on "Design-In".

4.1.3. Knowledge Transfer as a Prerequisite for Unlearning

Company A's organizational routines have been transformed due to a change in corporate policy, but customer delivery requirements are still a problem that cannot be ignored. Company A's production department basically responds to the customer's requirements, as it is based on the customer's long-term forecast. The planned production input has reduced the need to absorb short-term deviations in individual projects through the efforts of each sales staff member. The role of sales in delivery was also reduced, and negotiations with customers were mainly handled by the customer service department.

Customer service is handled by local staff, who communicate with the supply chain division at the headquarter in a standardized format. According to a local Non-Automotive BU sales staff, sudden requests from customers to change delivery dates are considered non-routine work, but local customer service does not respond to such requests individually (Figure 1, First row); instead, they are centralized with management and handled according to priority. Management prioritizes issues raised by each region and department from a strategic perspective, based on criteria such as customer importance and receipt of longterm orders. After management's decision, the requests will be sent to the operations department to take action. Therefore, the supply chain division at the headquarter can no longer communicate through Japanese expats of overseas sales-companies, but the members must negotiate in English with local people in the U.S. business planning department. For example, the company's micro controller chips occupy a high share of the air conditioner market in China, and because demand is seasonal, frequent communication in English with local sales is necessary. Since the time when the company still had Japanese expats in China, it has been a rule that when a local person participates in a meeting, the conversation must be in English. Therefore, even when Japanese expats return to their home country and only local employees are present, there are no particular problems with communication (Figure 1. First row, SCM Director, headquarter).

The staff at the headquarter also analyzed that the local sales side also formed a TMS and deepened their understanding of non-routine operations by learning tacit knowledge through working with Japanese expats for many years. The experiences enabled them to fill in the absence of Japanese expats. (Figure 1. First row, SCM Director at headquarter)

4.2. Automotive Business Unit

4.2.1. The Value of Not Stopping the Automaker's Production Line

Semiconductors are produced by forming hundreds to tens of thousands of chips on a single wafer to provide a large volume of electronic circuit components with a wide range of functions at low cost. In addition to the several months required for circuit formation, it is difficult to respond to short-term fluctuations in demand due to the production input in fixed-quantity units in the production process. On the other hand, electronic equipment manufacturers, who are the consumers of semiconductors, have a widespread management approach to optimize component inventories and minimize inventory risk. It has become common practice to adjust production volumes according to changes in market demand and to procure the necessary quantity of parts at the necessary time. In particular, Toyota's Kanban system has been adopted by automobile original equipment manufacturers (OEMs) throughout the industry as the dominant logic, and Just-In-Time (JIT) procurement has become the norm [56,57]. The OEMs' JIT policy also requires their primary suppliers, the equipment manufacturers (Tier 1), to make similar demands on their downstream suppliers. Therefore, semiconductor manufacturers are constantly under pressure from their Tier 1 customers, who are linked to the OEMs, to supply their products in a timely manner. Therefore, the policy of "Never stopping an OEM's production line" is shared as an absolute value in the organizational routines of the Automotive BU, and all processes are designed to achieve this goal. In addition, the supply response is recognized as a competence against Western competitors. (Figure 1. First row, Local top management of Automotive BU).

4.2.2. Organizational Routines Complicated by Formal Organizational Changes

At the same time, the Automotive BU also underwent organizational reform through functional differentiation. In addition, the company implemented a series of measures to obtain long-term orders from customers, and it is believed that the company formally intended to adopt the same organizational routines as the Non-Automotive BU. However, whereas the Non-Automotive BU was able to respond to customer delivery requests in an organized manner by selecting customers based on priority, the Automotive BU, which has a policy of "Never stopping the OEM line", was not able to make such a separation, and it was necessary to evaluate all requests from Tier 1 customers on an equivalent basis without changing the conventional approach.

On the other hand, the formal organizational changes applied by the Non-Automotive BU and the handling of long-term orders further complicated the business process, and for certain product lines where supply and demand were tight, regular liaison meetings had to be held by the relevant departments such as sales, marketing, design, business planning, and supply chain, etc. (Figure 1. First row). Since all the participating members from these related departments were Japanese, the role of Japanese expats rather increased in

the Automotive BU as opposed to the Non-Automotive BU (Figure 1. First row, Local top executives in Automotive BU).

5. Discussion

5.1. Management Control

The interviews revealed that Company A adopted the management methods of U.S. Company B after acquiring it and advanced the globalization of its organization. As a result, the global management of Company A became localized, i.e., the number of Japanese expats were reduced. There was a significant organizational change in the Non-Automotive BU, which was headed by the management of Company B, an acquired U.S. company.

The Automotive BU implemented the reorganization and operational measures same as the Non-Automotive BU. However, this made operations more complex, and the role of Japanese expats became more important in coordinating this complexity.

The interviews showed that a strong value system of "The OEM's line cannot be stopped" continued to dominate in the Automotive BU, while the Non-Automotive BU had shifted to a policy of "Putting the company's own interests first". Despite the fact that both divisions initially recognized "the ability to respond to supply as a competitive competence (Figure 1. first row, Non-Automotive BU, former expats sales manager currently in headquarter)", the Non-Automotive BU rejected the existing organizational routines and established new ones after struggling with the new values.

In organizational learning, the mental models of individuals and the shared vision of the organization are pointed out as important factors that define the learning attitude of individuals [58]. The mental model that "The ability to respond to supply is a competitive competence" (Figure 1. Second row, local top management of Automotive BU) that the sales realized in actual negotiations with customers, and the value of "Never stopping the customer line" as the shared vision of the organization can be understood as influencing the formation of organizational routines in the Automotive BU. From this case study, we found that the mental model and the values that are the premise of the shared vision, may be influential in the organization's unlearning of existing knowledge and establishing new organizational routines.

This suggests that management control by culture is applied to "Research Question 1: What kind of management control do Japanese companies use to manage their global organizations?". At Company A, values dominate the direction of organizational routines in both the automotive and Non-Automotive BU. In the Automotive BU, a shared vision of "Never stopping the OEM's line" dominates. The mental model of "Supply response is a competitive competence" requires a meticulous response by each individual. To achieve this, Japanese expats play a major role in communication between the headquarter and overseas. In this way, it was observed that cultural control is strongly exercised at Company A.

Company A made the acquisition of U.S. company B in order to respond to changes in the external environment, and in applying its management approach, it instilled its profit-oriented values at the shop-floor level. Using "Cultural" management control, which emphasizes contextual understanding based on shared values and implicitly requires actions in line with these norms, the company established optimal organizational routines for each of its two business units, which target customers with different levels of demand.

5.2. Changes in Organizational Routines

According to Feldman & Pentland [29], organizational routines can be classified into an "Ostensive" aspect that defines its structure, and a "Performative" aspect that involves actual actions. Organizational routines are optimized by switching back and forth between the two aspects. The direction in which more weight is placed in response to changes in the environment determines the organizational routines.

In this case, Company A acquired Company B, a U.S. company, and adopted the management methods of Company B. The organizational routines that emphasize the

"Ostensive" aspect correspond to the U.S. model, while the routines that emphasize the "Performative' aspect correspond to the Japanese model.

Semiconductor manufacturing originally has a long production period. Therefore, it is difficult to respond to sudden increases or decreases in demand. In particular, the response to increased demand often requires not only a physical shortening of the production period, but also a solution by freeing up capacity that had been allocated to other customers. It can be said that the emphasis was on the "Performative" rather than the "Ostensive" aspects of organizational routines. In such dynamic processes, the targets of communication also become diverse. In the case of requests from overseas customers, when sales representatives of overseas sales companies communicate the customer's request to the home country where production resources are concentrated, there is no major problem as long as the customer's request is communicated in a standardized manner in advance through normal communication channels. However, when actions outside of the standard channels are required, it is important to have TMS of expats, who know the appropriate parties to negotiate with (Figure 1. First row, Local top management of Automobile BU).

The Automotive BU reaffirmed its value of "Never stopping a customer's line" and continued to adopt organizational routines that maximize the knowledge of Japanese expats in order to maximize the value of services to customers in the midst of tight global semiconductor supply.

On the other hand, in the Non-Automotive BU, an executive from acquired U.S. company B was appointed to the top management position to instill a "Profit-oriented" value system, and unlearned business processes that rely on the knowledge of expats and establish global organizational routines through a systematic approach.

In the U.S.-style organizational routines modeled by the Non-Automotive BU, this process is carried out by customer service department. The new organization does not tolerate fluctuations in customer demand. Under the same policy, the new organization will support production requests based on the delivery date and quantity information initially ordered by the customer, all the way through to supply. This is a key point that distinguishes the new organization from Japanese-style organizational routines. The acquired U.S. company B had outsourced its manufacturing to an external company. Therefore, it lacked flexibility in making production changes. It is assumed that the company was forced to design a system to meet customer requirements without changing the production plan as much as possible.

To establish the U.S.-style organizational routines described above in the Non-Automotive BU, significant changes were required in organizational reconfiguration and negotiation policies with customers. In the process, a function-based organization was established that did not allow any ambiguity in role and responsibility. From this perspective, the role of Japanese expats who were responsible for non-standardized tasks was difficult to evaluate and they were sent back to their home country. This can be considered as unlearning the use of knowledge in the form of TMS by Japanese expats. As a precondition for unlearning, it was confirmed that (1) "English communication" was available to respond to foreign clients' requests according to a standardized flow, and (2) Essential management knowledge of communication with the headquarter was transferred between organizations based on the actual performance of the expats during their tenure. (Figure 1. Third column 1).

Therefore, the answer to "Research Question 2: What kind of organizational routines do Japanese firms use to manage their global organizations?" is to apply appropriate values, which are determined by each business characteristics and implement optimal organizational routines in that direction. In this process, it was found that changes in the environment may involve the establishment of new organizational routines by unlearning organizational routines based on a shift in existing values.

Since Hedberg [32] proposed the model of organizational learning in which existing knowledge is dismissed. New knowledge is learned through unlearning when there is a risk of misleading organizational behavior due to changes in the environment and other factors. It has been considered that there is a certain level of agreement in the academic literature,

and various conceptual as well as logical explanatory models have been attempted to validate it. For example, Bettis and Prahalad [59] and Tsang and Zahra [43].

On the other hand, there have been few cases in which existing organizational routines have been dismissed and unlearning has been implemented from the perspective of the empirical studies [45]. This paper discusses how unlearning of organizational routines was conducted through a case study based on interviews with the people in actual operation. It has further confirmed that organizational values influence the composition of organizational routines. The organizational routines that had been conventionally defined by the norms of Japanese "Culture" were expanded after the acquisition of U.S. company B to spread its management methods. The penetration of "Profit-oriented" values that could be shared more globally from the Japanese culture, led to the unlearning of organizational routines that had relied on the conventional Japanese cultural norms. This paper discusses the unlearning of organizational routines based on traditional Japanese cultural norms from the perspective of the people in operation. In contrast to the tendency of existing studies to focus on theoretical considerations, we believe it is significant to reinforce the case studies of organizational learning in actual organizations from a practical perspective.

6. Conclusions, Implication and Research Limitation

In this study, to answer the question of what kind of management control Japanese firms use to manage their global organizations, we analyzed the cross-border M&A case of a semiconductor manufacturer, Company A, and found that the company adopted "Cultural" management control and adapted to changes in the environment. Through the cross-border M&A, company A has acquired talents to execute change the values of the organization by top-down organizational reforms. It brought the change in values from formerly dominated customer-oriented one to more focus on company's own profit. This vector change in values finally brought the change in organizational routines by unlearning the legacy TMS of expats. In other words, Japanese company A finally achieved globalization only after acquiring the external view outside of dominant "Cultural" values. It explains why Japanese firms have recently been accelerating the cross-border M&A. To obtain such external views to conduct change in "Cultural" management control systems, it will be effective.

From sustainability point of view, in the unprecedented situation of global shortage of semiconductors after 2020, we analyzed in detail the supply response process in the supply chain of a semiconductor company as a case study. It clarified the mechanism of the organizational routines. Semiconductors are so called the "Rice of the industry", and it represents the importance of this industry. Accordingly, this study will help to deepen consideration of the sustainable growth of the semiconductor industry. There has been no research to focus on the "Performative" organization routines throughout the semiconductor supply chain dynamic operation, in which demand and supply balance is frequently changed. From this point, it is meaningful to find out how a semiconductor company got the capability to align with the optimal supply chain operation through organizational learning in the sustainability scope.

On the other hand, we believe that we were able to extract certain mechanisms of how Japanese companies have globalized their organizations in response to changes in the external environment, from the perspective of unlearning organizational routines. However, this is only a case study of one company, and it needs to be verified through more case studies and multifaceted, quantitative research. In addition, although this study examined the case of unlearning in the Non-Automotive BU of Company A, it is insufficient to examine the point where unlearning did not occur in the Automotive BU due to a lack of transparency in the shift in values. Consideration from factors that hinder organizational learning and knowledge transfer, such as competency traps [60] and information stickiness [61], seems necessary. Author Contributions: Writing—original draft, M.O.; Writing—review & editing, K.S. All authors have read and agreed to the published version of the manuscript.

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