

Proposal and Evaluation of Organizational Design Process to Adopt Evidence- Based Management

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SUMMARY OF DOCTORAL DISSERTATION

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<p>Title</p> <p style="text-align: center;">Proposal and Evaluation of Organizational Design Process to Adopt Evidence-Based Management</p>			
<p>Abstract</p> <p>It is essential to respond to changes in the environment in such as the VUCA era. Furthermore, in an atmosphere of technological pressures and fierce competition brought about by globalization and the digital revolution, organizations must constantly monitor and respond to the changes surrounding their internal and external environments while maintaining their business revenue. In other words, in the present day, organizations are forced to aim for efficiencies optimized for the existing environment and flexibility to adapt to changes in the external environment.</p> <p>Therefore, this study proposes an organizational architecture design process based on evidence-based management and aims to verify the effects on "efficiency," which is the ability to optimize to the existing environment, and "flexibility," which is the ability to adapt to changes in the external environment, through case studies in the area of human resource flow. The results of this study are as follows. The organizational architecture design process proposed in this study consists of five steps: "Extraction of issues from front-line staff," "Extraction of evidence for internal issues," "Utilization of external evidence such as surveys and research," "Extraction of stakeholder perspectives," and "Decision making to improve the organizational architecture. Steps 1 and 2 aim to adapt to the existing environment to improve efficiency while utilizing CMM and systems engineering methods. On the other hand, Steps 3 and 4 aim to adapt to changes in the external environment by using knowledge and perspectives other than those of the organizational designer.</p> <p>Through three case studies conducted in different areas of human resource flow, the results show that the organizational architecture process based on evidence-based management proposed in this study enhances both "efficiency in terms of being able to optimize to the existing environment" and "flexibility in terms of being able to adapt to changes in the external environment." The results showed that the process was both efficient and flexible. However, since the results of this study focused on the design phase, it is necessary to conduct a quantitative analysis by completing the verification after the development phase.</p>			
<p>Keywords (5 words)</p> <p>Human Resource Management, Harvard Model, Organizational Design, Evidence-Based management, Systems Engineering</p>			

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1. Introduction

1.1 Research Background

As symbolized by VUCA (Bennett et al., 2014), it is essential to adapt to environmental changes in an era of significant change. The operational impact of the changes in the external environment caused by COVID-19 on HR professionals is substantial. (Advantage Risk Management, 2020) In addition, companies need to implement agile governance in the coming era of significant change. (Ministry of Economy, Trade, and Industry, 2021) In agile governance, two loops are depicted: one is to increase efficiency by accumulating improvements in the existing environment, and the other is to change the goal itself in response to changes in the external environment. In other words, it is necessary to balance these two loops in this VUCA era.

The motivation and retention of knowledgeable workers to adapt to the external environment and gain a winning edge in the market is one of the most significant challenges for human resource professionals. Human Resource Management (HRM) will be the critical area of focus in the 21st century as companies and government organizations implement strategies to cope with the economic crisis and recovery. (Ravisankar et al., 2013) Drucker states that the most important, and indeed genuinely unique, the contribution of management in the 20th century was the fifty-fold increase in manual worker productivity in manufacturing. The most important contribution management needs to make in the 21st century is to increase the productivity of skilled workers and knowledge workers. (Drucker, 1999). Rapid economic changes have recently requested human resource departments in Japanese firms to transform their roles and services. (Kido et al., 2006)

In addition, organizations need to constantly monitor the changes around their internal and external environment to compete and maintain the business interests due to the pressure and brutal competitive conditions of the age of technology posed by globalization and the Digital Revolution. One of the most critical approaches to can manage this change most efficiently is Strategic Human Resources Management, which is one of the key strategic management processes of human resources within an organization. (Kaygusuz, 2016) Still, most organizations gave employees little control over their careers, preferring to make placement and promotion decisions without consultation. (Beer et al., 1984)

In a questionnaire survey conducted by Miwa, the more companies utilize HRM to emphasize individual achievements, use the external labor market, and invest in human resources development, and the more knowledge workers continue to work for these companies. (Miwa, 2015) Additionally, Al-Zahrani describes that there is a positive correlation between effective HRM practices and financial performance. (Al-Zahrani, 2014) Therefore, it is vital to construct a

proper human resource flow to attract knowledge workers and improve corporate performance in the future. Boxall divides competitive advantage into "Human Capital Advantage" and "Human Process Advantage." He also explains that "Human Process Advantage" is more difficult for other companies to imitate. (Boxall et al., 1999) In other words, improving the process of human resource flow for knowledge workers is a factor that increases the competitive advantage of companies. Therefore, we need to derive HRM Policy Choice and HR Systems issues within the Harvard Model, which Beer proposed. (Beer et al., 1984) When we identify problems of HR Systems, we can increase the "Human Process Advantage." In addition, it is essential to design and operate HR Systems from a strategic point of view to improve the outcome of HRM and to build the core competence of an organization. (Kido et al., 2006)

1.2 Research Objective, Novelty, and Originality

This paper proposes a method to design organizational architecture to enhance efficiency and agility based on evidence. As a reminder of the importance of the two loops in agile governance, I would like to introduce a specific example from the past: the case of a company that experienced a major change in the market from film cameras to digital cameras in the early 2000s. While Fujifilm was able to adapt and grow in the face of this external market change, Kodak was unable to change in this external environment and went bankrupt. It seems that it is important not only to improve efficiency in the existing environment by making improvements on a regular basis, but also to be flexible enough to catch and adapt to changes in the external environment. The purpose of this paper is to propose an organizational design process that balances the two goals of efficiency and flexibility.

It could be said that many companies are caught in the organizational traps. The organizational traps refer to the fact that an organization may not be aware of the fact that organizational routines, such as technologies and procedures, that worked well in the past and produced a lot of results may no longer work due to subsequent changes in the environment, or even if they are aware of the fact, they may tend to stick to using the familiar organizational routines. (Argyris, 2010), in other words, in order to break out of the organizational traps, I can say that a two-loop practice is required. This means, in other words, that the evidence-based organizational design process proposed in this paper aims to give organizations the power to overcome organizational traps, turn two loops for organizational learning, and take a leap forward. Therefore, in this research, we designed the organizational design process with the awareness that it can be used by many companies, and at the same time, we verified whether it can be used in practical situations through three case studies.

I suggest a way to visualize current HR Systems by using theory, framework, and analytics

such as “Three-axis Matrix,” “Organization Strategy and Management Type,” “Systems Engineering,” and “Statistics.”

While many studies have mentioned organizational design, there is little consensus on how corporate design unleashes agility in Organizations. (Kristensen et al., 2019) Teece et al. stated that decisions need to be theoretically based and (if possible) evidence-based. (Teece et al., 2016) While we sometimes recognized the trade-off between agility and efficiency in economics, it has not received much attention in strategic management and is rarely mentioned in organizational theory. (Teece et al., 2016) In addition, some agile organizations in various industries have successfully implemented organizational change, while others have been unsuccessful. We know little about the practicality and viability of these practices. The next step in the research is to conduct case studies to gain insight into actual practices that contribute to organizational agility and their associated challenges and outcomes. (Kristensen et al., 2019)

Therefore, the novelty of this paper is to propose a method of organizational design based on evidence such as HRM that enhances organizational agility and provides insights through case studies.

On the other hand, why hasn't such an important evidence-based organizational design been advocated? As mentioned above, the importance of organizational design processes that are both efficient and flexible has been pointed out by academic researchers, and the times have demanded it. Perhaps practitioners would have recognized the need for it as well.

Perhaps the challenge was that as researchers, we only pointed out the importance of the academic perspective and remained at a highly abstract conceptual level. At the same time, it was pointed out that empirical research is scarce in this area. On the other hand, although they were aware of the necessity of organizational design in practice, they did not have the opportunity to deepen their understanding of the academic concepts of organizational design and organizational learning, and therefore, in practice, they only relied on their experience and intuition, and could not implement organizational design backed by systematic academic insight and evidence.

However, coincidentally, I have been in the field for more than 10 years and have experience in organizational design as an HR professional focusing on HR strategy, and as a researcher, I had the opportunity to explore organizational design and organizational learning. Therefore, I can say that my originality is an important factor that led me to the method proposed in this paper.

In actually designing this organizational design process, many of my practical experiences came in handy. I could foresee that if I were to incorporate highly abstract academic concepts directly into the organizational design process, the field would be confused. For this reason, I chose methods while thinking about how best to utilize academic concepts in a careful and practical way. As I will explain later, I think CMM is the best example of this. Although the concept of

maturity is naturally considered academically, not much is known about how effective it is in identifying current issues in business practice, especially in organizational design. However, when I was first introduced to the concept of CMM, I could see that it is very important for the field. The same is true for the five steps of evidence-based management. While following these academic methods, I adopted them from my perspective of how they can be used in the field, and improved the quality of the process itself through empirical research. I believe this is the uniqueness of this research, which is more than just a combination of methods.

1.3 Structure of the Research

The following chapters elaborate on this research with all its relevant details. First, Chapter 2 outlines previous studies such as organizational agility, organizational design, organizational architecture, evidence-based management, HRM, Systems Engineering, SECI Model, and CMM. Then, in Chapters 3, we propose an organizational design method to enhance agility based on evidence. In Chapter 4, we evaluate the process in 3 cases. Finally, in Chapter 5, we summarize the implication and explain the direction of future research as a conclusion.

2. Previous Studies

2.1 Organizational Agility

Teece et al. refer to agility as the capacity of an organization to efficiently and effectively redeploy / redirect its resources to value creating and value protecting (and capturing) higher-yield activities as internal and external circumstances warrant. (Teece et al., 2016) In addition, organizational agility is mainly defined as an organization's ability to be adaptable in response to environmental changes. Organizational agility is the capacity to sense and respond rapidly to changing customer needs, to make decisions rapidly, and to reallocate resource quickly as circumstances change (Nijssen et al., 2012)

2.2 Organizational Design and Organizational Architecture

Burton et al. says that organizational design is not only about drawing a new organization chart, but also about the many interrelated factors that need to be taken into account. In other words, organizational design is about deciding who does what and when. Burton et al. then presented the diagnosis, design, and implementation of organizational architecture. (Burton et al., 2020) Therefore, it can be said that organizational design is to determine the "organizational architecture" of "who does what when," which takes into account many interrelated factors.

2.3 Evidence-based management

2.3.1 The definition and overview of Evidence-based management

Briner et al. defined Evidence-based management (EBMgt) as follows: "Evidence-based management is about making decisions through the conscientious, explicit, and judicious use of four sources of information: practitioner expertise and judgment, evidence from the heal context, a critical evaluation of the best available research evidence, and the perspectives of those people who might be affected by the decision." (Briner et al., 2009)

Briner et al. divided EBMgt into four areas which was "Practitioner experience and judgments", "Context organizational actors, circumstances", "Evaluated external evidence", and "Stakeholders (e.g., employees), preferences, or values". (Briner et al., 2009) Briner described that it was important to consider all four of these factors when doing or thinking about EBMgt. EBMgt takes place at the intersection of all four factors, and it is important to note that the size of each circle, and thus the strength of its influence, will vary with each decision. (Briner et al., 2009)

In addition, Briner et al. defined the steps of the EBMgt approach as follows. The process begins with the practitioner's or manager's problem, question, or challenge, and involves discussing the validity of the issue raised and ensuring that it is expressed as clearly as possible. The next step

is to gather evidence and data from within the organization about the problem or issue, and to check its relevance and validity. At this stage, the problem can be restated, reframed, or made more specific. It also identifies and critically evaluates external evidence from published studies on the issue, in the form of systematic reviews and rapid evidence assessments (a more rapid and rigorous version of systematic reviews, employing similarly explicit and systematic methods). It also considers the views of stakeholders and others who may be affected by the decision, and the ethical implications of the decision. After all these sources of information have been collected and critically evaluated, a decision is made to consider and attempt to integrate these four sources of information. (Briner et al., 2009)

2.3.2 Is Evidence-based Organizational Design Effective?

We understand the importance of EBMgt and its procedures, but is it effective in Organizational Design?

In collaboration with the Institute for Employment Research, I conducted research on this question and published it as the Employment White Paper 2021. The outline is as follows. The survey targeted 4,577 companies with at least five employees that hire new graduates throughout Japan. The survey method was a mail survey (including an online survey for graduates in 2021). The survey period was from December 4, 2020 to January 13, 2021. The number of companies surveyed was 1,398 (recovery rate: 30.5%).

The entire hiring process can be divided into two major parts: the first part, "Recruitment preparation" and the second part, "Recruitment process". Recruitment communication takes place in the latter half of the hiring process, and in order to improve its quality, careful preparation is the starting point. (Shushoku Mirai Kenkyujo, 2021)

For each of the items listed, about half of the companies conducted "Recruitment preparation". As a result of the analysis of the state of "Recruitment preparation" by companies that were satisfied with their prospective employees and companies that were not satisfied with their prospective employees, there were significant differences in all six items surveyed. The results showed that the companies that were satisfied with their prospective employees were significantly more likely than the other groups to conduct analysis and planning during "Recruitment preparation". This means that companies that design their hiring process based on proper evidence were more successful in hiring.

To what extent do companies collect evidence in the four perspectives of EBMgt? We found that more than 60% of the companies were collecting internal data and external research results. Furthermore, according to the results of the survey, there was a significant difference between the satisfied and the other groups in terms of the items surveyed, leading to the conclusion that it was

important to collect information from the four perspectives presented in this report during recruitment activities. In particular, the results of the survey showed that there was a significant difference between the groups of companies that use the four perspectives presented in the report. In particular, they found that it was necessary to proactively collect "the knowledge of HR professionals," "data from within the organization," and "results of external research and studies.

The significant differences between the companies that were satisfied with their prospective employees and those that were not satisfied with them were in terms of the type of person they were looking for, corporate culture, work style and training programs, and services offered. It can be said that reviewing and improving recruitment activities every year will lead to results.

2.4 Human Resource Management

2.4.1 Human Resource Management (HRM)

Beer et al. defines HRM as “all management decisions and actions that affect the nature of the relationship between the organization and employees-its human resources.” (Beer et al., 1984) In this paper, we use Beer’s definition because we proposed the method based on the Harvard Model advocated by him.

2.4.2 Features of the Soft version of HRM and the Hard version of HRM

Storey argued that there are two types of HRM: the Soft version of HRM, which aims to strategically develop employees' capabilities and improve their commitment, and the Hard version of HRM, which aims to strategically utilize employees as management resources. (Storey, 1992) Features of the Soft and Hard versions of HRM are arranged as follows referring to tables of Kuriyama (Kuriyama, 2009) and Iwade (Iwade, 2013).

Table 1. The features of Soft version of HRM and Hard version of HRM

(Written by the author with reference to Iwade (2013))

	Soft version of HRM	Hard version of HRM
Strategic Objectives	Employee capacity development and commitment improvement	Effective use of employees as management resources
Organizational Characteristics	<ul style="list-style-type: none"> • Gain employee organizational commitment • Human aspects of the organization (microstructure theory) • Human-oriented 	<ul style="list-style-type: none"> • HRM strategic fit • Structural aspects of the organization (macro-organization theory) • Production-oriented
Representative Model	<ul style="list-style-type: none"> • Harvard Model • Best practice approach 	<ul style="list-style-type: none"> • Michigan Model • Contingency Approach
View of Workers	<ul style="list-style-type: none"> • Human • Theory Y (self-realizer model) 	<ul style="list-style-type: none"> • Resource • Theory X (economic model)
Management Control	Employee Self-control (internal control)	External control by the administrator
Stakeholder Perspective	Stakeholder affects people's commitments	Stakeholder affects strategies
Theoretical Basic	Human Relations Theory and Behavioral Science	Management Strategy Theory and System Theory

Iwade insists that people are disregarded in the Hard version of HRM (Iwade, 2013) What is required for the HRM in the future is a more human-centered system, considering the high level of attention paid to autonomous organizations such as “Teal Organization” nowadays.

Therefore, in this study, we would like to proceed based on Soft version of HRM.

2.4.3 Soft version of HRM Details

The Soft version of HRM recognizes that employees have psychological and social demands and expectations, and that organizations can achieve high productivity and performance by designing and managing work based on such human considerations. Specifically, (1) Employees should be treated as the assets of the organization, not as items that can be disposed of; (2) Work should be designed to be interesting and self-controlling; (3) A mutually beneficial form of reward should be devised; and (4) An attitude should be aimed at enabling both labor and management to enjoy benefits by improving productivity. (Iwade, 2013) Lepak et al. (2006) pointed out three HR systems with these guidelines: "High-Commitment HR System" "High-Involvement HR System" and "High Performance Work System" (Lepak et al., 2016). We quote Iwade's table. (Iwade, 2013)

Table 2. Three models of soft version of HRM
(Written by the author with reference to Iwade (2013))

HR System	Objectives and Measures
High-Commitment HR System	<ul style="list-style-type: none"> •The goal is to create conditions that encourage the integration of employee and organizational goals and motivate efforts to achieve those goals. Develop dedicated employees and increase organizational effectiveness. •Intensive training and capacity building, socialization, internal promotion, higher compensation, and selective recruitment of employees with stronger psychological ties.
High-Involvement HR System	<ul style="list-style-type: none"> •Facilitate employee performance and improve productivity by increasing information sharing and decision-making authority. Focus on HR practices that directly affect the nature and scope of the work performed by employees •Formal work teams, employee participation groups, production-related proposal systems, job transitions, quality control
High Performance Work System	<ul style="list-style-type: none"> •Treat workers with dignity, invest in capacity development, promote trust in management and encourage commitment to achieve organizational goals •It covers the above two HR system elements and includes best practices of all types. selective recruitment, individual and group incentives, fringe benefits, intensive training, performance assessments, teams, employee participation programs, work-life balance programs, information sharing

Iwade wrote a summary of HRM's success criteria in best practice approach theorists who can be represented by soft models such as Beer et al. (Beer et al., 1984), Walton (Walton, 1985), and Lawler (Lawler, 1986). (Iwade, 2013)

Table 3. Success Criteria in Soft version of HRM
(Written by the author with reference to Iwade (2013))

HR System	HRM performance measurement items
High-Commitment Duties System (Beer et al., 1984)	<ul style="list-style-type: none"> •Employee Commitments (loyalty to work or organization) •Securing necessary human resources •Cost Effectiveness (Salary, benefits, turnover and absenteeism) •Satisfaction of stakeholder requirements
High-Commitment Work System (Walton, 1985)	<ul style="list-style-type: none"> •the economic effectiveness of an organization (quality, capacity utilization, cost reduction, indirect headcount reduction, turnover, absenteeism) •Employee Objectives (Job satisfaction, human growth)
High-Involvement Management (Lawler, 1986)	<ul style="list-style-type: none"> •Willingness to work, satisfaction, communication •problem solving, reducing resistance to change

2.4.4 Harvard Model

Beer et al. offers a “Map of the HRM Theory” for diagnosing not only the impact of management decisions on the human resources of the firm, but also whether the policies that guide those decisions continue to make sense and what changes might be considered in them. (Beer et al., 1984) Beer et al. show the analytical approach in Figure 1 which is a broad causal mapping of the determinants and consequences of HRM Policies.

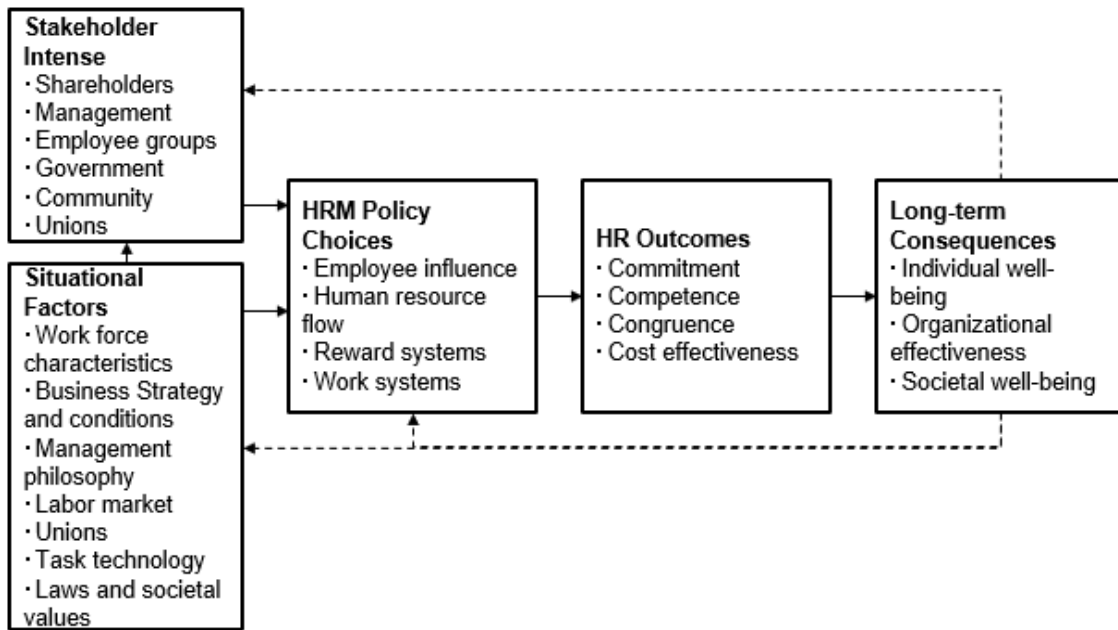


Figure 1. Map of the HRM Theory (Written by the author with reference to Beer et al. (1984))

Beer et al. proposes that many diverse personnel and labor relations activities may be subsumed under four human resource policy areas, which are Employee Influence, Human Resource Flow, Reward Systems, and Work Systems. (Beer et al., 1984) Beer depicts these four areas as “Human Resource Systems” in Figure 2.

Beer et al. describe that “this policy area has to do with the responsibility shared by all managers in an organization for managing the flow of people (at all levels) into, through and out of the organization. Beer divides human resource flow in to three areas, which are Inflow, Internal flow, and Outflow. (Beer et al., 1984)

Inflow includes Recruitment, Assessment and selection, as well as Orientation and socialization. Internal flow consists of Evaluation of performance and potential, Career development, Internal placement, Promotion and demotion, as well as Education and training. Outflow is composed of Termination, Outplacement, and Retirement. We show these three areas in Figure 3.

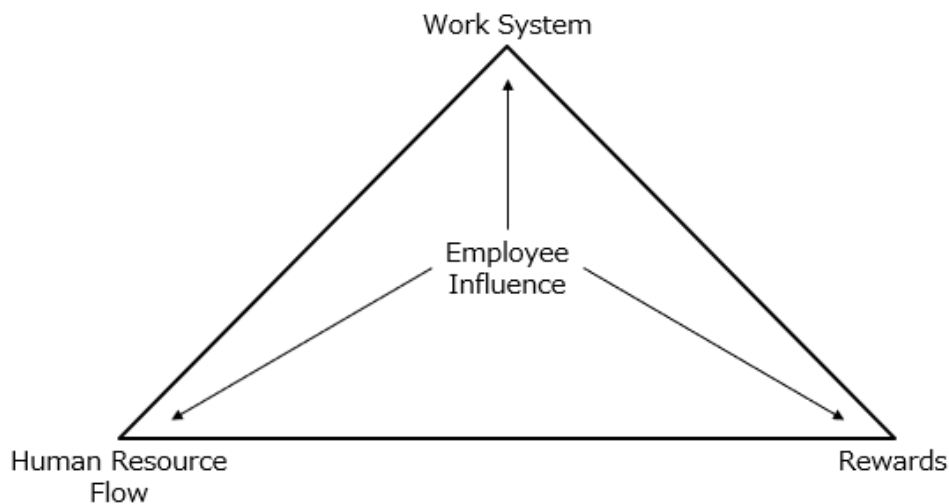


Figure 2. Human Resource Systems (Written by the author with reference to Beer et al. (1984))

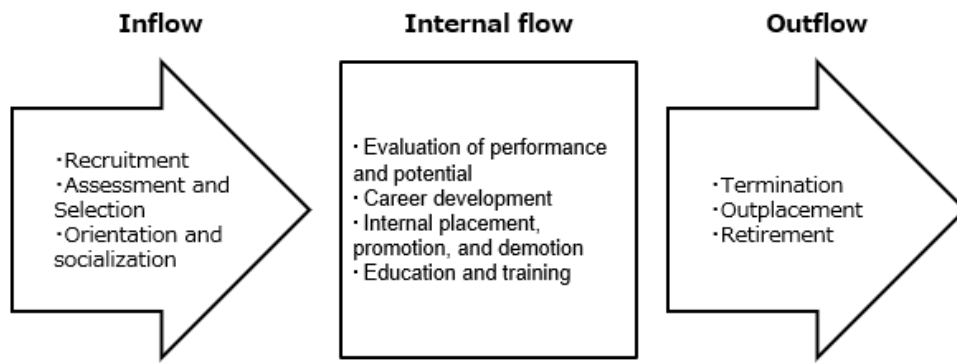


Figure 3. Three Human Resource Flows (Written by the author with reference to Beer et al. (1984))

Beer et al. explain that there are three basic types of human resource flow patterns that may exist in an organization, and a fourth pattern that is a mix of the first three. Each of the patterns has different effects on employee well-being, organizational effectiveness, and the role of the corporation in society. (Beer et al., 1984) The first pattern is the “Lifelong employment system”. People usually enter the organization at the bottom and stay with the organization throughout their career. The bottom may be defined differently for different employee groups. No one is laid off as a result of economic cycles, but people may be asked to leave because of poor performance, depending on the company and on national practices. Large companies in Japan operate under this system. A select group of their employees are not discharged because of poor performance; instead, they may be sidetracked to less important jobs. (Beer et al., 1984)

The second pattern is the “Up-or-out system”. Employees enter at the bottom and move up through the organization through predetermined tracks until they reach the top rank, which offers full partnership in the organization and usually tenure. Inability to be promoted through any of the ranks along the way or to the highest rank usually means that the person must leave. This system has high levels of turnover at the bottom and relative stability at the top. (Beer et al., 1984)

The third pattern is the “Unstable in-and-out system”. Employees enter at any level in the organization, depending on the organization’s need and may be asked to leave at any level or point in their career due to economic conditions, poor performance, or a bad fit with new management. Sometimes, employment contracts exist for given periods to ensure individual performance (rather than group) and is highly variable (often due to factors outside the control of the individual). (Beer et al., 1984)

The last pattern is a mix of patterns. There are few corporations that are clear-cut examples of any one of the above. Large Japanese companies have lifelong employment for their core employees while using an in-and-out system for temporary workers and women. Some companies operate a lifelong employment system for top management, but an in-and-out system for middle and lower management. (Beer et al., 1984) We depict this in Figure 4.

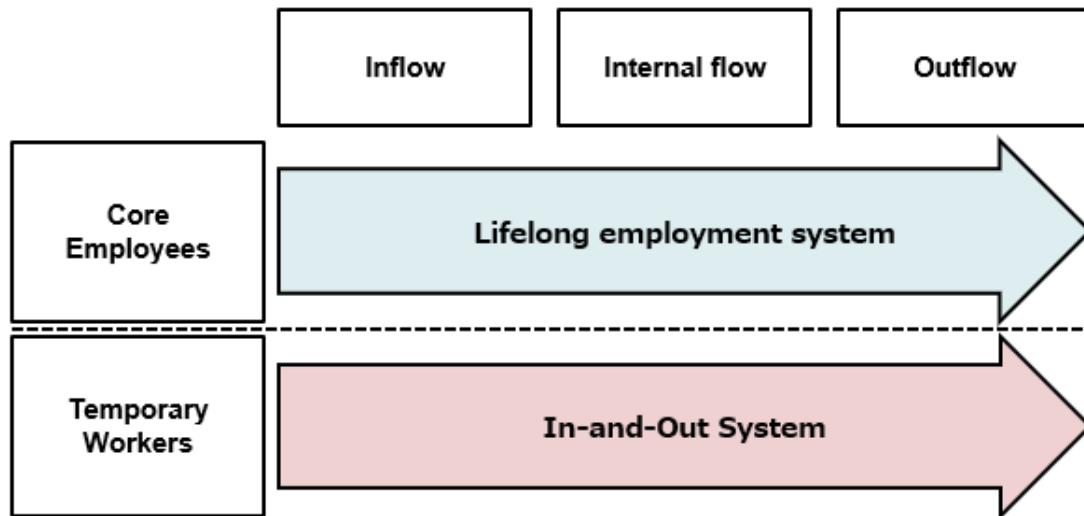


Figure 4. Application of Different Flow Pattern in Large Japanese Companies
(Written by the author with reference to Beer et al. (1984))

Furthermore, flow patterns shift over the life cycle of an organization. In the United States, mature companies under competitive pressure from Japan have moved from de-facto lifelong employment for management to an in-and-out pattern in an effort to revitalize the firm. (Beer et al., 1984) When the economy got worse in the late 1990s, large Japanese companies changed flow patterns from previously lifelong employment systems to in-and-out systems. We separate target employee into permanent employee and temporary employee because it is known that companies may change the flow pattern according to the external environment and the type of employees. (Beer et al., 1984)

As for flow patterns, Takahashi introduced "Natural Selection", "Work Separated", "Integrated Career Path" type. (Takahashi, 1998) Miwa extracted four types of "Strong Result / Ability Principle", "Process-Oriented", "Market-Oriented", "Non-Competitive" from a questionnaire survey of companies. (Miwa, 2015) We can develop patterns of human resource flow in the future.

2.5 Systems Engineering

2.5.1 Systems Engineering Definition

INCOSE defines Systems Engineering as a transdisciplinary and integrative approach to enable the successful realization, use, and retirement of engineered systems, using systems principles and concepts, and scientific, technological, and management methods. (INCOSE, 2019)

2.5.2 Context Analysis

Context analysis is a method of understanding internal influences and external influences by creating a context diagram at each step of the life cycle.

2.5.3 Use Case Description

A use case description is a written description of the behavior that the system should perform in order to achieve a certain purpose.

2.5.4 Functional Design

Functional design is the process of dividing the required functions of a system and replacing them with a set of sub-functions that constitute the functions. We use FFBD (Function Flow Block Diagram) in this paper. The function flow diagram is a method of subdividing by function flow and hierarchy. This method is used as a functional design for architectural design.

2.5.5 Physical Design

The physical design is the assignment of functions to the elements such as sub-systems that make up the system.

2.6 SECI Model

Nonaka et al. proposed the SECI Model in "Knowledge Creation Company". (Nonaka et al. 1996) The SECI Model is divided into 4 areas: Socialization, which imagines tacit knowledge of a group from an individual's tacit knowledge; Externalization, which imagines explicit knowledge from tacit knowledge; Combination, which imagines systematic explicit knowledge from individual explicit knowledge; and Internalization, which imagines tacit knowledge from explicit knowledge. We show the concept of the SECI Model in Figure 5.

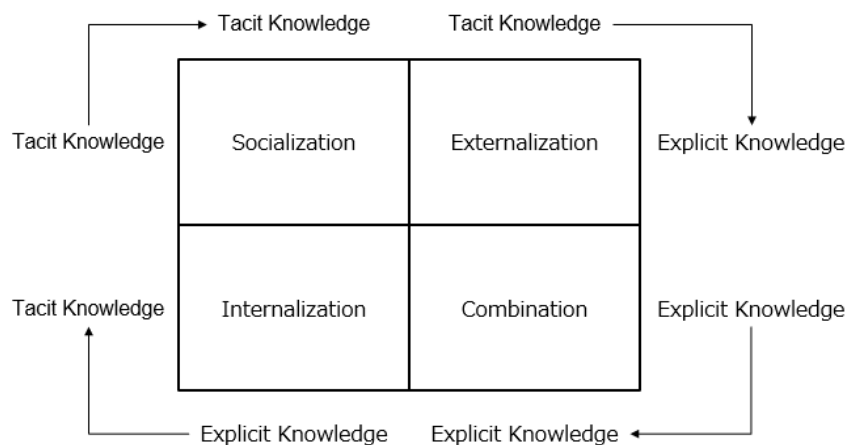


Figure 5. SECI Model (Written by the author with reference to Nonaka et al., (1996))

2.7 CMM

Paulk states that the Capability Maturity Model (CMM) provides organizations with guidance on how to gain control of their processes for developing and maintaining software and how to evolve toward a culture of software engineering and management excellence. The CMM was designed to guide software organizations in selecting process improvement strategies by determining current process maturity and identifying the few issues most critical to software quality and process improvement. By focusing on a limited set of activities and working aggressively to achieve them, an organization can steadily improve its organization-wide software process to enable continuous and lasting gain- in software process capability. (Paulk et al., 1993) CMM defines the five levels of software process maturity. The first level is “Initial”. This level means that the software process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on individual effort. The second level is “Repeatable”. This level means that basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications. The third level is “Defined”. This level means that the software process for both management and engineering activities is documented, standardized, and integrated into a standard software process for the organization. All projects use an approved, tailored version of the organization's standard software process for developing and maintaining software. The fourth level is “Managed”. This level means that detailed measures of the software process and product quality are collected. The fifth level is “Optimizing”. This level means that continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies. (Paulk et al., 1993)

2.8 Organizational Learning

Organizational learning is defined as changes in organizational routines throughout a system that encompasses organizations and individuals. (Ando, 2019) Organizational routines are also defined as the ways of working and processing information that are used repeatedly in an organization. (Ando, 2019) This study aims to describe these organizational routines in detail using organizational design methods. In accordance with the concept of primary and secondary learning proposed by Adler, we will use evidence to improve existing organizational routines to promote primary learning and increase productivity, and use evidence to develop engineering design, that is, changes in organizational routines to promote secondary learning and adapt to the external environment to increase productivity. (Adler, 1991) Sequential balance basically means that the organization conducts primary learning (lower-order learning) in pursuit of efficiency, however, interrupts its activities as necessary to conduct secondary learning (higher-order

learning) to reexamine and reorient the direction of the organization, and then resumes lower-order learning to converge its learning outcomes, thereby maintaining the desired balance between the two. We would like to achieve both goals based on the concept of sequential balance. On the other hand, I believe that the significance of organizational design is to overcome the competence trap. The competence trap is when an organization is unaware of the fact that technologies, procedures, and other organizational routines that worked well in the past and produced a lot of results are no longer working due to subsequent changes in the environment, or when they are aware of this fact, they tend to stick to using the familiar organizational routines. (Ando, 2019)

It also mentions the concepts of single-loop learning, double-loop learning, and triple-loop learning questions. (Nielsen, 1996) (Seo, 2003) One of the possible future directions of organizational learning theory is the possibility that there will be more and more discussions about overcoming differences and power relations with partners who are not favorable to each other or whose values are not compatible with each other, and aiming for the overall optimization of the larger system. (Ando, 2019)

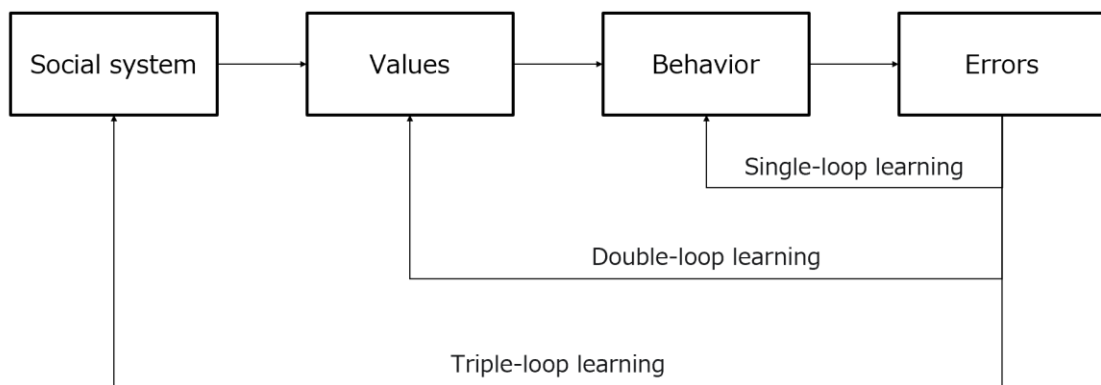


Figure 6. Single-loop learning, Double-loop learning, Triple-loop learning
(Written by the author with reference to Nielsen (1996) and Seo (2003))

3. Proposal of Organizational Design Process to Adopt

Evidence-Based Management

3.1 5 steps to design organizational architecture

In this chapter, I explain a method to design evidence-based agile organizational architecture to enhance both efficiency and flexibility. I describe the five steps as follow.

Step 1: To identify issues for frontline staff

Step 2: To extract evidence of internal issues

Step 3: To use of external evidence such as research and studies

Step 4: To extract stakeholder perspectives

Step 5: To make decisions to improve the organizational architecture

3.2 Academic importance to extract issues from the perspective of HRM

In steps 1 and 2, it is important to extract the issues from employees or managers of organizations. However, what is the purpose to extract the issues? What is the academic value to do that. Therefore, we conducted a review to find out the issues in the human resource flow to refer the Harvard model.

3.2.1 Visualization Map of an HR System based on Life Cycle and the definition of HRP, HRD, and HRU (Sato et al. 2019a)

I confirm the definitions of HRP (Human Resource Planning), HRD (Human Resource Development) and HRU (Human Resource Utilization), which are subordinate concepts of HRM.

Mondy defines HRP as “Workforce Planning”. Human Resource Planning (HRP) is the process of systematically reviewing human resource requirements to ensure the required numbers of employees with the required skills, are available when needed. (Mondy, 2012) In this paper, we use the definition of "Workforce Planning" named by Mondy.

Kusano explains that HRD is an approach to learning, performance, change at the individual level, group level, and organization level in order to increase the effectiveness of human resources towards achieving the goals of the organization. (Kusano, 2007) In this paper, we adopt the definition of HRD that Kusano describes.

Sanno University Research Institute indicates that HRU is to utilize human resources such as the placement and treatment of employees and to operate the personal system. (Sanno University

Research Institute, 1995) In this paper, we use the definition of HRU that Sanno University Research Institute shows.

3.2.2 Explanation of Three-axes Matrix

Prior to this chapter, we explained the Human Resource Flow of the Harvard model and referred to the definitions of HRP, HRD, HRU. In this chapter, we describe human resource management of knowledge workers by creating a matrix with 3 axes to organize prior studies as expressed in Figure 7. The horizontal axis shows three human resource flows of HR systems. The vertical axis represents Target Employees. We divided Target Employees into Permanent Employees and Temporary Employees. Permanent Employees are employees who have a full-time labor contract with no fixed period. Temporary Employees are employees who have a part-time labor contract or have a full-time labor contract with a fixed period. We classify each human resource flow into Concept, Development, Production, Utilization / Support, and retirement based on the lifecycle stages of ISO/IEC/IEEE 15288 from the system design perspective in Figure 8. (INCOSE, 2015) The concept stage is to study new ideas or enable technologies and capabilities, which then mature into the initiation stage of a new project. The development stage defines and realizes a system that meets stakeholder requirements. The production stage is where the system is produced or manufactured. The utilization stage is where the system is operated in its intended environment to deliver its intended services. The support stage is where the system is provided services that enable continued operation. The retirement stage is where the system and its related services are removed from operation. (INCOSE, 2015)

Target Employee	Lifecycle Stage	Human Resource Flow		
		Inflow	Internal Flow	Outflow
Permanent Employee	Concept Stage			
	Development Stage			
	Production Stage			
	Utilization/Support Stage			
	Retirement Stage			
Temporary Employee	Concept Stage			
	Development Stage			
	Production Stage			
	Utilization/Support Stage			
	Retirement Stage			

Figure 7. Explanation of the Component Three-axes Matrix

Concept stage	Development stage	Production stage	Utilization stage	Retirement stage
			Support stage	

Figure 8. Generic life cycle (Written by the author with reference to ISO/IEC/IEEE 15288:2015)

We research Google Scholar and divide papers referring to Harvard Model, Human Resource Flow and any of the three systems -Lifelong employment system, Up-or-out system, and Unstable in-and-out system- into the matrix. We demonstrate the mapping matrix in Table 4 and list in order of priority as indicated by Google Scholar in Table 5.

Table 4. Mapping Matrix of Previous Studies

Target	Lifecycle Stage	Inflow	Internal Flow	Outflow
Permanent Employment	Concept	01,03,04,05,06,07,08,09,11,13,14,16,17,18,21,23,24,25,28,29,30,31	01,03,04,05,06,07,08,09,10,11,13,14,17,18,24,25,28,29,30,31	01,03,04,05,06,07,08,09,11,13,14,24,25,28,29,30,31
	Development	01,05,16,23,29	01,05,29	01,05,29
	Production			
	Utilization/Support	02,05,16,18,23	02,05,18	02,05
	Retirement			
Temporary Employment	Concept	01,03,05,24	01,24	01,05,24
	Development	01,05	01,05	01,05
	Production			
	Utilization/Support	01,05		01,05
	Retirement			

Table 5. The List of Previous Studies

No.	Title	Author	Year
01	Employment Activities and Its Expansion Form - Toward Understanding the Structure of Human Resource Management	Namie, I	2007
02	Human Resources Management in VietNan A Comparative Study of Japanese, Western and Vietnamese Companies, Addressing Questions of Consciousness of Vietnamese People	Harada, Y	2005
03	Employment System of Japanese Companies and Lifetime Employment Systems	Namie, I	1997
04	An Essay on Critical Analytical Viewpoint of Human Resource Management	Tanaka, K	2014
05	Possibility of implementation of human resources management and strategic human resource planning in Japanese companies in China	Wei, L	2014
06	Integrated approach of strategic human resource management theory	Oso, N	2015
07	On the Adjustment Effect of Self-Efficacy to the Relation Between Professional Human Resource Management Measures and Job Outcomes	Sunadome, Y	2014
08	Positioning of employees in the framework of SHRM	Sakurai, T	2015
09	New trend of human resource management research	Okada, Y	2015
10	Convergence or divergence: human resource practices and policies for competitive advantage worldwide	Sparrow, P., Schuler, R. S., & Jackson, S. E	1994
11	Managing Human Resource Shortages in a Unionized Setting: Best Practices in Air Traffic Control	Fisher, E. G., & Marciano, V	1997
12	Critical Issues in Downsizing in India	Maiya, U	2011
13	Archetype Change in Professional Organizations	Pinnington, A., & Morris, T	2003
14	Competence development and career advancement in professional service firms	Pinnington, A. H	2011
15	Strategic Management for Organizational Effectiveness	Oppenheim, L. S., Hyman, S. D., & Kydd, C. T	1984
16	Recruiting the cyber leader: an evaluation of the human resource model used for recruiting the Army's "Cyber Operations Officer"	Nicholson, W. C., & Gibbs, S. A	2017
17	Exposing the Concept of Power	Bosch, R	2003
18	Bringing Nuance into the Globalization Debate Changes in US, Japanese, and German Management, with Special Reference to the Impact of International Finance	Bosch, R	2008
19	Persistent Homogeneity in Top Management	Erfurt Sandhu, P	2013
20	HUMAN RESOURCE STRATEGIES IN THE COMMERCIALISATION	Jones, E. H., & WOOD, M	1993
21	Big Business in South Korea: The Reconfiguration Process	Rowley, C., & Bae, J	2004
22	A re-conceptualization of career systems, its dimensions and proposed measures	Krishnan, T. N., & Maheshwari, S. K	2011
23	Teachers' recruitment and retention in Tanzania	Chenelo, A. J	2011
24	Orchestrating the flow of human resources Insights from Spanish soccer clubs	Fainshmidt, S., Smith, A., & Guldiken, O	2017
25	The Influence of Human Resource Management on the Development and Maintenance of A Culture	Slevin, K	1997
26	A review of theoretical development in strategic human resource management by the application of a framework to a small firm in the credit management sector	Asquith, M. M	1996
27	Exploring human resource management practices: An empirical study of the Performing Arts companies in Australia	Opara, S. C	2016
28	Exploring the effective use of self rostering: A contingent approach	Mwiya, M	2008
29	Recruiting skilled orderlies for health care organization	Pukkila, I	2012
30	The Art of Keeping a Contractor	Lindgren, I	2009
31	Aged Care Institutions Management: A study of management's engagement strategies to support migrant careworkers' delivery of quality elderly care.	Ngocha-Chaderopa, N. E	2014

3.2.3 The Positioning of HRM

Figure 9 shows the positioning of HRM in Figure 7 because HRM is a conceptual framework. HRM corresponds to the whole Concept area in the Lifecycle Stage. In fact, most of the previous studies refer to the conceptual framework of HRM. In addition, they describe both Permanent Employees and Temporary Employees.

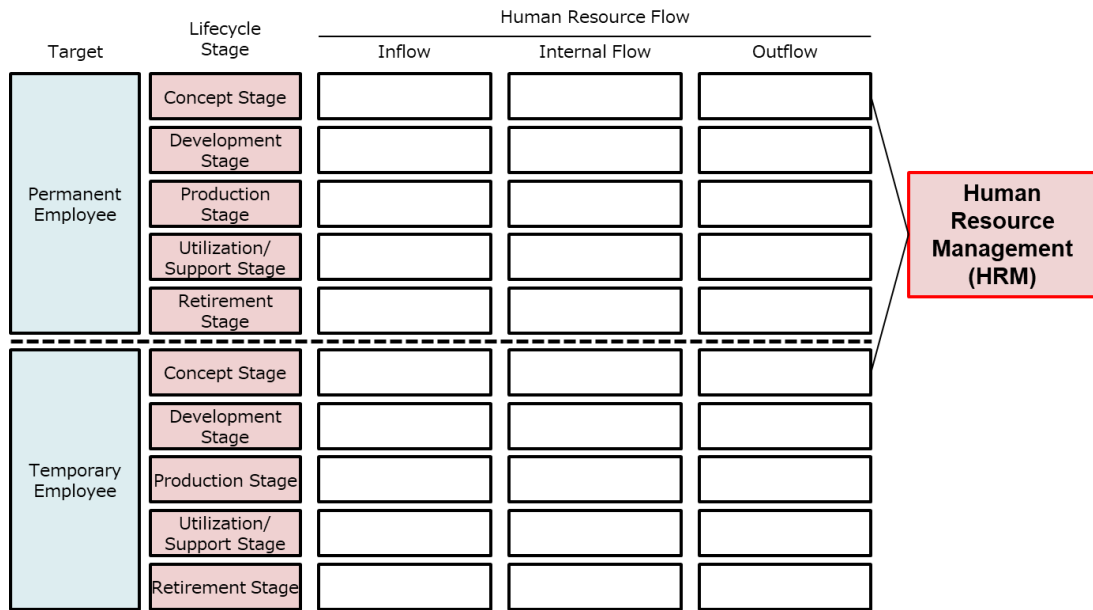


Figure 9. The Positioning of HRM

3.2.4 The Positioning of HRP

Figure 10 demonstrates the positioning of HRP in Figure 7. We can state that HRP falls under the whole Design area in the Lifecycle Stage because HRP means Workforce Planning as mentioned in section 2 and 3 of this chapter. Some previous studies indicate personnel planning based on talent portfolios as HRP. Therefore, we believe that HRP covers the development stage because it is meant to define and realize a system that meets stakeholder requirements. They also describe both Permanent Employees and Temporary Employees.

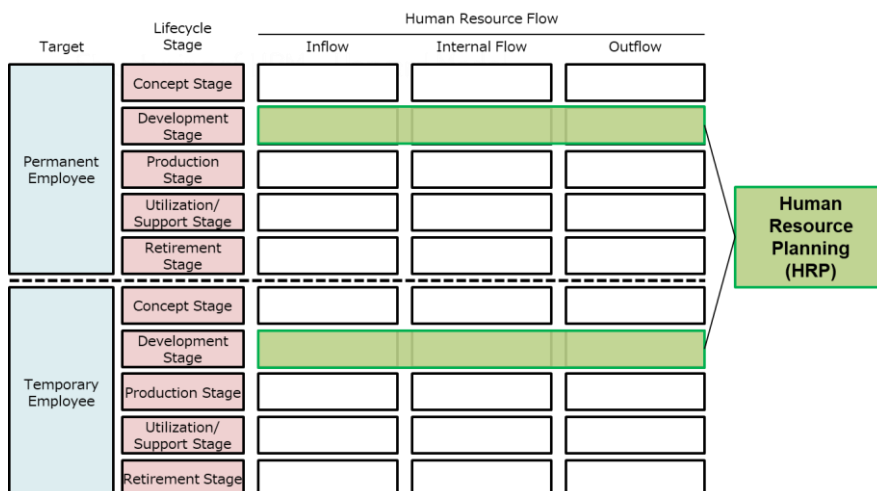


Figure 10. The Positioning of HRP

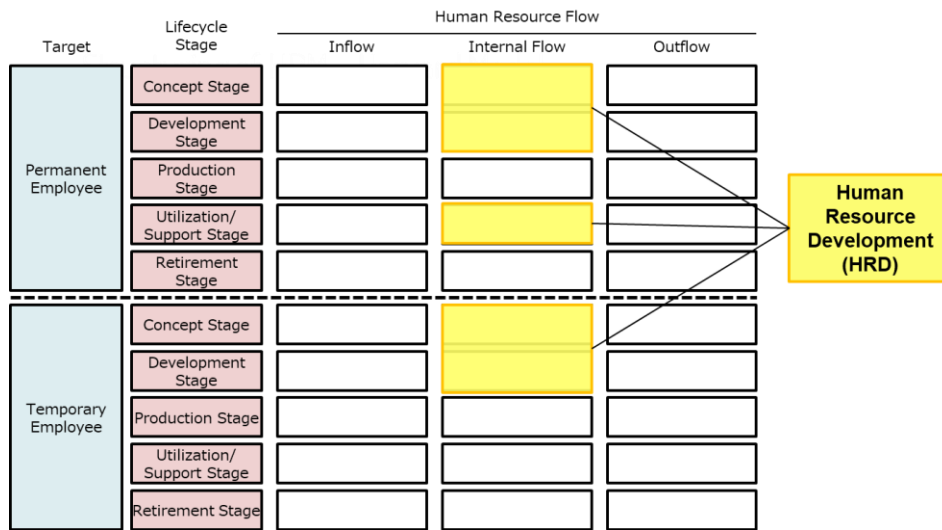


Figure 11. The Positioning of HRD

3.2.5 The Positioning of HRD

Figure 11 reveals the positioning of HRD in Figure 7 because HRD applies to internal flow. We can find papers corresponding to the Concept, Development, Utilization / Support domains for Permanent Employees. However, we cannot find papers referring to the Utilization / Support domains of HRD for Temporary Employees. This implies that HRD prioritizes Permanent Employees.

3.2.6 The Positioning of HRU

Figure 12 depicts the positioning of HRU in Figure 7 because HRU exactly presents the Utilization stage of the Lifecycle. HRU corresponds to the whole Utilization / Support domain of the Lifecycle Stage. Previous studies state both Permanent Employees and Temporary Employees.

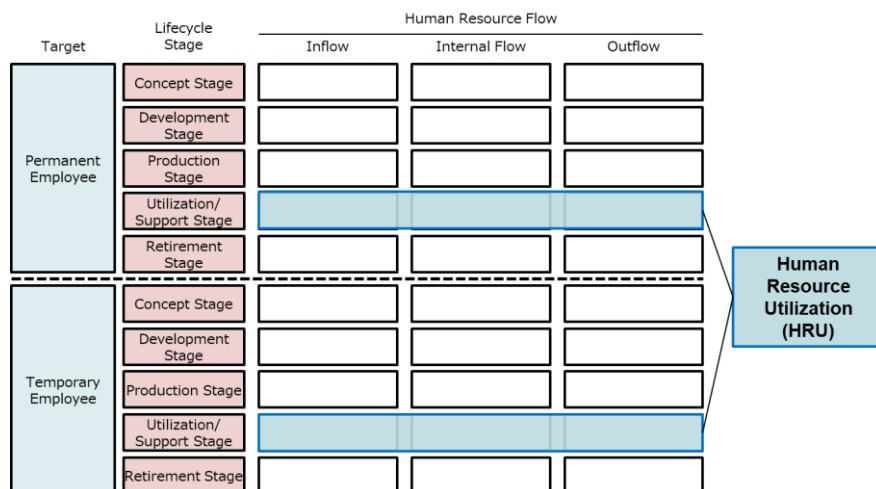


Figure 12. The Positioning of HRU

3.2.7 Explanation of the Remaining Areas

We have clarified areas that HRM, HRP, HRD, and HRU do not touch. Figure 13 demonstrates the positioning of the Production Stage of Human Resource Flow. There are no previous studies to create a concrete human resource flow for achieving a personnel plan. We believe that there are three reasons for this.

Firstly, it is not enough to use the standard of making a human resource flow. For example, we usually set channels, selection criteria, interviewer, and offer conditions to hire employees in Inflow as part of the Recruiting process from an independent standpoint. We do not arrange recruiting processes which are not based on standards. If we use the standard of Systems Engineering that INCOSE provides, we will be able to create the best process to recruit people by achieving Quality, Cost, and Delivery at a certain level. The creation process of personnel systems is often created by relying on the experience and intuition of each personnel manager. Therefore, the standard process of Systems Engineering will support the creation process of personnel systems to achieve Quality, Cost, and Delivery at a certain level. However, it is necessary to evaluate the creation process of personnel system using the standard process of Systems Engineering as a research topic in the future.

Secondly, best practices are seldom released. Human resource departments usually do not disclose their corporate human resource flow as the information in the human resource area is highly confidential. However, some companies disclose their human resource flow, which attracts the attention of the market, and allows them to hire excellent people. We presume that the best practices are released, the more companies use them and make the best process in human resource flow.

Thirdly, a lot of choices cause complexity in constructing human resource flow. For instance, companies decide to use various channels to attract people based on their own thoughts which leads to complexity in human resource flow. As we mentioned earlier, it is possible to choose some patterns based on best practices and to build a highly effective human resource flow.

Target	Lifecycle Stage	Human Resource Flow		
		Inflow	Internal Flow	Outflow
Permanent Employee	Concept Stage			
	Development Stage			
	Production Stage	Production Stage of Human Resource Flow		
	Utilization/Support Stage			
	Retirement Stage			
Temporary Employee	Concept Stage			
	Development Stage			
	Production Stage	Production Stage of Human Resource Flow		
	Utilization/Support Stage			
	Retirement Stage			

Figure 13. Production Stage of Human Resource Flow

Figure 14 shows the positioning of the Retirement Stage of Human Resource Flow that HRM, HRP, HRD, and HRD do not refer to. We assume that there are three reasons for this. Firstly, companies make human resource flow by the waterfall model, which is not an agile model. It takes a lot of effort and cost to retire some human resource processes. Most companies try to examine their existing processes only after they realize their flows are obsolete. Secondly, human resource departments tend to make conservative decisions as they need to work without mistakes and keep fairness among employees. Therefore, human resource departments do not attempt to retire existing flows and rebuild new ones. Finally, most companies do not set KPI's (Key Performance Indicators) to check the performance of their human resource flows. If they monitor it, they can decide to change or abolish existing human resource flows.

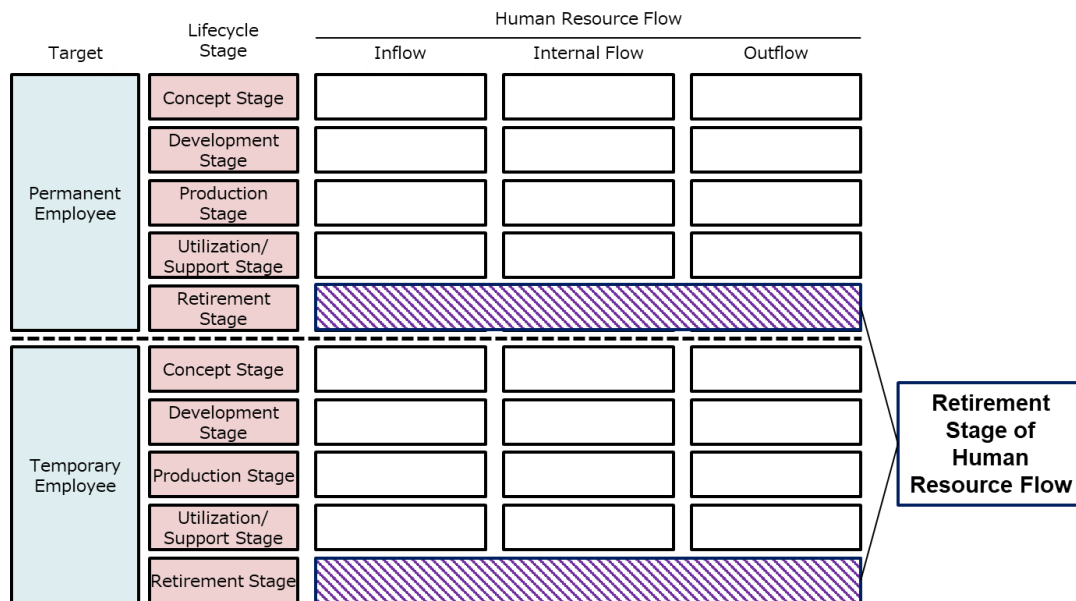


Figure 14. Retirement Stage of Human Resource Flow

Figure 15 depicts the positioning of areas from the Production to the Retirement Stage of Internal Flow for Temporary Employees. As we mentioned, most companies train Permanent Employees because they are the source of a company's competitiveness. On the other hand, firms ask temporary employees to carry out low value work. Therefore, companies tend not to invest money on the development of temporary employees. However, in recent years, knowledge workers have become independent workers and they work with a company as a temporary employee. (Pink, 2005) As acquiring knowledge workers become harder, firms need to provide attractive environments and conditions for them. It is important to invest more money into the development of temporary employees because HRD increases the length of service. (Miwa, 2015) It is ambiguous who is going to be the leader in each area of the matrix. Especially, the position of the human resources department is unclear. (Tanaka, 2008)

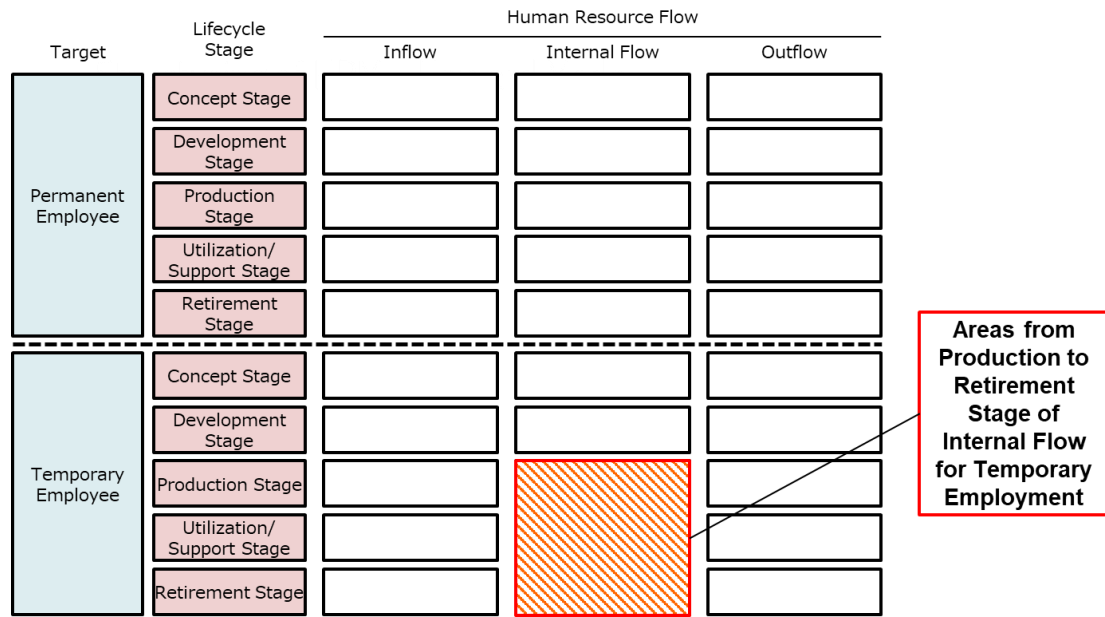


Figure 15. Areas from Production to Retirement Stage of Internal Flow for Temporary Employee

3.3 Step 1: To identify issues for frontline staff

As Briner et al. stated, the first step of EBMgt is to gather information about the issues of the people in charge through interviews. (Briner et al., 2009) However, through preliminary verification, it became clear that just attempting to extract issues through interviews would result in a disjointed level of abstraction. In addition, bias and omissions would easily occur without an overall picture. For this reason, it is recommended that in the stage of the first interview to gather issues, we should prepare a framework in advance, such as a semi-structured interview.

3.4 Step 2: To extract evidence of internal issues

3.4.1 A method to discover current issues of HR systems based on the Harvard Model, Life Cycle, and Organization Strategy and Management Type (Sato et al. 2020a)

In this chapter, we propose a method to map the theme they talk about and to discuss the issues explicitly by using the Harvard Model and Organization Strategy and Management Type. The method is divided into a Visualization Map of HR Systems based on Life Cycle and Organization Strategy and Management Type. As the Visualization Map of HR Systems is based on the previously explained Life Cycle approach, we explain Organization Strategy and Management Type in this section.

Itakura suggested a concept of a “creative autonomous organization”. (Itakura, 2010) He stated

that the need for a creative and autonomous organization has emerged in modern companies, and its functions are a combination of "creative aspect" and "autonomous aspect". The autonomous aspect has long been taken in the context of companies adapting to environmental changes. In such a case, the organization itself is under self-control with a large degree of delegation of authority, and the "Plan (plan) — Execution (do) — Control (see)" step is carried out under self-control within the organization. They also evaluated the plans and results selected. The centralized command system made it difficult to respond effectively to various issues, and the need for on-site coordination arose. (Itakura, 2010) Therefore, in this chapter, we define a centralized management system in which the field faithfully follows the direction of the top in an organization. we also define a decentralized management system in which the organization responds to diverse issues on the ground.

First, we quote Strategy Formation which is composed of Deliberate and Emergent as the vertical axis. (Mintzberg et al., 1985) Deliberate Strategy is realized as people intended. Emergent Strategy is realized in the absence of intentions. Second, we define the management type, Centralization or Decentralization, as the horizontal axis. Finally, we call this matrix Organization Strategy and Management Type and name the four boxes in Figure 16.

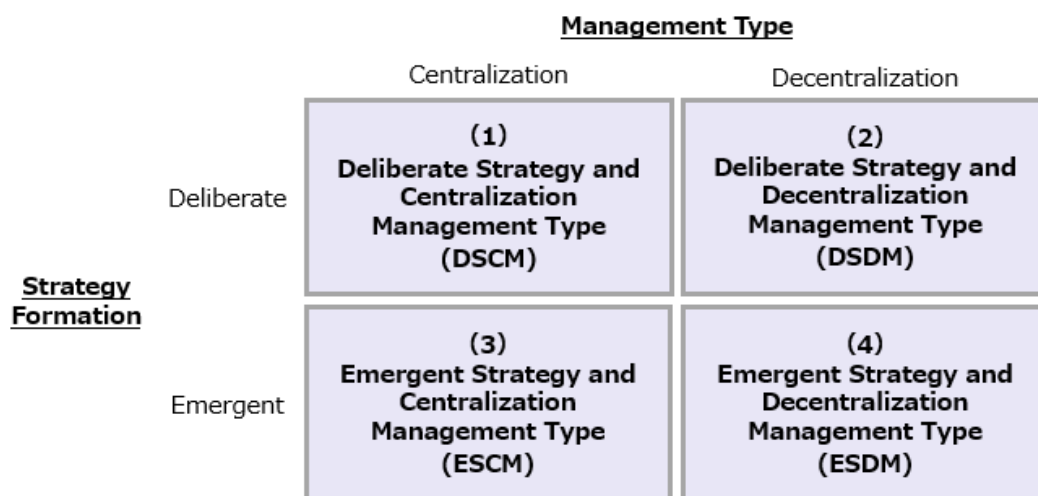


Figure 16. Organization Strategy and Management Type

I will explain each segment in Organization Strategy and Management Type as follows.

(1) Deliberate Strategy and Centralization Management Type (DSCM)

In this segment, the strategy of a company is decided by the management team. The strategy is executed through centralization. When people of the Human Resources Department construct their HR System, it is important how their employees act in accordance with the strategy. In addition, people of the Human Resources Department need to confirm whether a HR System is compatible with their own Strategy. It is effective, for example, in heavy-duty and large-sized industries as well as highly confidential businesses because this organization type consolidates the authority in the management team. However, when the strategy is wrong, there is a risk of suffering fatal damage. Employees cannot raise their voices in dissatisfaction and retire as a result of strong centralization.

(2) Deliberate Strategy and Decentralization Management Type (DSDM)

In this segment, although corporate strategy is decided by the management team, the employees can execute their work autonomously. Therefore, it is important to design ways to promote collaboration among employees after the management team announces the strategy. The employees of the Human Resources Department need to pay attention to the delegation of authority and foster a collaborative culture in their organizations. This organization type is particularly effective in businesses that have a high uncertainty in their industry and speed because management teams indicate guidelines and employees can work based on their decision. On the other hand, there is the disadvantage of suffering fatal damage when the strategy is wrong and a risk that the autonomy of the employees increases the management cost.

(3) Emergent Strategy and Centralization Management Type (ESCM)

In this segment, a corporate strategy is created emergently by their employees and it is executed centrally. For this, it is important how to develop the strategy emergently, how to decide who will manage and pursue the execution of the formulated strategy, and how to raise employee's commitment. In other words, the balance between "autonomy" and "centralization" is the key. This organization type is good for large enterprises in need of innovation and startup companies in the stage of providing a new business to the world. However, it takes time to decide strategy. If the management shift unconsciously from ESCM to DSCM type, the employees may hate the shrinking of their business and authority and leave the firms. Transition of organization type can generate risks that can cause employees to retire as they dislike the new organization types.

(4) Emergent Strategy and Decentralization Management Type (ESDM)

In this segment, a strategy of a company is emergently created, and the employees execute it autonomously. We call this type of organization “DAO” (Decentralized Autonomous Organization). It is the most difficult to design rules to manage this organization. It is important to promote commitment while guaranteeing the autonomy of employees. This organization type is highly effective for business situations where the uncertainty is high and a number of new businesses need to be launched and deployed quickly. Otherwise, there is a danger of being broken down because there is no policy or management theory.

We created a worksheet to make it easy to use the “Visualization Map of HR Systems based on Life Cycle” and “Organization Strategy and Management Type”. In the worksheet, we set several frames in order to define the “Organization Strategy and Management Type” and the scope of the HR System. Next, it is possible to clearly show which area we are discussing by writing out the HR System in detail for each Life Cycle Stage. We show the worksheet in Figure 17.

Name					
1. HR System					
2. Object		Company / Department / Individual			
3. Employee Type		Permanent / Temporary			
4. Organization Strategy and Management Type		DSCM / DSMD / ESCM / ESDM			

The Matrix to Create HR System		HR Policy Choices			
		Human Resource Flow	Reward System	Work System	Employee Influence
Life Cycle Stage	Concept				
	Development				
	Production				
	Utilization / Support				
	Retirement				

Figure 17. Worksheet of Visualizing HR System based on Organization Strategy and Management Type

I verified this function. Therefore, I explain the verification procedure and content. We asked 12 employees of Human Resource Departments to use the worksheet "Visualization map of HR systems based on life cycle" and "Organization Strategy and Management Type". Then, we evaluated the two points on whether they thought the HR System of their company was appropriate and whether they could write down and explain the HR System to other people. When they finished, we let them review HR Systems through discussions with other members and finally answer the questionnaire. We analyzed the results of the questionnaire and worksheet and then conducted validation. We show this verification procedure and content in Figure 18.

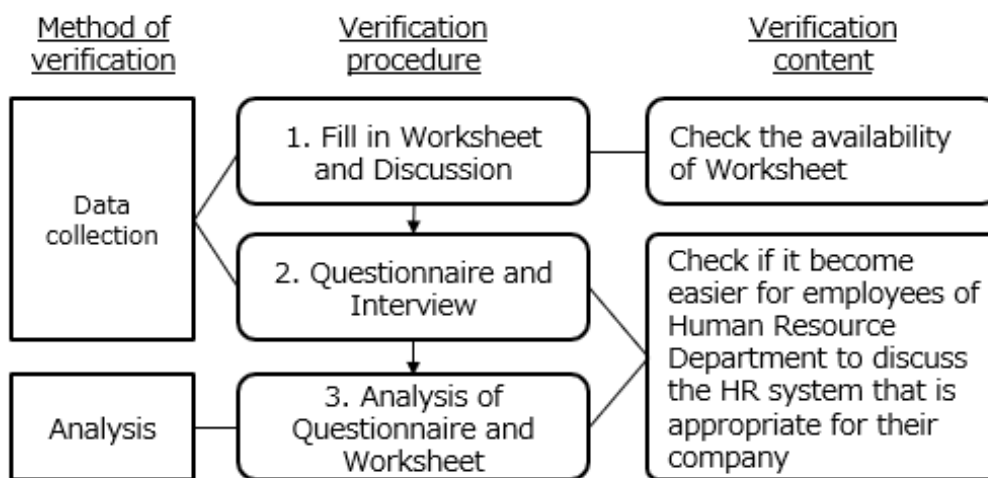


Figure 18. Verification Procedure and Content

I share the evaluation results. We show the results of the evaluation in the following Table. From the result of No. 1, more than 90% of the people were able to visualize what they discussed and what they wanted to convey by using this method. In addition, it was also confirmed from the result of No. 2 that more than 90% of the personnel could make discussions easier by using the worksheet. Finally, we checked the validity of the result of No.3 that 75% of the people can easily discuss the appropriate HR system based on their Organization & Strategy Type. However, only 7 out of 12 people who could complete the matrix comprehensively; more than 90% which was 18 boxes out of 20 boxes on the worksheet.

Table 6. The evaluation result of 12 Human Resource Department employees

Evaluation method	No.	Evaluation item	Evaluation criteria	Evaluation results
Questionnaire	1	Whether the worksheet make it possible to visualize what you are discussing and what you want to convey.	Majority of positive responses	Effectiveness (91.6%)
	2	Whether the worksheet make it easy to argue with other people.	Majority of positive responses	Effectiveness (91.6%)
	3	Whether the worksheet make it easy for employees of human resource department to discuss their appropriate HR system.	Majority of positive responses	Effectiveness (75.0%)
Worksheet	4	Whether the employees of human resource department comprehensively considered the appropriate HR system of their company?	Fill in the box over 90%	7 people out of 12 people

We show the results of the evaluation results about Comprehensibility, Availability, and Effectiveness in Table 11. From the result of No. 5, 66.7% of the people stated that the framework structure was easy to understand. In addition, it was also confirmed from the result of No. 6, No. 7, and No.8 that the HR employees were able to understand the concepts of Organization Strategy and Management Type, HRM Policy Choices, and Life-Cycle Stage. From the result of No. 6, all of the people mentioned that they understood the concepts of Organization Strategy and Management Type. From the result of No. 7, 75.0% of the people stated that they understood HRM Policy Choices. From the result of No. 8, 91.7% of the people stated that they understood the concept of Life-Cycle Stages. Next, from the result of No. 9, we confirmed the availability of the worksheet because 66.7 % of people answered that the framework worksheet was easy to organize. Finally, we checked the effectiveness of the worksheet from the results of No.10 to No. 14. From the result of No. 10, 75% of the people stated that the framework has made it easier for them to organize their thoughts and communicate their requests. From the result of No. 11, 75% of the people answered that they were more comfortable with their HR system. From the result of No. 12, 75% of the people mentioned that they have gained a better understanding of the HR system of other companies. From the result of No. 13, 66.7% of the people mentioned that they thought it would be easier to work with the president. From the result of No. 14, 66.7% of the people stated that they found it easier to work with other HR professionals. However, the result of No. 15 and 16 implied that there were some improvements. From the result of No. 15, 41.7% of the people mentioned that they thought it would be easier to work with their employees. In addition, from the result of No. 16, only 33.3% of the people stated that they thought employees could communicate their needs to management and human resource department.

Table 7. The evaluation result of 12 human resource department employees about Comprehensibility, Availability, and Effectiveness.

Evaluation method	No.	Evaluation item	Evaluation criteria	Evaluation results
Comprehensibility	5	Is the framework structure easy to understand?	Majority of positive responses	Effectiveness (66.7%)
	6	Do you understand the concepts of Organization Strategy and Management Type	Majority of positive responses	Effectiveness (100.0%)
	7	Do you understand HRM Policy Choices?	Majority of positive responses	Effectiveness (75.0%)
	8	Do you understand the concept of Life-Cycle Stage?	Majority of positive responses	Effectiveness (91.7%)
Availability	9	Is the framework worksheet easy to organize?	Majority of positive responses	Effectiveness (66.7%)
Effectiveness	10	Has the framework made it easier for you to organize your thoughts and communicate your requests?	Majority of positive responses	Effectiveness (75.0%)
	11	Are you more comfortable with your HR system?	Majority of positive responses	Effectiveness (75.0%)
	12	Have you gained a better understanding of the HR system of other companies?	Majority of positive responses	Effectiveness (75.0%)
	13	Do you think it will be easier to work with the president?	Majority of positive responses	Effectiveness (66.7%)
	14	Do you find it easier to work with other HR professionals?	Majority of positive responses	Effectiveness (83.3%)
	15	Do you think it will be easier to work with employees?	Majority of positive responses	Not Effectiveness (41.7%)
	16	Do you think employees can communicate their needs to management and human resource department?	Majority of positive responses	Not Effectiveness (33.3%)

Sato et al. states that Employees of Human Resource Departments are often confused as to what area they discuss because they do not have enough viewpoints. (Sato et al. 2019a) However, from the results of No.1 and No.2, we could solve this issue by using the worksheet of Visualizing HR Systems based on Organization Strategy and Management Type. In addition, the participants commented that they could identify whether they had already considered or not to review the boxes of the worksheet. They figured out that they had not thought about the area because the boxes were blank. It also turned out that they could find the present problem to visualize by using the method.

Sato et al. argued that it is necessary to design appropriate HR Systems based on HR Management such as controlled or autonomous types. (Sato et al. 2019a) They also thought that it is ambiguous about who decides the HR Strategy, HR Management Process, and HR System. (Sato et al. 2019a) From the result of No.3, the employees of human resource departments could be in charge of deciding to create HR Systems by using the worksheet. They could suggest HR Strategy and HR Management if they get the appropriate support or tools.

On the other hand, in the result of No.4, we found out that most of the young people as well as people with little experience as human resource department employees could not write exhaustively in the boxes. If they think about their company's HR system on a daily basis, they could easily export it to a worksheet. It turned out that it can also be used as a standard to grasp self-coverage. In other words, we can suggest that it represents the Maturity of how much the current HR System is considered.

Some of the participants stated that this method could solve the lack of ability to think exhaustively. Therefore, they suggested that the people who have little experience in human resources use this worksheet as a training program.

These results suggest that this method not only solves the presented problems, but also can identify the cause of failure to construct an appropriate HR System. The first cause is "lack of viewpoints" and the second is "lack of personnel ability". There is a need to implement solutions suitable for each of these two causes in the future. The first "lack of viewpoints" can be solved by making it visible based on this framework. However, there is room to think in detail about the training method for the second cause, "lack of personnel ability".

We proposed a method by using the Harvard Model and Organization Strategy and Management Type. The method is divided into a Visualization Map of HR Systems based on Life Cycle and Organization Strategy and Management Type. We asked employees of Human Resource Departments to use a worksheet of "Visualization map of HR systems based on life cycle" and "Organization Strategy and Management Type". Then, we evaluated the two points on whether

they thought the HR System of their company was appropriate and whether they could write down and explain the HR System to other people. As a result, we confirmed that we achieved the goal of identifying issues of the firm and facilitating discussion with management and HR employees of other companies. In addition, this method can play a role in a training program for people who have little experience as employees of Human Resource Departments.

3.4.2 To design process in inflow’s recruitment, assessment, and selection by using Systems Engineering

In this chapter, we propose the design HR systems by using Systems Engineering. It aims to make it easier for human resources to build their own companies’ HR systems. We show the procedure for creating the proposed method in the following Table.

Table 8. Steps of the Design Process

No.	Methodology	Steps of the Design Process
1	Organization Strategy and Management Type	Participants select the Organization Strategy and Management Type.
2	Visualization Map of HR System based on Life Cycle	Participants define the scope on the Visualization Map of HR System based on Life Cycle.
3	Systems Engineering	Participants perform Context Analysis.
4		Participants write Use Case Description.
5		Participants extract functions from Use Case Description.
6		Participants create FFBD(Function Flow Block Diagram) in Inflow's Recruitment, Assessment, and Selection.
7		Participants allocate functions to physical.

By following the steps of the proposed design process, we can build a HR system that is appropriate for each company. Different types of strategies should naturally have different HR systems. By first identifying the Organization Strategy and Management Type, we can build an HR system that is best for our companies. By defining target HR areas and life cycles, it is possible to visualize which areas of HR systems that we currently focus on. This makes it easier to discuss with other HR personnel, managers, and employees. When we build an HR system, it is possible to create an effective HR system efficiently by following the standard process of Systems Engineering.

In the proposed process, the relationships among stakeholders that the person in charge knows are visualized in context analysis. If the person in charge cannot think of something, it is out of scope, so the scope is clear. If there are other stakeholders with decision-making abilities in the HR system, it is better to engage them in context analysis and define the scope. Then, the use case description within the scope clarified by the context analysis is performed, and any necessary functions can be extracted without fail.

I will share the steps of the questionnaire evaluation. This time, we asked 24 employees, most of whom belong to a Human Resources Department, to participate in the evaluation. They choose an Organization Strategy and Management Type and define the scope on the Visualization Map of a HR System based on Life Cycle as the Planning and Development Phase of Inflow's Recruitment, Assessment, and Selection for Full-Time Employees. We illustrate the scope in Figure 19.

Target Employee	Lifecycle Stage	Human Resource Flow		
		Inflow	Internal Flow	Outflow
Permanent Employee	Concept	X		
	Development	X		
	Production	X		
	Utilization/Support			
	Retirement			
Temporary Employee	Concept			
	Development			
	Production			
	Utilization/Support			
	Retirement			

Figure 19. The Scope of the evaluation in this chapter

In order to build an ideal process in the inflow's area, we asked them to create context diagrams, use case descriptions, function extraction, FFBD, and finally allocated the functions to physical objects such as people, organizations, and systems according to the steps of the proposed method.

Then, we evaluated the point on whether it was easier for employees of Human Resource Departments to build a HR system appropriate for their companies. When they finished, we let them review HR Systems through discussions with other members and finally answer the questionnaire. We analyzed the results of the questionnaire and worksheet and then conducted validation. We show this verification procedure and content in Figure 20.

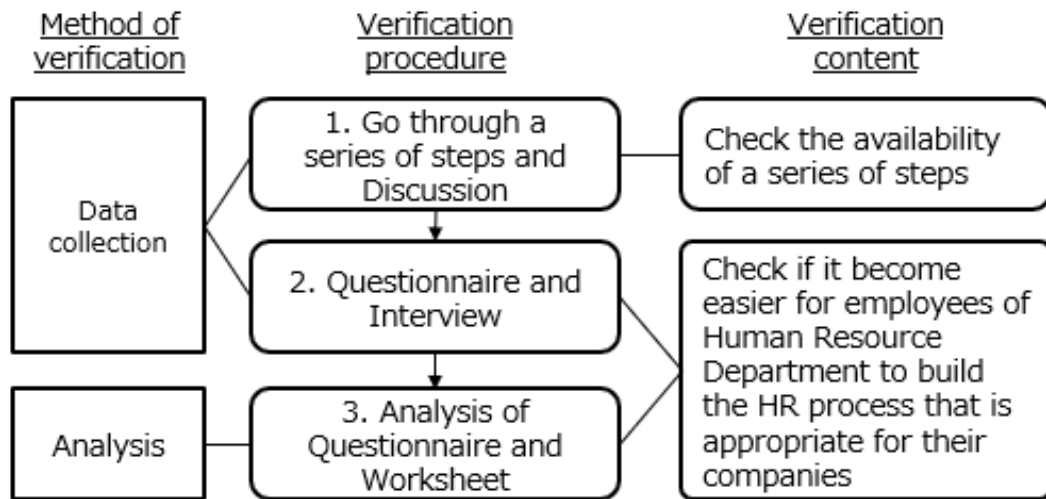


Figure 20. Verification Procedure and Content Results of questionnaire

We show the results of the evaluation about the validity of the proposed method in the following Table. The evaluation was carried out for 24 personnel staff across 16 enterprises. From the result of No. 1, more than 80% of the people were able to build a HR system appropriate for their companies. In addition, it was also confirmed from the result of No. 2 that more than 95% of the personnel could discuss and consult with other companies' personnel. Furthermore, from the result of No. 3, this method also enables the HR employees to recognize their companies' challenges and shortcomings by looking at other HR systems. Finally, from the result of No. 4, they could build a better HR system based on their Organization and Strategy Type.

Regarding No. 1, they generally agreed that HR would make it easier to build their own HR systems. However, the percentage of positive respondents to this survey was less than 90% compared to other responses because they had a habit of thinking about the process. Those who did not give a positive answer were those who thought about the personnel process on a regular basis and actively expressed what they thought on a regular basis in this verification. Responses to No. 2 were often positive, and in subsequent interviews, many people said, "The ability to visualize the HR system was effective". We realized that this method had a great effect to go through the process of identifying stakeholders from a broader perspective, describing use cases, and visualizing them in FFBD. As for No. 3, all of the subjects answered positively. In an actual interview, one participant said, "It was a new discovery that there were many problems to be solved by visualizing areas that were not considered as problems."

Regarding No. 4, some people said, "Normally, we only think about our own processes, but if there is a visualization of the processes of other companies, we can discuss and apply it to our own company.". There are few opportunities to visualize the personnel process in daily life, and it is extremely rare to exchange opinions with personnel from other companies based on it. Therefore, we believe that if this is realized, it will have a great effect.

Table 9. The evaluation result of 24 human resource development employees about the validity of the proposed method

Evaluation method	No.	Evaluation item	Evaluation criteria	Evaluation results
Questionnaire	1	Whether it become easier for employees of Human Resource Department to build the HR process that is appropriate for their companies.	Majority of positive responses	Effectiveness 21 of 24 gave a positive response. (87.5%)
	2	Whether it become easier for employees of Human Resource Department to discuss and consult with other personnel.	Majority of positive responses	Effectiveness 23 of 24 gave a positive response. (95.8%)
	3	Whether employees of Human Resource Department can recognize their companies' challenges and shortcomings by looking at other HR processes.	Majority of positive responses	Effectiveness 24 of 24 gave a positive response. (100.0%)
	4	Whether employees of Human Resource Department can build a better HR process by looking at other HR processes.	Majority of positive responses	Effectiveness 23 of 24 gave a positive response. (95.8%)

We show the results of the evaluation about the comprehensibility, availability and effectiveness of the proposed method in Table 10.

Table 10. The evaluation result of 24 human resource development employees about the comprehensibility, availability and effectiveness of the proposed approach of the proposed method

Evaluation method	No.	Evaluation item	Evaluation criteria	Evaluation results
Questionnaire	5	[Comprehensibility] Is the Organization Strategy and Management Type easy to understand?	Majority of positive responses	Effectiveness 19 of 24 gave a positive response. (79.2%)
	6	[Availability] Is the Organization Strategy and Management Type easy to use?	Majority of positive responses	Effectiveness 19 of 24 gave a positive response. (79.2%)
	7	[Effectiveness] Have you noticed what type of organization your company is?	Majority of positive responses	Effectiveness 22 of 24 gave a positive response. (91.7%)
	8	[Effectiveness] Have you proceeded with the development of the HR process while clarifying the scope of the business?	Majority of positive responses	Effectiveness 21 of 24 gave a positive response. (87.5%)
	9	[Effectiveness] Have the stakeholders of the target operations been identified?	Majority of positive responses	Effectiveness 22 of 24 gave a positive response. (91.7%)
	10	[Effectiveness] Have you clarified the procedure of the target operation?	Majority of positive responses	Effectiveness 22 of 24 gave a positive response. (91.7%)
	11	[Effectiveness] Have you clarified the process of the target operation?	Majority of positive responses	Effectiveness 21 of 24 gave a positive response. (87.5%)
	12	[Effectiveness] Have you made it clear what kind of people, systems, etc. will realize each HR process?	Majority of positive responses	Effectiveness 16 of 24 gave a positive response. (66.7%)

The organization strategy and management types of No. 5, No. 6 and No. 7 are generally easy to understand and use. When we explained this concept, we all considered types at the company, organization, or department level. On the other hand, when people in the same company discussed the type of company, they thought it was a little different, but the discussion heated up when they talked about the difference in the way they perceived the leader of the organization. When it comes to human resource employees, we felt that there were many questions about the type of organization they belong to. For No. 8, No. 9, No. 10, and No. 11, there were many opinions that the procedures and processes were clarified by writing about the stakeholders, use case descriptions, and FFBDs. It is assumed that the results show that many people feel the effects of the system because they do not usually work in a visual manner, although they are conscious of it. On the other hand, from the results of No. 12, the positive response rate was less than 70% as to what kind of people or systems would be used to realize a HR system. As for this, the concept of "Separation of function and physics" could not be conveyed, and the result seems to be low due to a lack of understanding. For this reason, we would like to consider providing more detailed explanations on the "Separation of function and physics" as room for improvement in our approach in the future.

I will state the steps to conduct open coding of the method we propose. As we collected data through the questionnaire, open coding (Sato, 2008) was carried out and 10 themes were found from 144 original comment texts. Procedures from 1 to 3 Kobayashi et al. (Kobayashi et al., 2017) were used as a method of open coding. The specific process is as following; Step 1. We picked something up related to the effect of the method from the text data of the questionnaire and determined the point of view to take for categorizing the affinity method used in the next procedure. (In order to visualize HR systems using Systems Engineering and to find problems and improvements by comparing it with other HR systems, we set the viewpoint "the information that human resource development employees obtain by visualizing HR systems using Systems Engineering.") Step 2. Comments in the free description field are classified by the similar projection method with similar meanings based on the above viewpoints. Step 3. We have named the category identified in step 2. These are the results of open coding.

The results of open coding are in table 11. The effects of the method are "Visualization", "Comparison with other HR Processes", as well as "Discovery of issues and areas for improvement were mentioned". For these reasons, the objective of this chapter, "to visualize HR systems using Systems Engineering and to find problems and improvements by comparing it with other HR systems" was achieved.

Table 11. The result of open coding regarding to Visualization, Comparison with other HR Processes, as well as the Discovery of issues and areas for improvement

Open Coding Results	
①Visualization	Reorganization and clarification of operations
	Visualization in languages and diagrams
	identification of characteristics
	Reorganization of Stakeholders
②Comparison with other HR processes	
③Discovery of issues and areas for improvement	

On the other hand, in Table 12, improvements for the future were found in open coding. Specifically, there are 4 categories “Insufficient understanding and proficiency” “Leakage of target operations and stockholders”, “Difficult to set particle size”, and “Difficult to define the scope”. In the future, we would like to make improvements to solve these problems in order to further improve our methods.

Table 12. The result of open coding regarding points to be improved in the future

Open Coding Results	
Points to be improved in the future	Insufficient understanding and proficiency
	Leakage of target operations and stakeholders
	Difficult to set particle size
	Difficult to define the scope

From the verification results mentioned above, it was confirmed that the initial target of "Human Resources understands the strategic types of your organization and builds an appropriate HR system" was achieved. It was also found to be effective in terms of comprehensibility, usability, and effectiveness. However, the concept of "Separation of function and physics" was not found to be very effective due to a lack of understanding, so we intend to work on it as there is room for improvement in the future. We consider the reason for this positive result was that human resource employees made the HR system visible by themselves. As we have heard in interviews, they did not have enough time to look at the whole thing as when they worked on the project, they ended up being overwhelmed by the task at hand. It is then rare to look back at the overall process and evaluate whether it is responding to stakeholder demands. In addition, they sometimes exchange opinions with other companies' personnel in order to improve the process, but since the process is not visualized, the information becomes fragmented and it is difficult to obtain reference information or to come up with measures that are truly beneficial to the company's issues. Therefore, we believe that this method can contribute to the improvement of personnel processes in companies and organizations.

This chapter proposed a method to visualize an appropriate HR system after the HR department understands the strategy type of the organization. Specifically, it is an architectural framework for human resource departments to build a Human Resource Flow using context analysis, use case description, and FFBD. From the viewpoint of building an appropriate HR system, FFBD was built using Organization Strategy and Management Type. The results of the questionnaire also confirmed that the original objective of "Human Resources can understand the strategic types of the organization and build an appropriate HR system" was achieved. Positive responses were also obtained from the viewpoints of comprehensibility, usability and effectiveness.

3.4.3 A validation of the training effectiveness for human resources based on the Harvard Model and FFBD (Sato et al., 2021)

I verified the training effectiveness for human resources based on the Harvard Model and FFBD. This time, we asked 24 employees, most of whom belong to a Human Resources Department, to participate in the evaluation. The evaluation was carried out for 24 personnel staff across 16 enterprises. Of the 24, 12 were men and 12 were women. The age distribution is as follows: 11 people in their 20s, 8 people in their 30s, and 5 people in their 40s or older. They choose an Organization Strategy and Management Type and define the scope on the Visualization Map of an HR System based on Life Cycle as the Planning and Development Phase of Inflow's Recruitment, Assessment, and Selection for Full-Time Employees. We illustrate the scope in Figure 21.

Target Employee	Lifecycle Stage	Human Resource Flow		
		Inflow	Internal Flow	Outflow
Permanent Employee	Concept	/ / / / /		
	Development			
	Production			
	Utilization/Support			
	Retirement			
Temporary Employee	Concept			
	Development			
	Production			
	Utilization/Support			
	Retirement			

Figure 21. The Scope of the evaluation in this chapter

In order to build an ideal process in the inflow's area, we asked them to create context diagrams, use case descriptions, function extraction, FFBD, and finally allocate functions to physical objects such as people, organizations, and systems according to the steps of the proposed method.

Then, we evaluated the point on whether the method is effective as training. When they finished, we let them review their HR Systems through discussions with other members and finally answer the questionnaire. We analyzed the results of the questionnaire and then conducted validation. We show this verification procedure and content in Figure 22.

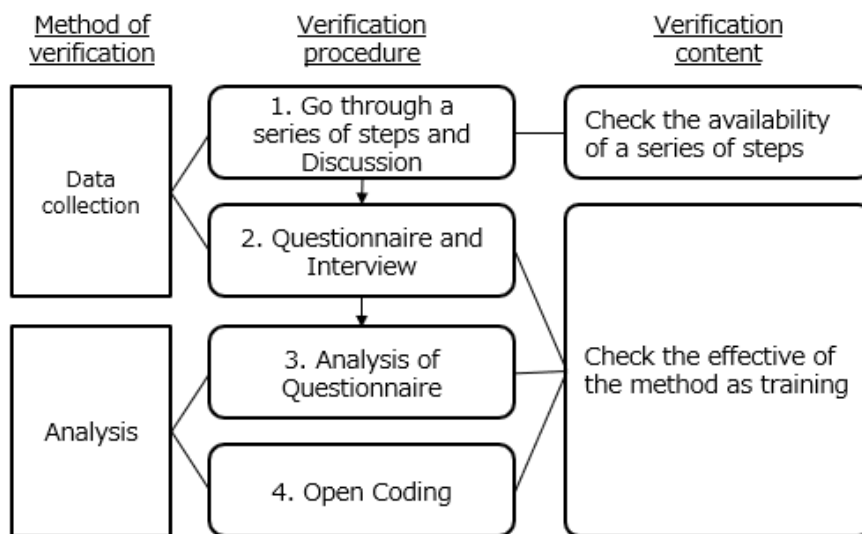


Figure 22. Verification Procedure of Questionnaire and Open Coding

I show the results of the evaluation about the validity of the proposed method in Table 13. From the result of No. 1, more than 80% of the people thought that the method enhanced the ability of Human Resource Departments to identify issues. In addition, it was also confirmed from the result of No. 2 that more than 90% of the personnel felt that the method was effective to train Human Resource Departments. Furthermore, from the result of No. 3, this method was also effective for people other than those in Human Resource Departments.

Regarding No. 1, they generally agreed that the method will enhance the ability of Human Resource Departments to identify issues. However, the percentage of positive respondents to this survey was less than 90% compared to other responses because they had a habit of thinking about the process. Those who did not give a positive answer were those who thought about the personnel process on a regular basis and actively expressed what they thought on a regular basis in this verification. The positive response of No. 2 was over 90%. In subsequent interviews, we got some new viewpoints that were critical for us to grow, thus many people stated that the method was effective as training. We realized that this method had an effect to get a broader perspective because they could go through the process of identifying stakeholders and HR systems. As for No. 3, most of all the subjects answered positively. In an actual interview, some participants said that they usually think about their own HR System as just the Human Resource Department, but people other than Human Resource Departments could get the capability to visualize the personnel process in daily life through this method. In addition, this method facilitates people to communicate with others and create new ideas from many viewpoints other than from the Human Resource Department. It is rare to exchange opinions with personnel from other companies or temporary employees. Therefore, we believe that this method also has a training effect for people other than those in Human Resource Departments.

Table 13. The evaluation result of 24 human resource development employees about the validity of the proposed method

Evaluation method	No.	Evaluation item	Evaluation criteria	Evaluation results
Questionnaire	1	[Validity] Do you think this approach will enhance the ability of Human Resource Department to identify issues?	Majority of positive responses	Effectiveness 20 of 24 gave a positive response. (83.3%)
	2	[Validity] Do you think this method is effective to train Human Resource Department to enhance their ability to identify issues?	Majority of positive responses	Effectiveness 22 of 24 gave a positive response. (91.7%)
	3	[Validity] Do you think this method will be effective for people other than human resources to enhance their ability to identify issues?	Majority of positive responses	Effectiveness 23 of 24 gave a positive response. (95.8%)

As we collected data through the questionnaire, open coding (Sato, 2008) was carried out and 8 themes were found from amongst the 96 original comment texts. Procedures 1 to 3 of Kobayashi et al. (Kobayashi et al., 2017) were used as a method of open coding. The specific process is as follows; Step 1. We picked something up related to the effect of the method from the text data of the questionnaire and determined the point of view to take for categorizing the affinity method used in the next procedure (in order to verify whether the proposed method has an effect on human resource development, we set the viewpoint "The information related an effect on human resource development."). Step 2. Comments in the free description field are classified by a similar projection method with similar meanings based on the above viewpoints. Step 3. We have named the category identified in Step 2. These are the results of open coding.

The results of open coding are in Table 14. The effects of the method are “Visualization”, “Comparison and dialogue with others”, as well as “Discovery of issues and areas for improvement” were mentioned. For these reasons, the objective of this chapter, the method to visualize HR systems using Systems Engineering is effective as training program, was achieved.

Table 14. The result of open coding regarding to Visualization, Comparison and dialogue with others, as well as the Discovery of issues and areas for improvement

Open Coding Results	
①Visualization	Visualization and lingualization of process
	Decomposition of process and elements
	A bird's-eye view
	Clarification of current status and ideal image
	Clarification of stakeholders
②Comparison and dialogue with others	
③Discovery of issues and areas for improvement	

By verifying the results mentioned above, it was confirmed that the objective of this chapter, “whether the method proposed in the previous paper is effective as a human resource development method” was achieved. As for open coding, there were many comments on visualization and linguisation. This range extends from the perspective of the overall picture, “a bird’s-eye view”, to a more detailed and clear analysis of factors and stakeholders. It was also found that visualization on the axis of the gap between the current situation and the ideal was carried out. We consider the reason for this positive result was that participants visualized the HR system by themselves and compared it with others through dialogue. It can be understood that the externalization of the SECI model which extracted the explicit knowledge from tacit knowledge by structuring the HR system was carried out. This is because participants visualized the HR system by themselves and compared it with others through dialogue. In addition, it can be interpreted that dialogue with both external and internal human resources resulted in further combination of explicit knowledge and linkage to imagine new knowledge. The reason is that participants got feedback from an unprecedented point of view in the conversation and had new ideas through feedback. It can be interpreted that the transfer of knowledge between explicit knowledge and the creation of knowledge through the linkage through dialogue produced a training effect. The reason is that they gained a broader perspective and acquired new knowledge through conversation and visualization.

As we heard in interviews, they did not have enough time to look at the whole thing as when they worked on the project, they ended up being overwhelmed by the task at hand. It was then rare to look back at the overall process and evaluate whether it was responding to stakeholder demands. In addition, they sometimes exchanged opinions with other companies' personnel in order to improve the process, but since the process was not visualized, the information became fragmented and it was difficult to obtain reference information or to come up with measures that were truly beneficial to the company's issues. Therefore, we believe that this method can contribute to the development of capabilities of human resource departments.

The purpose of this chapter is to confirm whether the method proposed in the previous study is effective as a human resource development method. Therefore, we conducted a questionnaire analysis and open coding to verify whether the proposed method has an effect on human resource development. In addition, we found that the method we proposed produced the “Externalization” and “Combination” seen in the SECI model. Therefore, the method has a training effect for human resource development.

3.5 Step 3: To use of external evidence such as research and studies

3.5.1 Deriving issues through clarification of areas to strengthen the HR System based on the map of the Harvard Model with three points of view (Sato et al. 2019b)

Boselie called the HR Outcomes as short-term outcomes. (Boselie et al., 2013) Therefore, we should add a feedback process to Human Resource Policy Choices from HR Outcomes. (Sato et al. 2019a) In this chapter, we focus on "1. HRM Policy Choices", "2. Verification of HR Outcomes" and "3. Feedback to HRM Policy Choices from HR Outcomes" as shown in Figure 23. We review the papers described for these three areas and show the paper list as shown in Table 6-7.

We categorize the papers by describing the three areas. "1. HRM Policy Choices" and "2. Verification of HR Outcomes" have been studied well. However, a few papers mention "3. Feedback to HRM Policy Choices from HR Outcomes".

First, regarding the box of "1. HRM Policy Choices", most of the previous papers that we read referred only to the concept of HRM Policy Choices. Second, in the box of "2. Verification of HR Outcomes", 14 papers verified HR Outcomes. However, they used not HR Outcomes defined in Harvard Model but items set by themselves. In addition, there are no papers which describe temporary employees. Finally, in the box of "3. Feedback to HRM Policy Choices from HR Outcomes", there was only one paper which applied the concept of Systems Engineering. Only No.7 paper (Cakar et al., 2003) refers to the concept of Systems Engineering by using IDEF0. However, it was also not based on the definition of HR Outcomes in the Harvard Model.

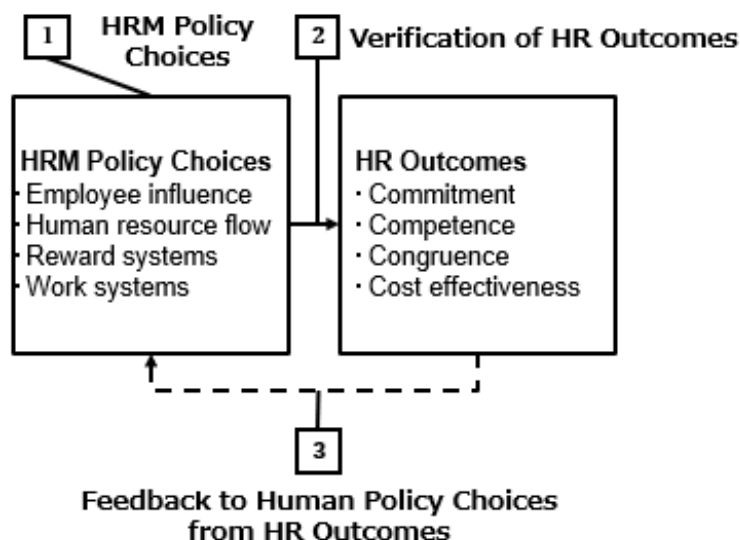


Figure 23. Map of the Harvard Model with Three points of view

Table 15. The List of Previous Studies

No.	Title	Author	Year
1	Human resource management practices in Indian IT industry—an overview	Ravisankar, M., & Saktivendan, K	2013
2	A business process approach to human resource management	Cakar, F., Bititci, U. S., & MacBryde, J	2003
3	At the crossroads at midnight Strategic human resource management now	Boselie, P., & Brewster, C	2013
4	On establishing human resource management as a social science discipline	Morishima, M	2010
5	Moderating effects of self-efficacy on the relationship between human resource management and professionals' job performance : a literature review	Sunadome, Y	2014
6	Human resource management in an international perspective	Poole, M	1990
7	An empirical study of high performance HRM practices in Chinese SMEs	Zheng, C., Morrison, M., & O'Neill, G	2006
8	STRATEGIC HUMAN RESOURCE MANAGEMENT	Boxall, P. F	1992
9	Strategic non HRM a viable alternative	Storey, J	1998
10	From personnel management to strategic human resource management	Lundy, O	1994
11	Organizational psychology and human resource management Towards a European approach	Guest, D. E	1994
12	An exploration of the impact of strategic international human resource management on firm performance The case of foreign MNCs in China	Bao, C., & Analoui, F	2011
13	Critique of Human resources theory	Radcliffe, D	2005
14	Developments in Human Resource Management An Analytical Review of the American and British Models	Budhwar, P	1996
15	Lower-level and middle-level managers as the recipients and actors of human-resource management	Staehele, W., & Schirmer, F	1992
16	Managers are the key to workforce stability an HRM approach towards improving retention of health professionals in remote northern Australia	Onnis, L. A	2014
17	The human resources management (HRM) practices a panacea to the challenges of the Ministry for Home Affairs	Gamedze, S. B	2012
18	Is strategic human resource management strategic-The fit between strategy and strategic human resource management	Andersen, T., Eriksen, B., Lemmergaard, J., & Povlsen, L	2005
19	The significance of the human resources function in the Zimbabwe iron and steel industry	Ruziwa, M., Mutanga, M., & Siwadi, P	2013
20	RESEARCH IN HUMAN RESOURCES FOR HEALTH AND ITS RELEVANCE TO HEALTHCARE MANAGEMENT PRACTICES	Browne, P., & McCarthy, A	2009
21	Human Resource Management and Performance of Public	Kuipers, B., & Steijn, B	2009
22	Human resource management policy choices, management practices and health workforce sustainability remote Australian perspectives	Onnis, L. A	2019
23	A Study on International Human Resources Management Practices (IHRM)	Michael, M., & Francis, R	2018
24	An investigation into E-participation	Pudas, R. H	2014
25	HEALTHCARE HUMAN RESOURCE POLICY & NURSE WELL-BEING	Browne, P	2009
26	Empirical Studies on Human Resource Management	Wenlu, C	2014
27	The HR function in Australia supports and barriers to strategic HRM integration	Sheehan, C	2002
28	Emerging Patterns of HRM The Influence of Social Ties and " Guanxi " on Recruitment and Selection in China	Hong, W. Y	2008
29	Business Strategies, HRM Policies and Organizational Performance Evidence from the Peoples Republic of China	Zhang, B	2011
30	Job descriptions the heart of every HRM System An effective way to compose and implement job descriptions for Lidl Nederland GmbH Master thesis	Hiddinga, J. M	2013
31	Understanding Human Resource Management in a Chinese company	Zhou, Y	2009
32	Achieving a Sustainable Competitive Advantage through People AB InBev's Performance Culture	Massot, P	2010
33	The Performance Management and Appraisal in Higher Education	Camilleri, M. A., & Camilleri, A	2018
34	Service Development and New Service Performance	Fliikkema, M. J	2008
35	Human resource competency models changing evolutionary trends	Abdullah, A. H.	2012

Table 16. The List of Previous Studies

No.	Title	Author	Year
36	An Effective Remuneration and Motivation System	Ivana V	2014
37	EFFECT OF TRAINING AND DEVELOPMENT ON PERFORMANCE OF ORGANISATIONS	Ogola, D	2011
38	Recruitment and selection and human resource management in the Taiwanese cultural context	Hsu, Y. R	1999
39	An investigation into strategic human resource management in Indonesia a grounded research approach	Hartono, A	2010
40	Managing human resource shortages in a unionized setting Best practices in air traffic control	Fisher, E. G., & Marciano, V	1997
41	The scope and limitations of human resource management a case study of the Bank of Thailand	Limpaphayom, K	2002
42	MODEL OF FACULTY MEMBERS'RESEARCH PERFORMANCE IN NATIONAL RESEARCH UNIVERSITIES	Leephajaroen, S	2013
43	The effect of human resource practices on firm performance in Chinese SMEs an empirical study in man [u] facturing sector	Zhu, Y	2010
44	RELATIONSHIP BETWEEN HUMAN RESOURCE MANAGEMENT PRACTICES AND QUALITY SERVICE DELIVERY IN KENYAN PUBLIC SECONDARY	Christine, M. M	2010
45	A comprehensive human resource recruitment and selection model the case of the Department of Justice and Constitutional Development	Thebe, T. P	2014
46	An emprical evaluation of strategic human resource management within construction sites	Naismith, N	2007
47	Exploring the linkages between attitudes towards human resource management practices and organisational commitment evidence from the financial services	Conway, E	2003
48	Human Resource Management Strategy for UK SMEs to Reduce the Employee Turnover and Maintain Success Business	Li, B	2012
49	A review of theoretical development in strategic human resource management by the application of a framework to a small firm in the credit management sector	Asquith, M. M	1996
50	Senior management perception of strategic international human resource management effectiveness. The case of multinational companies performance in China	Bao, C	2010
51	Department OF Human Resource Management Strathclyde Business School	Erras, M	2002
52	Exploring human resource management practices an empirical study of the performing arts companies in Australia	Opara, S. C	2016
53	Human resource development in government organizations of Nepal	Bhattarai, N	2017
54	From collegial engagement to performance management the changing academic landscape in Australia	Morris, L	2011
55	The Influence of Human Resource Management on the Development and Maintenance of A Culture	Slevin, K	1997
56	Effective people performance strategies critical ingredients for business success in Barbados and Eastern Caribbean business enterprises	Richards, H. B	2010
57	Managerial perceptions of the personal and career transitions of redundant executives and survivors of redundancy	Doherty, N	2000
58	The ageing workforce practices and their effect on the financial performance of companies in metal industry	Öztürk, F	2009
59	Towards a framework for performance management in a Higher Education institution	Allison O'Reilly	2009
60	Work-life balance balancing work-life and operations in the elderly care home care and maternity care	Kupper, K	2010
61	The societal culture dimension within the human resource practices of Taiwanese management in the UK	Chen, I	2005
62	Reward & Recognition Strategies A case study of GE Healthcare in Umeå	Oztopark, T., & Lundmark, R	2007
63	Teachers' recruitment and retention in Tanzania private secondary schools a case of Mbeya region	Chenelo, A. J	2011
64	Recruiting the cyber leader an evaluation of the human resource model used for recruiting the Army's Cyber Operations Officer	Nicholson, W. C., & Gibbs, S. A	2017
65	Towards balanced personalized client care Human Resources Planning and Workforce (Re) scheduling in the Elderly care, Home care, and Maternity care	Westerop, B	2010
66	AN INQUIRY INTO THE NATURE AND USE OF EXECUTIVE RECRUITMENT CONSULTANCY IN GLOBAL	Cuthbertson, N. A	1996
67	Copycat Absenteeism Reasons for the Difference in Sickness Absenteeism	Van der Honing, P. O., & Fuchs, U	2007
68	KOUJYOU RICCHI TO TAYOUSEINI KANSURU KENKYUU (Study on factory location and diversity)	Utsunomiya, Y	2017

Sato suggested a matrix using the three axes of target employee, Human Resource Flow, and Life Cycle Stage. (Sato et al., 2019a)

As mentioned in previous sections, no paper referring to Human Resource Flow shows how to construct and operate HRM Policy Choices in the Harvard Model which includes Human Resource Flow, Work System, Reward System, and Employment Influence by using the concept of Life Cycle Stage. (Sato et al., 2019a) Therefore, this chapter uses HRM Policy Choices instead of Human Resource Flow.

Target Employee	Lifecycle Stage	Human Policy Choices			
		Human Resource Flow	Reward System	Work System	Employee Influence
Permanent Employee	Concept				
	Development				
	Production				
	Utilization/Support				
	Retirement				
Temporary Employee	Concept				
	Development				
	Production				
	Utilization/Support				
	Retirement				

Figure 24. The New Matrix by using Human Resource Choices

Table 17. Mapping Matrix of Previous Studies

Target	1. HRM Policy Choices	2. Verification of HR Outcomes	3. Feedback to HRM System from HR Outcomes
Permanent Employment	<p>Box A</p> <p>1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68</p>	<p>Box C</p> <p>2,4,6,10,14,17,20,21,22,29,32,42,54,58</p>	<p>Box E</p>
Temporary Employment	<p>Box B</p> <p>3,24,36,45,51,52,57,59,60,61,63,66</p>	<p>Box D</p>	<p>Box F</p>

I divided studies into six boxes. We named the boxes as below to deploy them to the new matrix that we mentioned.

Figure 25 shows the positioning of these six boxes. As we mentioned, the papers in Box A and Box B only refer the concept of HRM Policy Choices. We mapped Box C to Utilization/Support Stage of Permanent Employee because studies in the box verified HR Outcomes while operating HR Systems. The paper in Box E is classified to Development, Production, and Retirement stage of Permanent Employee as it designs a HR System and process by using Systems Engineering such as IDEF0. When we do not get the HR Outcomes we expect, the HR System and process is improved by System Engineering. We also mapped Box D and Box F for the same reason as Box C and Box E. However, there are no papers that mention these areas.

Target Employee	Lifecycle Stage	Human Policy Choices			
		Human Resource Flow	Reward System	Work System	Employee Influence
Permanent Employee	Concept	Box A			
	Development	Box E			
	Production	Box E			
	Utilization/Support	Box C			
	Retirement	Box E			
Temporary Employee	Concept	Box B			
	Development	Box F			
	Production	Box F			
	Utilization/Support	Box D			
	Retirement	Box F			

Figure 25. The Positioning of Each Box

This section discusses the results of this study with Table 8 and Figure 18. Because of comparison of the number of papers in Box A and B and lack of reference in Box D and F, most of the papers in HRM mainly referred to permanent employees. However, we can design an HR system that will enhance our organization by involving such as talented freelancers who are not permanent employees when we consider temporary employees as well. As we mentioned, it is important to attract knowledgeable workers such as talented freelancers and improve corporate performance in the future. Improving the process of HRM Systems which targets not only permanent employees but also temporary employees is a factor that increases the competitive advantage of companies. Therefore, companies that do not use talented freelancers may not enhance their competitive advantage in the future, resulting in a difference in financial performance compared to companies that use talented freelancers.

We also find out that many studies did not consider the retirement stage of HR systems in its life cycle and focused not on abolishing and improving an HR system but on only creating it. Therefore, we discovered the methodological novelty that this chapter has potential to identify issues and change HR system based on feedback process. For instance, we will not transform an HR system by considering retirement stage of it for the talented freelancers. When the score of HR outcomes does not rise as expected, the HR system will be improved by testing and abolishing it, which changes the design process of HR systems. From the above, we consider this transition is academic and theoretical contribution. In addition to helping existing organizations improve their HR systems, new companies may be able to shorten the lead time to build an appropriate

HR system as they build new organizations. Therefore, this chapter will contribute to the management system because it finds out areas to strengthen HR Systems.

This chapter aimed to derive challenges by reviewing the papers which refer the relation among HRM Policy Choices, HR Outcomes, and Feedback Process to HRM Policy Choices from HR Outcomes for revealing areas that have been studied and those that have not.

3.5.2 Analysis of the relationship between HR Systems and HRM outcomes and Long-term Consequences

Competition in the Information and Communication Technology (ICT) industry is intensifying these days. Professional engineers are a source of competitive advantage, and every company is eager to acquire them. (Ministry of Economy, Trade and Industry, 2013) Based on the Harvard model, the goal of this chapter is to develop a causal relationship between the HR Systems and HRM outcomes and Long-term Consequences. In addition, we also provide a guide for human resource department employees working at large companies in the ICT industry to identify HR System issues that have a high priority in terms of recruitment. Based on this result, we would like to use it as a criterion for judging which HR system to add design or improvement in the future.

We describe the analysis steps in this section. We made the questionnaire survey as a method for evaluating the causal relationship between the HR systems and HRM outcomes and Long-term consequences. Other methods include qualitative surveys such as interview surveys and ethnography, but this time, we wanted to clarify the causal relationship by analyzing quantitative data. Therefore, we selected a questionnaire survey. HR systems and HRM outcomes and Long-term consequences are abstract concepts. If it can be grasped quantitatively by statistical processing, it is possible to understand the comparison between IT engineers and non IT engineers and the relationship between HR systems and HRM outcomes and Long-term consequences. As a result, we could analyze what elements of the HR systems affect the outcomes and consequences of HRM.

After designing and implementing the questionnaire survey, we would like to perform basic statistics. We would like to make use of this survey data for understanding the outline of the survey in the ICT industry. We will analyze the causal relationship between HR systems and HRM outcomes and Long-term consequences through exploratory analysis.

As a result, we propose a new hypothesis on the causal relationship between HR systems and HRM outcomes and Long-term consequences in the ICT industry. Finally, we attempt to clarify

the causal relationship through covariance structure analysis in order to carry out a confirmatory analysis of the derived hypothesis.

In summary, the analytical steps of this section are as follows.

1. Design of questionnaire items
2. Implementation of a questionnaire survey
3. Implementation of Basic Statistics (Frequency distribution, crosstab, mean, median, mode)
4. Derivation of Hypotheses by Exploratory Analysis (multiple regression analysis)
5. Confirmatory analysis of hypotheses (covariance structure analysis)

We set the following question regarding HRM outcomes and Long-term consequences "Q1 Please answer the following questions. * If you work for more than one company or organization, please tell us about your main workplace. (The same applies to the following)". The target HRM outcomes and Long-term consequences were expressed in 10 questions. "Commitment" in HRM outcomes were divided into "Q1S1 You have an attachment to your work or organization." and "Q1S2 You work responsibly.". "Competence" in HRM outcomes was asked as "Q1S3 You feel your abilities are growing.". "Cost Effectiveness" in HRM outcomes was questioned as "Q1S4 You feel that your organization is operating at an efficient cost.". "Congruence" in HRM outcomes was asked as "Q1S5 You feel that the goals of your organization are aligned with the goals of your employees."

"Individual well-being" in Long-term consequences, was divided into "Q1S6 You are working happily", "Q1S7 You are working lively.", and "Q1S8 You are happy". "Organizational Effectiveness" in Long-term consequences was asked as "Q1S9 You feel that your organization is adaptable to changing markets and social environments.". "Prosperity of Society" in Long-term consequences was questioned as "Q1S10 You feel that your organization contributes to the prosperity of society as a whole.". We used the six-point scale of Likert scale. ("6. Very applicable", "5. Applicable", "4. Slightly applicable", "3 Less applicable", "2. Not applicable", "1. Not applicable at all")

We set the following question regarding motivation for HR systems "Q3 Please answer whether or not the following systems of your current organization will motivate you to work. * If you do not have a relevant system or mechanism in your current organization, please tell us what you think about it."

The target HR systems were divided into 10 groups and set as "Q3S1 Recruiting System", "Q3S2 Transfer System", "Q3S3 Evaluation System", "Q3S4 Retirement System", "Q3S5 Salary System", "Q3S6 Benefits System", "Q3S7 Job Content", "Q3S8 Job Evaluation Criteria", "Q3S9 Working System (working at home, side jobs, flextime, etc.)", and "Q3S10 System for Responding to Employee Requests and Suggestions". We used the six-point scale of Likert scale. ("6. Very motivated", "5. motivated", "4. Slightly motivated", "3. Less motivated", "2. Not motivated", "1. Not motivated at all")

The following table shows the types of employment, the number of employees at the company in which they work, the type of industry, and the type of job.

- Employment type: Regular employee
- Number of employees at companies: Large companies with 300 or more employees
- Industry: Information and Communications
- Age: 20 ~ 49
- Sex: Male
- Occupation: 258 IT Engineers, 258 Non-IT Engineers

The definition of a large company with more than 300 employees is based on "Economic Census (Released in November 2015)". The industry was quoted from "G. Information and Communications" in "Japan Standard Industrial Classification (Revised October 2013)". Job types were set according to the definition of "Japan Standard Occupational Classification (Revised November 2009)" by the Ministry of Internal Affairs and Communications.

We asked MACROMILL, INC to conduct an Internet questionnaire survey. The survey period was from 16: 40 on October 29, 2019 to 20: 53 on October 30, 2019.

The effective answer number were the 516 persons (Valid response rate of 94.0%). As attribute information, the frequency distribution of age classification, residential area, unmarried/married, children, household income, and individual income is as follows.

The respondents' age classification was 9 (1.7%) between 20 and 24 years old, 37 (7.2%) between 25 and 29 years old, 53 (10.3%) between 30 and 34 years old, 76 (14.7%) between 35 and 39 years old, 158 (30.6%) between 40 and 44 years old, and 183 (35.5%) between 45 and 49 years old.

The respondents' residential areas classification was 10 (1.9%) in Hokkaido, 10 (1.9%) in Tohoku Area, 320 (62.0%) in Kanto Area, 58 (11.2%) in Chubu Area, 76 (14.7%) in Kinki Area, 9 (1.7%) in Chugoku Area, 3 (0.6%) in Shikoku Area, 30 (5.8%) in Kyushu Area

Table 18. Age Groups

	Number	Ratio	Cumulative Ratio
20~24	9	1.7	1.7
25~29	37	7.2	8.9
30~34	53	10.3	19.2
35~39	76	14.7	33.9
40~44	158	30.6	64.5
45~49	183	35.5	100.0
Total	516	100.0	

Table 19. Residential Areas

	Number	Ratio	Cumulative Ratio
Hokkaido	10	1.9	1.9
Tohoku Area	10	1.9	3.9
Kanto Area	320	62.0	65.9
Chubu Area	58	11.2	77.1
Kinki Area	76	14.7	91.9
Chugoku Area	9	1.7	93.6
Shikoku Area	3	0.6	94.2
Kyushu Area	30	5.8	100.0
Total	516	100.0	

Table 20. Unmarried/Married

	Number	Ratio	Cumulative Ratio
Unmarried	200	38.8	38.8
Married	316	61.2	100.0
Total	516	100.0	

Respondents were 200 unmarried (38.8%) and 316 married (61.2%). In addition, respondents were 260 without children (50.4%) and 256 with children (49.6%).

Respondents' household income was as follows. Less than 200: 3 (0.6%), less than 200 ~ 400: 37 (7.2%), less than 400 ~ 600: 113 (21.9%), less than 600 ~ 800: 116 (22.5%), less than 800 ~ 1000: 81 (15.7%), less than 1000 ~ 1200: 49 (9.5%), less than 1200 ~ 1500: 39 (7.6%), less than 1500 ~ 2000: 14 (2.7%), 2000 yen or more: 4 (0.8%), do not know: 16 (3.1%), and missing values: 44 (8.5%).

Respondents' individual income was as follows. Less than 200: 5 (1.0%), less than 200 ~ 400: 54 (10.5%), less than 400 ~ 600: 152 (29.5%), less than 600 ~ 800: 132 (25.6%), less than 800 ~ 1000: 71 (13.8%), less than 1000 ~ 1200: 26 (5.0%), less than 1200 ~ 1500: 17 (3.3%), less than 1500 ~ 2000: 3 (0.6%), 2000 yen or more: 0 (0.0%), do not know: 11 (2.1%), and missing values: 45 (8.7%).

Table 21. Presence of Children

	Number	Ratio	Cumulative Ratio
No children	260	50.4	50.4
With children	256	49.6	100.0
Total	516	100.0	

Table 22. Household Annual Income

	Number	Ratio	Cumulative Ratio
Less than 2 million	3	0.6	0.6
2-4,000,000	37	7.2	7.8
4 to less than 6 million	113	21.9	29.7
6 to less than 8 million	116	22.5	52.1
800 to less than 10 million	81	15.7	67.8
10-12 million	49	9.5	77.3
12 to less than 15 million	39	7.6	84.9
Between 15 and 20 million	14	2.7	87.6
20 million yen or more	4	0.8	88.4
do not know	16	3.1	91.5
Sub Total	472	91.5	
Missing values	44	8.5	
Total	516	100.0	

Table 23. Individual Annual Income

	Number	Ratio	Cumulative Ratio
Less than 2 million	5	1.0	1.0
2-4,000,000	54	10.5	11.4
4 to less than 6 million	152	29.5	40.9
6 to less than 8 million	132	25.6	66.5
800 to less than 10 million	71	13.8	80.2
10-12 million	26	5.0	85.3
12 to less than 15 million	17	3.3	88.6
Between 15 and 20 million	3	0.6	89.1
20 million yen or more	0	0.0	89.1
do not know	11	2.1	91.3
Sub Total	471	91.3	
Missing values	45	8.7	
Total	516	100.0	

As basic statistics of dependent variables, we performed frequency distributions from Q1S1 to Q1S 10, which are dependent variables in this section. In addition, we calculated frequency distribution and average value and compared IT engineer and non-IT engineer.

The table 24 shows the frequency distribution of responses to "Q1S1 You have an attachment to your job or organization". In addition, the average was 3.65, the median was 4.0, the mode was 4, the standard deviation was 1.261, and the variance was 1.591.

The table 25 is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S1 You have an attachment to your job or organization".

Table 24. The frequency distribution of responses for Q1S1_Attachment

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	39	7.6	7.6
2. Not applicable	47	9.1	16.7
3. Not very applicable	126	24.4	41.1
4. Somewhat applicable	179	34.7	75.8
5. Applicable	94	18.2	94.0
6. Very applicable	31	6.0	100.0
Total	516	100.0	

Table 25. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S1_Attachment

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	20	7.8%	19	7.4%
2. Not applicable	26	10.1%	21	8.1%
3. Not very applicable	65	25.2%	61	23.6%
4. Somewhat applicable	91	35.3%	88	34.1%
5. Applicable	41	15.9%	53	20.5%
6. Very applicable	15	5.8%	16	6.2%
Total	258	100.0%	258	100.0%

Table 26. The frequency distribution of responses for Q1S2_Responsibility

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	9	1.7	1.7
2. Not applicable	6	1.2	2.9
3. Not very applicable	71	13.8	16.7
4. Somewhat applicable	170	32.9	49.6
5. Applicable	192	37.2	86.8
6. Very applicable	68	13.2	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S2 You are working with a sense of responsibility". In addition, the average was 4.42, the median was 5.0, the mode was 5, the standard deviation was 1.031, and the variance was 1.061.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S2 You are working with a sense of responsibility".

Table 27. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S2_Responsibility

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	4	1.6%	5	1.9%
2. Not applicable	3	1.2%	3	1.2%
3. Not very applicable	43	16.7%	28	10.9%
4. Somewhat applicable	89	34.5%	81	31.4%
5. Applicable	93	36.0%	99	38.4%
6. Very applicable	26	10.1%	42	16.3%
Total	258	100.0%	258	100.0%

Table 28. The frequency distribution of responses for Q1S3_Growth

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	22	4.3	4.3
2. Not applicable	39	7.6	11.8
3. Not very applicable	151	29.3	41.1
4. Somewhat applicable	182	35.3	76.4
5. Applicable	91	17.6	94.0
6. Very applicable	31	6.0	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S3 You feel that your ability is growing". In addition, the average was 3.72, the median was 4.0, the mode was 4, the standard deviation was 1.150, and the variance was 1.322.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S3 You feel that your ability is growing".

Table 29. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S3_Growth

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	8	3.1%	14	5.4%
2. Not applicable	24	9.3%	15	5.8%
3. Not very applicable	87	33.7%	64	24.8%
4. Somewhat applicable	93	36.0%	89	34.5%
5. Applicable	36	14.0%	55	21.3%
6. Very applicable	10	3.9%	21	8.1%
Total	258	100.0%	258	100.0%

Table 30. The frequency distribution of responses for Q1S4_Cost Effectiveness

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	30	5.8	5.8
2. Not applicable	51	9.9	15.7
3. Not very applicable	177	34.3	50.0
4. Somewhat applicable	164	31.8	81.8
5. Applicable	70	13.6	95.3
6. Very applicable	24	4.7	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S4 You feel that your organization is operating the business at an efficient cost". In addition, the average was 3.51, the median was 3.50, the mode was 3, the standard deviation was 1.162, and the variance was 1.349.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S4 You feel that your organization is operating the business at an efficient cost".

Table 31. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S4_Cost Effectiveness

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	15	5.8%	15	5.8%
2. Not applicable	21	8.1%	30	11.6%
3. Not very applicable	106	41.1%	71	27.5%
4. Somewhat applicable	83	32.2%	81	31.4%
5. Applicable	26	10.1%	44	17.1%
6. Very applicable	7	2.7%	17	6.6%
Total	258	100.0%	258	100.0%

Table 32. The frequency distribution of responses for Q1S5_Congruence

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	29	5.6	5.6
2. Not applicable	41	7.9	13.6
3. Not very applicable	155	30.0	43.6
4. Somewhat applicable	181	35.1	78.7
5. Applicable	85	16.5	95.2
6. Very applicable	25	4.8	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S5 You feel that the goals of your organization and the people are aligned". In addition, the average was 3.63, the median was 4.0, the mode was 4, the standard deviation was 1.162, and the variance was 1.351.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S5 You feel that the goals of your organization and the people are aligned".

Table 33. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S5_Congruence

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	14	5.4%	15	5.8%
2. Not applicable	18	7.0%	23	8.9%
3. Not very applicable	98	38.0%	57	22.1%
4. Somewhat applicable	83	32.2%	98	38.0%
5. Applicable	36	14.0%	49	19.0%
6. Very applicable	9	3.5%	16	6.2%
Total	258	100.0%	258	100.0%

Table 34. The frequency distribution of responses for Q1S6_ Working Happily

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	37	7.2	7.2
2. Not applicable	55	10.7	17.8
3. Not very applicable	141	27.3	45.2
4. Somewhat applicable	166	32.2	77.3
5. Applicable	89	17.2	94.6
6. Very applicable	28	5.4	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S6 You are working happily". In addition, the average was 3.58, the median was 4.0, the mode was 4, the standard deviation was 1.249, and the variance was 1.561.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S6 You are working happily".

Table 35. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S6_ Working Happily

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	14	5.4%	23	8.9%
2. Not applicable	32	12.4%	23	8.9%
3. Not very applicable	76	29.5%	65	25.2%
4. Somewhat applicable	88	34.1%	78	30.2%
5. Applicable	41	15.9%	48	18.6%
6. Very applicable	7	2.7%	21	8.1%
Total	258	100.0%	258	100.0%

Table 36. The frequency distribution of responses for Q1S7_Working Lively

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	39	7.6	7.6
2. Not applicable	60	11.6	19.2
3. Not very applicable	146	28.3	47.5
4. Somewhat applicable	163	31.6	79.1
5. Applicable	90	17.4	96.5
6. Very applicable	18	3.5	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S7 You are working lively". In addition, the average was 3.50, the median was 4.0, the mode was 4, the standard deviation was 1.224, and the variance was 1.497.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S7 You are working lively".

Table 37. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S7_Working Lively

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	17	6.6%	22	8.5%
2. Not applicable	36	14.0%	24	9.3%
3. Not very applicable	76	29.5%	70	27.1%
4. Somewhat applicable	89	34.5%	74	28.7%
5. Applicable	35	13.6%	55	21.3%
6. Very applicable	5	1.9%	13	5.0%
Total	258	100.0%	258	100.0%

Table 38. The frequency distribution of responses for Q1S8_Happy

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	22	4.3	4.3
2. Not applicable	41	7.9	12.2
3. Not very applicable	107	20.7	32.9
4. Somewhat applicable	194	37.6	70.5
5. Applicable	111	21.5	92.1
6. Very applicable	41	7.9	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S8 You are happy". In addition, the average was 3.88, the median was 4.0, the mode was 4, the standard deviation was 1.196, and the variance was 1.430.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S8 You are happy".

Table 39. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S8_Happy

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	9	3.5%	13	5.0%
2. Not applicable	21	8.1%	20	7.8%
3. Not very applicable	65	25.2%	42	16.3%
4. Somewhat applicable	97	37.6%	97	37.6%
5. Applicable	51	19.8%	60	23.3%
6. Very applicable	15	5.8%	26	10.1%
Total	258	100.0%	258	100.0%

Table 40. The frequency distribution of responses for Q1S9_Organizational Effectiveness

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	25	4.8	4.8
2. Not applicable	44	8.5	13.4
3. Not very applicable	150	29.1	42.4
4. Somewhat applicable	177	34.3	76.7
5. Applicable	97	18.8	95.5
6. Very applicable	23	4.5	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments". In addition, the average was 3.67, the median was 4.0, the mode was 4, the standard deviation was 1.152, and the variance was 1.328.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments".

Table 41. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S9_Organizational Effectiveness

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	10	3.9%	15	5.8%
2. Not applicable	26	10.1%	18	7.0%
3. Not very applicable	77	29.8%	73	28.3%
4. Somewhat applicable	99	38.4%	78	30.2%
5. Applicable	40	15.5%	57	22.1%
6. Very applicable	6	2.3%	17	6.6%
Total	258	100.0%	258	100.0%

Table 42. The frequency distribution of responses for Q1S10_Prosperty of Society

	Number	Ratio	Cumulative Ratio
1. Not applicable at all	29	5.6	5.6
2. Not applicable	30	5.8	11.4
3. Not very applicable	123	23.8	35.3
4. Somewhat applicable	189	36.6	71.9
5. Applicable	115	22.3	94.2
6. Very applicable	30	5.8	100.0
Total	516	100.0	

The above table shows the frequency distribution of responses to "Q1S10 You feel that your organization contributes to the prosperity of society as a whole". In addition, the average was 3.82, the median was 4.0, the mode was 4, the standard deviation was 1.184, and the variance was 1.401.

The following table is a cross tabulation of IT Engineer and non-IT Engineer responses to "Q1S10 You feel that your organization contributes to the prosperity of society as a whole".

Table 43. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S10_Prosperty of Society

	IT Engineer		Not IT Engineer	
	Number	Ratio	Number	Ratio
1. Not applicable at all	15	5.8%	14	5.4%
2. Not applicable	22	8.5%	8	3.1%
3. Not very applicable	62	24.0%	61	23.6%
4. Somewhat applicable	100	38.8%	89	34.5%
5. Applicable	51	19.8%	64	24.8%
6. Very applicable	8	3.1%	22	8.5%
Total	258	100.0%	258	100.0%

3.5.3 Relationship between motivation for HR systems and HR Outcomes and Long-term consequences and Deriving hypotheses through exploratory analysis of all employees

We would like to conduct an exploratory analysis to extract hypotheses about the relationship between motivation with the HR system and HR outcomes and Long-term consequences for all employees in the ICT industry who responded to the questionnaire. We would like to perform multiple regression analysis with each item of HR outcomes and Long-term consequences as dependent variables and the degree of satisfaction with the HR systems as independent variables. The results are described below. However, for the results based on Likert's six-point method, the scores were converted from negative to -3, -2, -1, 1, 2, and 3 for analysis.

Table 44. Descriptive Statistics

Descriptive Statistics	Frequency	Minimum	Maximum	Mean	Standard deviation
Q1S1_Attachment	516	-3	3	0.24	1.69
Q1S2_Responsibility	516	-3	3	1.26	1.33
Q1S3_Growth	516	-3	3	0.31	1.58
Q1S4_Cost Effectiveness	516	-3	3	0.01	1.60
Q1S5_Congruence	516	-3	3	0.20	1.59
Q1S6_Working Happily	516	-3	3	0.13	1.68
Q1S7_Working Lively	516	-3	3	0.03	1.66
Q1S8_Happy	516	-3	3	0.55	1.60
Q1S9_Organizational Effectiveness	516	-3	3	0.25	1.58
Q1S10_Proprosperity of Society	516	-3	3	0.46	1.60
Q3S1_Recruiting System	516	-3	3	-0.27	1.47
Q3S2_Transfer System	516	-3	3	-0.04	1.60
Q3S3_Evaluation System	516	-3	3	0.38	1.79
Q3S4_Retirement System	516	-3	3	-0.08	1.63
Q3S5_Salary System	516	-3	3	0.77	1.87
Q3S6_Benefits System	516	-3	3	0.59	1.64
Q3S7_Job Content	516	-3	3	0.67	1.59
Q3S8_Job Evaluation Criteria	516	-3	3	0.38	1.71
Q3S9_Working System	516	-3	3	0.64	1.62
Q3S10_System for Responding to Employee	516	-3	3	0.30	1.66

Table 45. Correlation Analysis

	Q1S1_Attachment	Q1S2_Responsibility	Q1S3_Growth	Q1S4_Cost Effectiveness	Q1S5_Congruence
Q1S1_Attachment	1				
Q1S2_Responsibility	.448**	1			
Q1S3_Growth	.622**	.515**	1		
Q1S4_Cost Effectiveness	.518**	.253**	.394**	1	
Q1S5_Congruence	.645**	.375**	.528**	.583**	1
Q1S6_Working Happily	.699**	.447**	.630**	.430**	.604**
Q1S7_Working Lively	.719**	.462**	.630**	.462**	.618**
Q1S8_Happy	.544**	.413**	.475**	.371**	.466**
Q1S9_Organizational Effectiveness	.584**	.357**	.528**	.580**	.587**
Q1S10_Prosperty of Society	.642**	.461**	.581**	.482**	.562**
Q3S1_Recruiting System	.418**	.249**	.371**	.404**	.423**
Q3S2_Transfer System	.343**	.263**	.341**	.330**	.315**
Q3S3_Evaluation System	.438**	.274**	.326**	.271**	.306**
Q3S4_Retirement System	.381**	.262**	.303**	.299**	.306**
Q3S5_Salary System	.378**	.293**	.292**	.214**	.265**
Q3S6_Benefits System	.348**	.285**	.291**	.242**	.291**
Q3S7_Job Content	.460**	.373**	.388**	.270**	.357**
Q3S8_Job Evaluation Criteria	.433**	.302**	.357**	.238**	.306**
Q3S9_Working System	.368**	.274**	.296**	.257**	.355**
Q3S10_System for Responding to Employee	.452**	.302**	.385**	.324**	.388**

** . Correlation coefficient is significant (two-sided) at the 1% level.

Table 46. Correlation Analysis

	Q1S6_Working Happily	Q1S7_Working Lively	Q1S8_Happy	Q1S9_Organizational Effectiveness	Q1S10_Prosperty of Society
Q1S1_Attachment					
Q1S2_Responsibility					
Q1S3_Growth					
Q1S4_Cost Effectiveness					
Q1S5_Congruence					
Q1S6_Working Happily	1				
Q1S7_Working Lively	.835**	1			
Q1S8_Happy	.621**	.584**	1		
Q1S9_Organizational Effectiveness	.543**	.535**	.418**	1	
Q1S10_Prosperty of Society	.544**	.574**	.463**	.565**	1
Q3S1_Recruiting System	.370**	.374**	.254**	.394**	.383**
Q3S2_Transfer System	.283**	.327**	.266**	.298**	.320**
Q3S3_Evaluation System	.314**	.328**	.319**	.303**	.342**
Q3S4_Retirement System	.313**	.302**	.270**	.302**	.308**
Q3S5_Salary System	.304**	.302**	.316**	.280**	.295**
Q3S6_Benefits System	.329**	.316**	.328**	.259**	.325**
Q3S7_Job Content	.402**	.425**	.333**	.315**	.392**
Q3S8_Job Evaluation Criteria	.346**	.341**	.309**	.276**	.328**
Q3S9_Working System	.336**	.359**	.354**	.283**	.309**
Q3S10_System for Responding to Employee	.394**	.402**	.339**	.348**	.412**

** . Correlation coefficient is significant (two-sided) at the 1% level.

Table 47. Correlation Analysis

	Q3S1_Recruiting System	Q3S2_Transfer System	Q3S3_Evaluation System	Q3S4_Retirement System	Q3S5_Salary System
Q1S1_Attachment					
Q1S2_Responsibility					
Q1S3_Growth					
Q1S4_Cost Effectiveness					
Q1S5_Congruence					
Q1S6_Working Happily					
Q1S7_Working Lively					
Q1S8_Happy					
Q1S9_Organizational Effectiveness					
Q1S10_Prosperty of Society					
Q3S1_Recruiting System	1				
Q3S2_Transfer System	.557**	1			
Q3S3_Evaluation System	.469**	.571**	1		
Q3S4_Retirement System	.520**	.542**	.563**	1	
Q3S5_Salary System	.431**	.497**	.760**	.564**	1
Q3S6_Benefits System	.416**	.463**	.538**	.534**	.594**
Q3S7_Job Content	.467**	.540**	.692**	.460**	.655**
Q3S8_Job Evaluation Criteria	.472**	.545**	.838**	.540**	.737**
Q3S9_Working System	.438**	.491**	.604**	.518**	.623**
Q3S10_System for Responding to Employee	.538**	.600**	.700**	.591**	.670**

** . Correlation coefficient is significant (two-sided) at the 1% level.

Table 48. Correlation Analysis

	Q3S6_Benefits System	Q3S7_Job Content	Q3S8_Job Evaluation Criteria	Q3S9_Working System	Q3S10_System for Responding to Employee
Q1S1_Attachment					
Q1S2_Responsibility					
Q1S3_Growth					
Q1S4_Cost Effectiveness					
Q1S5_Congruence					
Q1S6_Working Happily					
Q1S7_Working Lively					
Q1S8_Happy					
Q1S9_Organizational Effectiveness					
Q1S10_Prosperty of Society					
Q3S1_Recruiting System					
Q3S2_Transfer System					
Q3S3_Evaluation System					
Q3S4_Retirement System					
Q3S5_Salary System					
Q3S6_Benefits System	1				
Q3S7_Job Content	.490**	1			
Q3S8_Job Evaluation Criteria	.520**	.672**	1		
Q3S9_Working System	.572**	.579**	.556**	1	
Q3S10_System for Responding to Employee	.562**	.658**	.710**	.623**	1

** . Correlation coefficient is significant (two-sided) at the 1% level.

Table 49. The result of multiple regression analysis for Q1S1_Attachment

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	0.081	0.081		0.997	0.319		
Q3S1_Recruiting System	0.214	0.056	0.187	3.824	0.000	***	1.71
Q3S2_Transfer System	-0.064	0.055	-0.061	-1.160	0.246		1.97
Q3S3_Evaluation System	0.084	0.073	0.089	1.138	0.256		4.34
Q3S4_Retirement System	0.084	0.054	0.082	1.554	0.121		1.97
Q3S5_Salary System	-0.083	0.060	-0.092	-1.389	0.166		3.12
Q3S6_Benefits System	0.049	0.052	0.047	0.929	0.353		1.87
Q3S7_Job Content	0.226	0.061	0.213	3.675	0.000	***	2.40
Q3S8_Job Evaluation Criteria	0.069	0.074	0.070	0.941	0.347		3.96
Q3S9_Working System	0.020	0.057	0.020	0.362	0.717		2.10
Q3S10_System for Responding to Employee	0.113	0.065	0.111	1.735	0.083		2.92

Dependent variable : Q1S1_Attachment

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

The above table shows the result of multiple regression analysis for Q1S1. According to the table, Q3S1 and Q3S7 are 0.1% significant.

The following table shows the result of multiple regression analysis for Q1S2. According to the table, Q3S7 are 0.1% significant.

Table 50. The result of multiple regression analysis for Q1S2_Responsibility

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	1.061	0.069		15.281	0.000		
Q3S1_Recruiting System	0.036	0.048	0.040	0.757	0.450		1.71
Q3S2_Transfer System	0.020	0.047	0.024	0.422	0.673		1.97
Q3S3_Evaluation System	-0.104	0.063	-0.140	-1.651	0.099		4.34
Q3S4_Retirement System	0.045	0.047	0.056	0.974	0.330		1.97
Q3S5_Salary System	0.010	0.051	0.014	0.195	0.846		3.12
Q3S6_Benefits System	0.076	0.045	0.094	1.688	0.092		1.87
Q3S7_Job Content	0.232	0.053	0.277	4.402	0.000	***	2.40
Q3S8_Job Evaluation Criteria	0.076	0.063	0.097	1.195	0.233		3.96
Q3S9_Working System	0.017	0.048	0.020	0.348	0.728		2.10
Q3S10_System for Responding to Employee	0.004	0.056	0.005	0.067	0.947		2.92

Dependent variable : Q1S2_Responsibility

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

Table 51. The result of multiple regression analysis for Q1S3_Growth

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	0.217	0.080		2.729	0.007		
Q3S1_Recruiting System	0.180	0.055	0.168	3.262	0.001	**	1.71
Q3S2_Transfer System	0.055	0.054	0.056	1.012	0.312		1.97
Q3S3_Evaluation System	-0.073	0.072	-0.083	-1.016	0.310		4.34
Q3S4_Retirement System	0.028	0.053	0.029	0.522	0.602		1.97
Q3S5_Salary System	-0.079	0.059	-0.094	-1.352	0.177		3.12
Q3S6_Benefits System	0.050	0.052	0.052	0.963	0.336		1.87
Q3S7_Job Content	0.195	0.060	0.196	3.224	0.001	**	2.40
Q3S8_Job Evaluation Criteria	0.121	0.072	0.131	1.672	0.095		3.96
Q3S9_Working System	0.003	0.056	0.003	0.054	0.957		2.10
Q3S10_System for Responding to Employee	0.106	0.064	0.112	1.665	0.097		2.92

Dependent variable : Q1S3_Growth

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

The above table shows the result of multiple regression analysis for Q1S3. According to the table, Q3S1 and Q3S7 are 1% significant.

The following table shows the result of multiple regression analysis for Q1S4. According to the table, Q3S1 is 0.1% significant.

Table 52. The result of multiple regression analysis for Q1S4_Cost Effectiveness

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	0.089	0.082		1.094	0.275		
Q3S1_Recruiting System	0.297	0.057	0.274	5.248	0.000	***	1.71
Q3S2_Transfer System	0.088	0.056	0.088	1.576	0.116		1.97
Q3S3_Evaluation System	0.080	0.074	0.090	1.079	0.281		4.34
Q3S4_Retirement System	0.063	0.055	0.064	1.150	0.251		1.97
Q3S5_Salary System	-0.094	0.060	-0.110	-1.564	0.118		3.12
Q3S6_Benefits System	0.026	0.053	0.027	0.489	0.625		1.87
Q3S7_Job Content	0.048	0.062	0.047	0.766	0.444		2.40
Q3S8_Job Evaluation Criteria	-0.098	0.074	-0.105	-1.320	0.187		3.96
Q3S9_Working System	0.021	0.057	0.021	0.360	0.719		2.10
Q3S10_System for Responding to Employee	0.107	0.065	0.112	1.641	0.102		2.92

Dependent variable : Q1S4_Cost Effectiveness

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

Table 53. The result of multiple regression analysis for Q1S5_Congruence

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	0.131	0.079		1.658	0.098		
Q3S1_ Recruiting System	0.292	0.055	0.269	5.316	0.000	***	1.71
Q3S2_Transfer System	-0.014	0.054	-0.014	-0.263	0.793		1.97
Q3S3_Evaluation System	-0.025	0.072	-0.028	-0.342	0.732		4.34
Q3S4_Retirement System	0.020	0.053	0.021	0.376	0.707		1.97
Q3S5_Salary System	-0.117	0.058	-0.137	-2.006	0.045	*	3.12
Q3S6_Benefits System	0.037	0.051	0.039	0.728	0.467		1.87
Q3S7_Job Content	0.140	0.060	0.140	2.323	0.021	*	2.40
Q3S8_Job Evaluation Criteria	0.004	0.072	0.004	0.056	0.955		3.96
Q3S9_Working System	0.136	0.055	0.138	2.455	0.014	*	2.10
Q3S10_System for Responding to Employee	0.142	0.064	0.149	2.242	0.025	*	2.92

Dependent variable : Q1S5_Congruence

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

The above table shows the result of multiple regression analysis for Q1S5. According to the table, Q3S1 is 0.1% significant and Q3S5, Q3S7, Q3S9 and Q3S10 are 5% significant.

The following table shows the result of multiple regression analysis for Q1S6. According to the table, Q3S1 and Q3S7 are 0.1% significant, Q3S10 is 1% significant.

Table 54. The result of multiple regression analysis for Q1S6_Working Happily

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	-0.054	0.084		-0.644	0.520		
Q3S1_ Recruiting System	0.208	0.058	0.181	3.562	0.000	***	1.71
Q3S2_Transfer System	-0.072	0.057	-0.069	-1.260	0.208		1.97
Q3S3_Evaluation System	-0.116	0.076	-0.123	-1.520	0.129		4.34
Q3S4_Retirement System	0.050	0.056	0.048	0.886	0.376		1.97
Q3S5_Salary System	-0.083	0.062	-0.092	-1.340	0.181		3.12
Q3S6_Benefits System	0.104	0.054	0.101	1.901	0.058		1.87
Q3S7_Job Content	0.248	0.064	0.235	3.888	0.000	***	2.40
Q3S8_Job Evaluation Criteria	0.102	0.077	0.103	1.332	0.183		3.96
Q3S9_Working System	0.065	0.059	0.063	1.113	0.266		2.10
Q3S10_System for Responding to Employee	0.135	0.067	0.133	2.005	0.045	*	2.92

Dependent variable : Q1S6_Working Happily

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

Table 55. The result of multiple regression analysis for Q1S7_Working Lively

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	-0.159	0.082		-1.926	0.055		
Q3S1_ Recruiting System	0.188	0.057	0.166	3.288	0.001	**	1.71
Q3S2_Transfer System	0.006	0.056	0.005	0.100	0.920		1.97
Q3S3_Evaluation System	-0.074	0.075	-0.080	-0.992	0.322		4.34
Q3S4_Retirement System	0.013	0.055	0.013	0.242	0.809		1.97
Q3S5_Salary System	-0.099	0.061	-0.112	-1.636	0.103		3.12
Q3S6_Benefits System	0.066	0.053	0.065	1.231	0.219		1.87
Q3S7_Job Content	0.274	0.063	0.262	4.379	0.000	***	2.40
Q3S8_Job Evaluation Criteria	0.044	0.075	0.046	0.592	0.554		3.96
Q3S9_Working System	0.104	0.058	0.101	1.798	0.073		2.10
Q3S10_System for Responding to Employee	0.127	0.066	0.127	1.927	0.055		2.92

Dependent variable : Q1S7_Working Lively

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

The above table shows the result of multiple regression analysis for Q1S7. According to the table, Q3S7 is 0.1% significant and Q3S1 is 1% significant.

The following table shows the result of multiple regression analysis for Q1S8. According to the table, Q3S9 is 1% significant and Q3S6 is 5% significant.

Table 56. The result of multiple regression analysis for Q1S8_Happy

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	0.302	0.083		3.624	0.000		
Q3S1_ Recruiting System	0.040	0.058	0.037	0.695	0.487		1.71
Q3S2_Transfer System	0.003	0.057	0.003	0.054	0.957		1.97
Q3S3_Evaluation System	0.009	0.075	0.010	0.116	0.907		4.34
Q3S4_Retirement System	0.007	0.056	0.007	0.120	0.904		1.97
Q3S5_Salary System	-0.004	0.061	-0.004	-0.060	0.952		3.12
Q3S6_Benefits System	0.120	0.054	0.123	2.219	0.027	*	1.87
Q3S7_Job Content	0.109	0.063	0.108	1.719	0.086		2.40
Q3S8_Job Evaluation Criteria	0.016	0.076	0.017	0.214	0.831		3.96
Q3S9_Working System	0.144	0.058	0.146	2.484	0.013	**	2.10
Q3S10_System for Responding to Employee	0.063	0.067	0.066	0.947	0.344		2.92

Dependent variable : Q1S8_Happy

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

Table 57. The result of multiple regression analysis for Q1S9_Organizational Effectiveness

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	0.222	0.081		2.737	0.006		
Q3S1_ Recruiting System	0.279	0.056	0.259	4.946	0.000	***	1.71
Q3S2_Transfer System	0.005	0.055	0.005	0.085	0.933		1.97
Q3S3_Evaluation System	0.056	0.074	0.063	0.760	0.448		4.34
Q3S4_Retirement System	0.048	0.055	0.050	0.881	0.379		1.97
Q3S5_Salary System	-0.004	0.060	-0.004	-0.060	0.952		3.12
Q3S6_Benefits System	0.015	0.053	0.015	0.281	0.779		1.87
Q3S7_Job Content	0.090	0.062	0.091	1.464	0.144		2.40
Q3S8_Job Evaluation Criteria	-0.082	0.074	-0.089	-1.113	0.266		3.96
Q3S9_Working System	0.021	0.057	0.021	0.367	0.713		2.10
Q3S10_System for Responding to Employee	0.111	0.065	0.116	1.701	0.090		2.92

Dependent variable : Q1S9_Organizational Effectiveness

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

The above table shows the result of multiple regression analysis for Q1S9. According to the table, Q3S1 is 0.1% significant.

The following table shows the result of multiple regression analysis for Q1S10. According to the table, Q3S1 is 0.1% significant, Q3S7 and Q3S10 are 1% significant.

Table 58. The result of multiple regression analysis for Q1S10_Proprosperity of Society

	Non-standardized Coefficient		Standardized Coefficient	t value	p value	Statistical Significance	VIF
	B	Standard Error	Beta				
(constant)	0.352	0.080		4.411	0.000		
Q3S1_ Recruiting System	0.206	0.055	0.190	3.732	0.000	***	1.71
Q3S2_Transfer System	-0.009	0.054	-0.009	-0.168	0.866		1.97
Q3S3_Evaluation System	0.039	0.072	0.044	0.545	0.586		4.34
Q3S4_Retirement System	0.017	0.054	0.018	0.320	0.749		1.97
Q3S5_Salary System	-0.095	0.059	-0.111	-1.612	0.108		3.12
Q3S6_Benefits System	0.100	0.052	0.103	1.943	0.053		1.87
Q3S7_Job Content	0.195	0.061	0.194	3.220	0.001	**	2.40
Q3S8_Job Evaluation Criteria	-0.037	0.073	-0.040	-0.515	0.607		3.96
Q3S9_Working System	-0.007	0.056	-0.008	-0.133	0.894		2.10
Q3S10_System for Responding to Employee	0.187	0.064	0.195	2.925	0.004	**	2.92

Dependent variable : Q1S10_Proprosperity of Society

*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

We conducted a factor analysis of the Harvard Model's HR outcomes. The analysis method was the principal factor method, and the rotation method was Promax. The results are as follows and the score of Cronbach α is 0.899.

The results of multiple regression analysis and factor analysis are shown before. The following modifications were made to develop a structural understanding to derive hypotheses for the relationship between the HR system and HR outcomes and Long-term consequences. We hypothesized that they would be related as the same group because Q1S6, and Q1S7 has a significant relationship with Q3S1 and Q3S7. Q3S1 was 0.1% significant with Q1S4, Q1S5, and Q1S9. Q3S7 was 5% significant with Q1S4, Q1S5, and Q1S9. Therefore, it was considered that this was also related. Although there was a significant relationship with Q3S9 and Q3S6, Q1S8 was excluded because of its poor structural relationship with others.

Table 59. The result of factor analysis of HR Outcomes

HR Outcomes	Good Organizational Management	Working Happily and Lively	Growing and Working for Society with Responsibility
Q1S4_Cost Effectiveness	0.93	-0.04	-0.17
Q1S9_Organizational Effectiveness	0.63	0.01	0.17
Q1S5_Congruence	0.57	0.22	0.05
Q1S6_Working Happily	-0.02	0.93	0.00
Q1S7_Working Lively	0.04	0.83	0.06
Q1S2_Responsibility	-0.13	0.00	0.74
Q1S3_Growth	0.01	0.16	0.66
Q1S10_Prospersity of Society	0.33	-0.04	0.53

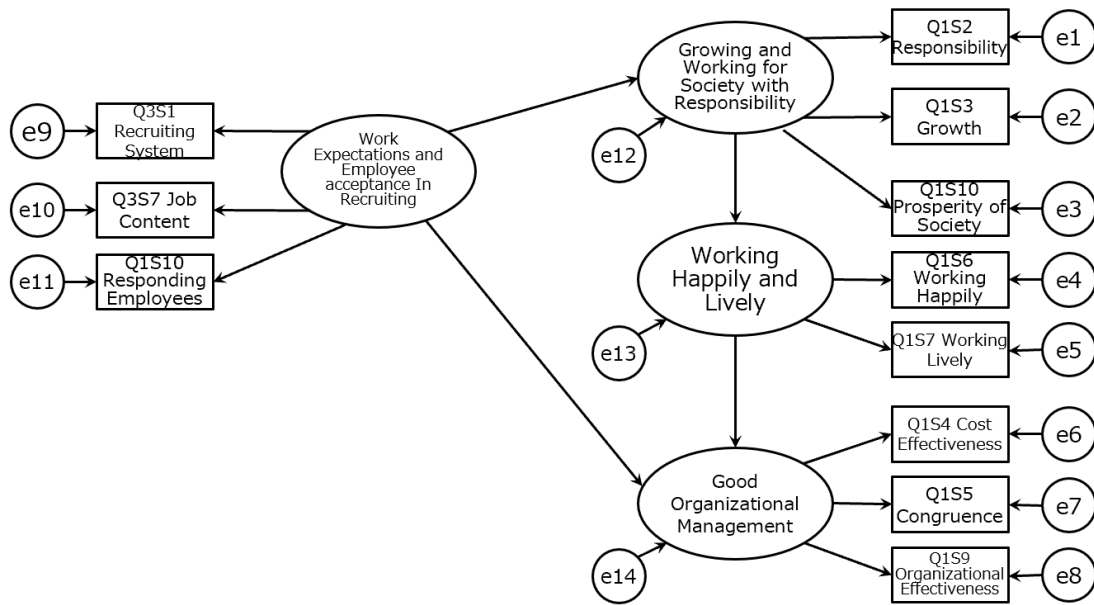


Figure 26. A hypothesis of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences

To confirm the validity of the structural hypotheses derived in the previous section, structural analysis of covariance was performed using SPSS AMOS 25.0. Model analysis. The result showed that the goodness of fit index was $GFI = .950$, $CFI = .965$, $RMSEA = .071$. Since RMSEA of 0.05 or less is considered good, and 0.10 is considered not good (Oshio, 2008), this model can be said to be at a level of goodness of fit that is neither good nor not good.

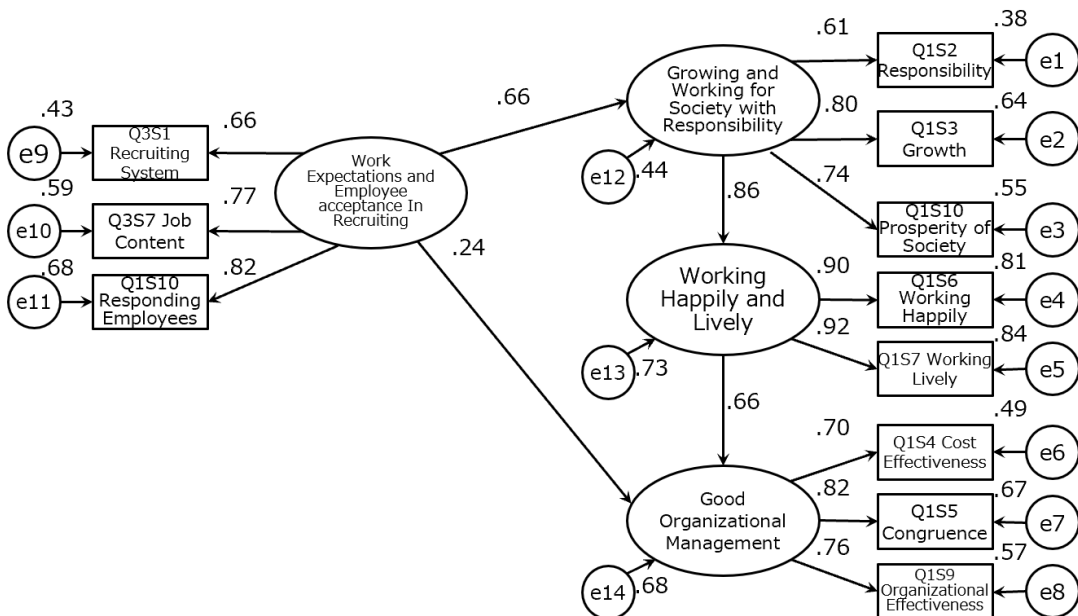


Figure 27. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for all employees in ICT industry.

The results of covariance structure analysis showed that, among HR Systems, “Expectation in the Recruiting” plays an important role in increasing HR Outcomes and Long-term Consequences. The structure is such that expectation in the recruiting increases the sense of responsibility of employees, which in turn contributes to capability growth. It was also found that “expectation in the recruiting” contributes to employees' happiness by enabling them to work happily and energetically. We also found a structural relationship between HR Outcomes and Long-Term Consequences. If we can work in a way that enables us to develop our abilities with a sense of responsibility, we can work happily and energetically. Therefore, designing HR Systems with a high level of employee satisfaction for expectation in the recruiting seems to be the best way to generate HR outcomes and long-term consequences.

In the original Harvard model, the four HRM Policy Choices, Employee influence, Human resource flow, Reward systems, and Work systems, were defined as Commitment, Competence, Congruence, and Cost effectiveness, respectively. The Harvard model shows that the four HRM Policy Choices of Employee influence, Human resource flow, Reward systems, and Work systems affect HR Outcomes such as Commitment, Competence, Congruence, and Cost effectiveness, and Long-term Consequences such as Individual well-being, Organizational effectiveness, and Societal well-being. However, the four HRMs are not the same. However, the analysis revealed that the four HRM Policy Choices do not have equal impact on HR Outcomes and Long-term Consequences. Since this survey was conducted on people who belong to Japanese companies, it can be said that different results were obtained due to differences in countries and cultures. In other words, for people working in Japan, the adjustment of expectations in the hiring process is the most important aspect of HRM, and it is important that there is no difference between the expectations and the actual situation after joining the company. The survey also revealed that if the expectations set during the hiring process remain the same after the employee joins the company, the employee will be able to work with a sense of responsibility, grow, and work happily and vigorously, and ultimately have a positive mental image of the management of the organization. The survey revealed that people who are happy and thriving at work, who are engaged and growing at work, and who ultimately have a positive mental image of their organization's management.

As I stated, I propose a method to define the priority of important HR systems based on statistical analysis. We would like to combine this method with a method of extracting problems and examine whether the transformation areas can be finally identified.

3.6 Step 4: To extract stakeholder perspectives

Step 4 is to share the results obtained in the process up to Step 3 with stakeholders and get feedback from their perspective. In this case, the stakeholders can be management, employees, or outside experts who are involved in decision making. In a functional test as I wrote, it was found that the system was effective for both employees of the same company and employees of different companies.

3.7 Step 5: To make decisions to improve the organizational architecture

After receiving the final feedback from the stakeholders in step 4, the organizational architecture is finally decided based on the evidence collected in the overall process. At this point, it is easier to get the stakeholders' approval if the decision is based on valid evidence for the issues that have been properly identified. After the final decision is made in Step 5, it is also important to prepare for implementation by further refining the details of the organizational architecture.

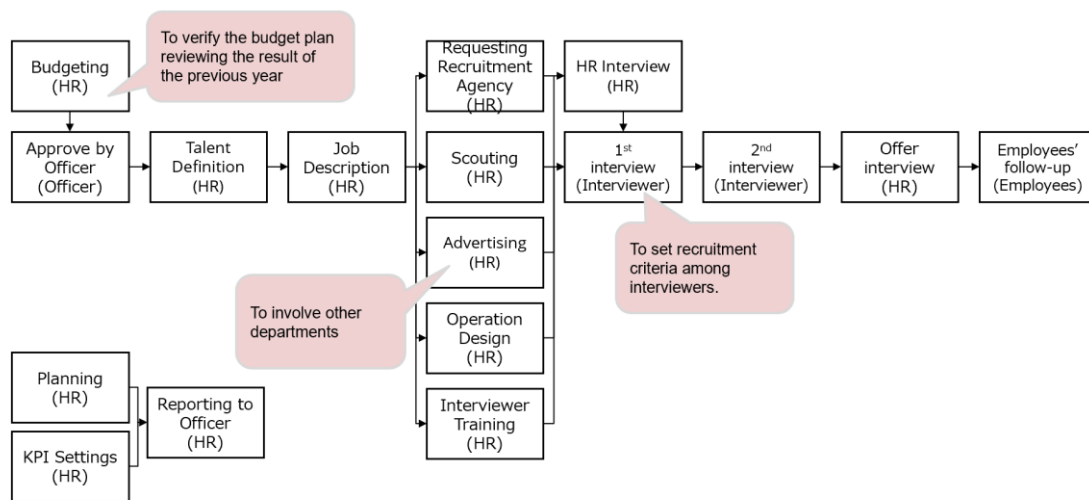


Figure 28. Improved Organizational Architecture

4. Verification and Validation of Entire Process

4.1 Overview of verification and validation

I conducted three case studies to verify and validate the methodology proposed in the previous section. In order to clarify the purpose and scope of each validation, I created the following figure based on human resource flow.

As shown in the following diagram, Case 1 is designing organizational architecture in the area of recruitment. Similarly, Case 2 covers onboarding area and Case 3 covers division area. In this way, I verified and validated the methodology in different target areas and companies in three cases. I will explain the results in the next section.

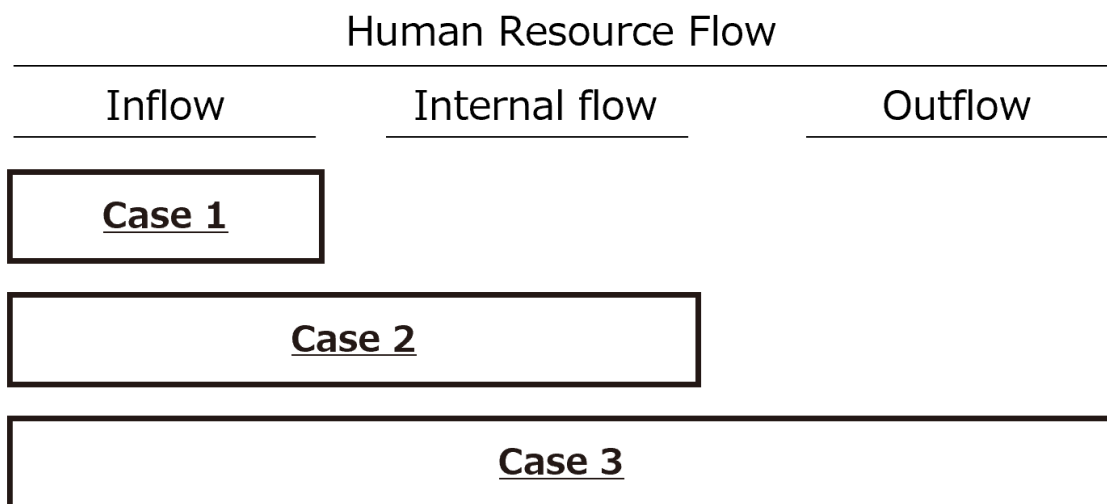


Figure 29. Overview of verification and validation

4.2 Case 1: Designing organizational architecture in the area of recruitment

In Case 1, I held a workshop and facilitated practitioners to design organizational architecture on Thursday, June 3, 2021, from 6:00 to 8:30 p.m. in the Zoom online format. The participants designed an organizational architecture in the area of recruitment. They were three HR professionals (one from a major company and two from a start-up). The evidence used in this case was the "White Paper on Employment 2021" published by the Shushoku Mirai Research Institute in March 2021. To improve efficiency, they used evidence and CMM. To improve flexibility, they used evidence on the theme of environmental adaptation for COVID-19, which arose last year. I will explain the details in the next section for each step.

4.2.1 Step 1: To identify issues for frontline staff

In this part, we describe the results conducted by a human resource employee of a major company who participated in the verification and validation session. As shown in the figure, he was able to identify issues for each of the frameworks presented. For example, such as those related to the process of strengthening the analytical skills of the person in charge, which was said to be important in another report, and the need for cross-departmental cooperation to prevent students from declining.

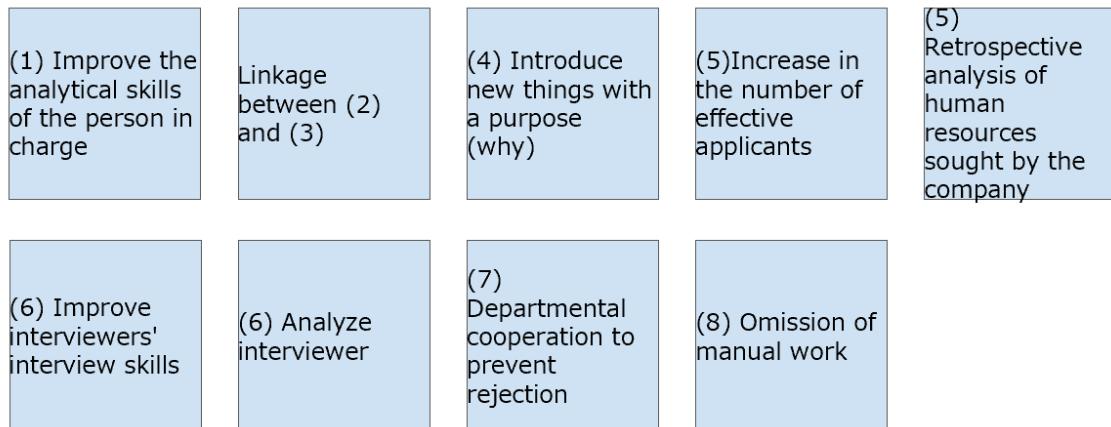


Figure 30. The result to identify issues for frontline staff

4.2.2 Step 2: To extract evidence of internal issues

Next, the participant determined the Organization Strategy and Management Type of the company to which he belonged. He also wrote down the architecture of the recruiting area and identify the maturity level using CMM to extract the issues.

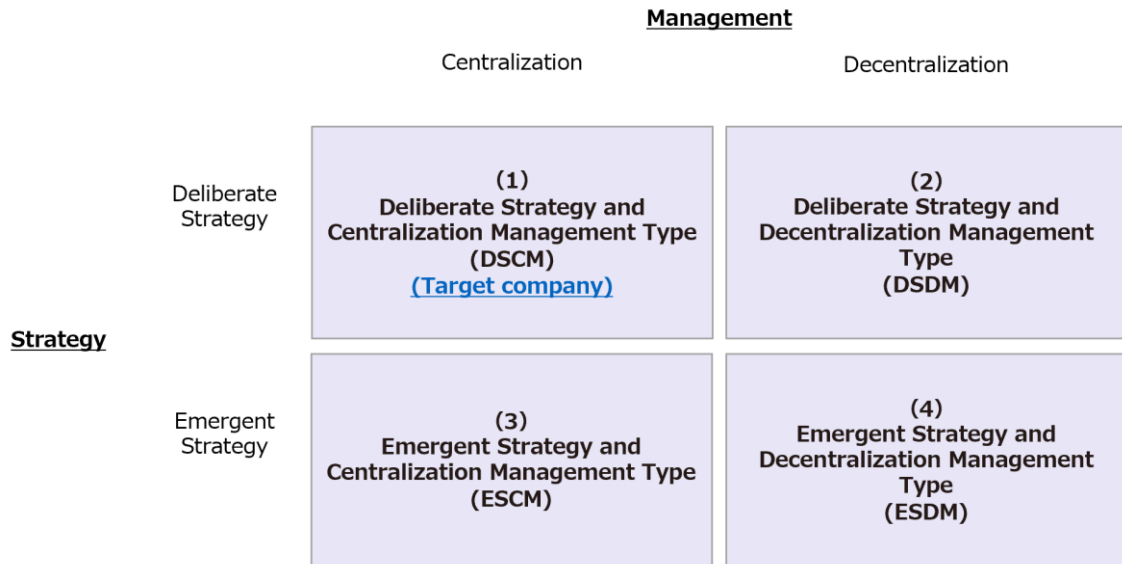


Figure 31. The result of Organization Strategy and Management Type

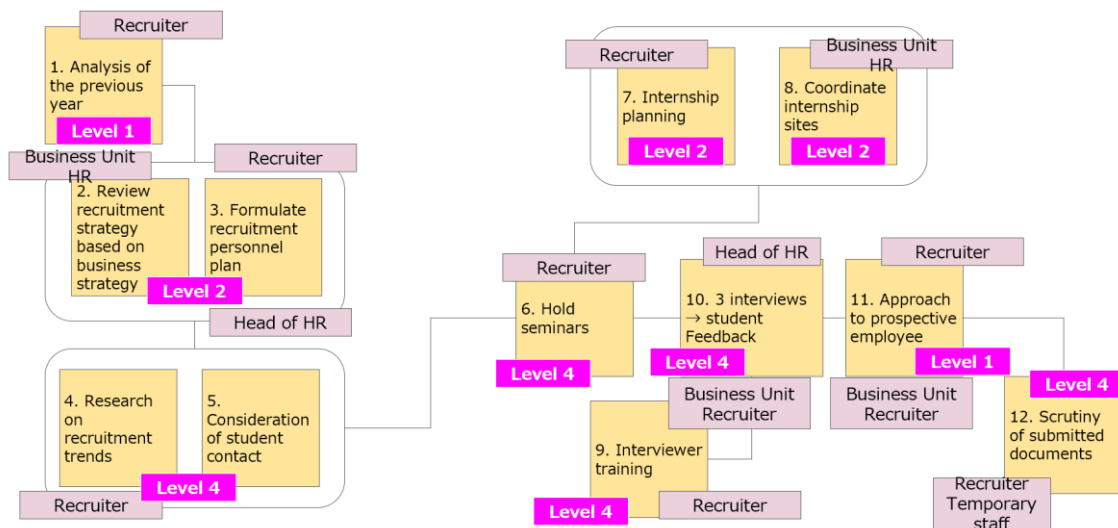


Figure 32. The result to extract evidence of internal issues

4.2.3 Step 3: To use of external evidence such as research and studies

Then, the participant looked at the report again and check it to utilize the evidence presented by the Shushoku Mirai Research Institute in "White Paper on Employment 2021" for the issues extracted.

4.2.4 Step 4: To extract stakeholder perspectives

In the next step, the participant explained the process he had implemented so far to external HR employees and received feedback from their perspective. This allowed him to look back at the organizational architecture objectively.



Figure 33. Stakeholder perspectives

4.2.5 Step 5: To make decisions to improve the organizational architecture

In the last step, the participant integrated the previous work and summarized the challenges and improvements in the organizational architecture. Thus, he was able to evolve into an improved organizational architecture.

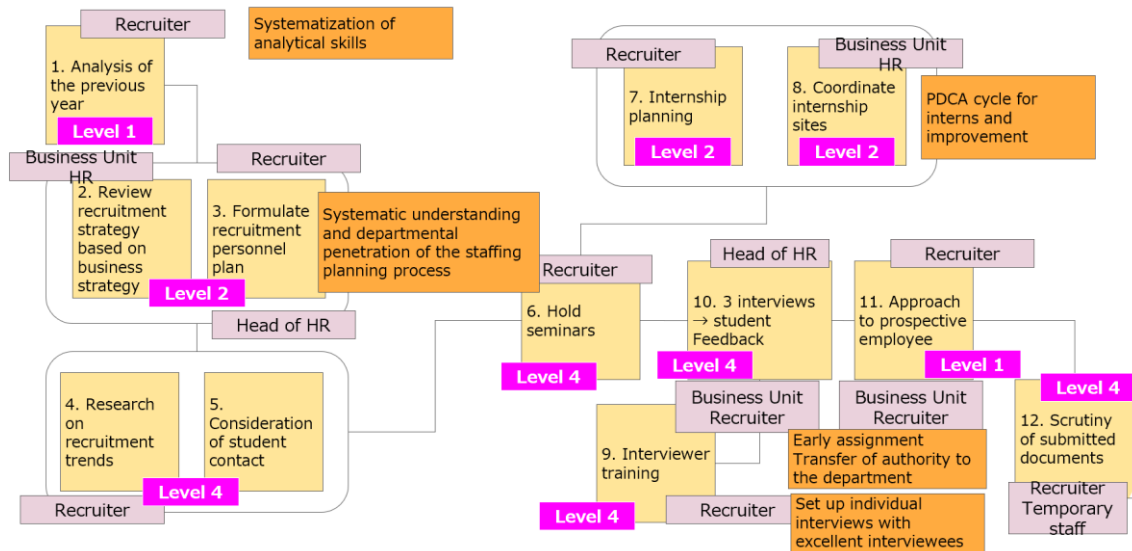


Figure 34. Improved Organizational Architecture

4.2.6 Survey Results and Discussion

Q. Do you think that using the Agile Organization Design method this time will help us to find a direction to solve problems while discovering issues and improve efficiency?

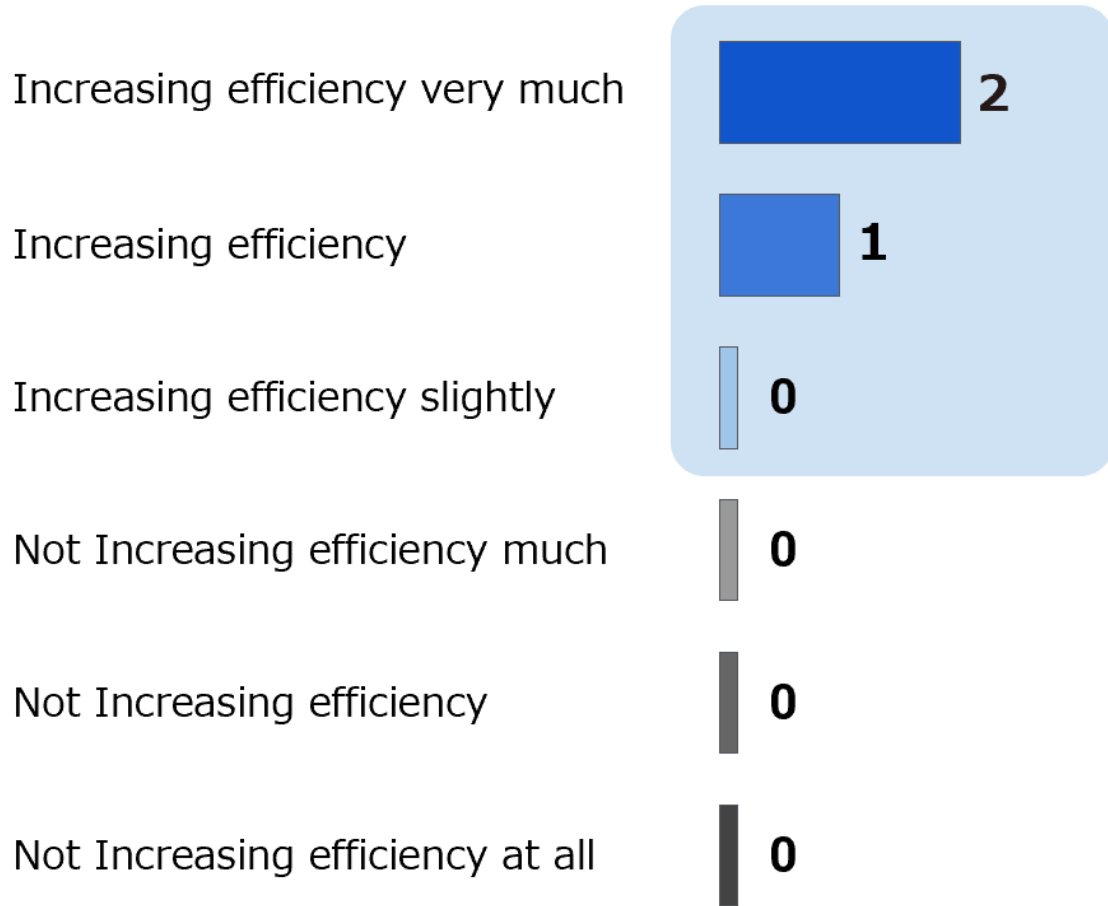


Figure 35. Result 1: Verification of efficiency

Comments from the survey are as follows.

- Because I was able to analyze who, what, and to what extent, in accordance with the procedure, by dividing the evaluation into different stages.
- The research results supported what I had been thinking and gave me confidence.
- I had never designed a process with clear intentions before, so I thought it would be easy to verify the effectiveness of the process since it is a concept that can be approached with an objective.

Q. Do you think it will be possible to increase flexibility by changing the organizational architecture drawn by Agile Organization Design this time?

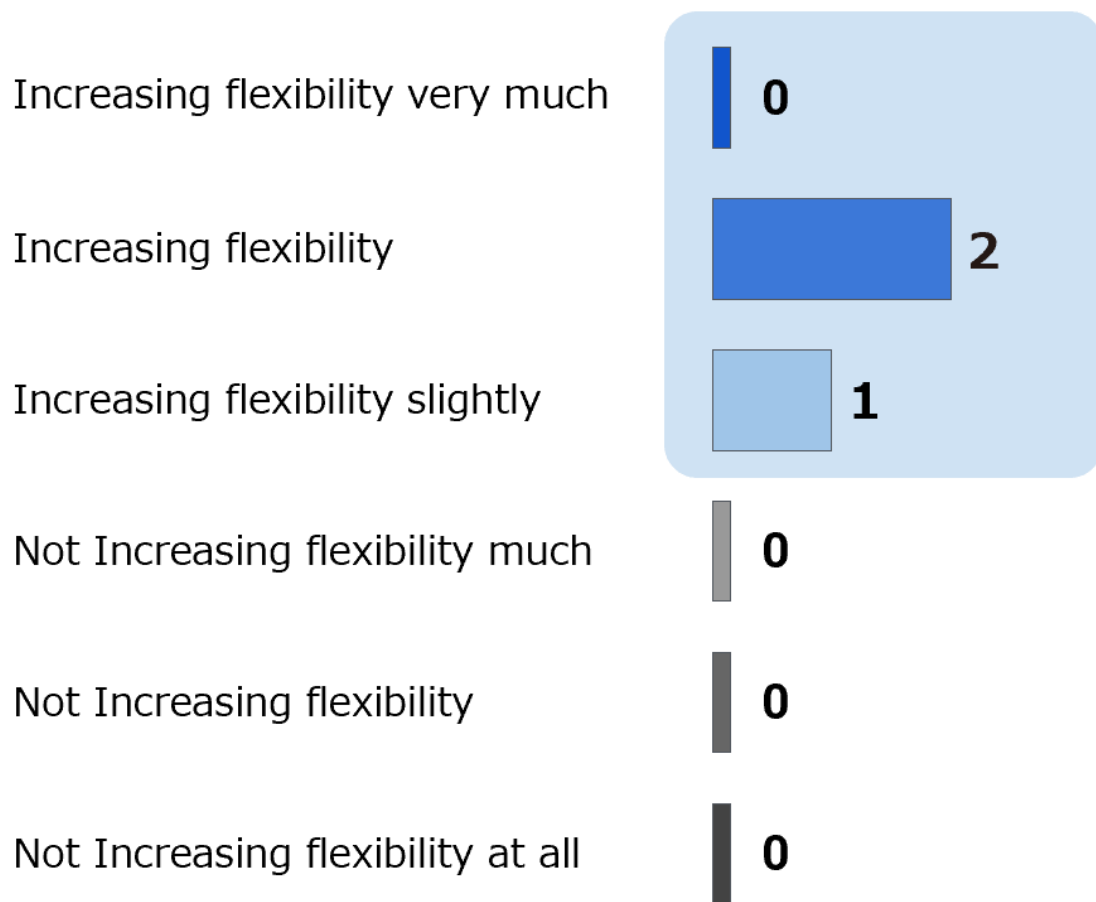


Figure 36. Result 2: Verification of flexibility

Comments from the survey are as follows.

- The PDCA cycle seems to be easy to implement because the process design clarifies the points to be reviewed.
- I am able to discuss by visualization
- Because we could understand the pain points in the process well.

Q. Do you think it is possible to increase the agility (efficiency and flexibility) of the organization by using the agile organization design methodology?



Figure 37. Result 2: Validation

Comments from the survey are as follows.

- I felt efficiency was high to begin with, but I could see that I was stuck in a success trap and that it was an opportunity to do the opposite.
- Because I can visualize it.
- It was good to learn specific approaches and ways of thinking.

Q. Do you think that the evidence collected by the Agile Organization Design will help to increase the agility (efficiency and flexibility) of the organization?



Figure 38. Result 2: Effectiveness of evidence

Comments from the survey are as follows.

- In particular, I realized that evidence-based explanations are one way to break through to increase flexibility.
- I felt visualization is important.
- It seems to take a long time to incorporate into measures and to see results, so it seems difficult to implement PDCA.

4.3 Case 2: Designing organizational architecture in the area of onboarding

In Case 2, I collaborated a listed company to design the organizational architecture for the onboarding area at the company from October 2020 to June 2021. The employees of the company designed an organizational architecture in the area of on-boarding. They were 14 employees who are recruiter, training officer, head of the business unit to which the employee is assigned, director, new employees. The evidence used in this case was the research papers in on-boarding. To improve efficiency, they used evidence and CMM. To improve flexibility, they used evidence on the theme of environmental adaptation for COVID-19, which arose from last year. I will explain the details in the next section for each step.

4.3.1 Step 1: To identify issues for frontline staff

In this part, I describe the results conducted by the employees of a listed company. As shown in the figure, they were able to identify issues through semi-structured interviews. In constructing the interview items, I referred to the transition theory, which is divided into three phases: Ends, Neutral zone, and New beginning. (Bridges et al., 2004) I listed the interview items created based on transition theory below.

1. What do you think are the factors that prevent new employees in your organization from adapting to the organization?
2. What do you think are the factors that inhibit stretching (further challenge and growth) after organizational adaptation?
3. What do you think are the issues that hinder organizational adaptation and stretching before joining the company (during the period before joining a company)? What kind of "purpose of work" and "company's expectations" do you think should be set at the time of joining the company?
4. What do you think are the issues that hinder organizational adaptation and stretching in new employee training?
5. What do you think are the issues that hinder organizational adaptation and stretching in post-employment (post-assignment)?

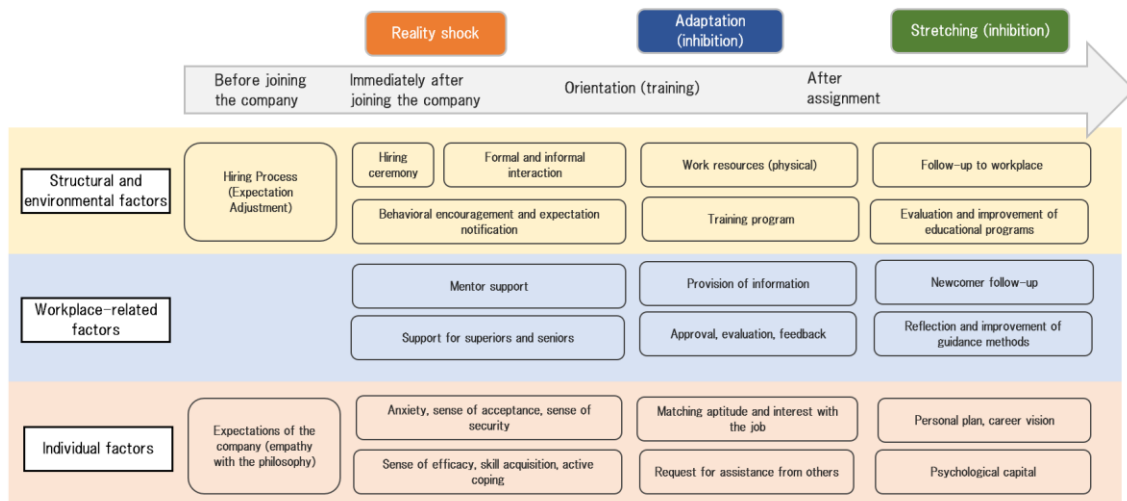


Figure 39. The result to identify issues through interviews

We recorded the interviews, transcribed all of them into text, and conducted the M-GTA. The results are above.

To examine the details of the psychological state of the new employees, we also transcribed the emotional curves and what happened at that time in chronological order. In addition, we extracted where and what issues were found.

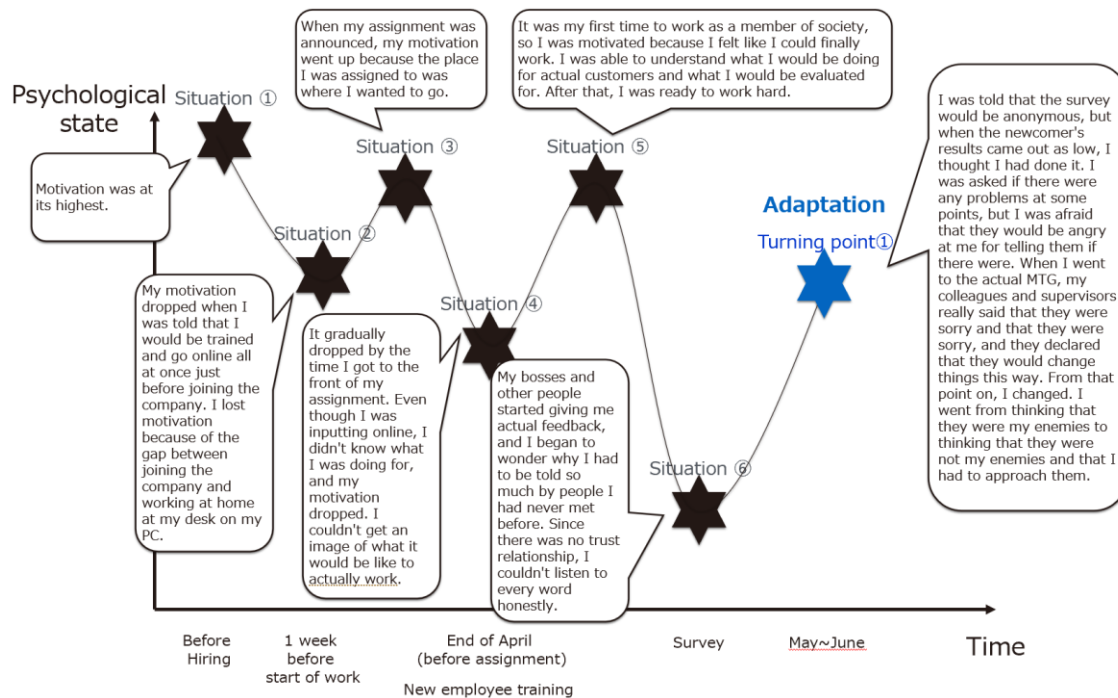


Figure 40. The result of emotional curve of new employee A through interview

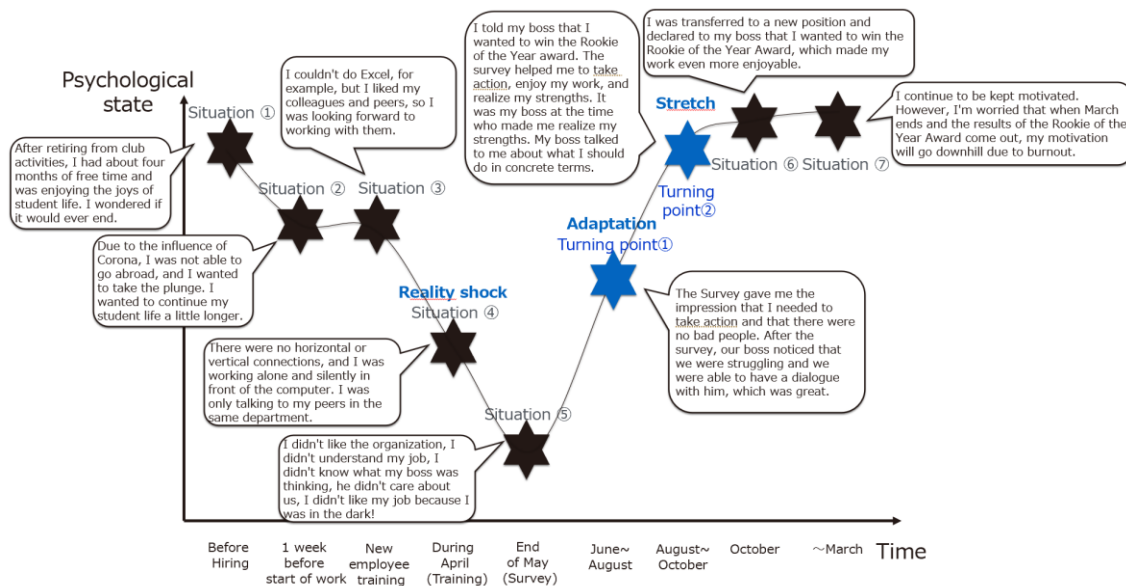


Figure 41. The result of emotional curve of new employee B through interview

4.3.2 Step 2: To extract evidence of internal issues

Next, the employees of the company determined the Organization Strategy and Management Type. They also structured the architecture of on-boarding area and identify the maturity level using CMM to extract the issues.

		Management	
		Centralization	Decentralization
Strategy	Deliberate Strategy	(1) Deliberate Strategy and Centralization Management Type (DSCM)	(2) Deliberate Strategy and Decentralization Management Type (DSDM) <i>(Target company)</i>
	Emergent Strategy	(3) Emergent Strategy and Centralization Management Type (ESCM)	(4) Emergent Strategy and Decentralization Management Type (ESDM)

Figure 42. The result of Organization Strategy and Management Type

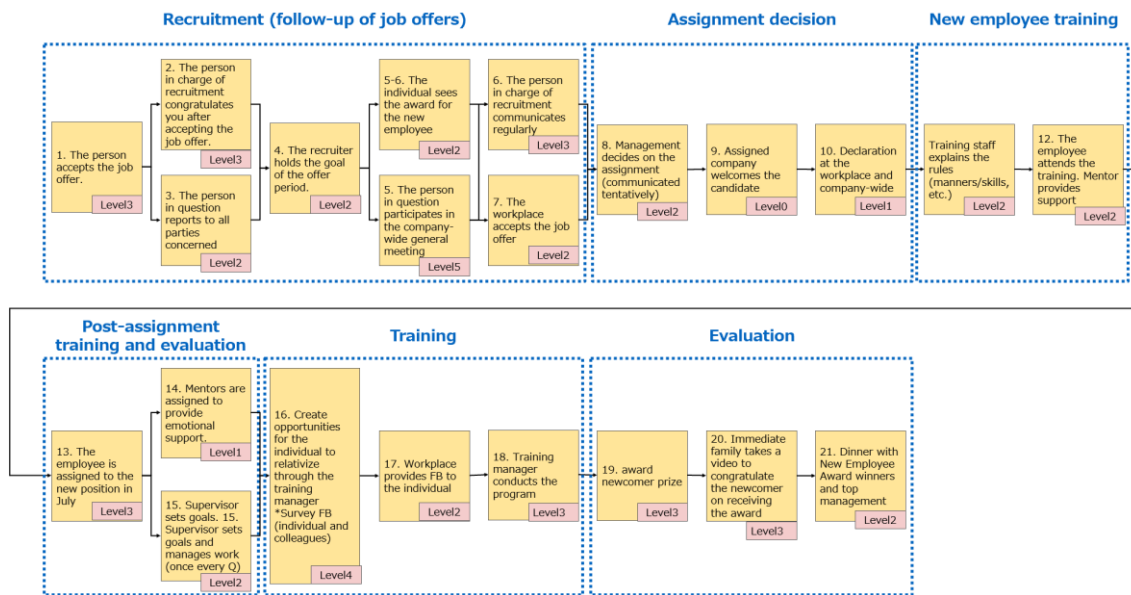


Figure 43. The result to extract evidence of internal issues

4.3.3 Step 3: To use of external evidence such as research and studies

Then, the employees looked at the research papers and check it to utilize the evidence presented in on-boarding area. For example, Koyama stated cognitive processes after reality shock in organizational socialization (Koyama, 2014). Nagata clarified the importance of the process of beginning to support growth by "Understanding the situation and providing psychological reassurance" and "Sharing expectations". (Nagata, 2021) Onodera found out that it was important to "To request the support of supervisors". (Onodera, 2021)

4.3.4 Step 4: To extract stakeholder perspectives

In the next step, the new employees confirmed the result of organizational architecture designed in on-boarding area and gave feedback from their perspective.

Results of A's perspective				Results of B's perspective				
5. it didn't work well because the purpose of participating in the General Assembly was not known.	5. communicating the purpose and expectations of what will happen if you participate	5. on the contrary, even if expectations are raised at the general meeting, motivation goes down when the assignment is different	6. did not function well because information was not shared between mentors and recruiters and their roles were unclear	A mentor should be someone who understands your work as well as your aptitude.	I only knew the job of the person in charge, so I thought I would do that. It's good to have the opportunity to meet people from different professions.	There should be an unofficial job offer period. Two of my classmates went to other companies.	I wanted a mentor at the company I was assigned to.	It would have been nice if information was shared and my boss knew who I was.
14. I was able to express my vague concerns to my mentor, but I got the impression that he was an individual.	I feel that there is little organizational love. People at work felt like an online connection, a social networking connection	Covid-19 disaster makes the sense of belonging thin. I was not motivated to contribute to the same organization.	If we were in an office, we would have gotten excited about each contract win and felt a sense of realism in reaching our goals.	The post-assignment training was very meaningful in that I could see what my peers around me were doing.	At first, I was tied to the idea that I had won the award. I was troubled by the curse of "I must not make a mistake" and "I must produce value.	I didn't feel like I was a part of the organization. There was a welcoming atmosphere, but remote drinking parties were held.	Feedback varied from workplace to workplace, but I feel that there is no need to be too uniform. It was good to be able to talk frankly, not in a format.	There is a lot of variation in the way workplace support is provided. It would be better to standardize it.
I think it would have been easier to onboard in the Corona disaster if there were opportunities to learn kata and other skills.	I couldn't learn manners and rules that were not explicitly stated.	I was not able to learn by watching, such as where the elevators were located. It would have been nice if these things had been made into knowledge.	Experiencing the same painful experiences in a real environment and overcoming them together creates a sense of trust and unity.	The letter from the supervisor at the post-placement training was very good.	It is important to communicate the importance and background of quantitative and qualitative goals (stretch).	Depending on how much you want to win the Rookie of the Year Award, the way you perceive the post-assignment training will be different.		

Figure 44. New employees' perspectives

4.3.5 Step 5: To make decisions to improve the organizational architecture

In the last step, the employees integrated the previous work and summarized the challenges and improvements in the organizational architecture. Thus, they were able to evolve into an improved organizational architecture.

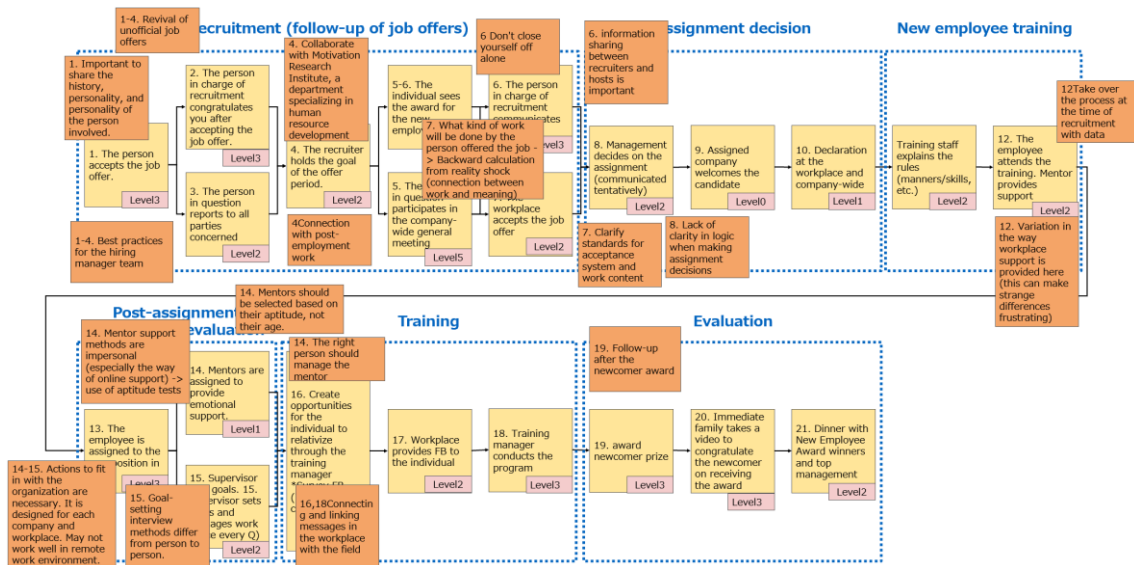


Figure 45. Improved Organizational Architecture

4.3.6 Survey Results and Discussion

Q. Do you think that using the Agile Organization Design method this time will help us to find a direction to solve problems while discovering issues and improve efficiency?

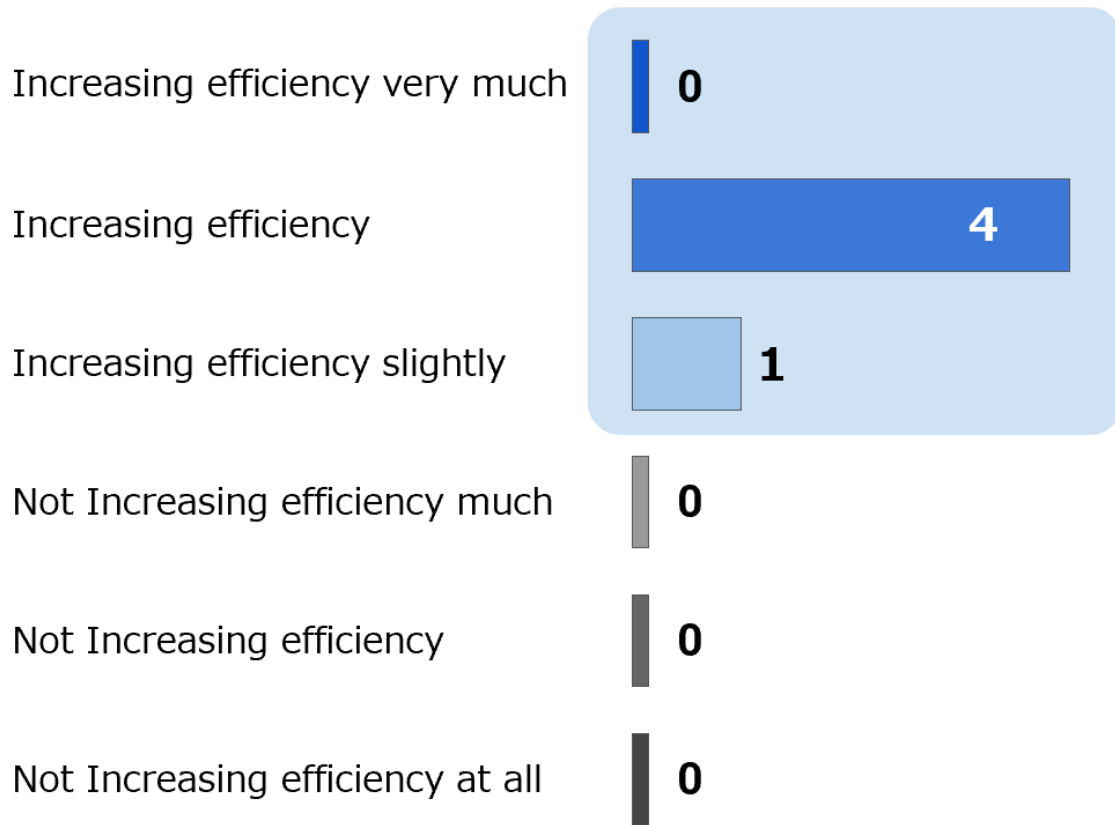


Figure 46. Result 1: Verification of efficiency

Comments from the survey are as follows.

- It is meaningful for different stakeholders to be able to share their opinions at the same time using a common set of criteria.
- Because the steps are standardized, it is easy to discuss the issues without blurring the lines between them.
- I found the idea of "maturity" to be very useful in making improvements.
- Rather than saying that the method is "good," I felt that we can find ways to improve when we put it on the table.
- It became clear to me which measures are the center pin for the success of the main objective of onboarding.

Q. Do you think it will be possible to increase flexibility by changing the organizational architecture drawn by Agile Organization Design this time?

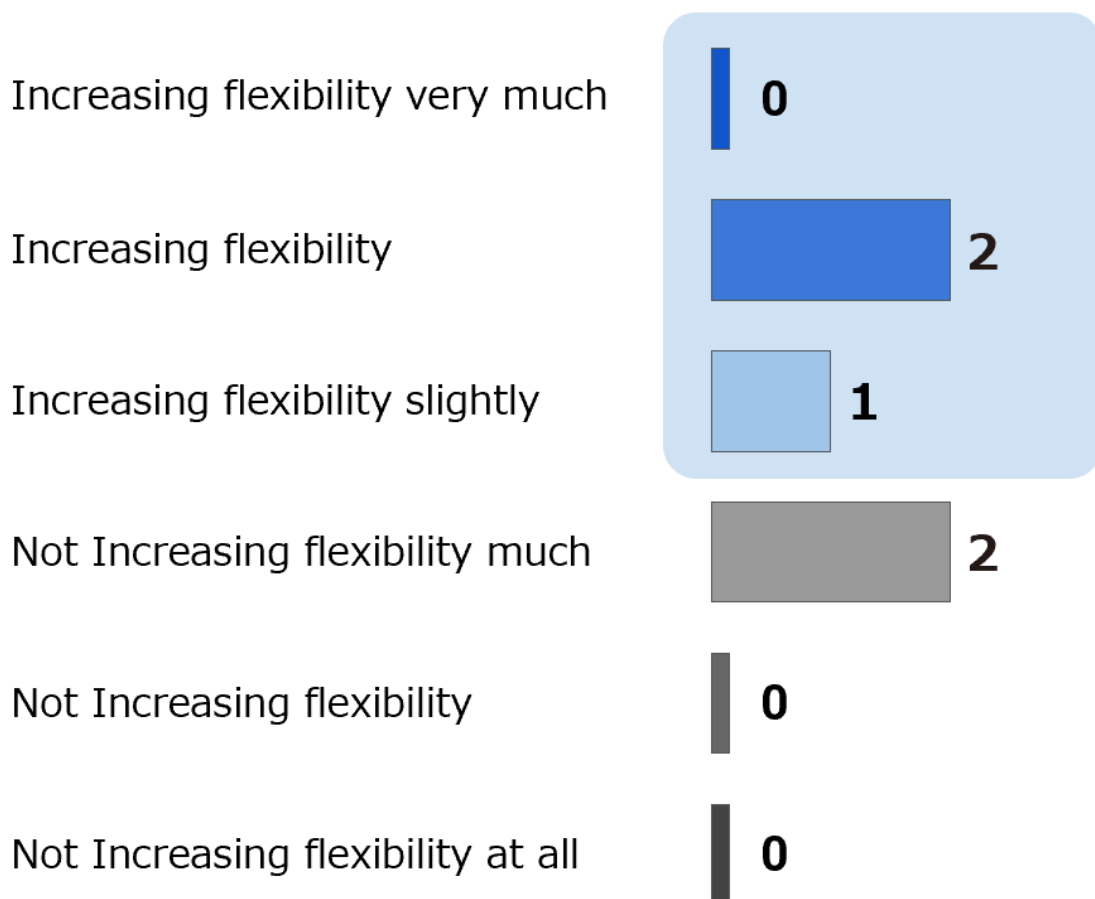


Figure 47. Result 2: Verification of flexibility

Comments from the survey are as follows.

- It is meaningful for different stakeholders to be able to share their opinions at the same time using a common set of criteria.
- I'm not sure I have a clear picture yet!
- Because I recognized that the key is to control the maturity level of the process.
- There seems to be a big gap between "I was able to share my vision" and "I was able to solve the problem."
- I thought it was meaningful that the people with the most hands-on experience got together and discussed the issues rather than the methods.

Q. Do you think it is possible to increase the agility (efficiency and flexibility) of the organization by using the agile organization design methodology?

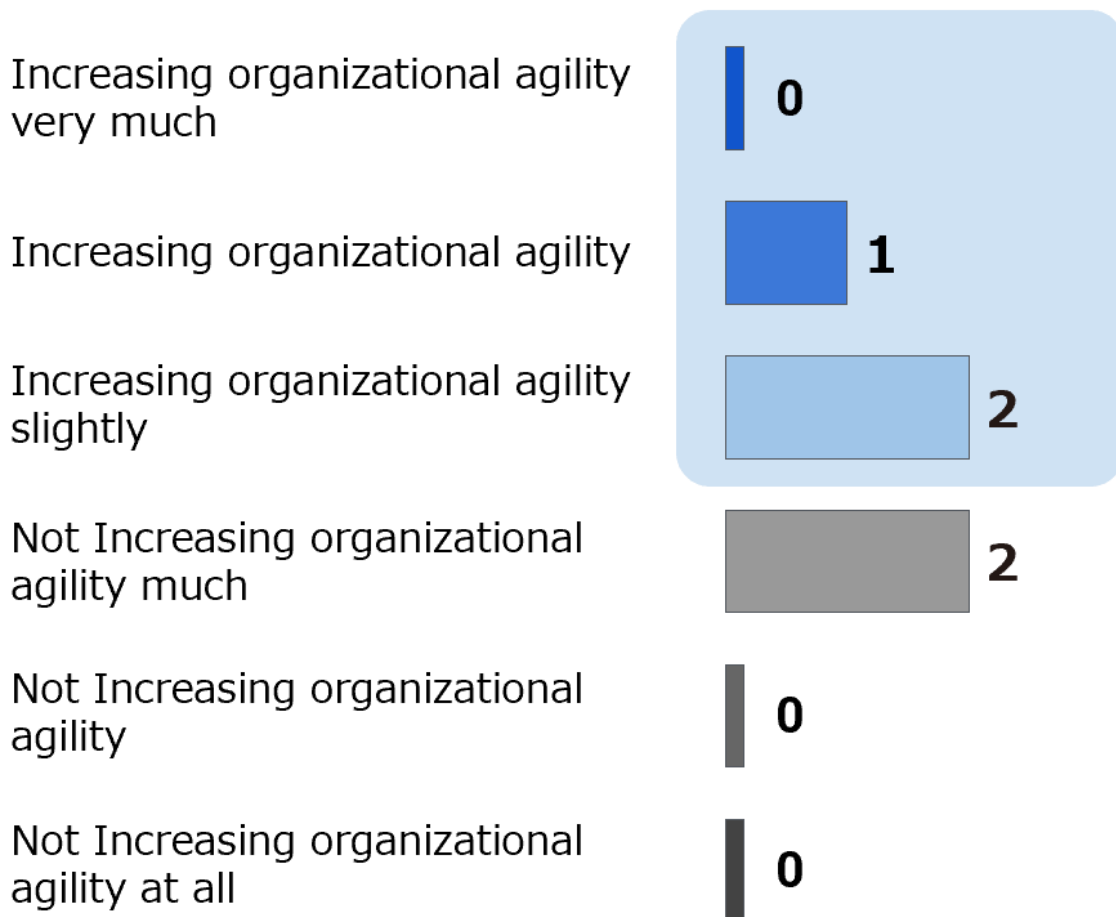


Figure 48. Result 2: Validation

Comments from the survey are as follows.

- It is meaningful for different stakeholders to be able to share their opinions at the same time using a common set of criteria.
- Because the image is not yet clear.
- Because the definition and scope were not specified, so it was unclear whether it was comprehensive or not.
- It seems that we cannot have a real value.

Q. Do you think that the evidence collected by the Agile Organization Design will help to increase the agility (efficiency and flexibility) of the organization?



Figure 49. Result 2: Effectiveness of evidence

Comments from the survey are as follows.

- It is meaningful for different stakeholders to be able to share their opinions at the same time using a common set of criteria.
- Because it gave me a hint on how to identify what needs to be done.
- Because the definition and scope were not specified, so it was unclear whether it was comprehensive or not.
- It seems that we cannot have a real value.

4.4 Case 3: Designing organizational architecture in the area of two divisions

In Case 3, I collaborated a technology company to design the organizational architecture for the entire human resource flow area of two division at the company from March 2021 to June 2021. The employees of the company designed an organizational architecture in the area of human resource flow of two division. They were 5 employees who are a president, a business unit leader, human resources staff, field staffs. The evidence used in this case was the research papers in human resource flow. To improve efficiency, they used evidence and CMM. To improve flexibility, they used evidence through scenario planning. I will explain the details in the next section for each step.

4.4.1 Step 1: To identify issues for frontline staff

In this part, I describe the results conducted by the employees of a technology company. As shown in the figure, they were able to identify issues through semi-structured interviews. In constructing the interview items, I referred to the Schein's theory, which is divided into three parts: vertical movement, horizontal movement, and center movement. (Schein, 1978) In addition, I referred to DX at Work (Kagami, 2020) I listed the interview items created based on transition theory below.

1. What are the current issues in Division A and Division B?
2. What are the current issues in Division A and Division B in terms of retirement and transfer patterns?
3. What are the challenges in terms of GAFA work style in Division A and Division B?
4. What are the challenges in terms of service-oriented teams in Division A and Division B?
5. What are some of the issues in terms of organizational processes in Division A and Division B?

We wrote the interview up, . The results are in the following figure.

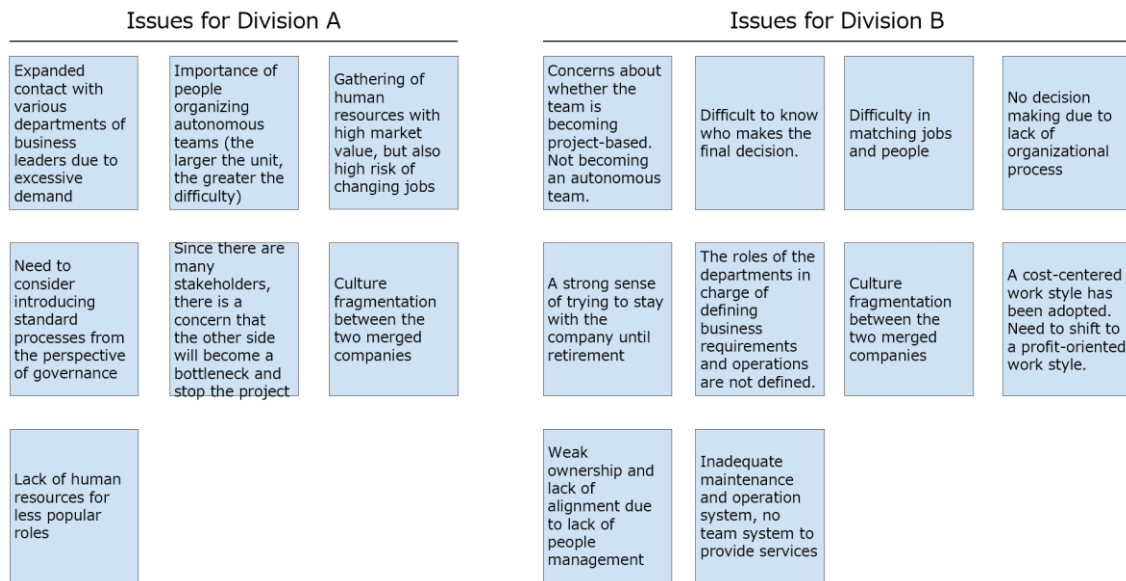


Figure 50. The result of interview

4.4.2 Step 2: To extract evidence of internal issues

Next, the employees of the company determined the Organization Strategy and Management Type. They also structured the architecture of on-boarding area and identify the maturity level using CMM to extract the issues.

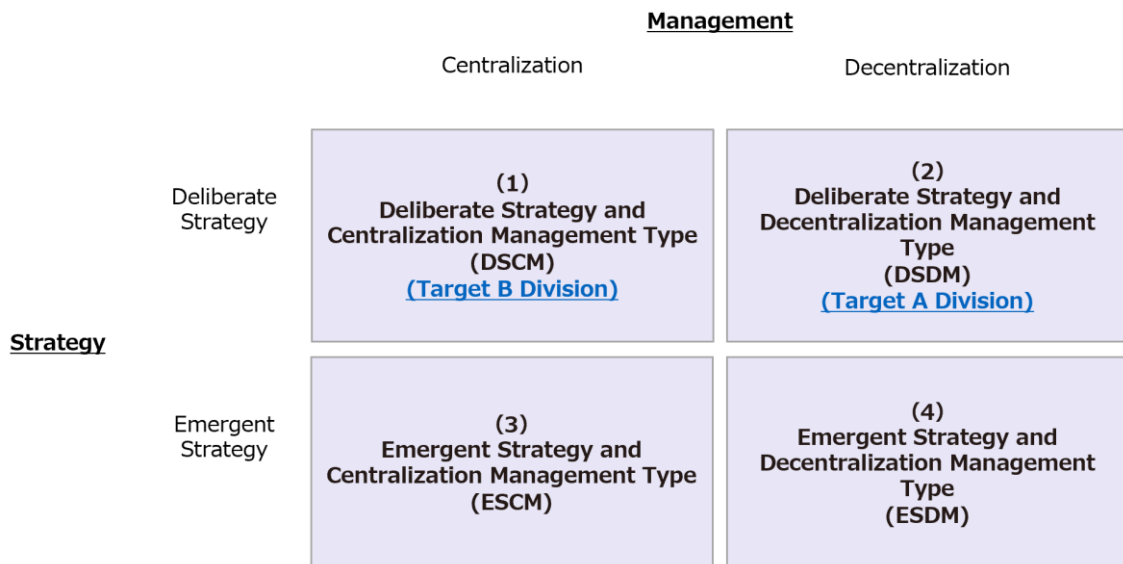


Figure 51. The result of Organization Strategy and Management Type

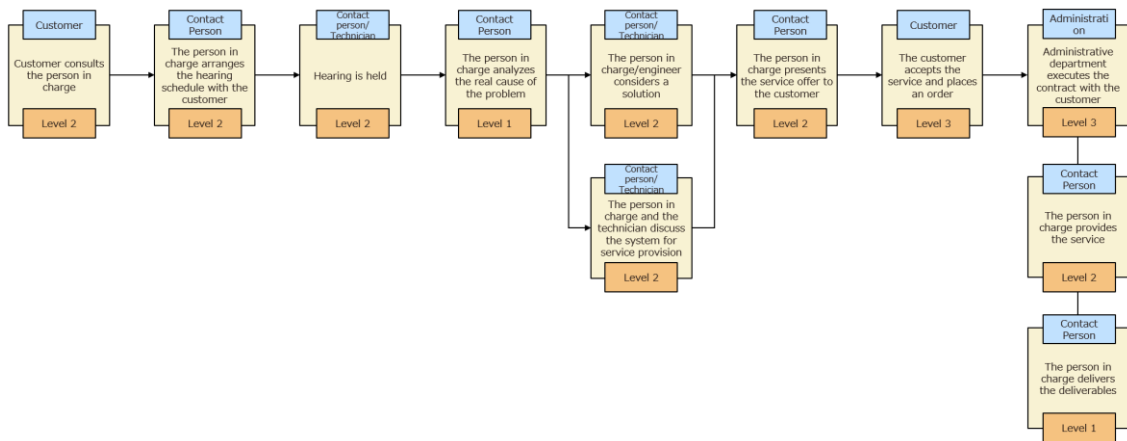


Figure 52. The result to extract evidence of internal issues of Division A

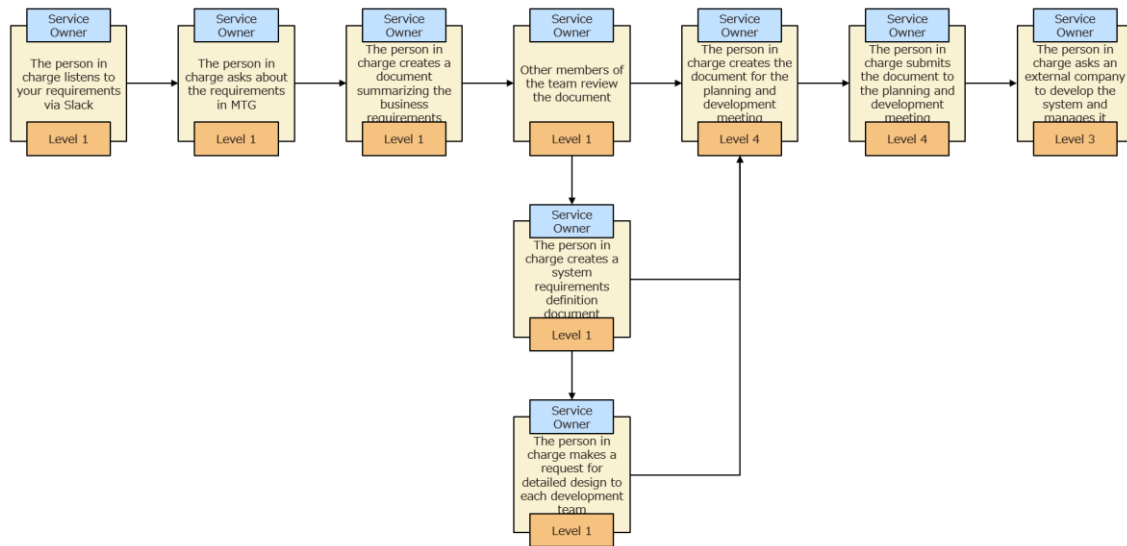


Figure 53. The result to extract evidence of internal issues of Division B

4.4.3 Step 3: To use of external evidence such as research and studies

Then, the employees looked at the research papers and check it to utilize the evidence presented in human resource flow area. For example, Yamamoto stated the concepts of promotion management, placement management, and job management to achieve vertical career development, horizontal career development, and centrality career development. (Yamamoto, 2002)

In addition, the employees extract risk factors and four cases in the future through scenario planning based on the steps Tezuka presented (Tezuka, 2020). The result of scenario planning is as follow.

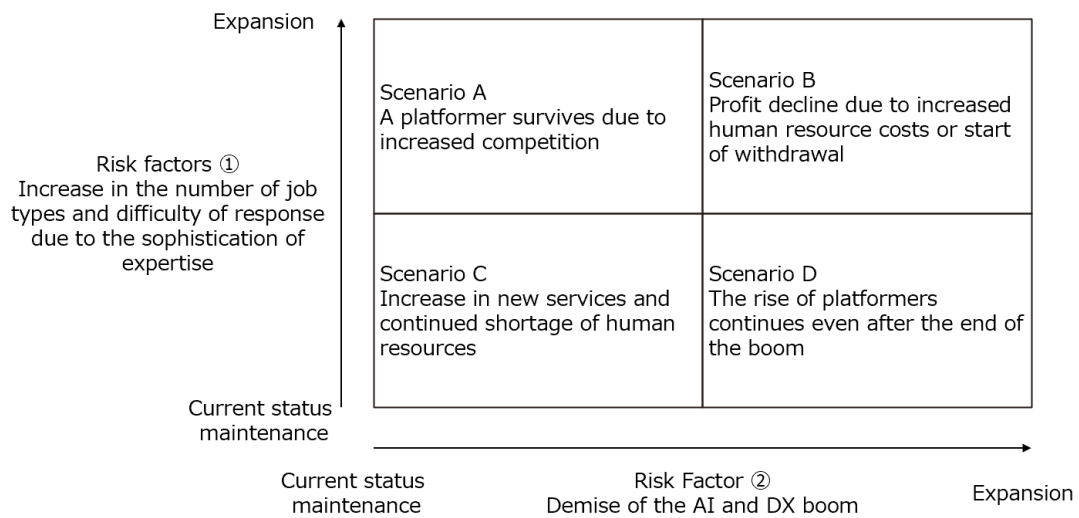


Figure 54. The result of scenario planning

4.4.4 Step 4: To extract stakeholder perspectives

In the next step, two field managers for each divisions confirmed the result of organizational architecture and gave feedback from their perspective.

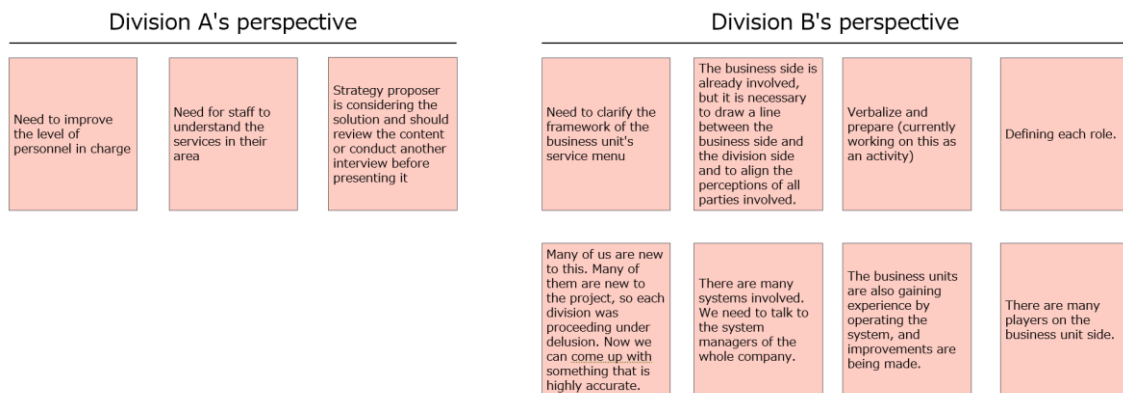


Figure 55. two employees' perspectives

4.4.5 Step 5: To make decisions to improve the organizational architecture

In the last step, the employees integrated the previous work and summarized the challenges and improvements in the organizational architecture. Thus, they were able to evolve into an improved organizational architecture.

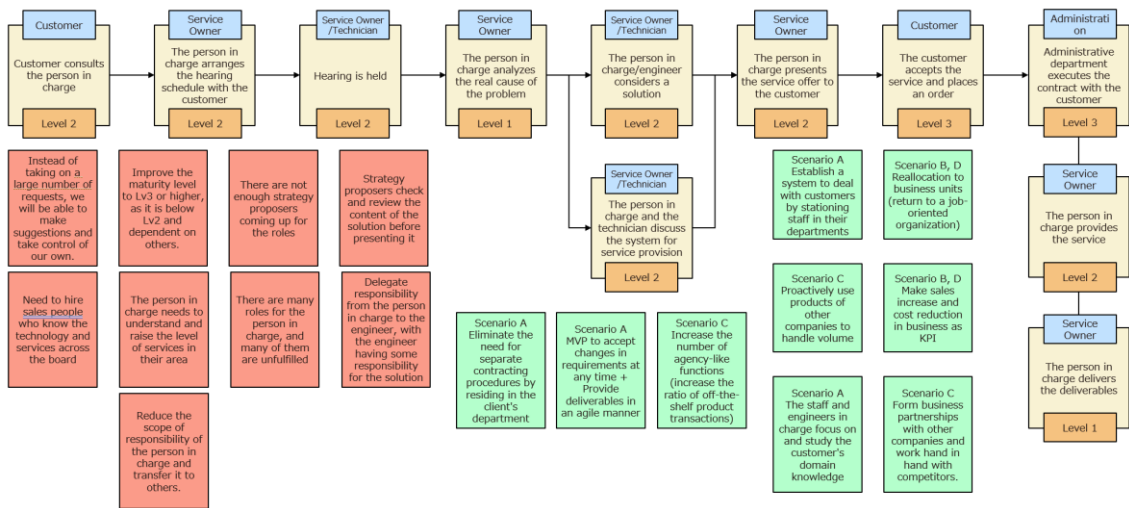


Figure 56. Improved Organizational Architecture of Division A

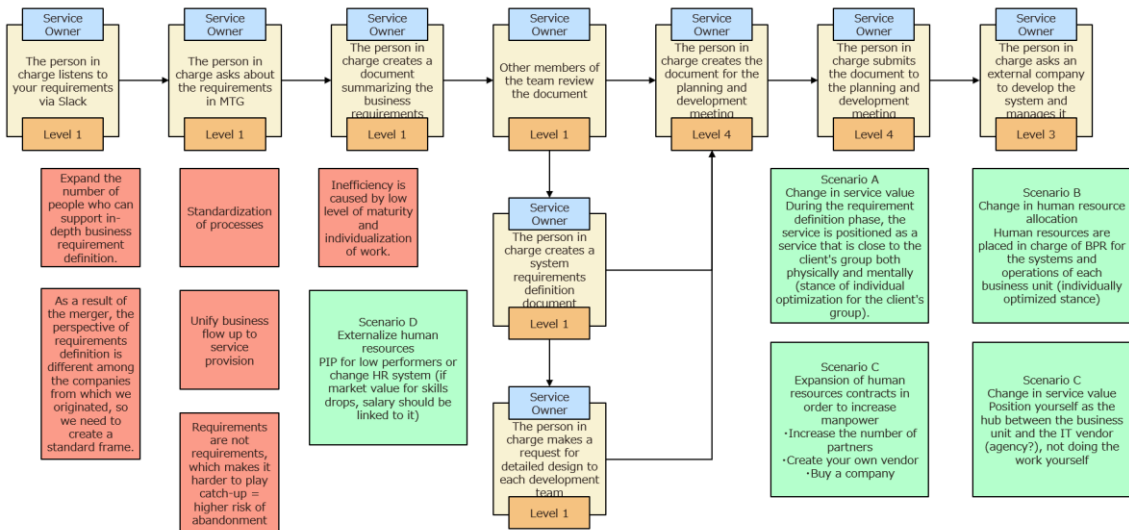


Figure 57. Improved Organizational Architecture of Division B

4.4.6 Survey Results and Discussion

Q. Do you think that using the Agile Organization Design method this time will help us to find a direction to solve problems while discovering issues and improve efficiency?

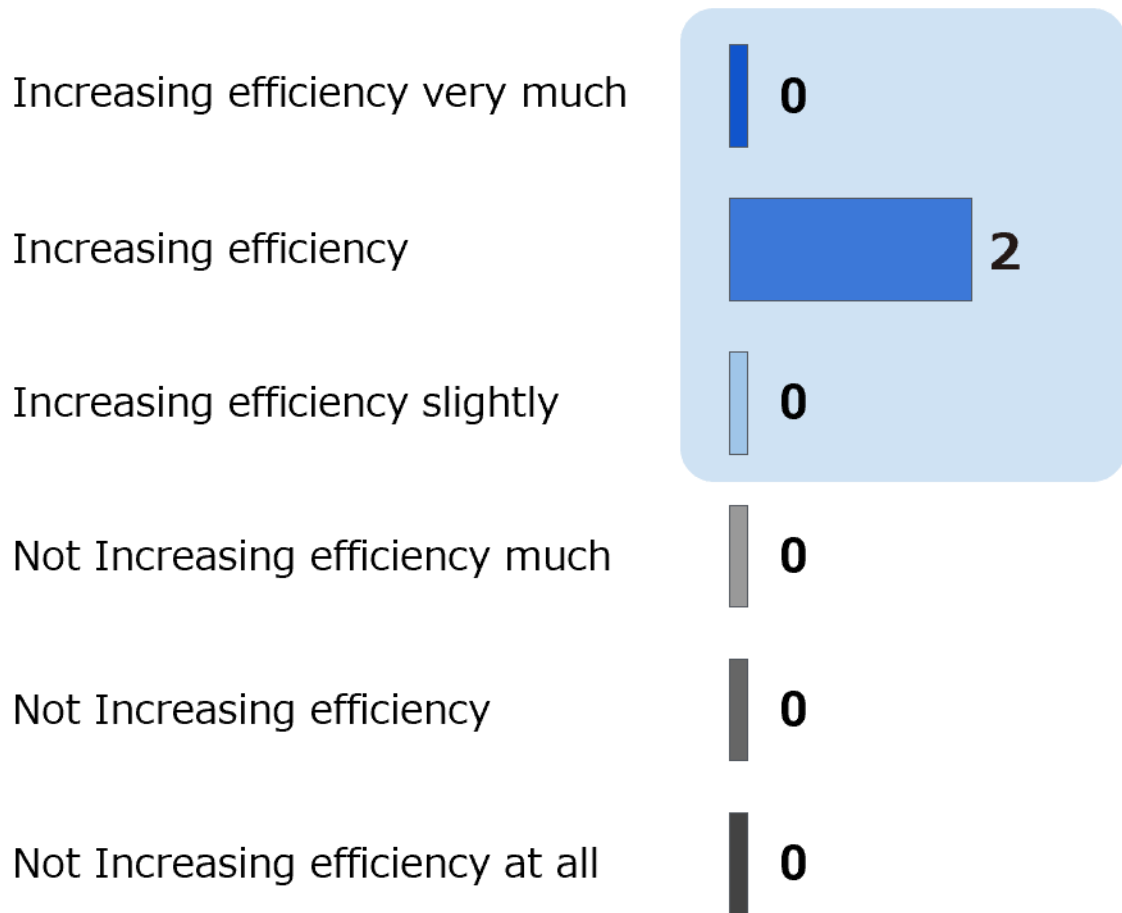


Figure 58. Result 1: Verification of efficiency

Comments from the survey are as follows.

•I thought it was very useful as an approach, because I thought that if we follow the method you proposed, issues would be revealed without hesitation. If I had to pick one, I would say that the final product would depend on whether or not the interviewees had business skills, domain literacy, and essential problem-solving skills, especially with regard to the external environment analysis (PEST, 5Froce) and scenario planning. External environment analysis (PEST, 5Froce) → I thought it would be better if I could suggest, even briefly, what requirements would be ideal for people who can talk about scenario planning.

•I have not yet been able to visualize how to incorporate this issue identification and next action into the improvement cycle (in the operation). Therefore, I can always identify issues and measures, but I cannot imagine the continuity.

Q. Do you think it will be possible to increase flexibility by changing the organizational architecture drawn by Agile Organization Design this time?

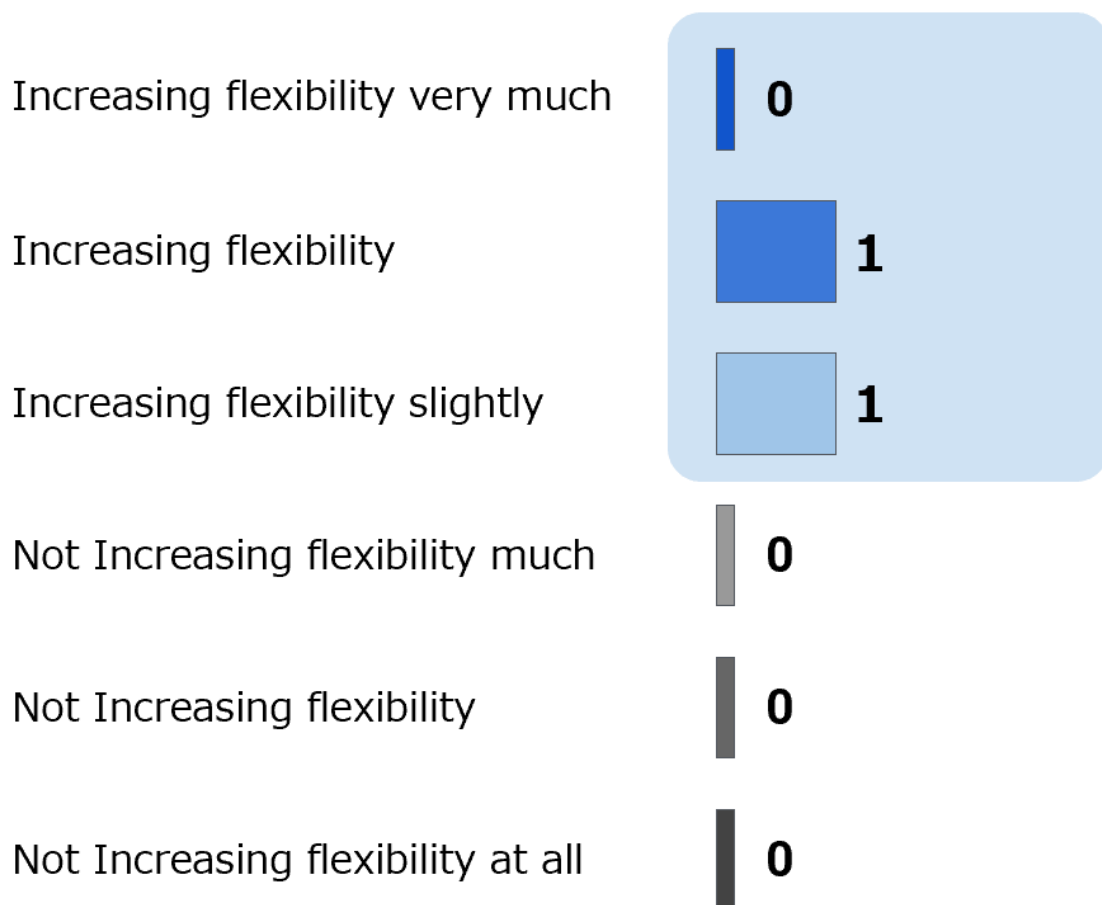


Figure 59. Result 2: Verification of flexibility

Comments from the survey are as follows.

•In this process, I think it will be a solution to a problem that is close to the current organization and business (⇔ change in organizational architecture), so I thought it would be highly flexible from that perspective. In addition, by implementing this process on a regular basis, such as once a year or once every six months, I think it will be possible to solve the organizational issues of the time, and if the implementation of this process itself can be firmly established in the organization, it will become an organization with a high degree of flexibility in solving organizational issues.

•I was not aware of flexibility, but now that it is visualized, I can consider measures from the perspective of flexibility.

Q. Do you think it is possible to increase the agility (efficiency and flexibility) of the organization by using the agile organization design methodology?

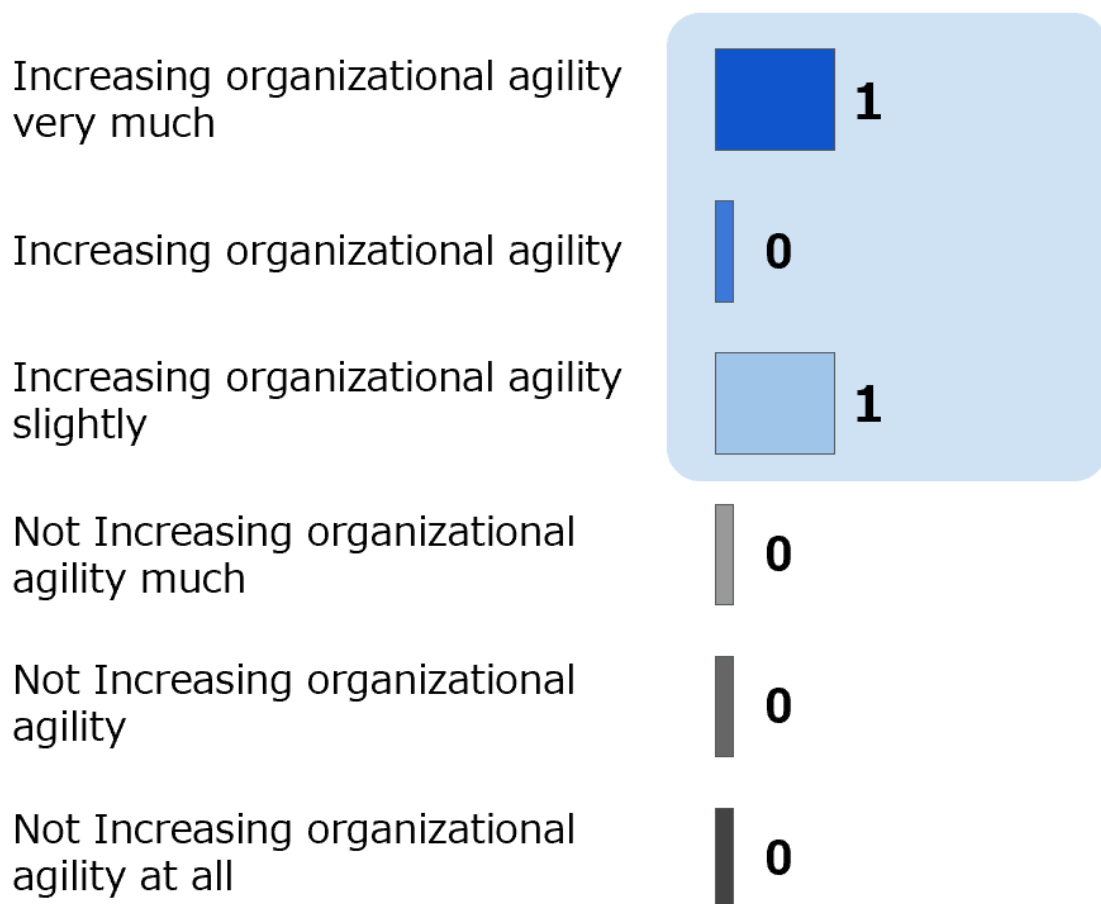


Figure 60. Result 2: Validation

Comments from the survey are as follows.

•I thought it would be very useful as an approach, because I thought that if we followed the process you proposed, issues would be revealed undeniably. I thought that the agility of the organization would be enhanced by implementing this methodology on a regular basis and taking measures to resolve issues. In particular, I thought that having both perspectives, the Ordinary Capability approach and the Dynamic Capability approach, would allow us to reach a balanced solution rather than solving problems only within the existing framework.

•With this approach, we can improve internal efficiency, but I feel that the cycle will slow down there because of the lack of monitoring and action on the external environment.

Q. Do you think that the evidence collected by the Agile Organization Design will help to increase the agility (efficiency and flexibility) of the organization?



Figure 61. Result 2: Effectiveness of evidence

Comments from the survey are as follows.

- I felt that it is impossible to set appropriate issues without evidence, so I thought that collecting evidence is essential. I thought that collecting evidence is indispensable. I also thought that skills and literacy are required to be able to take evidence as evidence and to set appropriate issues while avoiding being overly influenced by it.
- With this method, internal efficiency can be improved, but monitoring the external environment and acting on the external environment are lacking, so I feel that the cycle will slow down there.

4.5 A qualitative study with open coding in three case studies

I will state the steps to conduct open coding of the method we propose. As we collected data through the questionnaire from organizational designers of three case studies, open coding (Sato, 2008) was carried out and 12 themes were found from 89 original comment texts. Procedures 1 to 3 of Kobayashi et al. (Kobayashi et al., 2017) were used as a method of open coding. The specific process is as following; Step 1. We picked something up related to the effect of the method from the text data of the questionnaire and determined the point of view to take for categorizing the affinity method used in the next procedure. Step 2. Comments in the free description field are classified by the similar projection method with similar meanings. Step 3. We have named the category identified in step 2. These are the results of open coding.

The results of open coding are in the following tables. The effects of the method are “Visualization” and “Issue identification”. However, we find some issues such as “Hurdles during internal deployment”, “Dependence on skills and literacy of organization designers” and “Operational cycle (continuity)”. We need to improve these shortcomings to develop the organizational design process.

Table 60. The result of open coding regarding to effectiveness

Category (Effectiveness)↵
Visualization through standardized procedures↵
Issue identification↵
Effectiveness of supporting evidence↵
Stakeholders discuss on a common basis↵
Extraction of countermeasures↵
Effectiveness of maturity (CMM)↵
Identification of critical processes↵
Design intent and effectiveness can be verified↵

Table 61. The result of open coding regarding to issues

Category (Issues)↵
Hurdles during internal deployment (length of time, difficulty)↵
Dependence on skills and literacy of organization designers↵
Operational cycle (continuity)↵
Definition and scope↵

4.6 Additional verification and validation results by external evaluators

In this paper, we have focused on three case studies for validation, but in order to add objective evaluation, we conducted additional validation by an external evaluator.

The survey outline includes an online survey of company employees and managers. After explaining the organizational design process and the design results of the three tests in a video, the participants were asked to complete a questionnaire after agreeing to view the video and fill in at least 50 words of free text. A total of 240 people responded to the survey over a three-day

period from July 6 to July 8, 2021, commissioned by Macromill, Inc. Of the response data, those that did not respond appropriately in text were screened out, and the number of valid responses was narrowed down to 197 for analysis. The text of the question is as follows.

Q1. By using this organizational design process, do you think you will be able to optimize the existing environment to increase efficiency?

Q2. By using this organizational design process, do you think you will be able to adapt to changes in the environment and increase flexibility?

Q3. Do you think that the organizational design process can achieve both "(1) optimization for the existing environment (efficiency)" and "(2) adaptation to environmental changes (flexibility)"?

Q4. Do you think that evidence-based management can achieve both "(1) optimization for the existing environment (efficiency)" and "(2) adaptation to environmental changes (flexibility)" in this organizational design process?

The results of the quantitative responses were as follows. Nearly 40% to 50% of the respondents answered positively, but it can be seen that there are some issues to be addressed. Therefore, a qualitative analysis was conducted using open coding, a qualitative research method, on the free text attached to each questionnaire. Based on the results of the open coding, the following issues were identified. "Small and medium-sized companies find it difficult to use (less effective).", "Difficult to implement unless there is enough time to do so.", "Difficulty due to lack of skills of individuals and absence of persons in charge in actual business.", "Difficult to adapt to some industries (e.g., medical industry, real estate industry, construction industry, tutoring schools).", "Difficulty in gaining the understanding and cooperation of management and stakeholders.", and "In-house human resources and systems are old and changing, making it difficult to adapt." However, when we showed the results of this open coding to the people involved in case study 3, they pointed out that the reason for this was that the benefits and effects of the organizational design process were not well understood. Therefore, it is important to show examples of implementation of the organizational design process.

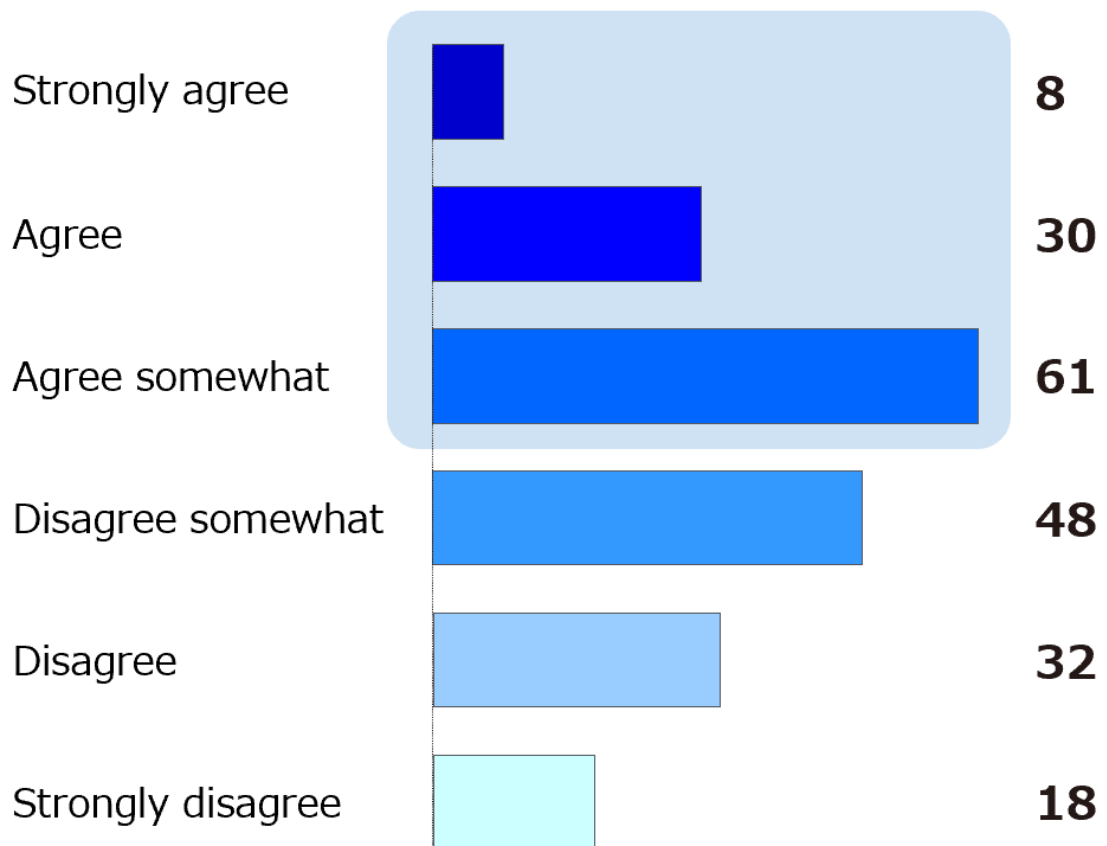


Figure 62. Result of Q1: By using this organizational design process, do you think you will be able to optimize the existing environment to increase efficiency?

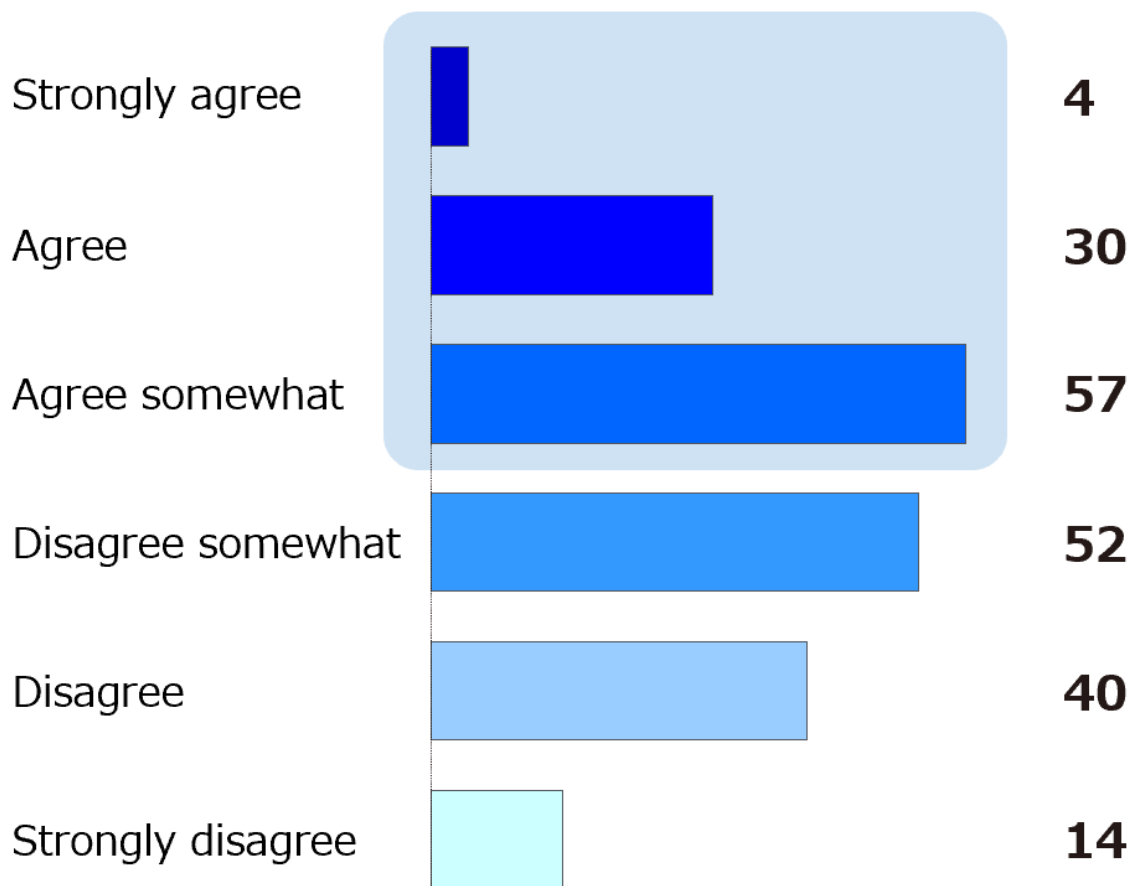


Figure 63. Result of Q2: By using this organizational design process, do you think you will be able to adapt to changes in the environment and increase flexibility?

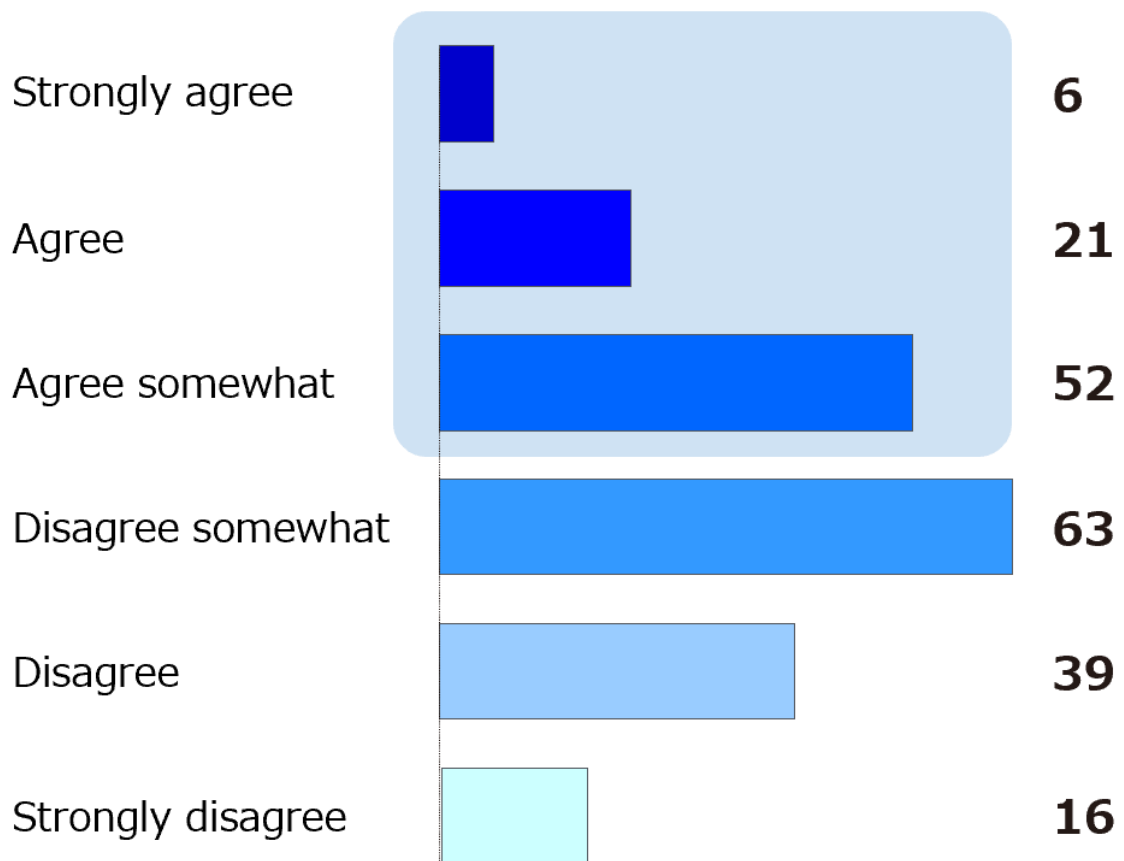


Figure 64. Result of Q3. Do you think that the organizational design process can achieve both "(1) optimization for the existing environment (efficiency)" and "(2) adaptation to environmental changes (flexibility)"?

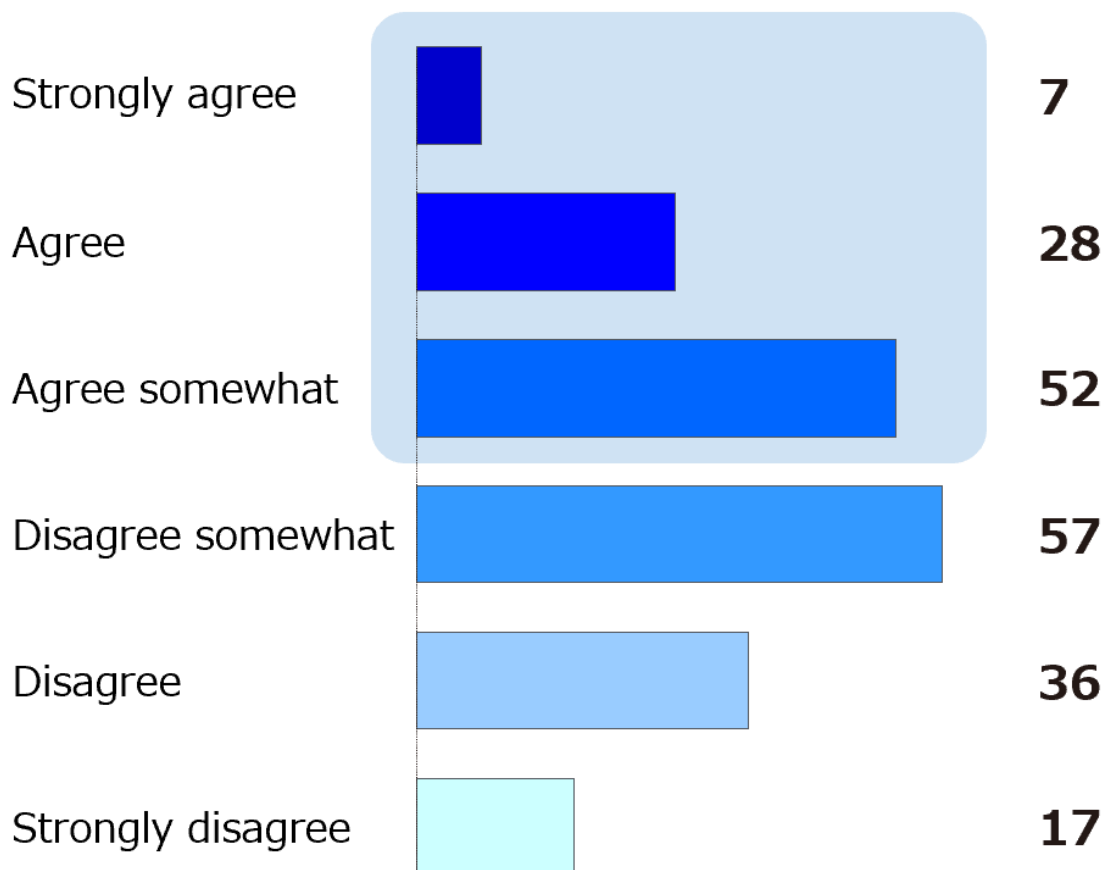


Figure 65. Result of Q4. Do you think that evidence-based management can achieve both "(1) optimization for the existing environment (efficiency)" and "(2) adaptation to environmental changes (flexibility)" in this organizational design process?

4.7 Final verification and validation results by external evaluators in Human Resources

As you read, the results of additional verification and validation is not good. Therefore, I execute final verification and validation for external evaluators in Human Resources. In addition, I focus the experiment on the human resources department based on the results of the previous experiment and considering the level of understanding and necessity of the organizational design process.

After explaining the organizational design process and the design results of the tests in a video, the participants were asked to complete a questionnaire after agreeing to view the video. A total of 206 people responded to the survey over a two-day period from November 19 to November 20, 2021, commissioned by Macromill, Inc. The text of the question is as follows.

Q1-1. Did you understand the organizational design process based on evidence-based management after watching the video?

Q1-2. Do you understand "Internal Evidence" and "External Evidence"?

Q1-3. Do you understand the concepts of "organizational learning" and "organizational routines"?

Q2. Do you feel the need to design the organization in your organization?

Q3. What was the purpose of the "Evidence-Based Management-based Organizational Design Process" explained in the video?

Q4. Do you think that the proposed organizational design process can achieve "optimization (efficiency) to the existing environment"?

Q5. Why do you think the above can/can't be achieved? (In particular, which parts of the process do you feel contribute or not contribute to the realization of the above?)

Q6. Do you think that the proposed organizational design process can achieve "adaptability to environmental changes (flexibility)"?

Q7. Why do you think the above can/can't be realized? (In particular, what parts of the process do you feel contribute to or do not contribute to the realization of the above?)

Q8. Do you think that the proposed organizational design process can achieve both "optimization for the existing environment (efficiency)" and "adaptation to changes in the environment (flexibility)"?

Q9. Why do you think the above can/can't be achieved at the same time? (In particular, which parts of the system do you feel contribute to or do not contribute to the above compatibility?)

Q10. "Please feel free to describe anything that impressed you when you viewed the video.

Please try to write at least 50 words."

The results of the quantitative responses were as follows. Based on the result screening by respondents who answered "very much," "much," or "little" to the questions in Q1-1, Over 60% of the respondents answered positively to Q8 which is the most important question of this survey. I conducted a t-test and obtained a result of 0.1% significance with a t-value of -6.25. In addition, from the free comments, the significance of balancing efficiency and flexibility was found: "I think it is easier to be accepted than either one or the other because there is a concern that the pursuit of efficiency alone will not produce value creation and that flexibility alone is too weak to predict the future. In addition, "I think that the intervention of a third party can suggest the best method for problem solving according to the work environment. I think that once a pattern is established, it can be followed and eventually take root in the company as a corporate culture. The significance of third party intervention was also mentioned by one commenter, who said, "I think it is possible to achieve both by taking careful measures and measuring the effects," and "I thought it was possible to achieve this by repeating the PDCA cycle and trial and error. We were able to confirm the significance of PDCA, including the measurement of effects.

At the same time, however, there were some comments such as, "I can't get the understanding of the executives," "The understanding of the top management is still lacking," "I can't get the understanding of the management," and "It's a very good idea and I can relate to it. However, the key is how to share this within the company, and I felt that I could not convey this message because there was not enough understanding in this area. However, this also indicates the significance of third-party intervention. Another comment was, "The whole process looks very detailed, but there are a lot of letters and that means there are a lot of processes. It is difficult to know whether the process can be carried out according to the process," "I understand the desire to balance the two, but when it comes to the actual operation phase, there is no time to devote to it 100%," and "How to analyze the evidence? And finally, "It's not theoretical, but because there are a certain number of people who don't like change," "It won't work unless there are a lot of success stories," and "It's hard to get flexibility in HR relations because it's rigid. I think we will have to prioritize efficiency." These comments indicate that there is also a deep-rooted issue of resistance to change. We feel that these issues need to be further addressed in the future.

Table 62. Results of screening by respondents who answered "very much," "much," or "little" to the questions in Q1-1

Answer	Number of people	Percentage
I think it's very compatible.	5	4.3%
I think I can manage both.	30	25.6%
Little bit compatible	36	30.8%
I didn't think I could manage both	33	28.2%
Didn't think I could manage both	12	10.3%
Didn't think it was possible at all	1	0.9%
Total	117	100.0%

5. Conclusion

The purpose of the research is to explore organizational design process to increase efficiency and flexibility based on evidence-based management. The proposed method consists of five steps which are as follows.

Step 1: To identify issues for frontline staff

Step 2: To extract evidence of internal issues

Step 3: To use of external evidence such as research and studies

Step 4: To extract stakeholder perspectives

Step 5: To make decisions to improve the organizational architecture

As a result of each verification and validation, the proposal can be said to achieve the research purpose to increase efficiency and flexibility. It was especially meaningful to get the result from the last external evaluation that this compatibility was possible from those who understood the organizational design process of this project.

For example, from the comments on the questionnaire, we were able to confirm the following three significant points: The first is the significance of balancing efficiency and flexibility. The first is the significance of balancing efficiency and flexibility, as one respondent commented, "I think this is easier to accept than either one or the other, as there is a concern that pursuing efficiency alone will not create value and flexibility alone is too weak to predict the future. Similarly, a survey respondent commented, "By having a third party intervene, it seems that the best method for problem solving can be proposed according to the work environment. I believe that once a pattern is established, it can be followed and eventually take root as a corporate culture in the company. The third is the significance of the PDCA cycle, including the measurement of effectiveness. We can sense the significance of the PDCA cycle from comments such as, "I think it is possible to achieve both by responding carefully and measuring the effects," and "I thought it was possible to achieve this by repeating the PDCA cycle and trial and error. We can sense the significance of this.

On the other hand, however, the survey respondents also pointed out that there are issues with the understanding and driving power of management and leaders, as well as issues with who and how to promote the organizational design process. Therefore, while conveying the significance of the aforementioned third party's intervention, we would like to continue empirical research and develop the process into a more valuable organizational design process so that people can realize

that this organizational design process can solve these problems.

In addition, I introduced an example of analysis based on the Harvard model specifically in the design process of this study. Based on the results of the analysis, I would like to discuss how it compares to the Harvard model. Since the analysis was conducted on people who belong to Japanese companies, I think the results may have been slightly different from the original Harvard model. In particular, we identified that the four HRM Policy Choices do not equally affect subsequent HR Outcomes, but that the Recruiting process is particularly important among them. In other words, it was meaningful to find out that in order for employees belonging to an organization in Japan to have a sense of responsibility, to grow, and to work happily and vividly, it is important to design the organization starting from the recruitment process. For this reason, I believe that the fact that we were able to get the cooperation of the personnel in charge of hiring as the first case study of the empirical research and actually go into the verification of the organizational design of the hiring process was also a victory for this research.

I noticed some important points. First, evidence as an important resource element. It can be said that evidence can be an important resource element from the perspective of RBV. The ability to collect and utilize evidence that is appropriate for the task is important in "evidence-based organizational architecture design. Second, dependence on the ability of the subject who designs the organizational architecture. This proposal is a method in which the employees of the organization design the organizational architecture by themselves. In this case, the speed and quality of the work differed between case 1, 2 and case 3 due to the difference in the level of understanding of the architecture by the designer. In addition, the results of the external evaluator's verification indicated concerns about whether it would actually be effective for "small and medium-sized companies" and "industries/sectors," as well as about the burden of "time and resources" and the "competence of the person in charge" when implementing it. Finally, the scope of the proposed method was up to the "Concept" and "Design" phases of the lifecycle. We need to suggest the method that actually implementing the "development" to "operation and utilization" phase. It would also require "internal approval procedures and communication on organization" which is another process different from the organizational architecture design.

Lastly, I would like to reiterate that I think this organizational design process can help many companies that have fallen into the "organizational trap" as I mentioned at the beginning of this report. The author feels that many Japanese companies are stuck in the "competence trap" caused by their past successes. Therefore, I believe that it is important to transform old organizational routines that are no longer functioning by utilizing the organizational design process that was validated in this study, based on a correct understanding of the current internal situation and external environment. For this reason, as a third-party researcher, I would like to push forward

with further research so that this organizational design process can be put into practice in Japanese companies.

Through this study, we discovered some challenges that could be tackled in the future through further research. The first is Research on how to increase the available evidence to design organizational architecture to enhance efficiency and flexibility. First, research on how to increase the available evidence to design organizational architecture to enhance efficiency and flexibility. Second, training is needed to improve the architectural design skills of workers. The third is A method for architects who understand architectural design to implement organizational design and monitor the results of organizational activities quantitatively. The fourth is Empirical research from the "development" to the "operation" phase is necessary. The fourth one is Empirical research from the "development" to the "operation" phase is necessary. In addition, it is important to add quantitative evaluation to the organizational design process throughout. Specifically, it is necessary to implement and quantitatively evaluate the results of organizational design, to quantitatively evaluate the status of optimization in the existing environment such as recruitment lead time and cost, and to quantitatively evaluate the status of adaptation to environmental changes such as online adoption rate and recruitment success. We would like to explore these issues by repeating empirical studies carefully in the future.

In the context of organizational learning, the current study focused on single-loop and double-loop learning, but there is still the issue of whether it is possible to develop the design process to include triple-loop learning, as proposed by Nielsen et al. In such a case, the question of what an organization is will naturally arise at the same time, and we would like to evolve our research into a design process that incorporates this triple-loop learning, so that we can contribute value to many companies and individuals.

Furthermore, there is still the issue of how to switch between optimizing for the existing environment and adapting to the external environment. There is a way to think about the whole thing first, and then consider which should be prioritized. Or, when running the organizational design process for the second time, it is necessary to decide whether to implement both or choose one or the other. From these, it is necessary to determine which organizational design process to choose according to the needs of the organization. I would like to explore this because it is possible that some trigger will determine the choice.

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Appendix

Questionnaires used for the analysis in 3.5.2

No.	Items	回答項目
1	Age	Under 12 years old 12 to 19 years old 20 to 24 years old 25 to 29 years old 30 to 34 years old 35 - 39 years old 40 to 44 years old 45 - 49 years old 50 to 54 years old 55 to 59 years old Over 60 years old
2	Sex	Men, Women
3	Residential Areas	Hokkaido, Tohoku Area, Kanto Area, Chubu Area, Kinki Area, Chugoku Area, Shikoku Area, Kyushu Area
4	Unmarried/Married	Unmarried, Married
5	Presence of Children	No Children, With Children
6	Household Annual Income	Less than 2 million, 2-4 million, 4-6 million, 6-8 million, 8-10 million, 10-12 million, 12-15 million, 15-20 million, over 20 million, do not know
7	Individual Annual Income	Less than 2 million, 2-4 million, 4-6 million, 6-8 million, 8-10 million, 10-12 million, 12-15 million, 15-20 million, over 20 million, do not know
8	Type of industry	A Agriculture, forestry B Fishery C Mining, quarrying, gravel extraction D Construction E Manufacturing F Electricity, gas, heat supply and water supply G Information and communication H Transportation and postal services I Wholesale and Retail J Finance and Insurance K Real estate and goods leasing L Academic research, professional and technical services M Lodging and eating and drinking establishments N Living-related services and entertainment O Education and learning support P Medical care and welfare Q Complex service business R Services, not elsewhere classified S Public services, n.e.c. T Industries not elsewhere classified

No.	Items	回答項目
9	You are attached to your work and your organization.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
10	You are engaged in your work with a sense of responsibility.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
11	You feel that you are growing in your abilities.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
12	You feel that your organization is operating at an efficient cost.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
13	You feel that your organization's goals are aligned with those of its employees.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
14	You enjoy your work.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
15	You work with energy and enthusiasm.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
16	You are happy.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
17	You feel that your organization is able to respond flexibly to changing market and social environments.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
18	You feel that your organization contributes to the prosperity of society as a whole.	Very much applicable, Applicable, Somewhat applicable, Not very applicable, Not applicable, Not at all applicable
19	Please indicate whether you are satisfied with the following systems and mechanisms in your organization Hiring process Transfer system Evaluation system Retirement system Salary system Benefit system Job description Job evaluation standards Work style system (telecommuting, dual/side jobs, flexible working, etc.) A system for responding to employees' requests and suggestions.	Very satisfied, satisfied, somewhat satisfied, not very satisfied, not satisfied, not at all satisfied
20	Please answer whether the following systems and mechanisms in your organization motivate you to work Hiring process Transfer system Evaluation system Retirement system Salary system Benefit system Job description Job evaluation standards Work style system (telecommuting, dual/side jobs, flexible working, etc.) A system for responding to employees' requests and suggestions.	Very motivating, motivating, somewhat motivating, not very motivating, not motivating, not motivating at all

No.	Items	回答項目
21	<p>Please answer whether the following systems and mechanisms of your organization are criteria for you to choose your organization.</p> <p>Hiring process Transfer system Evaluation system Retirement system Salary system Benefit system Job description Job evaluation standards Work style system (telecommuting, dual/side jobs, flexible working, etc.) System for responding to employees' requests and suggestions</p>	<p>Very much a criterion for choosing an organization, a criterion for choosing an organization, somewhat a criterion for choosing an organization, not much a criterion for choosing an organization, not a criterion for choosing an organization, not a criterion for choosing an organization at all</p>
22	<p>From an objective point of view, please answer whether the following systems and mechanisms of your organization are superior to those of other companies in your industry.</p> <p>Hiring process Transfer system Evaluation system Retirement system Salary system Benefit system Job description Job evaluation standards Work style (telecommuting, dual/side jobs, flexible working, etc.) A system for responding to employees' requests and suggestions.</p>	<p>Very much better than my peers, better than my peers, somewhat better than my peers, not much better than my peers, not better than my peers, not better than my peers at all</p>
23	<p>From an objective point of view, please indicate the level of maturity of the following systems and mechanisms in your organization.</p> <p>Hiring process Transfer system Evaluation system Retirement system Salary system Benefit system Job description Job evaluation standards Work style (telecommuting, dual/side jobs, flexible working, etc.) System for responding to employees' requests and suggestions</p>	<p>Level 0: The system does not exist. There is no recognition of the issue by HR. Level 1: A system exists, but it is not standardized and is handled on an individual basis. Level 3: Procedures are not standardized. Level 3: Procedures are standardized and documented, but management is dependent on individuals. Level 3: Procedures are standardized and documented, but management is dependent on individuals. •Level 4: Procedures are followed and management is quantitatively measured, and improvements are made on a daily basis. Level 5: Continuous improvement activities have resulted in optimized best practices. I don't know.</p>