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Master's Dissertation 2019

A Method to Identify Transformation Area in HR System based on Harvard Model

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Major in System Design and Management

SUMMARY OF MASTER'S DISSERTATION

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Title

A Method to Identify Transformation Area in HR System based on Harvard Model

Abstract

In the era of information technology, the motivation and retention of knowledgeable workers in order to gain a winning edge in the market is one of the most important challenges for human resource professionals. Human Resource Management (HRM) will be the key area of focus in the 21st century as companies and government organizations put in place strategies to cope up with the economic crisis and recovery.

The purpose of this study is to identify issues in the current HR system and discover areas to be abolished in order to revise the HR System. We suggest a method based on Harvard Model in the area of Human Resource Management. The proposal is comprised of two main parts: identifying problems of an HR System to eliminate and replace, and prioritizing HR systems based on Quantitative Analysis.

As a result of each verification, the proposal can be said to achieve the research purpose of identifying issues of the current HR System and discovering transformation areas. On the other hand, some of the points are still a bit difficult for beginners. In addition, the current HR system is geared toward non-IT engineers, so it is necessary to consider a new HR system suitable for IT engineers.

Finally, it is important to focus on high-priority issues such as the content of work and evaluation criteria, job description in the recruitment process, and company acceptance. With that, we can identify the challenges and areas of obsolescence in the current HR system and make changes accordingly.

Keywords (5 words)
Human Resource Management, Harvard Model, Systems Engineering, CMM, HR System

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1. Introduction

1.1 Research Background

In the era of information technology, the motivation and retention of knowledgeable workers in order to gain a winning edge in the market is one of the most important challenges for human resource professionals. Human Resource Management (HRM) will be the key area of focus in the 21st century as companies and government organizations put in place strategies to cope up with the economic crisis and recovery. (M. Ravisankar et al., 2013) Drucker states that the most important, and indeed truly unique, contribution of management in the 20th century was the fifty-fold increase in the productivity of the manual worker in manufacturing. The most important contribution management needs to make in the 21st century is similarly to increase the productivity of skilled work and knowledge workers. (Drucker, 1999). Rapid economic changes have recently been requesting 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 technetronic age posed by globalization and the Digital Revolution. One of the most important approaches to can manage this change in the most efficient way is Strategic Human Resources Management, which is one of the key strategic management processes of human resources within an organization. (İlhami et al., 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, utilize the external labor market, and to invest human resources development, the more knowledge workers continue to work for these companies. (Miwa, 2015) Additionally, Abdullah describes that there is a positive correlation between effective HRM practices and financial performance. (Abdullah, 2014) Therefore, it is important to construct an appropriate human resource flow in order 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, 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 issues of HRM Policy Choice and HR Systems within the Harvard Model which was proposed by Beer. (Beer et al., 1984) When we identify issues of HR Systems, we can increase the "Human Process Advantage". In addition, it is important to

design and operate HR Systems from a strategic point of view in order to increase the outcome of HRM and to build the core competence of an organization. (Kido et al., 2016)

Finally, it is necessary to evaluate the process of creating personnel systems using the standard process of Systems Engineering. (Sato et al., 2019a) The reason is that the standard process of Systems Engineering will support the creation process of Human Resource (HR) systems to achieve Quality, Cost, and Delivery at a certain level. (Sato et al., 2019a) In addition, the creation process of personnel systems is often made by relying on the experience and intuition of each personnel manager. (Sato et al., 2019a) There is also no way for Human Resource Department employees to build an appropriate HR system with an understanding of the strategic types of their organization. (Sato et al., 2019b) The aim of this study is to visualize HR systems using Systems Engineering for building an appropriate HR system with an understanding of the strategic types of their organization and to find problems and improvements by comparing it with other HR systems.

1.2 Research Objective and Novelty

This paper proposes a method to prioritize HR Systems, discover current issues of HR Systems, and identify transformation areas to eliminate or improve based on the Harvard Model. We analyzed causal relationships between HRM Policy Choices (HR Systems) and HRM output and long-term consequences. In addition, we suggest a method to visualize current HR Systems by using theory, framework, and analytics such as “Three-axes Matrix”, “Organization Strategy and Management Type”, “Systems Engineering”, and “Statistics”.

While many studies have mentioned the Harvard Model, none have attempted to eliminate or replace HR Systems. (Sato et al. 2019a). Sato et al. also points out that no paper refers to the method to discover current issues of HR Systems based on the Harvard Model and Systems Engineering. (Sato et al. 2019c)

Therefore, the novelty of this paper is that we consider it to be the first proposal to prioritize HR Systems and find transformation areas to eliminate or replace HR Systems based on the Harvard Model, Systems Engineering, Organization Strategy and Management Type, as well as providing a guide of statistical results between HRM Policy Choices and HR Outcomes and Long-term consequences within the ICT industry in Japan.

1.3 Structure of the Research

The following chapters elaborate on this research with all its relevant details. First, in Chapter 2, we outline previous studies such as HRM, Systems Engineering, SECI Model, and CMM. Then, in Chapters 3 and 4, we review previous studies especially papers referring to the Harvard Model.

We propose some frameworks to discover issues of HR systems in Chapter 5 and evaluate them in Chapter 6. In Chapter 7, we analyze data of employees in the Japanese ICT industry to find some problems and improvements of HR Systems, and show the relationship between HR Systems and HR Outcomes and Long-term consequences that have not yet been studied in Japan. In Chapter 8, we evaluate a whole approach to combine the methodology and facts stated in Chapter 5 and Chapter 7. Finally, in Chapter 9, we summarize what has been indicated and explain the direction of future research as a conclusion.

2. Previous Studies

2.1 Previous Studies of Human Resource Management

2.1.1 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.

2.1.2 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, 2008) and Iwade (Iwade, 2013).

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

	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	・Gain employee organizational commitment ・Human aspects of the organization (microstructure theory) ・Human-oriented	・HRM strategic fit ・Structural aspects of the organization (macro-organization theory) ・Production-oriented
Representative Model	・Harvard Model ・Best practice approach	・Michigan Model ・Contingency Approach
View of Workers	・Human ・Theory Y (self-realizer model)	・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.

2.1.3 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)

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 2. Three models of soft version of HRM

HR System	Objectives and Measures
High-Commitment HR System	・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	・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	・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

Table 3. Success Criteria in Soft version of HRM

HR System	HRM performance measurement items
High-Commitment Duties System (Beer et al., 1984)	・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)	・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)	・Willingness to work, satisfaction, communication ・problem solving, reducing resistance to change

2.1.4 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.

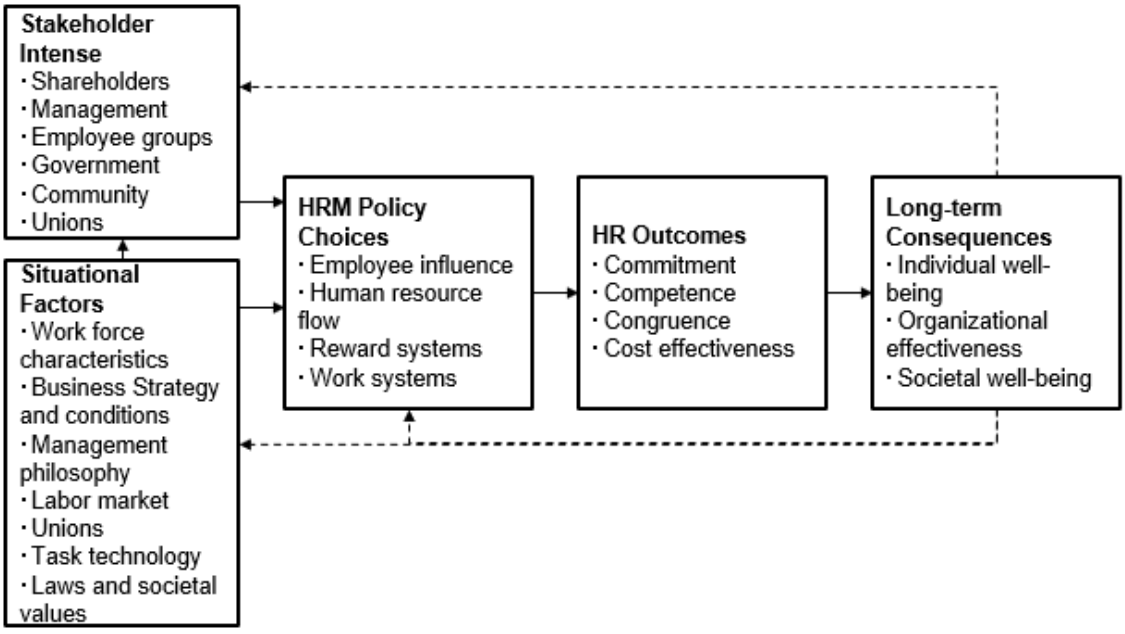

Figure 1. Map of the HRM Theory (Beer et al., 1984)

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.

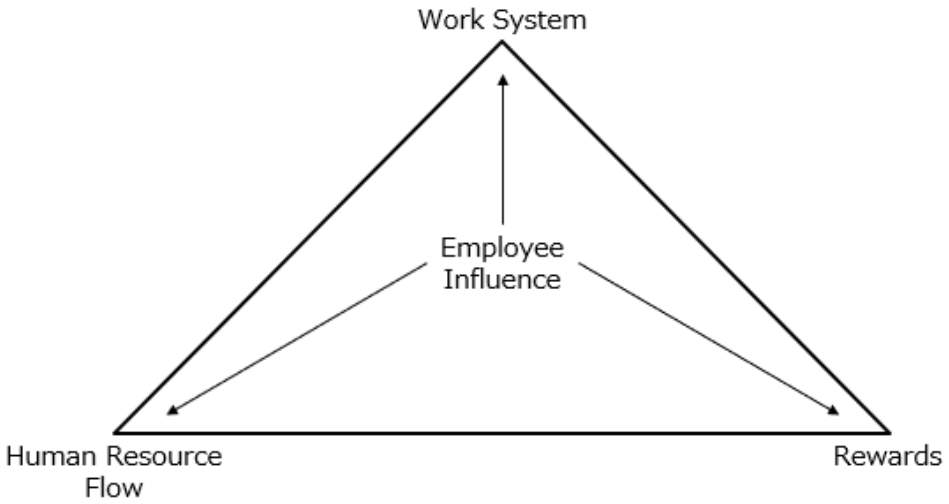

Figure 2. Human Resource Systems (Beer et al., 1984)

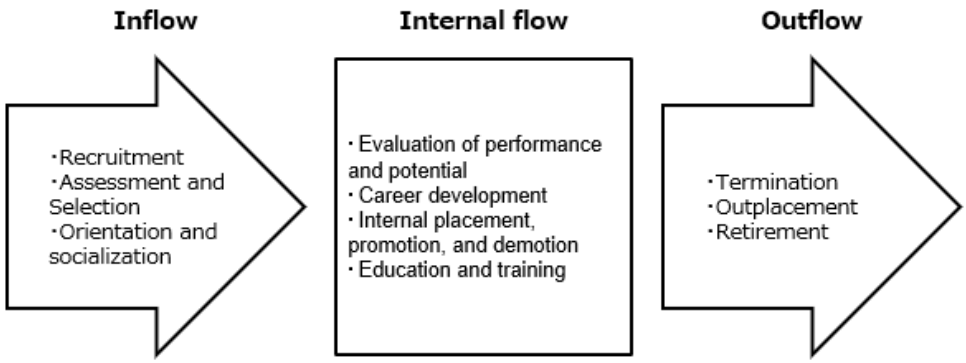

Figure 3. Three Human Resource Flows

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.

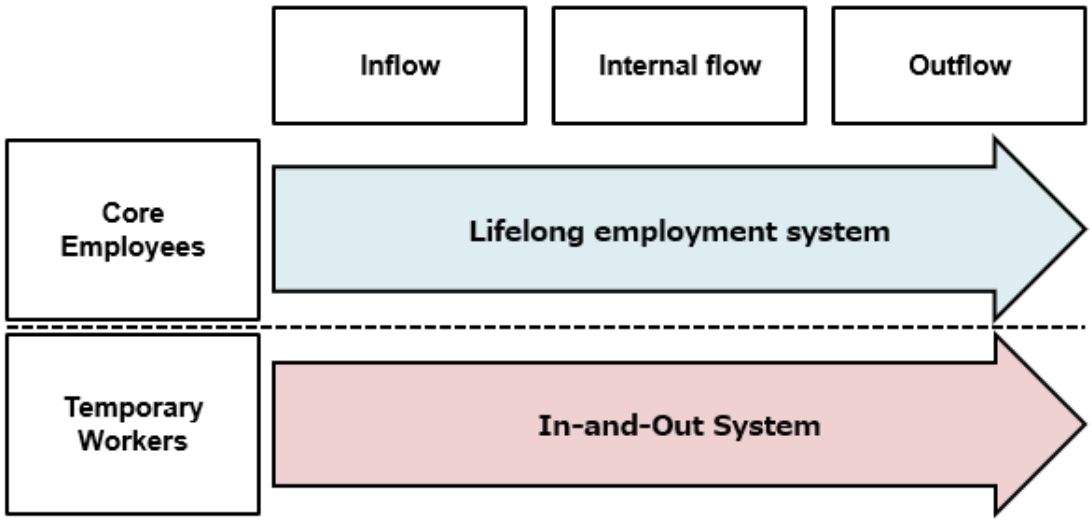

Figure 4. Application of Different Flow Pattern in Large Japanese Companies

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.

2.2 Systems Engineering

2.2.1 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)

2.2.2 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.

2.2.3 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.

2.2.4 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.

2.2.5 Physical Design

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

2.3 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.

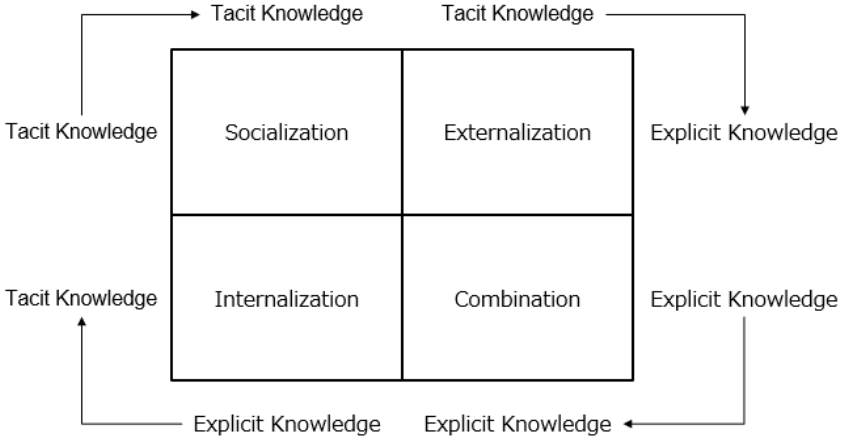

Figure 5. SECI Model (Nonaka et al., 1996)

2.4 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)

3. Visualization Map of an HR System based on Life Cycle

3.1 The Definition of HRP, HRD, and HRU

In this chapter, we 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 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 6. The horizontal axis shows three human resource flows. 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 in Figure 7. (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)

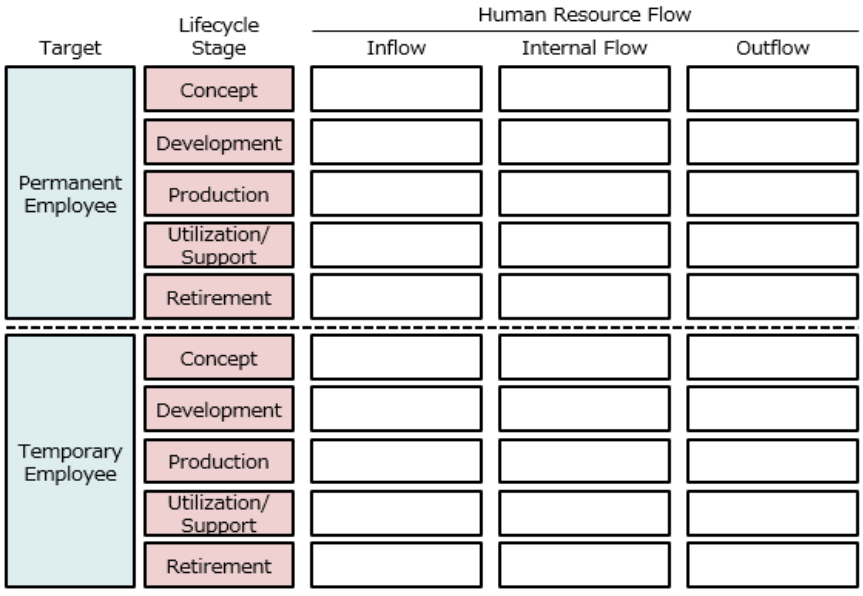

Figure 6. Explanation of the Component Three-axes Matrix

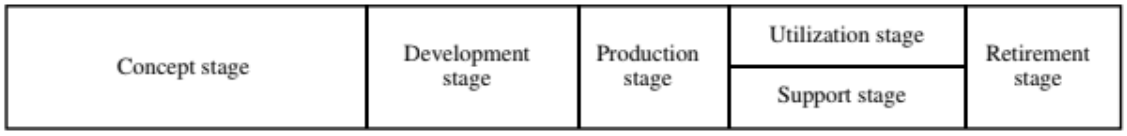

Figure 7. Generic life cycle (ISO/IEC/IEEE 15288:2015)

We divide papers referring to 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 the list 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	Iwao Namie	2007
02	Human Resources Management in VietNan A Comparative Study of Japanese, Western and Vietnamese Companies, Addressing Questions of Consciouseness of Vietnamese People	YoshifumiHara	2005
03	Employment System of Japanese Companies and Lifetime Employment Systems	Iwao Namie	1997
04	An Essay on Critical Analytical Viewpoint of Human Resource Management	Kazuo Tanaka	2014
05	Possibility of implementation of human resources management and strategic human resource planning in Japanese companies in China	Liu Wei	2014
06	Integrated approach of strategic human resource management theory	Nobuyoshi Oso	2015
07	On the Adjustment Effect of Self-Efficacy to the Relation Between Professional Human Resource Management Measures and Job Outcomes	Youko Sunadome	2014
08	Positioning of employees in the framework of SHRM	Tadamitsu Sakurai	2015
09	New trend of human resource management research	Yukimasa Okada	2015
10	Convergence or divergence: human resource practices and policies for competitive advantage worldwide	Paul Sparrow, Randall S. Schuler & Susan E. Jackson	2006
11	Managing Human Resource Shortages in a Unionized Setting: Best Practices in Air Traffic Control	Edward George Fisher and Vitor Marciano	1997
12	Critical Issues in Downsizing in India	Umesh Maiya	2011
13	Archetype Change in Professional Organizations	Ashly Pinnington and Timoty Morris	2003
14	Competence development and career advancement in professional service firms	Ashly H. Pinnington	2011
15	Strategic Management for Organizational Effectiveness	Lynn S. Oppenheim	1984
16	Recruiting the cyber leader: an evaluation of the human resource model used for recruiting the Army's "Cyber Operations Officer"	Nicholson, Wallace C. and Gibbs, Sean A.	2017
17	Exposing the Concept of Power	Reinoud Bosch	2003
18	Bringing Nuance into the Globalization Debate Changes in US, Japanese, and German Management, with Special Reference to the Impact of International Finance	Reinoud Bosch	2008
19	Persistent Homogeneity in Top Management	Philine Erfurt Sandhu	2013
20	HUMAN RESOURCE STRATEGIES IN THE COMMERCIALISATION	Michael Wood and Evan H.Jones	1993
21	Big Business in South Korea: The Reconfiguration Process	Chris Rowley & Johngseok Bae	2004
22	A re-conceptualization of career systems, its dimensions and proposed measures	T.N. Krishnan, Sunil Kumar Maheshwari	2011
23	Teachers' recruitment and retention in Tanzania	Ayubu Japheth Chenelo	2011
24	Orchestrating the flow of human resources Insights from Spanish soccer clubs	Stav Fainshmidt, Adam Smith, and Orhun Guldiken	2017
25	The Influence of Human Resource Management on the Development and Maintenance of A Culture	Kieran Slevin	1997
26	A review of theoretical development in strategic human resource management by the application of a framework to a small rm in the credit management sector	Asquith, Margaret Main	1996
27	Exploring human resource management practices: An empirical study of the Performing Arts companies in Australia	Stanley Chibuzo Opara	2017
28	Exploring the effective use of self rostering: A contingent approach	Mondwa Mwiya	2008
29	Recruiting skilled orderlies for health care organization	Iida Pukkila	2012
30	The Art of Keeping a Contractor	Isabelle Lindgren	2009
31	Aged Care Institutions Management: A study of management's engagement strategies to support migrant careworkers' delivery of quality elderly care.	Nyemudzai Esther Ngocha-Chaderopa	2014

3.3 The Positioning of HRM

Figure 8 shows the positioning of HRM in Figure 6 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 flamework of HRM. In addition, they describe both Permanent Employees and Temporary Employees.

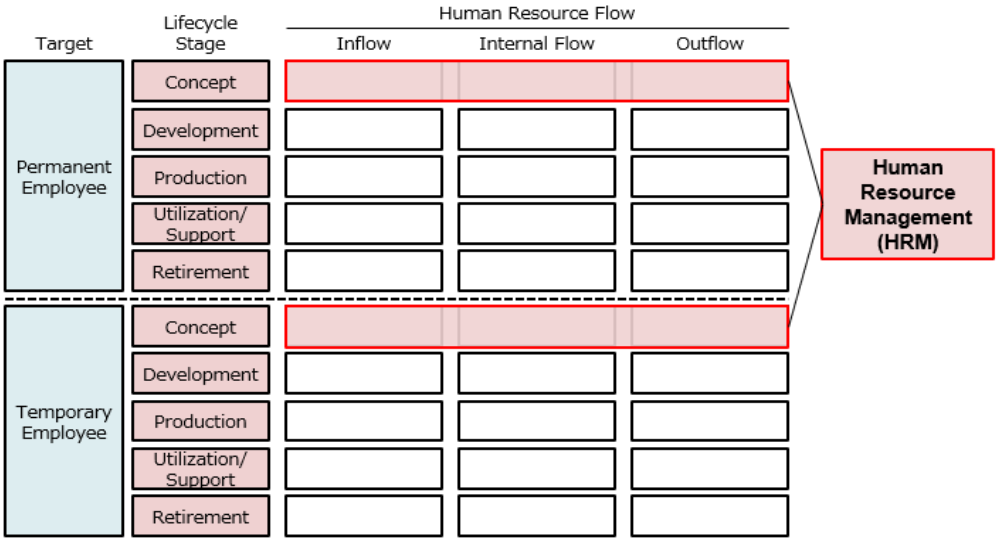

Figure 8. The Positioning of HRM

3.4 The Positioning of HRP

Figure 9 demonstrates the positioning of HRP in Figure 6. We can state that HRP falls under the whole Design area in the Lifecycle Stage because HRP means Workforce Planning as mentioned in section 2and 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.

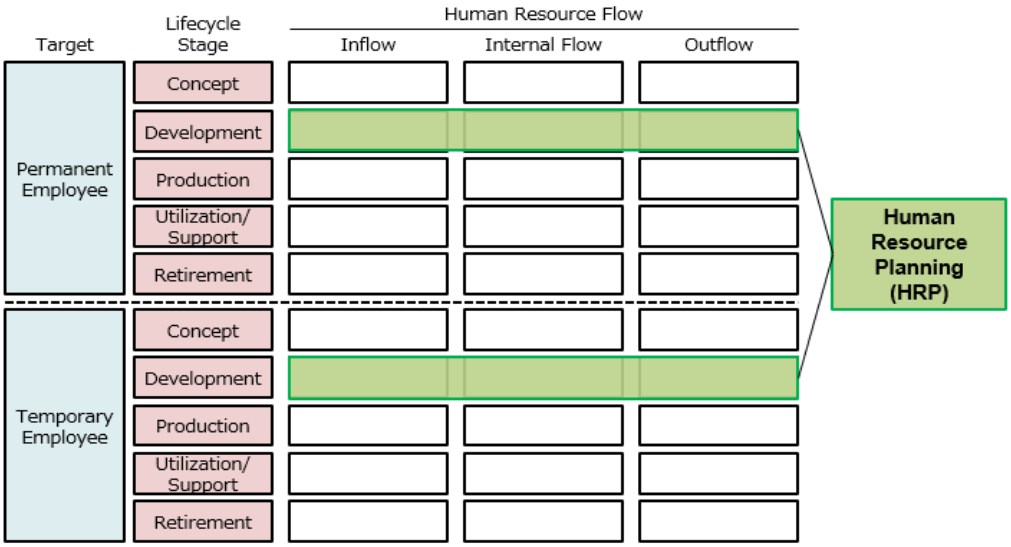

Figure 9. The Positioning of HRP

3.5 The Positioning of HRD

Figure 10 reveals the positioning of HRD in Figure 6 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.

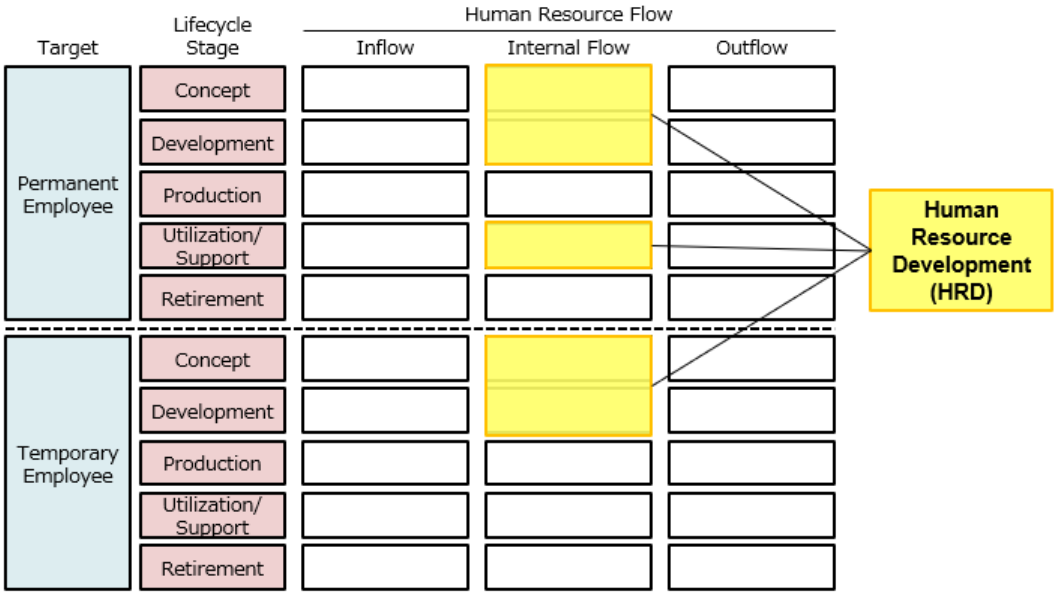

Figure 10. The Positioning of HRD

3.6 The Positioning of HRU

Figure 11 depicts the positioning of HRU in Figure 6 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.

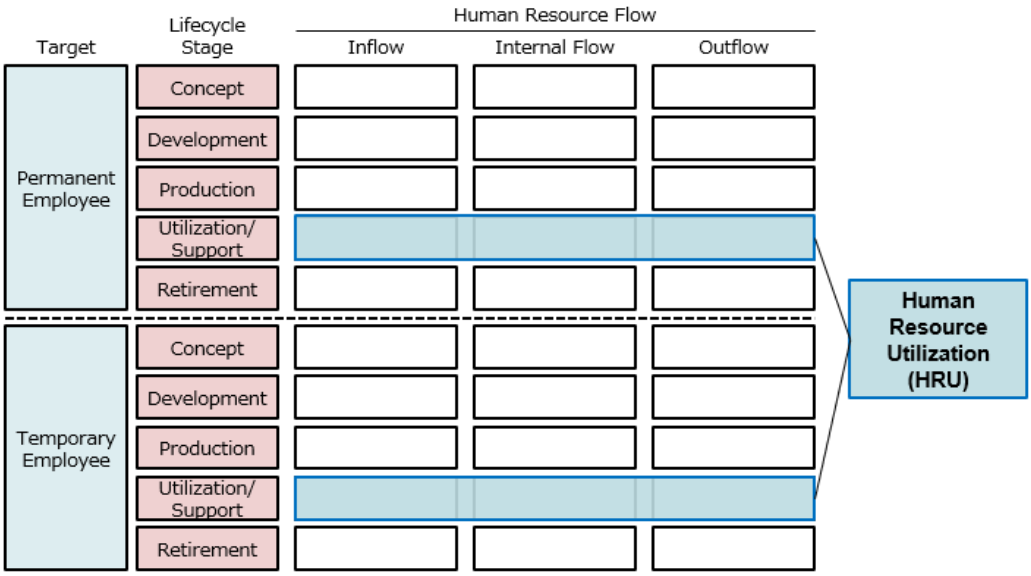

Figure 11. The Positioning of HRU

3.7 Explanation of the Remaining Areas

We have clarified areas that HRM, HRP, HRD, and HRU do not touch. Figure 12 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.

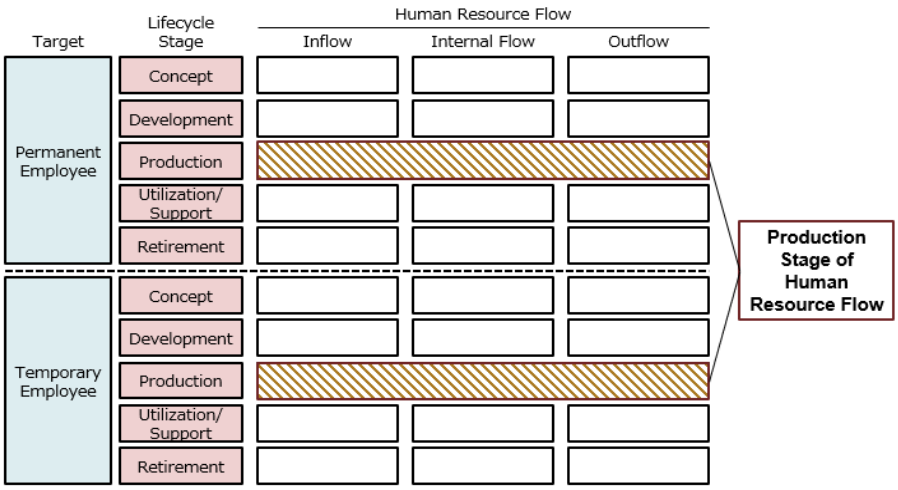

Figure 12. Production Stage of Human Resource Flow

Figure 13 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.

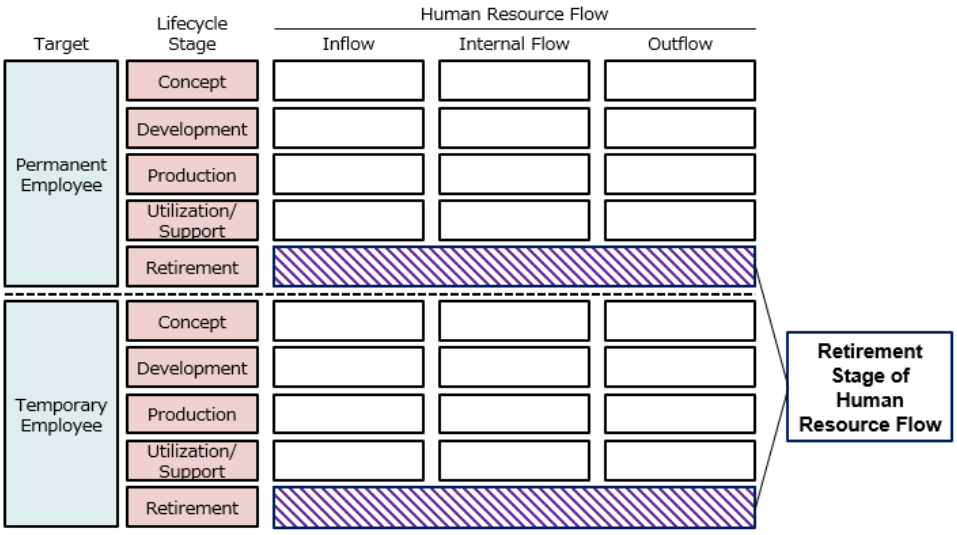

Figure 13. Retirement Stage of Human Resource Flow

Figure 14 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. (Daniel H. Pink, 2003) 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)

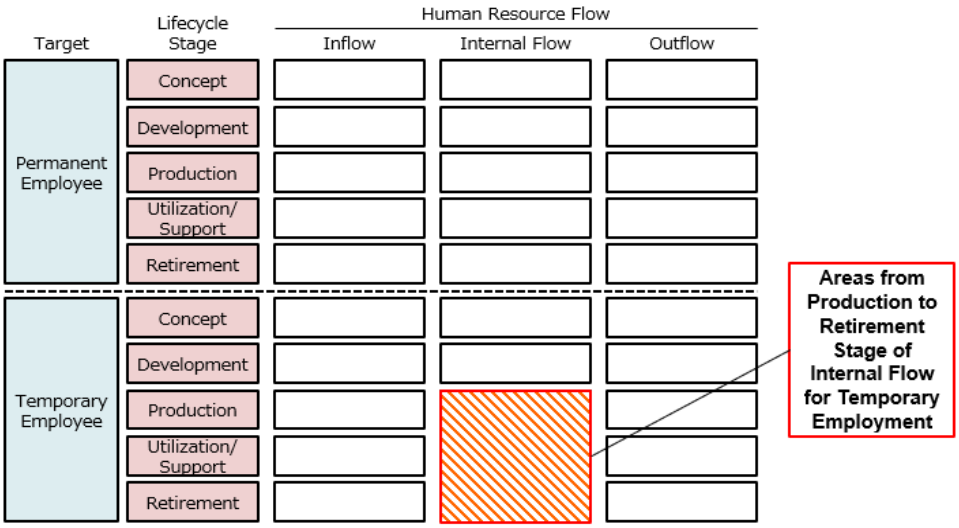

Figure 14. Areas from Production to Retirement Stage of Internal Flow for Temporary Employee

4. Deriving Challenges through Clarification of Areas to Strengthen the HR System

4.1 Map of the Harvard Model with Three points of view

Paul called the HR Outcomes as short-term outcomes. (Paul, 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 15. 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 (Figen, 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.

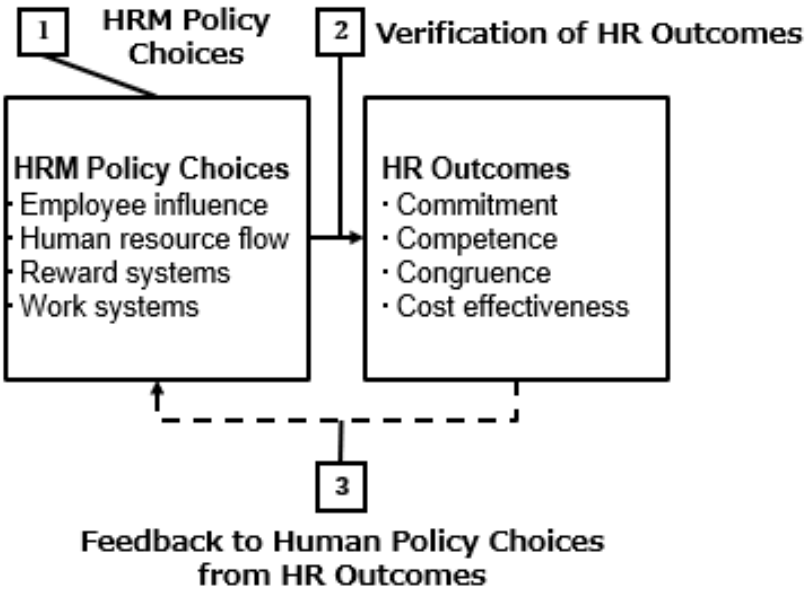

Figure 15. Map of the Harvard Model with Three points of view

Table 6. The List of Previous Studies

No.	Title	Author	Year
1	Human resource management practices in Indian IT industry–an overview	M. Ravisankar , K. Sakthivendan	2013
7	A business process approach to human resource management	Figen Cakar, Umit S. Bititci, Jillian MacBryde	2003
8	At the crossroads at midnight Strategic human resource management now	Paul Boselie , Chris Brewster	2013
9	On establishing human resource management as a social science discipline	Motohiro Morishima	2010
10	Moderating effects of self-efficacy on the relationship between human resource management and professionals' job performance : a literature review	Youko Sunadome	2014
11	Human resource management in an international perspective	Michael Poole	1990
12	An empirical study of high performance HRM practices in Chinese SMEs	Connie Zheng, Morrison Mark, O'Neill Grant	2006
13	STRATEGIC HUMAN RESOURCE MANAGEMENT	Peter F. Boxall	1992
14	Strategic non HRM a viable alternative	Julie Storey	1998
15	From personnel management to strategic human resource management	Olive Lundy	2006
16	Organizational psychology and human resource management Towards a European approach	David E Guest	1994
17	An exploration of the impact of strategic international human resource management on firm performance The case of foreign MNCs in China	Chanzi Bao, Farhad Analoui	2011
18	Critique of Human resources theory	Daniel Radcliffe	2005
19	Developments in Human Resource Management An Analytical Review of the American and British Models	Pawan Budhwar	1996
20	Lower-level and middle-level managers as the recipients and actors of human-resource management	Wolfgang Staehle, Frank Schirmer	1992
21	Managers are the key to workforce stability an HRM approach towards improving retention of health professionals in remote northern Australia	Leigh ann Onnis	2014
22	The human resources management (HRM) practices a panacea to the challenges of the Minstry for Home Affairs	Sipho Benedict. Gamedze	2012
23	Is strategic human resource management strategic-The fit between strategy and strategic human resource management	Torben Andersen et al	2005
24	The significance of the human resources function in the Zimbabwe iron and steel industry	Matthias Ruziwa, Marcus Mutanga, Patience Siwadi	2013
25	RESEARCH IN HUMAN RESOURCES FOR HEALTH AND ITS RELEVANCE TO HEALTHCARE MANAGEMENT PRACTICES	Patricia Browne, Alma McCarthy	2009
26	Human Resource Management and Performance of Public	Ben Kuipers, Bram Steijn	2009
27	Human resource management policy choices,management practices and health workforcesustainability remote Australian perspectives	Leigh ann Onnis	2017
28	A Study on International Human Resources Management Practices (IHRM)	Monica Michael, Richard Francis	2018
29	An investigation into E-participation	Riku Henrikki Pudas	2014
30	HEALTHCARE HUMAN RESOURCE POLICY & NURSE WELL-BEING	Patricia Browne	2009
31	Empirical Studies on Human Resource Management	Cao Wenlu	2014
32	The HR function in Australia supports and barriers to strategic HRM integration	Cathy Sheehan	2002
33	Emerging Patterns of HRM The Influence of Social Ties and" Guanxi 'on Recruitment and Selection in China	Wong Yu Hong	2008
34	Business Strategies, HRM Policies and Organizational Performance Evidence from the Peoples Republic of China	Bo Zhang	2011
35	Job descriptions the heart of every HRM System An effective way to compose and implement job descriptions for Lidl Nederland GmbH Master thesis	Jasper M Hidding	2013
36	Understanding Human Resource Management in a Chinese company	Yanjiao Zhou	2009
37	Achieving a Sustainable Competitive Advantage through People AB InBev's Performance Culture	Patrick Massot	2010
38	The Performance Management and Appraisal in Higher Education	Mark Camilleri, Adriana Camilleri	2018
39	Service Development and New Service Performance	Meindert Jan Flikkerma	2008
40	Human resource competency models changing evolutionary trends	Abdul Hamid Abdullah, Ilham Sentosa	2012

Table 7. The List of Previous Studies

No.	Title	Author	Year
41	An Effective Remuneration and Motivation System	Ivana Vorechovska	2014
42	EFFECT OF TRAINING AND DEVELOPMENT ON PERFORMANCE OF ORGANISATIONS	OGOLA DICKSON OGOLA	2011
43	Recruitment and selection and human resource management in the Taiwanese cultural context	Hsu Yu Ru	1999
44	An investigation into strategic human resource management in Indonesia a grounded research approach	Arif Hartono	2010
45	Managing human resource shortages in a unionized setting Best practices in air traffic control	Edward George Fisher, Vitor Marciano	1997
46	The scope and limitations of human resource management a case study of the Bank of Thailand	Kirana Limpaphayom	2002
47	MODEL OF FACULTY MEMBERS'RESEARCH PERFORMANCE IN NATIONAL RESEARCH UNIVERSITIES	Siripapun Leephaijaroen	2013
48	The effect of human resource practices on firm performance in Chinese SMEs an empirical study in man [u] facturing sector	Yan Zhu	2010
49	RELATIONSHIP BETWEEN HUMAN RESOURCE MANAGEMENT PRACTICES AND QUALITY SERVICE DELIVERY IN KENYAN PUBLIC SECONDARY	Mutiso M Christine	2010
50	A comprehensive human resource recruitment and selection model the case of the Department of Justice and Constitutional Development	Thapelo Phillip Thebe	2014
51	An emprical evaluation of strategic human resource management within construction sites	Nicola Naismith	2007
52	Exploring the linkages between attitudes towards human resource management practices and organisational commitment evidence from the financial services	Edel Conway	2003
53	Human Resource Management Strategy for UK SMEs to Reduce the Employee Turnover and Maintain Success Business	Boran Li	2012
54	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 Margaret Main	1996
55	Senior management perception of strategic international human resource management effectiveness. The case of multinational companies performance in China	Bao Chanzi	2010
56	Department OF Human Resource Management Strathclyde Business School	Michael Erras	2002
57	Exploring human resource management practices an empirical study of the performing arts companies in Australia	Stanley Chibuzo Opara	2016
58	Human resource development in government organizations of Nepal	Nakrishna Bhattarai	2017
59	From collegial engagement to perfomance management the changing academic landscape in Australia	Leanne Morris	2011
60	The Influence of Human Resource Management on the Development and Maintenance of A Culture	Kieran Slevin	1997
61	Effective people performance strategies critical ingredients for business success in Barbados and Eastern Caribbean business enterprises	Hartley B Richards	2010
62	Managerial perceptions of the personal and career transitions of redundant executives and suvivors of redundancy	Noeleen Doherty	2000
63	The ageing workforce practices and their effect on the financial performance of companies in metal industry	Filiz Ozturk	2009
64	Towards a framework for performance management in a Higher Education institution	Allison O'Reilly	2009
65	Work-life balance balancing work-life and operations in the eldery care home care and maternity care	Kristen Kupper	2010
66	The societal culture dimension within the human resource practices of Taiwanese management in the UK	I Chun Lisa Chen	2005
67	Reward & Recognition Strategies A case study of GE Healthcare in Umeå	Tugba Oztoprak, Richard Lundmark	2007
68	Teachers' recruitment and retention in Tanzania private secondary schools a case of Mbeya region	Ayubu Japheth Chenelo	2011
69	Recruiting the cyber leader an evaluation of the human resource model used for recruiting the Army's Cyber Operations Officer	Wallace C Nicholson, Sean A. Gibbs	2017
70	Towards balanced personalized client care Human Resources Planning and Workforce (Re) scheduling in the Elderly care, Home care, and Maternity care	Bo van Westerrop	2010
71	AN INQUIRY INTO THE NATURE AND USE OF EXECUTIVE RECRUITMENT CONSULTANCY IN GLOBAL	Neil Andew Cuthbertson	1996
72	Copycat Absenteeism Reasons for the Difference in Sickness Absenteeism	Pieter Oene Van Der Honing, Ulrika Fuchs	2007
73	KOUJYOU RICCHI TO TAYOUSEINI KANSURU KENKYUU (Study on factory location and diversity)	Yuzuru Utsunomiya	2017

4.2 Explanation of The New Matrix

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 in Figure 16.

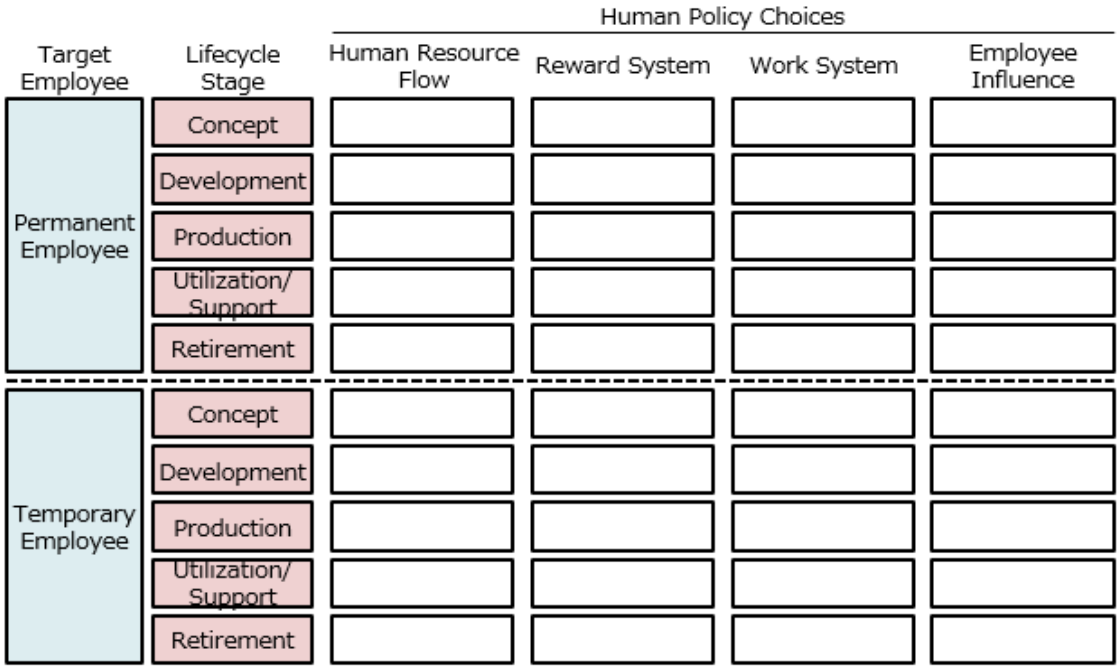

Figure 16. The New Matrix by using Human Resource Choices

Table 8. 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	Box A 1,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73	Box C 7,10,12,22,21,22,25,26,27,34,37,47,59,63	Box E 7
Temporary Employment	Box B 11,29,41,50,56,57,62,64,65,66,68,71	Box D	Box F

4.3 Classification of Boxes

In a previous section, we divided studies into six boxes. We named the boxes as below to deploy them to the new matrix that we mentioned.

Figure 17 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.

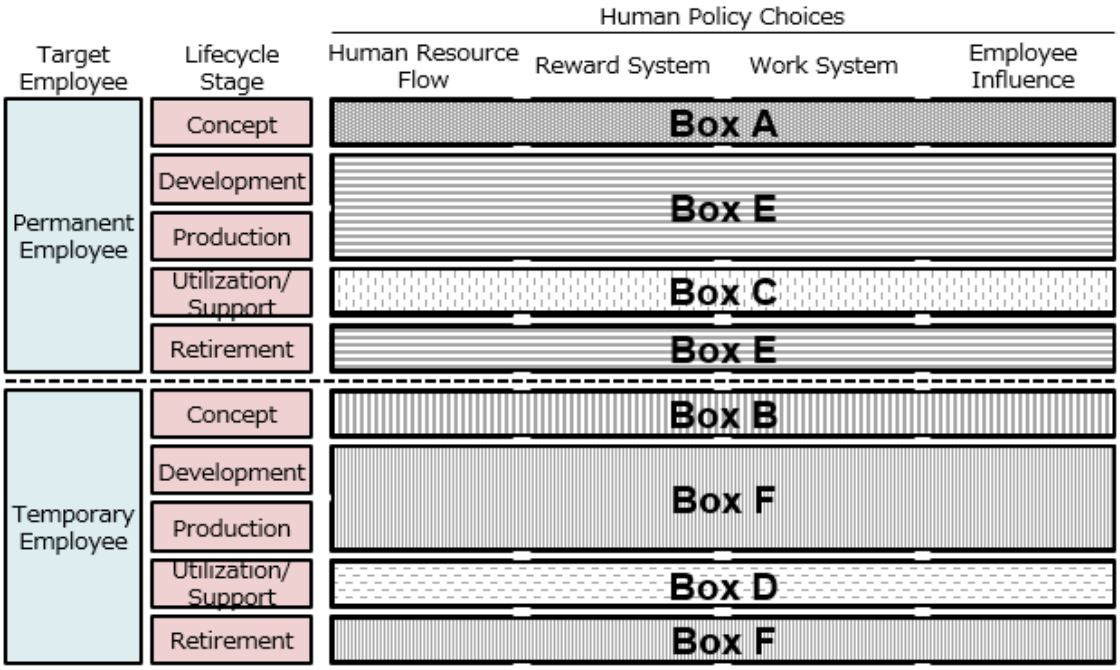

Figure 17. The Positioning of Each Box

4.4 Discussion

This section discusses the results of this study with Table 8 and Figure 17. 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.

Through this study, we discovered some challenges that lie ahead in the future.

1. We need to make a clear framework to design and operate a HR System. It is not enough to strengthen the feedback process while fitting an HR strategy and Management type as there are a few papers which refer the areas of Box C, D, E, and F.
2. While there are many papers in Box A and B, it is ambiguous about who decides the HR Strategy, HR Management Process, and HR Systems.
3. Regarding the studies in Box A and B, it is necessary to design an HR System based on HR Management such as controlled or autonomous types. Therefore, we need a framework to consider this point of view.
4. Most companies should plan not only to construct and operate an HR System but also to retire it. However, there are little papers in Box E and F. We need to make a detailed process to imagine the retirement stage.
5. We should combine the Harvard Model, HRMS (Human Resource Management System) and HRIS (Human Resource Information System) to operate HR System efficiently. In Box C, Figen used IDEF0, however, we need to push forward to utilize Systems Engineering more. (Figen et al., 2003)
6. HR researchers are often confused as to what area they discuss because they do not view Life Cycle Stages. Therefore, no one studied Box E and F. When they have a clear framework to map the theme they talk about, they can discuss issues explicitly.
7. No paper shows how an organization designs HRM Policy Choices and how mature it is. There is only Figen's thesis to improve HRM Policy Choices by applying Verification and Validation in Box E and F. (Figen et al., 2003) In addition, there is also no essay to identify and transform types of HR Strategy and Management in Box A and B.
8. Paul states that the focus of work on HRM is oriented towards HRM Policy Choices and short-term HR outcomes. We need to go back and consider other areas, a multiple stakeholder perspective, an attention to contextual factors and a focus on long-term consequences, which the Harvard Model provides. (Paul Boselie et al., 2013)

4.5 Summary

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.

The challenges derived from this chapter are as follows.

- ✓ We need to make a clear framework to design and operate a HR System.
- ✓ It is ambiguous about who decides the HR Strategy, HR Management Process, and HR System.
- ✓ It is necessary to design a HR System based on HR Management such as controlled or autonomous types.
- ✓ Most companies should plan not only to construct and operate a HR System but also to retire it.
- ✓ We need to make a detailed process to imagine the retirement stage.
- ✓ We should combine the Harvard Model, HRMS (Human Resource Management System) and HRIS (Human Resource Information System) to operate HR System efficiently.
- ✓ HR researchers are often confused as to what area they discuss because they do not view Life Cycle Stage.
- ✓ We need to show how an organization designs HRM Policy Choices and how mature it is.
- ✓ We need to go back and consider other areas, multiple stakeholder perspectives, an attention to contextual factors and a focus on long-term consequences, which the Harvard Model provides.

5. A Method to Discover Current Issues of HR Systems Based on the Harvard Model

5.1 A Proposal of HR System's Visualization based on the Harvard Model, Life Cycle, and Organization Strategy and Management Type

5.1.1 Overview of Organization Strategy and Management Type

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 18.

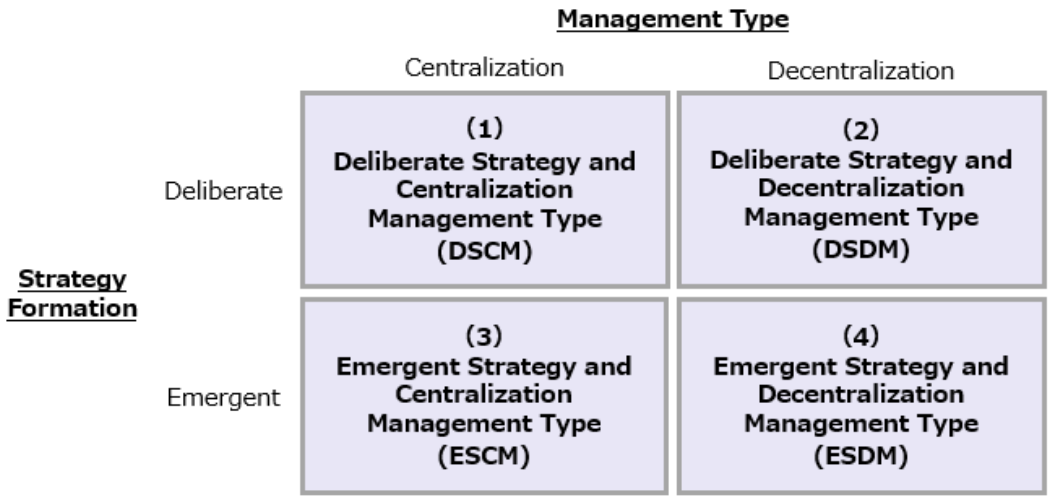

Figure 18. Organization Strategy and Management Type

5.1.2 Explanation of each segment in Organization Strategy and Management Type

(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.

5.1.3 Worksheet of Visualizing HR Systems based on Organization Strategy and Management Type

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 19.

Name	
1. HR System	
2. Object	Company / Department / Individual
3. Employee Type	Permanent / Temporary
4. Organization Strategy and Management Type	DSCM / DSDM / 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 19. Worksheet of Visualizing HR System based on Organization Strategy and Management Type

5.2 Proposal of Design Process in inflow's Recruitment, Assessment, and Selection by using Systems Engineering

5.2.1 Explanation of steps of the design process

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 Table 9.

Table 9. 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.

5.3 A validation of the training effectiveness for human resources based on the Harvard Model and FFBD

5.3.1 Explanation of 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. 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 20.

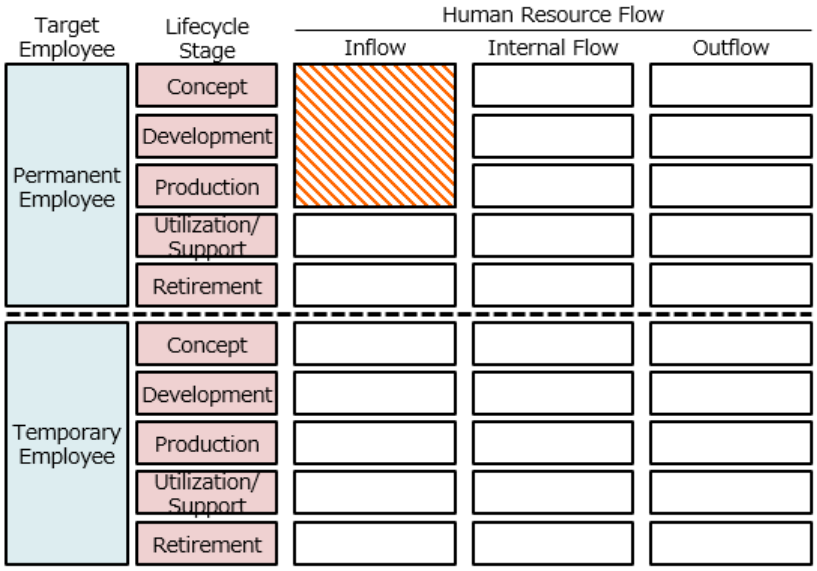

Figure 20. The Scope of the evaluation in this chapter

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 21.

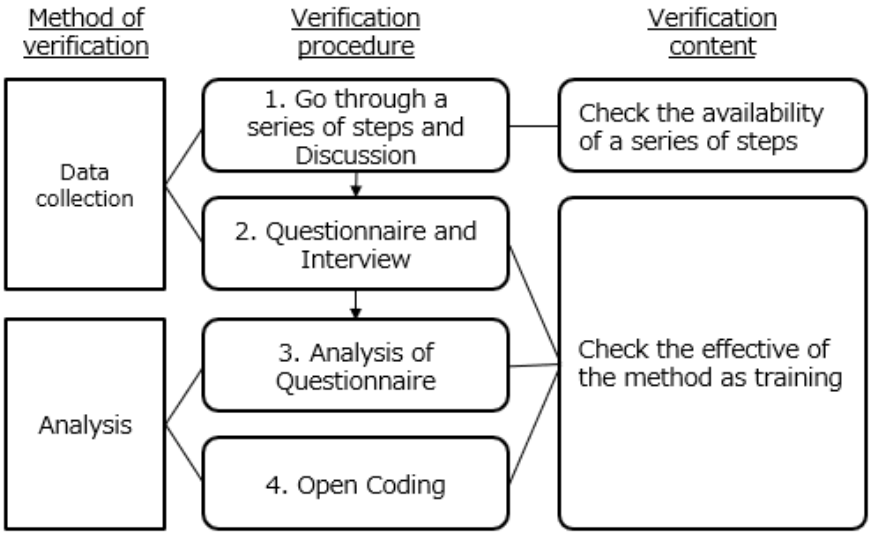

Figure 21. Verification Procedure of Questionnaire and Open Coding

6. Evaluation

6.1 Evaluation for the Proposed Method of HR System's Visualization based on the Harvard Model, Life Cycle, and Organization Strategy and Management Type

6.1.1 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 22.

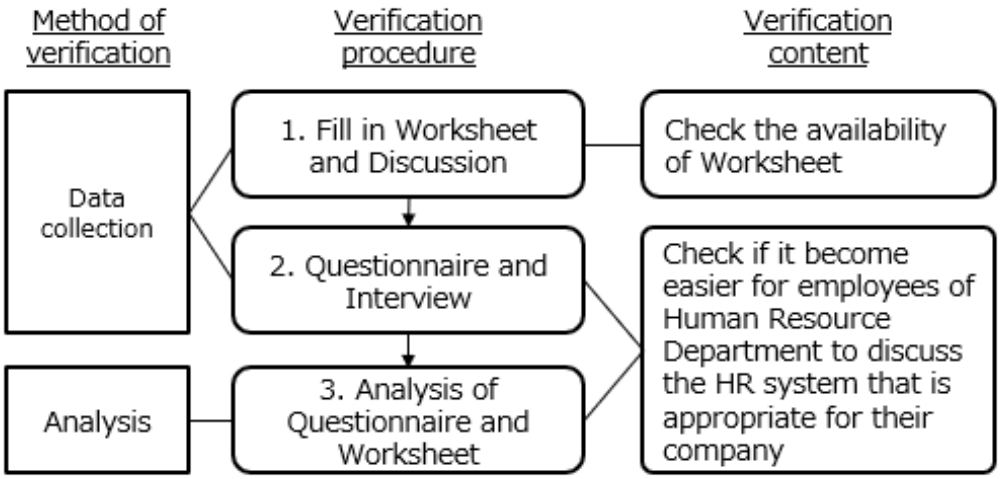

Figure 22. Verification Procedure and Content

6.1.2 Evaluation Results

We show the results of the evaluation in Table 10. 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 10. 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 11. 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%)

6.1.3 Discussion

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".

6.1.4 Summary

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.

6.2 Evaluation of Design Methodology in Recruitment, Assessment, and Selection process by using Systems Engineering

6.2.1 Explanation of 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 23.

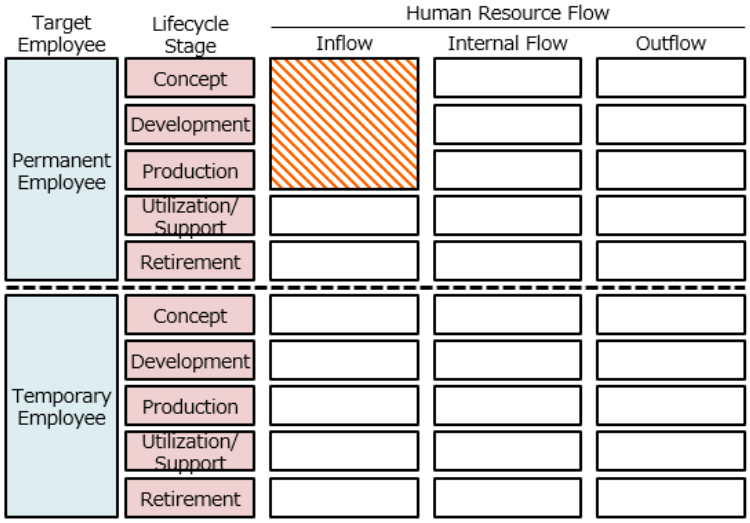

Figure 23. The Scope of the evaluation in this chapter

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 24.

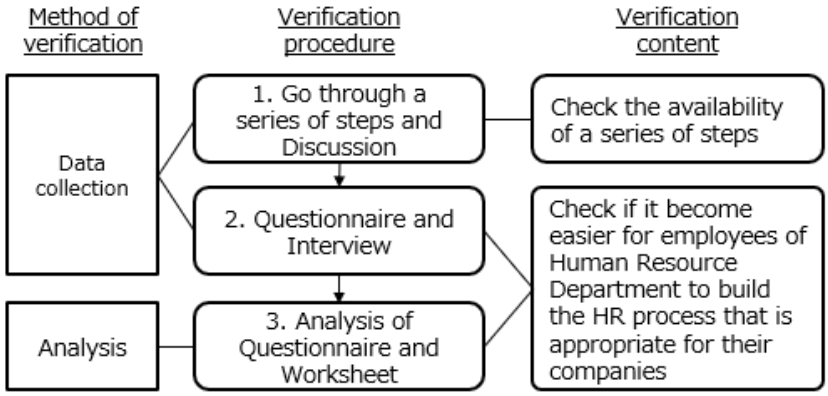

Figure 24. Verification Procedure and Content Results of questionnaire

6.2.2 The analysis of questionnaire

We show the results of the evaluation about the validity of the proposed method in Table 12. 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.

Table 12. 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%)

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.

We show the results of the evaluation about the comprehensibility, availability and effectiveness of the proposed method in Table 13.

Table 13. 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.

6.2.3 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 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. (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.

6.2.4 Results of open coding

The results of open coding are in table 14. 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 14. 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		Number of times
①Visualization	Reorganization and clarification of operations	53
	Visualization in languages and diagrams	31
	identification of characteristics	19
	Reorganization of Stakeholders	16
②Comparison with other HR processes		9
③Discovery of issues and areas for improvement		19

On the other hand, in Table 15, 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 15. The result of open coding regarding points to be improved in the future

Open Coding Results		Number of times
Points to be improved in the future	Insufficient understanding and proficiency	13
	Leakage of target operations and stakeholders	11
	Difficult to set particle size	7
	Difficult to define the scope	6

6.2.5 Discussion

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.

6.2.6 Summary

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.

6.3 The results of evaluation

We show the results of the evaluation about the validity of the proposed method in Table 16. 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.

Table 16. 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%)

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.

6.3.1 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 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.

6.3.2 Results of open coding

The results of open coding are in Table 17. 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 17. 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		**Number of times**
①Visualization	Visualization and lingualization of process	29
	Decomposition of process and elements	16
	A bird's-eye view	13
	Clarification of current status and ideal image	11
	Clarification of stakeholders	10
②Comparison and dialogue with others		10
③Discovery of issues and areas for improvement		35

6.3.3 Discussion

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.

6.3.4 Summary

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.

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

7.1.1 Objective

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.

7.1.2 Analysis Steps

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)

7.2 Design of questionnaire items

7.2.1 Questions about HRM outcomes and Long-term consequences

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.". “Organizational Effectiveness” 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")

7.2.2 Questions about satisfaction with HR systems

We set the following question regarding satisfaction with HR systems "Q2 Please answer whether you are satisfied with the following systems and mechanisms of your organization. * 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 "Q2S1 Recruiting System", "Q2 S2 Transfer System", "Q2S3 Evaluation System", "Q2S4 Retirement System", "Q2S5 Salary System", "Q2S6 Benefits System", "Q2S7 Job Content", "Q2S8 Job Evaluation Criteria", "Q2S9 Working System (working at home, side jobs, flextime, etc.)", and "Q2S10 System for Responding to Employee Requests and Suggestions". We used the six-point scale of Likert scale. ("6. Very satisfied", "5. Satisfied", "4. Slightly satisfied", "3. Less satisfied", "2. Not satisfied", "1. Not satisfied at all")

7.2.3 Questions about motivation for HR systems

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", "Q3 S2 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")

7.2.4 Questions about the selection criteria of an organization or a company

We set the following question regarding the selection criteria of an organization or a company "Q4 Please answer whether or not the following systems are the criteria for selecting an organization when you are looking for or changing jobs.".

The target HR systems were divided into 10 groups and set as "Q4S1 Recruiting System", "Q4 S2 Transfer System", "Q4S3 Evaluation System", "Q4S4 Retirement System", "Q4S5 Salary System", "Q4S6 Benefits System", "Q4S7 Job Content", "Q4S8 Job Evaluation Criteria", "Q4S9 Working System (working at home, side jobs, flextime, etc.)", and "Q4S10 System for Responding to Employee Requests and Suggestions". 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")

7.2.5 Questions about the comparison with other companies in the same industry

We set the following question regarding the selection criteria of an organization or a company "Q5 Based on an objective perspective, please answer whether or not the following systems and mechanisms of your organization are superior to those of other companies in the same industry. * If you do not have a relevant system in your current organization, please tell us what you think about it.".

The target HR systems were divided into 10 groups and set as "Q5S1 Recruiting System", "Q5 S2 Transfer System", "Q5S3 Evaluation System", "Q5S4 Retirement System", "Q5S5 Salary System", "Q5S6 Benefits System", "Q5S7 Job Content", "Q5S8 Job Evaluation Criteria", "Q5S9 Working System (working at home, side jobs, flextime, etc.)", and "Q5S10 System for Responding to Employee Requests and Suggestions". We used the six-point scale of Likert scale. ("6. Very superior", "5. Superior", "4. Slightly superior", "3 Less superior", "2. Not superior", "1. Not superior at all")

7.2.6 Questions about the maturity of HR systems

We set the following question regarding the maturity of HR systems "Q6 Based on an objective point of view, please tell us what level of maturity you think the following systems and systems in your organization are at.".

The target HR systems were divided into 10 groups and set as "Q6S1 Recruiting System", "Q6 S2 Transfer System", "Q6S3 Evaluation System", "Q6S4 Retirement System", "Q6S5 Salary System", "Q6S6 Benefits System", "Q6S7 Job Content", "Q6S8 Job Evaluation Criteria", "Q6S9

Working System (working at home, side jobs, flextime, etc.)", and "Q6S10 System for Responding to Employee Requests and Suggestions". We used the maturity scale of CMM. ("1. Level 0: No mechanism exists. No awareness of personnel issues.", "2. Level 1: There is a mechanism, but it is not standardized, and it is individually supported.", "3. Level 2: There is a system, but management is dependent on individuals such as veterans.", "4. Level 3: Procedures are standardized and documented, but management is individualized.", "5. Level 4: Procedures followed, quantitatively measured and continuously improved.", "6. Level 5: Continuous improvement activities result in optimized best practices.", "7. I have no idea.")

7.3 Methods of Conducting Questionnaires

7.3.1 Subject of the survey

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.

7.3.2 Survey Method

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.

7.4 Basic Statistics

7.4.1 Breakdown of Respondents

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	

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%).

Table 20. Unmarried/Married

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

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	

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 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	

7.4.2 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". In addition, the average for IT Engineer was 3.59 and the average for non-IT Engineer was 3.71.

Table 24. The frequency distribution of responses for Q1S1

	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

	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%
Average	3.59		3.71	

Table 26. The frequency distribution of responses for Q1S2

	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". In addition, the average for IT Engineer was 4.33 and the average for non-IT Engineer was 4.52.

Table 27. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S2

	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%
Average	4.33		4.52	

Table 28. The frequency distribution of responses for Q1S3

	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". In addition, the average for IT Engineer was 3.60 and the average for non-IT Engineer was 3.85.

Table 29. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S3

	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%
Average	3.60		3.85	

Table 30. The frequency distribution of responses for Q1S4

	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". In addition, the average for IT Engineer was 3.41 and the average for non-IT Engineer was 3.62.

Table 31. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S4

	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%
Average	3.41		3.62	

Table 32. The frequency distribution of responses for Q1S5

	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". In addition, the average for IT Engineer was 3.53 and the average for non-IT Engineer was 3.74.

Table 33. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S5

	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%
Average	3.53		3.74	

Table 34. The frequency distribution of responses for Q1S6

	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". In addition, the average for IT Engineer was 3.51 and the average for non-IT Engineer was 3.65.

Table 35. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S6

	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%
Average	3.51		3.65	

Table 36. The frequency distribution of responses for Q1S7

	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". In addition, the average for IT Engineer was 3.40 and the average for non-IT Engineer was 3.60.

Table 37. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S7

	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%
Average	3.40		3.60	

Table 38. The frequency distribution of responses for Q1S8

	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". In addition, the average for IT Engineer was 3.79 and the average for non-IT Engineer was 3.97.

Table 39. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S8

	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%
Average	3.79		3.97	

Table 40. The frequency distribution of responses for Q1S9

	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". In addition, the average for IT Engineer was 3.59 and the average for non-IT Engineer was 3.76.

Table 41. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S9

	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%
Average	3.59		3.76	

Table 42. The frequency distribution of responses for Q1S10

	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". In addition, the average for IT Engineer was 3.67 and the average for non-IT Engineer was 3.96.

Table 43. The cross tabulation of IT Engineer and non-IT Engineer responses to Q1S10

	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%
Average	3.67		3.96	

7.5 Relationship between satisfaction with HR systems and HR Outcomes and Long-term consequences

7.5.1 Deriving hypotheses through exploratory analysis of all employees

We would like to conduct an exploratory analysis to clarify the relationship between satisfaction 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.

The following table shows the result of multiple regression analysis for Q1S1. According to the table, Q2S7 and Q2S10 are 0.1% significant, Q2S8 is 1% significant, and Q2S1 is 5% significant.

Table 44. The result of multiple regression analysis for Q1S1

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	-0.062	0.171		-0.361	0.718	
Q2S1	**0.102**	**0.048**	**0.085**	**2.118**	**0.035**	*
Q2S2	0.075	0.044	0.068	1.688	0.092	
Q2S3	0.007	0.058	0.007	0.124	0.902	
Q2S4	0.073	0.045	0.065	1.615	0.107	
Q2S5	0.038	0.046	0.038	0.827	0.408	
Q2S6	-0.049	0.039	-0.047	-1.261	0.208	
Q2S7	**0.361**	**0.043**	**0.321**	**8.454**	**0.000**	***
Q2S8	**0.172**	**0.058**	**0.158**	**2.965**	**0.003**	**
Q2S9	0.064	0.039	0.064	1.660	0.098	
Q2S10	**0.198**	**0.055**	**0.176**	**3.628**	**0.000**	***

Dependent variable : "Q1S1 You have an attachment to your job or organization"

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

Table 45. The result of multiple regression analysis for Q1S2

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**2.099**	**0.174**		**12.030**	**0.000**	***
Q2S1	**0.178**	**0.049**	**0.181**	**3.617**	**0.000**	***
Q2S2	0.032	0.045	0.035	0.699	0.485	
Q2S3	**-0.136**	**0.059**	**-0.156**	**-2.293**	**0.022**	*
Q2S4	**0.155**	**0.046**	**0.171**	**3.371**	**0.001**	**
Q2S5	-0.025	0.047	-0.030	-0.524	0.601	
Q2S6	**0.095**	**0.040**	**0.110**	**2.379**	**0.018**	*
Q2S7	**0.327**	**0.044**	**0.356**	**7.510**	**0.000**	***
Q2S8	0.111	0.059	0.125	1.876	0.061	
Q2S9	0.058	0.040	0.071	1.474	0.141	
Q2S10	**-0.191**	**0.056**	**-0.207**	**-3.422**	**0.001**	**

Dependent variable : "Q1S2 You are working with a sense of responsibility"

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

The above table shows the result of multiple regression analysis for Q1S2. According to the table, Q2S1 and Q2S7 are 0.1% significant, Q2S4 and Q2S10 are 1% significant, and Q2S3 and Q2S6 are 5% significant.

The following table shows the result of multiple regression analysis for Q1S3. According to the table, Q2S5, Q2S7 and Q2S8 are 1% significant, and Q2S9 is 5% significant.

Table 46. The result of multiple regression analysis for Q1S3

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**0.767**	**0.178**		**4.300**	**0.000**	***
Q2S1	0.049	0.050	0.045	0.984	0.325	
Q2S2	0.019	0.046	0.019	0.405	0.686	
Q2S3	0.025	0.061	0.026	0.420	0.675	
Q2S4	0.055	0.047	0.054	1.173	0.241	
Q2S5	**-0.122**	**0.048**	**-0.134**	**-2.540**	**0.011**	**
Q2S6	0.030	0.041	0.031	0.728	0.467	
Q2S7	**0.397**	**0.045**	**0.387**	**8.906**	**0.000**	**
Q2S8	**0.186**	**0.061**	**0.188**	**3.079**	**0.002**	**
Q2S9	**0.100**	**0.040**	**0.110**	**2.481**	**0.013**	*
Q2S10	0.065	0.057	0.063	1.134	0.257	

Dependent variable : "Q1S3 You feel that your ability is growing"

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

Table 47. The result of multiple regression analysis for Q1S4

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.280**	**0.272**		**4.706**	**0.000**	***
Q2S1	0.075	0.077	0.069	0.967	0.334	
Q2S2	0.016	0.068	0.017	0.230	0.819	
Q2S3	0.090	0.089	0.093	1.006	0.315	
Q2S4	0.106	0.068	0.105	1.564	0.119	
Q2S5	0.006	0.075	0.006	0.076	0.939	
Q2S6	-0.004	0.060	-0.004	-0.063	0.949	
Q2S7	-0.083	0.066	-0.084	-1.254	0.211	
Q2S8	0.178	0.092	0.179	1.925	0.055	
Q2S9	0.042	0.058	0.048	0.731	0.466	
Q2S10	**0.226**	**0.082**	**0.225**	**2.755**	**0.006**	**

Dependent variable : "Q1S4 You feel that your organization is operating the business at an efficient cost"

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

The above table shows the result of multiple regression analysis for Q1S4. According to the table, Q2S10 is 1% significant.

The following table shows the result of multiple regression analysis for Q1S5. According to the table, Q2S10 is 0.1% significant and Q2S9 is 5% significant.

Table 48. The result of multiple regression analysis for Q1S5

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	0.439	0.253		1.739	0.083	
Q2S1	0.072	0.072	0.064	1.001	0.318	
Q2S2	0.055	0.064	0.056	0.866	0.388	
Q2S3	0.058	0.083	0.058	0.706	0.481	
Q2S4	0.114	0.063	0.110	1.815	0.071	
Q2S5	-0.055	0.070	-0.057	-0.780	0.436	
Q2S6	0.008	0.056	0.009	0.149	0.882	
Q2S7	0.105	0.062	0.102	1.703	0.090	
Q2S8	0.135	0.086	0.131	1.575	0.117	
Q2S9	**0.115**	**0.054**	**0.126**	**2.132**	**0.034**	*
Q2S10	**0.295**	**0.076**	**0.283**	**3.868**	**0.000**	***

Dependent variable : "Q1S5 You feel that the goals of your organization and the people are aligned."

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

Table 49. The result of multiple regression analysis for Q1S6

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	0.162	0.179		0.907	0.365	
Q2S1	0.012	0.050	0.010	0.240	0.811	
Q2S2	0.075	0.046	0.069	1.617	0.107	
Q2S3	-0.034	0.061	-0.033	-0.567	0.571	
Q2S4	0.027	0.047	0.024	0.566	0.572	
Q2S5	-0.041	0.048	-0.041	-0.846	0.398	
Q2S6	-0.037	0.041	-0.035	-0.897	0.370	
Q2S7	**0.452**	**0.045**	**0.406**	**10.123**	**0.000**	***
Q2S8	**0.210**	**0.061**	**0.195**	**3.462**	**0.001**	**
Q2S9	**0.085**	**0.041**	**0.086**	**2.094**	**0.037**	*
Q2S10	**0.196**	**0.057**	**0.175**	**3.426**	**0.001**	**

Dependent variable : "Q1S6 You are working happily."

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

The above table shows the result of multiple regression analysis for Q1S6. According to the table, Q2S7 is 0.1% significant, Q2S8 and Q2S10 are 1% significant, and Q2S9 is 5% significant.

The following table shows the result of multiple regression analysis for Q1S7. According to the table, Q2S7 and Q2S8 are 0.1% significant, Q2S9 and Q2S10 are 1% significant, and Q2S2 is 5% significant.

Table 50. The result of multiple regression analysis for Q1S7

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	0.063	0.170		0.372	0.710	
Q2S1	-0.013	0.048	-0.012	-0.280	0.780	
Q2S2	**0.106**	**0.044**	**0.100**	**2.413**	**0.016**	*
Q2S3	-0.039	0.058	-0.038	-0.674	0.500	
Q2S4	0.019	0.045	0.018	0.420	0.675	
Q2S5	-0.010	0.046	-0.010	-0.219	0.827	
Q2S6	-0.039	0.039	-0.039	-1.009	0.314	
Q2S7	**0.402**	**0.043**	**0.369**	**9.464**	**0.000**	***
Q2S8	**0.229**	**0.058**	**0.216**	**3.955**	**0.000**	***
Q2S9	**0.124**	**0.039**	**0.128**	**3.213**	**0.001**	**
Q2S10	**0.177**	**0.054**	**0.162**	**3.250**	**0.001**	**

Dependent variable : "Q1S7 You are working lively."

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

Table 51. The result of multiple regression analysis for Q1S8

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.105**	**0.197**		**5.613**	**0.000**	***
Q2S1	0.000	0.055	0.000	-0.003	0.997	
Q2S2	0.054	0.051	0.052	1.061	0.289	
Q2S3	0.109	0.067	0.108	1.625	0.105	
Q2S4	0.057	0.052	0.055	1.111	0.267	
Q2S5	0.045	0.053	0.047	0.850	0.396	
Q2S6	0.011	0.045	0.011	0.241	0.810	
Q2S7	**0.254**	**0.049**	**0.239**	**5.168**	**0.000**	***
Q2S8	0.048	0.067	0.047	0.724	0.469	
Q2S9	**0.200**	**0.045**	**0.211**	**4.471**	**0.000**	***
Q2S10	-0.012	0.063	-0.011	-0.194	0.846	

Dependent variable : "Q1S8 You are happy."

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

The above table shows the result of multiple regression analysis for Q1S8. According to the table, Q2S7 and Q2S9 are 0.1% significant.

The following table shows the result of multiple regression analysis for Q1S9. According to the table, Q2S8 and Q2S9 are 5% significant.

Table 52. The result of multiple regression analysis for Q1S9

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.313**	**0.269**		**4.884**	**0.000**	***
Q2S1	-0.014	0.077	-0.013	-0.182	0.856	
Q2S2	0.049	0.068	0.052	0.728	0.467	
Q2S3	0.110	0.088	0.113	1.249	0.213	
Q2S4	0.005	0.067	0.005	0.075	0.940	
Q2S5	0.114	0.075	0.123	1.535	0.126	
Q2S6	-0.061	0.059	-0.066	-1.019	0.309	
Q2S7	0.056	0.065	0.056	0.856	0.393	
Q2S8	**0.198**	**0.091**	**0.199**	**2.174**	**0.031**	*
Q2S9	**0.135**	**0.057**	**0.153**	**2.358**	**0.019**	*
Q2S10	0.092	0.081	0.091	1.131	0.259	

Dependent variable : "Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments."

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

Table 53. The result of multiple regression analysis for Q1S10

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	0.653	0.287		2.279	0.024	
Q2S1	**0.260**	**0.082**	**0.222**	**3.192**	**0.002**	**
Q2S2	0.107	0.072	0.104	1.479	0.140	
Q2S3	0.035	0.094	0.033	0.371	0.711	
Q2S4	0.042	0.071	0.038	0.588	0.557	
Q2S5	0.055	0.079	0.054	0.688	0.492	
Q2S6	0.038	0.063	0.038	0.599	0.550	
Q2S7	**0.181**	**0.070**	**0.169**	**2.598**	**0.010**	*
Q2S8	-0.020	0.097	-0.019	-0.210	0.834	
Q2S9	0.014	0.061	0.015	0.236	0.813	
Q2S10	0.145	0.087	0.132	1.669	0.096	

Dependent variable : "Q1S10 You feel that your organization contributes to the prosperity of society as a whole."

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

The above table shows the result of multiple regression analysis for Q1S10. According to the table, Q2S1 is 1% significant, and Q2S7 is 5% significant.

We conducted a factor analysis of responses to the Harvard Model's HR outcomes and Long-term consequences questionnaire. The results are in the table 54. Based on the above results, the first factor consists of Q1S4, Q1S5, and Q1S9 is named “Respect for the organization”. The second factor, Q1S2, Q1S3, and Q1S 10, is “Responsibly and capability growth”. The third factor consists of Q1S6, Q1S7, and Q1S1, is termed “Job attachment and happiness”. Only the last Q1S8 was left alone. Cronbach's alpha coefficient for reliability of the scale was 0.925. The results of multiple regression analysis and factor analysis are shown in the table 55.

Table 54. A factor analysis of HR outcomes and Long-term consequences

	F1	F2	F3	F4
Q1S4 You feel that your organization is operating the business at an efficient cost	0.989	-0.181	-0.091	0.038
Q1S5 You feel that the goals of your organization and the people are aligned	0.648	0.044	0.161	0.004
Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environ	0.613	0.149	0.068	-0.032
Q1S2 You are working with a sense of responsibility	-0.149	0.761	-0.045	0.072
Q1S3 You feel that your ability is growing	-0.018	0.668	0.199	-0.033
Q1S10 You feel that your organization contributes to the prosperity of society as a whole	0.323	0.599	-0.087	-0.011
Q1S6 You are working happily	-0.042	-0.051	0.982	0.041
Q1S7 You are working lively	0.040	0.068	0.823	-0.008
Q1S1 You have an attachment to your job or organization	0.316	0.258	0.343	0.001
Q1S8 You are happy	0.026	0.047	0.030	0.941

Table 55. Result of multiple regression analysis and factor analysis

	0.1% significant	1% significant	5% significant
Q1S4 You feel that your organization is operating the business at an efficient cost		Q2S10	
Q1S5 You feel that the goals of your organization and the people are aligned	Q2S10		Q2S9
Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments			Q2S8 and Q2S9
Q1S2 You are working with a sense of responsibility	Q2S1, Q2S7	Q2S4, Q2S10	Q2S3, Q2S6
Q1S3 You feel that your ability is growing		Q2S5, Q2S7, Q2S8	Q2S9
Q1S10 You feel that your organization contributes to the prosperity of society as a whole		Q2S1	Q2S7
Q1S6 You are working happily	Q2S7	Q2S8, Q2S10	Q2S9
Q1S7 You are working lively	Q2S7, Q2S8	Q2S9, Q2S10	Q2S2
Q1S1 You have an attachment to your job or organization	Q2S7, Q2S10	Q2S8	Q2S1
Q1S8 You are happy	Q2S7, Q2S9		

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. Q1S1 is far different from Q1S6 and Q1Q7 in content, and its content validity is weak. Therefore, Q1S1 was removed, while Q1S8 which was originally divided from Well-being was added. As for Q1S 10, it is closer to Q1S4, Q1S5, and Q1S9 because of its social nature and the structure of the whole organization. I added it to the group. As a hypothesis, we made the structure as follows, and then performed structural analysis of covariance.

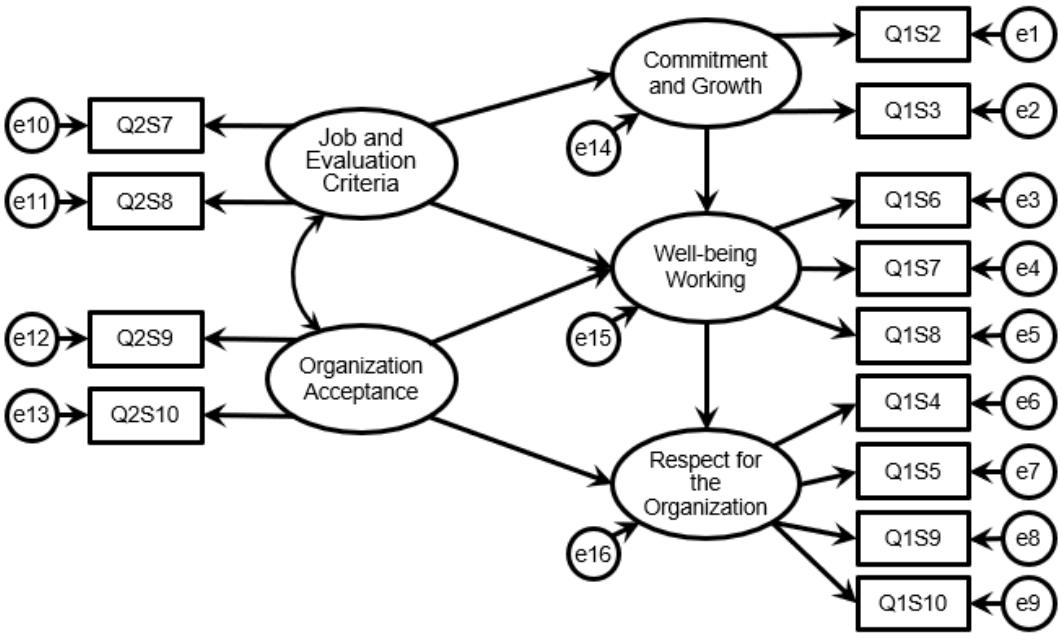

Figure 25. A hypothesis of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences

7.5.2 Confirmatory analysis of hypotheses for all employees

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 = .928, CFI = .952, RMSEA = .080, which were not sufficient, but the values that could be judged to be appropriate to some extent.

The results of covariance structure analysis showed that, among HR Systems, “job and evaluation criteria” plays an important role in increasing HR Outcomes and Long-term Consequences. The structure is such that the content of work and evaluation standards increase the sense of responsibility of employees, which in turn contributes to capability growth. It was also found that “job and evaluation criteria” 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 “the contents of work and evaluation criteria” seems to be the best way to generate HR outcomes and long-term consequences. At the same time, it was found that a high degree of acceptance of the company leads to increased engagement with the organization. Perhaps employees' attachment to the organization changes depending on whether the company is willing to respond to their wishes and demands. We also found that, although the correlation was a bit weak, the more fun, lively, and happy they were, the more engaged they were in the organization that provided the environment.

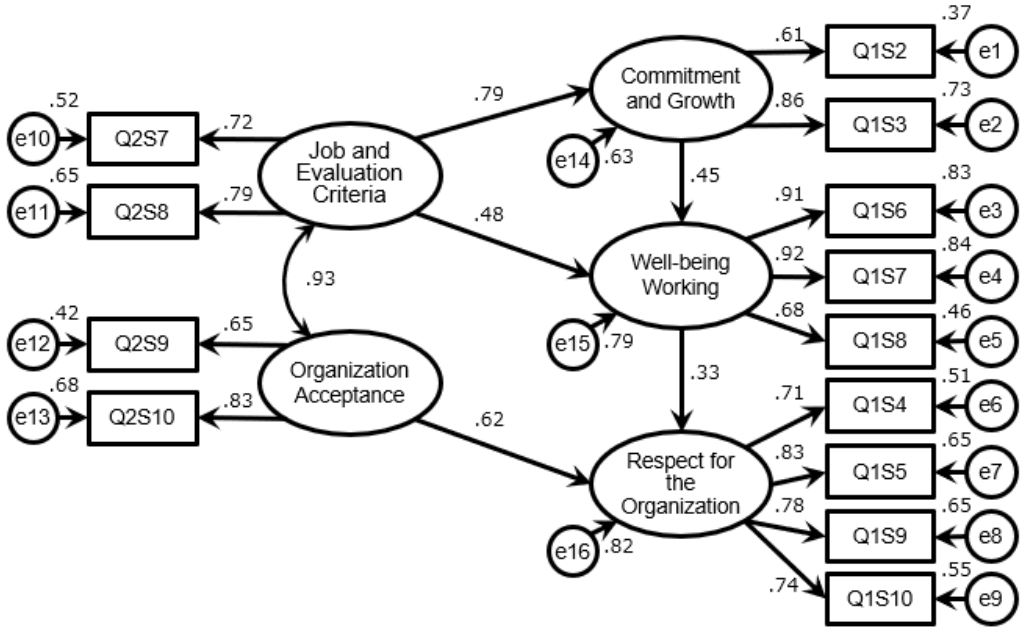

Figure 26. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for all employees in ICT industry.

7.5.3 Comparison of IT Engineer and non-IT Engineer

We would also like to confirm the results of the covariance structure analysis identified in the previous section, as compared with the results obtained when the subjects were divided into engineers and non-IT engineers. The results are as follows.

The result of IT Engineers showed that the goodness of fit index was GFI = .891, CFI = .918, RMSEA = .097, which were not sufficient, but the values that could be judged to be appropriate to some extent.

The result of non-IT Engineer showed that the goodness of fit index was GFI = .928, CFI = .968, RMSEA = .070, which were not sufficient, but the values that could be judged to be appropriate to some extent.

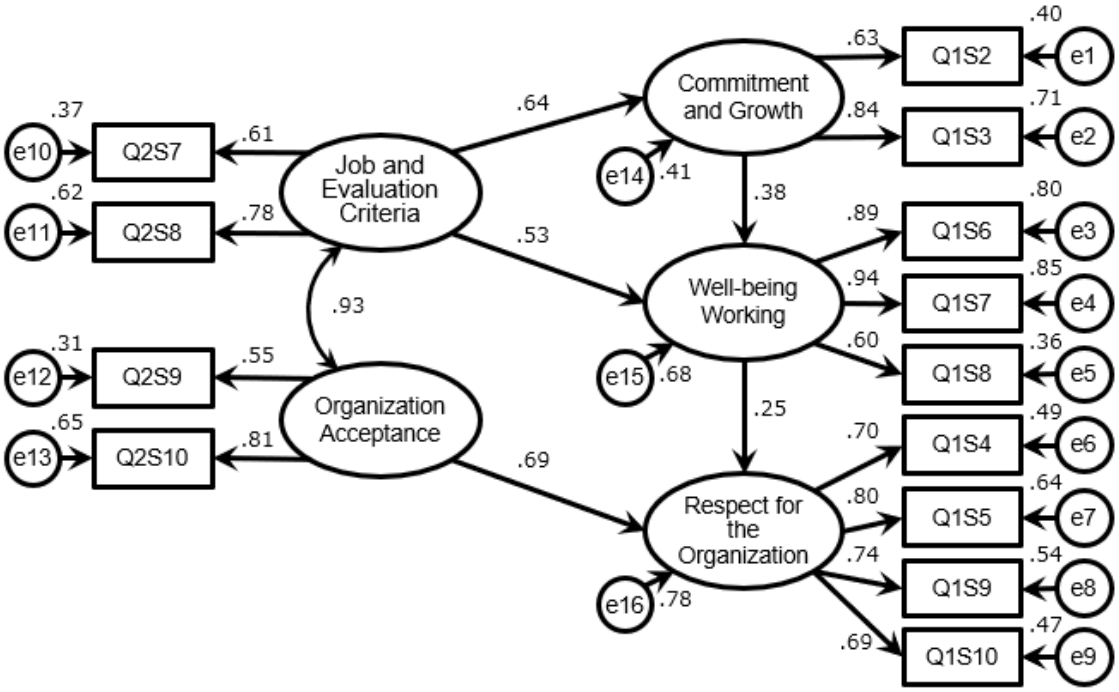

Figure 27. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for IT Engineer in ICT industry.

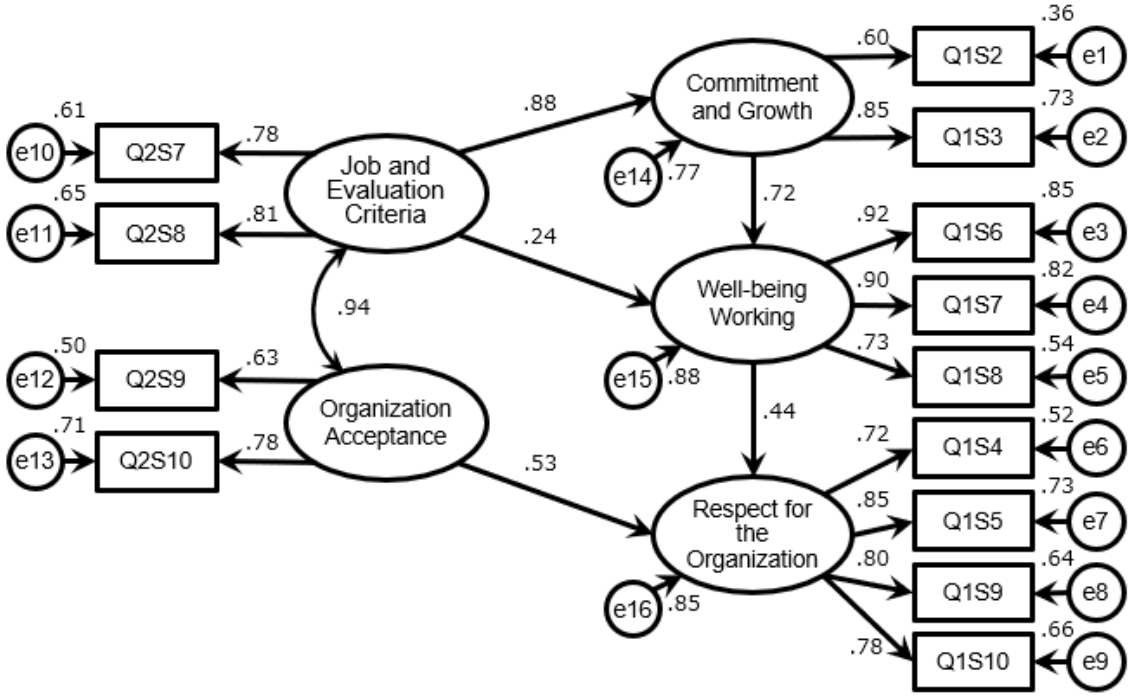

Figure 28. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for non-IT Engineer in ICT industry.

As a result, the structure fits non-IT Engineers better than IT engineers. Because non-IT Engineers design and operate current HR systems, various systems and measures are implemented according to their values. Therefore, in the future, IT engineers themselves need to think about building a highly compatible HR systems, which they want to work on it, and they need to create a structure that increases engagement with the organization.

7.6 Relationship between motivation for HR systems and HR Outcomes and Long-term consequences

7.6.1 Deriving hypotheses through exploratory analysis of all employees

We would like to conduct an exploratory analysis to clarify the relationship between satisfaction 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.

Table 56. The result of multiple regression analysis for Q1S1

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**0.956**	**0.200**		**4.782**	**0.000**	***
Q3S1	**0.246**	**0.060**	**0.204**	**4.076**	**0.000**	***
Q3S2	-0.040	0.058	-0.037	-0.688	0.492	
Q3S3	0.081	0.071	0.087	1.144	0.253	
Q3S4	0.081	0.056	0.077	1.427	0.154	
Q3S5	-0.083	0.057	-0.097	-1.452	0.147	
Q3S6	0.047	0.052	0.046	0.894	0.372	
Q3S7	**0.208**	**0.061**	**0.197**	**3.409**	**0.001**	**
Q3S8	0.081	0.073	0.082	1.105	0.270	
Q3S9	0.018	0.057	0.018	0.325	0.745	
Q3S10	0.103	0.065	0.100	1.575	0.116	

Dependent variable : "Q1S1 You have an attachment to your job or organization"

*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 is 0.1% significant, Q3S7 is 1% significant.

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

Table 57. The result of multiple regression analysis for Q1S2

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**2.713**	**0.177**		**15.290**	**0.000**	***
Q3S1	0.056	0.054	0.056	1.038	0.300	
Q3S2	0.004	0.051	0.005	0.079	0.937	
Q3S3	-0.086	0.063	-0.113	-1.364	0.173	
Q3S4	0.036	0.050	0.042	0.725	0.469	
Q3S5	0.011	0.051	0.015	0.209	0.835	
Q3S6	0.086	0.046	0.103	1.851	0.065	
Q3S7	**0.253**	**0.054**	**0.293**	**4.675**	**0.000**	***
Q3S8	0.071	0.065	0.088	1.097	0.273	
Q3S9	0.008	0.050	0.009	0.158	0.874	
Q3S10	0.005	0.058	0.006	0.093	0.926	

Dependent variable : "Q1S2 You are working with a sense of responsibility"

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

Table 58. The result of multiple regression analysis for Q1S3

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.592**	**0.192**		**8.274**	**0.000**	***
Q3S1	**0.168**	**0.058**	**0.152**	**2.884**	**0.004**	**
Q3S2	0.065	0.056	0.066	1.160	0.247	
Q3S3	-0.048	0.068	-0.057	-0.703	0.482	
Q3S4	0.043	0.054	0.045	0.798	0.425	
Q3S5	-0.080	0.055	-0.102	-1.450	0.148	
Q3S6	0.078	0.050	0.084	1.563	0.119	
Q3S7	**0.187**	**0.059**	**0.194**	**3.185**	**0.002**	**
Q3S8	0.111	0.071	0.123	1.574	0.116	
Q3S9	-0.024	0.055	-0.026	-0.447	0.655	
Q3S10	0.090	0.063	0.096	1.430	0.153	

Dependent variable : "Q1S3 You feel that your ability is growing"

*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 and Q3S5 is 5% significant.

Table 59. The result of multiple regression analysis for Q1S4

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.598**	**0.196**		**8.161**	**0.000**	***
Q3S1	**0.295**	**0.059**	**0.265**	**4.982**	**0.000**	***
Q3S2	0.059	0.057	0.059	1.031	0.303	
Q3S3	0.071	0.069	0.084	1.032	0.303	
Q3S4	0.095	0.055	0.098	1.723	0.086	
Q3S5	**-0.121**	**0.056**	**-0.153**	**-2.153**	**0.032**	*
Q3S6	0.023	0.051	0.025	0.457	0.648	
Q3S7	0.053	0.060	0.054	0.883	0.378	
Q3S8	-0.073	0.072	-0.081	-1.019	0.309	
Q3S9	0.035	0.056	0.036	0.623	0.533	
Q3S10	0.125	0.064	0.133	1.959	0.051	

Dependent variable : "Q1S4 You feel that your organization is operating the business at an efficient cost"

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

Table 60. The result of multiple regression analysis for Q1S5

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.321**	**0.189**		**6.990**	**0.000**	***
Q3S1	**0.329**	**0.057**	**0.296**	**5.758**	**0.000**	***
Q3S2	-0.025	0.055	-0.025	-0.459	0.647	
Q3S3	-0.017	0.067	-0.020	-0.253	0.800	
Q3S4	0.035	0.053	0.036	0.650	0.516	
Q3S5	-0.107	0.054	-0.134	-1.964	0.050	
Q3S6	0.039	0.049	0.042	0.793	0.428	
Q3S7	**0.132**	**0.058**	**0.135**	**2.284**	**0.023**	*
Q3S8	-0.003	0.069	-0.003	-0.038	0.969	
Q3S9	**0.124**	**0.054**	**0.130**	**2.314**	**0.021**	*
Q3S10	**0.142**	**0.062**	**0.150**	**2.292**	**0.022**	*

Dependent variable : "Q1S5 You feel that the goals of your organization and the people are aligned."

*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 Q3S7, Q3S9 and Q3S10 are 5% significant.

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

Table 61. The result of multiple regression analysis for Q1S6

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.141**	**0.207**		**5.512**	**0.000**	***
Q3S1	**0.216**	**0.063**	**0.180**	**3.447**	**0.001**	**
Q3S2	-0.058	0.060	-0.054	-0.969	0.333	
Q3S3	-0.102	0.073	-0.111	-1.392	0.165	
Q3S4	0.059	0.059	0.057	1.010	0.313	
Q3S5	-0.068	0.059	-0.080	-1.144	0.253	
Q3S6	0.088	0.054	0.088	1.640	0.102	
Q3S7	**0.245**	**0.063**	**0.234**	**3.873**	**0.000**	***
Q3S8	0.104	0.076	0.106	1.368	0.172	
Q3S9	0.064	0.059	0.062	1.086	0.278	
Q3S10	0.111	0.068	0.110	1.648	0.100	

Dependent variable : "Q1S6 You are working happily."

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

Table 62. The result of multiple regression analysis for Q1S7

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.018**	**0.200**		**5.091**	**0.000**	***
Q3S1	**0.186**	**0.060**	**0.158**	**3.071**	**0.002**	**
Q3S2	0.016	0.058	0.015	0.278	0.781	
Q3S3	-0.045	0.071	-0.050	-0.641	0.522	
Q3S4	0.016	0.057	0.016	0.288	0.774	
Q3S5	-0.095	0.057	-0.113	-1.650	0.100	
Q3S6	0.064	0.052	0.065	1.228	0.220	
Q3S7	**0.265**	**0.061**	**0.259**	**4.343**	**0.000**	***
Q3S8	0.048	0.073	0.050	0.654	0.514	
Q3S9	0.094	0.057	0.093	1.652	0.099	
Q3S10	0.123	0.065	0.123	1.879	0.061	

Dependent variable : "Q1S7 You are 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 63. The result of multiple regression analysis for Q1S8

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.903**	**0.206**		**9.233**	**0.000**	***
Q3S1	0.024	0.062	0.021	0.383	0.702	
Q3S2	0.028	0.060	0.027	0.468	0.640	
Q3S3	-0.006	0.073	-0.007	-0.081	0.936	
Q3S4	0.042	0.058	0.042	0.714	0.476	
Q3S5	0.004	0.059	0.005	0.074	0.941	
Q3S6	**0.124**	**0.054**	**0.129**	**2.314**	**0.021**	*
Q3S7	0.102	0.063	0.101	1.615	0.107	
Q3S8	-0.018	0.076	-0.020	-0.243	0.808	
Q3S9	**0.157**	**0.059**	**0.159**	**2.674**	**0.008**	**
Q3S10	0.059	0.067	0.061	0.876	0.381	

Dependent variable : "Q1S8 You are happy."

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

Table 64. The result of multiple regression analysis for Q1S9

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.693**	**0.196**		**8.644**	**0.000**	***
Q3S1	**0.284**	**0.059**	**0.258**	**4.803**	**0.000**	***
Q3S2	-0.009	0.057	-0.009	-0.160	0.873	
Q3S3	0.028	0.069	0.033	0.406	0.685	
Q3S4	0.065	0.055	0.068	1.176	0.240	
Q3S5	-0.044	0.056	-0.055	-0.775	0.439	
Q3S6	0.035	0.051	0.038	0.692	0.489	
Q3S7	**0.127**	**0.060**	**0.131**	**2.116**	**0.035**	*
Q3S8	-0.042	0.072	-0.047	-0.588	0.557	
Q3S9	0.028	0.056	0.029	0.496	0.620	
Q3S10	0.086	0.064	0.092	1.342	0.180	

Dependent variable : "Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments."

*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 and Q3S7 is 5% significant.

The following table shows the result of multiple regression analysis for Q1S10. According to the table, Q3S1, Q3S6 and Q3S7 are 1% significant, and Q3S10 is 5% significant.

Table 65. The result of multiple regression analysis for Q1S10

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.563**	**0.196**		**7.956**	**0.000**	***
Q3S1	**0.206**	**0.059**	**0.181**	**3.460**	**0.001**	**
Q3S2	0.014	0.057	0.013	0.238	0.812	
Q3S3	0.023	0.069	0.026	0.326	0.744	
Q3S4	0.026	0.056	0.026	0.466	0.641	
Q3S5	-0.103	0.056	-0.127	-1.823	0.069	
Q3S6	**0.136**	**0.051**	**0.143**	**2.666**	**0.008**	**
Q3S7	**0.191**	**0.060**	**0.192**	**3.175**	**0.002**	**
Q3S8	-0.005	0.072	-0.005	-0.068	0.946	
Q3S9	-0.008	0.056	-0.008	-0.137	0.891	
Q3S10	**0.141**	**0.064**	**0.147**	**2.200**	**0.028**	*

Dependent variable : "Q1S10 You feel that your organization contributes to the prosperity of society as a whole."

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

We conducted a factor analysis of responses to the Harvard Model's HR outcomes and Long-term consequences questionnaire. The results are as follows.

The results of multiple regression analysis and factor analysis are shown in the table 66. 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. Although Q1S2, Q1S3, and Q1S10 appeared to be highly related to Q3S1 and Q3S7, Q1S10 was excluded from this group because it was not considered to be qualitatively valid as we stated in the previous section. We hypothesized that they would be related as the same group because Q1S1, 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 66. Result of multiple regression analysis and factor analysis

	0.1% significant	1% significant	5% significant
Q1S4 You feel that your organization is operating the business at an efficient cost	Q3S1		Q3S5
Q1S5 You feel that the goals of your organization and the people are aligned	Q3S1		Q3S7, Q3S9, Q3S10
Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments	Q3S1		Q3S7
Q1S2 You are working with a sense of responsibility	Q3S7		
Q1S3 You feel that your ability is growing		Q3S1, Q3S7	
Q1S10 You feel that your organization contributes to the prosperity of society as a whole		Q3S1, Q3S6, Q3S7	Q3S10
Q1S6 You are working happily	Q3S7	Q3S1	
Q1S7 You are working lively	Q3S7	Q3S1	
Q1S1 You have an attachment to your job or organization	Q3S1	Q3S7	
Q1S8 You are happy		Q3S9	Q3S6

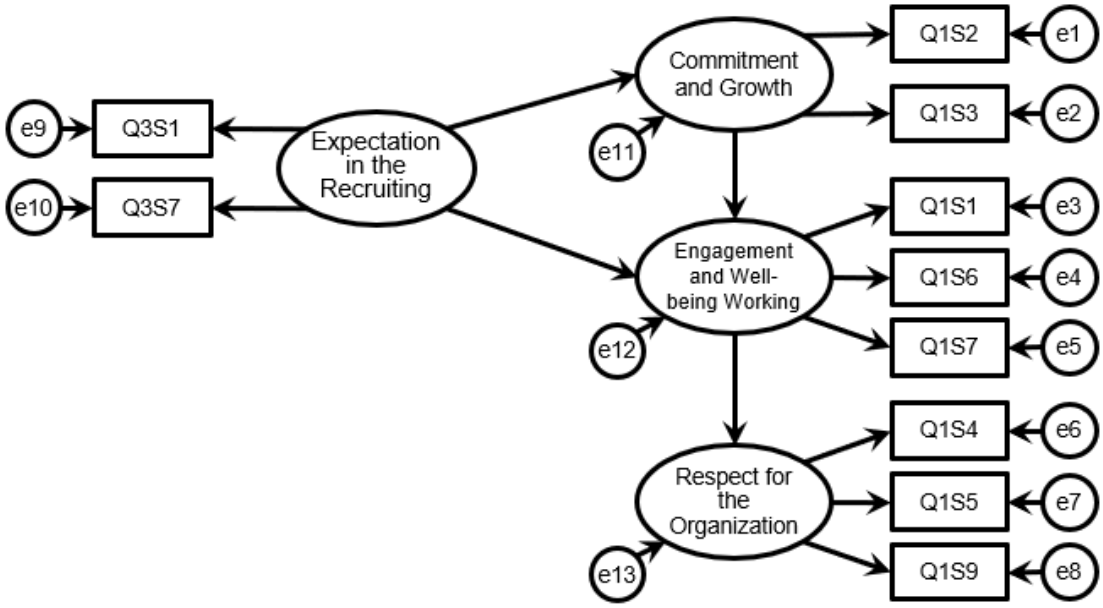

Figure 29. A hypothesis of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences

7.6.2 Confirmatory analysis of hypotheses for all employees

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 = .968, CFI = .982, RMSEA = .059, which were not sufficient, but the values that could be judged to be appropriate to some extent.

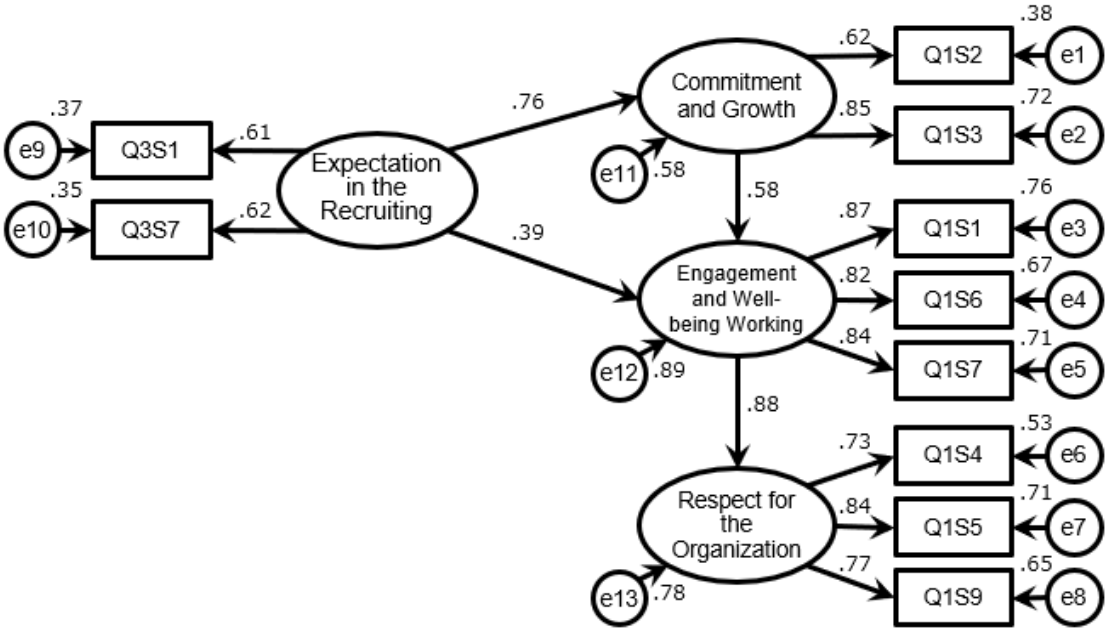

Figure 30. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for all employees in ICT industry.

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.

7.6.3 Comparison of IT Engineer and non-IT Engineer

We would also like to confirm the results of the covariance structure analysis identified in the previous section, as compared with the results obtained when the subjects were divided into engineers and non-IT engineers. The results are as follows.

The result of IT Engineer showed that the goodness of fit index was GFI = .953, CFI = .974, RMSEA = .066, which were not sufficient, but the values that could be judged to be appropriate to some extent.

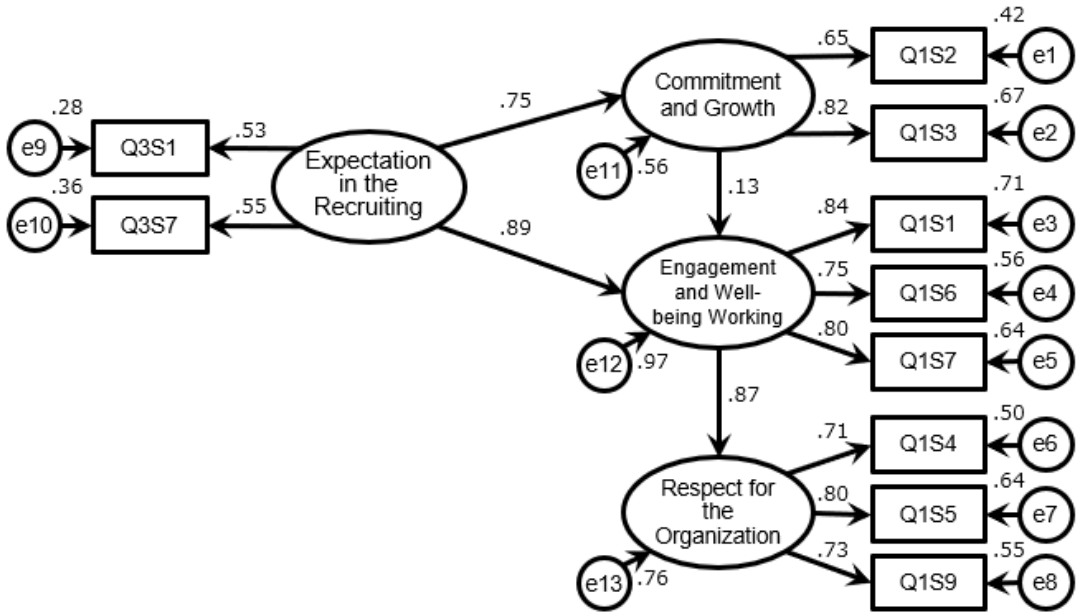

Figure 31. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for IT Engineer in ICT industry.

The result of non-IT Engineer showed that the goodness of fit index was GFI = .969, CFI = .994, RMSEA = .036, which were sufficient and the values that could be judged to be appropriate.

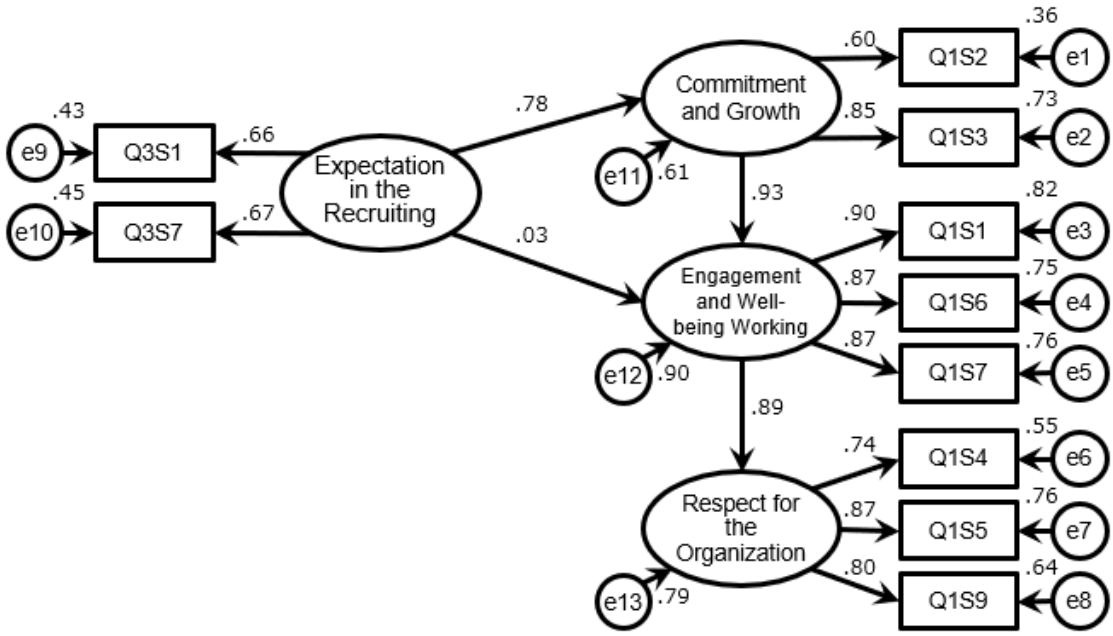

Figure 32. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for non-IT Engineer in ICT industry.

As a result, the structure fits non-IT Engineers better than IT engineers. Because non-IT Engineers design and operate current HR systems, various systems and measures are implemented according to their values. Therefore, in the future, IT engineers themselves need to think about building a highly compatible HR systems, which they want to work on it, and they need to create a structure that increases engagement with the organization. In addition, the relationship between "Expectation in the recruiting" and "Engagement and well-being working" was reversed between non-IT Engineers and IT engineers. And likewise, the relationship between "Commitment and Growth" and "Engagement and well-being working" was also reversed between non-IT Engineers and IT engineers. Therefore, we need to understand the motivation of IT Engineers in order to build HR Systems which fits them.

7.7 Relationship between organization selection criteria of HR systems and HR Outcomes and Long-term consequences

7.7.1 Deriving hypotheses through exploratory analysis of all employees

We would like to conduct an exploratory analysis to clarify the relationship between satisfaction 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.

Table 67. The result of multiple regression analysis for Q1S1

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.580**	**0.306**		**5.166**	**0.000**	***
Q4S1	0.061	0.064	0.051	0.963	0.336	
Q4S2	**0.161**	**0.063**	**0.144**	**2.570**	**0.010**	*
Q4S3	0.119	0.077	0.101	1.539	0.124	
Q4S4	0.031	0.066	0.027	0.466	0.642	
Q4S5	-0.098	0.068	-0.084	-1.439	0.151	
Q4S6	0.017	0.065	0.014	0.259	0.795	
Q4S7	0.034	0.067	0.028	0.511	0.609	
Q4S8	0.031	0.080	0.026	0.384	0.701	
Q4S9	0.000	0.069	0.000	-0.006	0.995	
Q4S10	**0.161**	**0.071**	**0.132**	**2.263**	**0.024**	*

Dependent variable : "Q1S1 You have an attachment to your job or organization"

*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, Q4S2 and Q4S10 are 5% significant.

The following table shows the result of multiple regression analysis for Q1S2. According to the table, Q4S1 and Q4S7 are 5% significant.

Table 68. The result of multiple regression analysis for Q1S2

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**2.229**	**0.246**		**9.055**	**0.000**	***
Q4S1	**0.119**	**0.051**	**0.122**	**2.319**	**0.021**	*
Q4S2	0.072	0.050	0.079	1.434	0.152	
Q4S3	0.037	0.062	0.039	0.600	0.548	
Q4S4	0.008	0.053	0.008	0.144	0.886	
Q4S5	0.021	0.055	0.022	0.388	0.698	
Q4S6	0.014	0.053	0.014	0.260	0.795	
Q4S7	**0.119**	**0.054**	**0.121**	**2.222**	**0.027**	*
Q4S8	0.119	0.065	0.121	1.843	0.066	
Q4S9	-0.013	0.056	-0.013	-0.229	0.819	
Q4S10	0.015	0.057	0.015	0.256	0.798	

Dependent variable : "Q1S2 You are working with a sense of responsibility"

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

Table 69. The result of multiple regression analysis for Q1S3

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.473**	**0.271**		**5.444**	**0.000**	***
Q4S1	0.097	0.056	0.090	1.732	0.084	
Q4S2	**0.165**	**0.055**	**0.163**	**2.987**	**0.003**	**
Q4S3	0.086	0.068	0.081	1.262	0.208	
Q4S4	0.092	0.058	0.089	1.583	0.114	
Q4S5	0.054	0.061	0.050	0.886	0.376	
Q4S6	0.007	0.058	0.006	0.123	0.902	
Q4S7	-0.055	0.059	-0.050	-0.934	0.351	
Q4S8	0.044	0.071	0.040	0.620	0.536	
Q4S9	-0.047	0.061	-0.042	-0.764	0.445	
Q4S10	0.112	0.063	0.102	1.791	0.074	

Dependent variable : "Q1S3 You feel that your ability is growing"

*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, Q4S2 is 1% significant.

The following table shows the result of multiple regression analysis for Q1S4. According to the table, Q4S2 is 0.1% significant and Q4S1 is 5% significant.

Table 70. The result of multiple regression analysis for Q1S4

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.992**	**0.281**		**7.094**	**0.000**	***
Q4S1	**0.137**	**0.058**	**0.125**	**2.353**	**0.019**	*
Q4S2	**0.209**	**0.057**	**0.204**	**3.644**	**0.000**	***
Q4S3	0.018	0.071	0.016	0.247	0.805	
Q4S4	-0.003	0.060	-0.003	-0.044	0.965	
Q4S5	-0.121	0.063	-0.112	-1.930	0.054	
Q4S6	0.076	0.060	0.068	1.263	0.207	
Q4S7	-0.105	0.061	-0.094	-1.714	0.087	
Q4S8	0.120	0.074	0.108	1.624	0.105	
Q4S9	0.025	0.063	0.022	0.390	0.696	
Q4S10	0.055	0.065	0.049	0.842	0.400	

Dependent variable : "Q1S4 You feel that your organization is operating the business at an efficient cost"

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

Table 71. The result of multiple regression analysis for Q1S5

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.659**	**0.278**		**5.961**	**0.000**	***
Q4S1	**0.170**	**0.058**	**0.155**	**2.938**	**0.003**	**
Q4S2	**0.176**	**0.057**	**0.171**	**3.086**	**0.002**	**
Q4S3	0.028	0.070	0.026	0.402	0.688	
Q4S4	-0.006	0.060	-0.006	-0.102	0.919	
Q4S5	-0.060	0.062	-0.055	-0.957	0.339	
Q4S6	0.004	0.059	0.003	0.065	0.948	
Q4S7	-0.056	0.061	-0.050	-0.924	0.356	
Q4S8	0.044	0.073	0.040	0.605	0.545	
Q4S9	0.091	0.063	0.080	1.450	0.148	
Q4S10	0.112	0.065	0.100	1.734	0.084	

Dependent variable : "Q1S5 You feel that the goals of your organization and the people are aligned."

*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, Q4S1 and Q4S2 are 1% significant.

The following table shows the result of multiple regression analysis for Q1S6. According to the table, there is no significant.

Table 72. The result of multiple regression analysis for Q1S6

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.682**	**0.306**		**5.494**	**0.000**	***
Q4S1	0.088	0.064	0.074	1.376	0.169	
Q4S2	0.121	0.063	0.110	1.935	0.054	
Q4S3	0.056	0.077	0.048	0.725	0.469	
Q4S4	0.065	0.066	0.057	0.980	0.328	
Q4S5	-0.037	0.068	-0.032	-0.540	0.589	
Q4S6	0.029	0.065	0.025	0.450	0.653	
Q4S7	-0.023	0.067	-0.019	-0.341	0.734	
Q4S8	0.074	0.080	0.062	0.920	0.358	
Q4S9	-0.035	0.069	-0.029	-0.507	0.612	
Q4S10	0.138	0.071	0.115	1.946	0.052	

Dependent variable : "Q1S6 You are working happily."

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

Table 73. The result of multiple regression analysis for Q1S7

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.433**	**0.296**		**4.842**	**0.000**	***
Q4S1	**0.125**	**0.062**	**0.108**	**2.037**	**0.042**	*
Q4S2	0.112	0.061	0.103	1.841	0.066	
Q4S3	0.063	0.075	0.056	0.848	0.397	
Q4S4	0.043	0.064	0.039	0.672	0.502	
Q4S5	-0.022	0.066	-0.019	-0.327	0.744	
Q4S6	-0.006	0.063	-0.005	-0.090	0.928	
Q4S7	-0.047	0.065	-0.040	-0.722	0.471	
Q4S8	0.046	0.078	0.039	0.590	0.555	
Q4S9	0.033	0.067	0.028	0.494	0.621	
Q4S10	**0.169**	**0.069**	**0.144**	**2.460**	**0.014**	*

Dependent variable : "Q1S7 You are 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, Q4S1 and Q4S10 are 5% significant.

The following table shows the result of multiple regression analysis for Q1S8. According to the table, Q4S2 is 1% significant and Q4S6 is 5% significant.

Table 74. The result of multiple regression analysis for Q1S8

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.874**	**0.292**		**6.413**	**0.000**	***
Q4S1	0.022	0.061	0.019	0.355	0.723	
Q4S2	**0.197**	**0.060**	**0.187**	**3.305**	**0.001**	**
Q4S3	-0.045	0.074	-0.040	-0.609	0.543	
Q4S4	0.074	0.063	0.068	1.170	0.243	
Q4S5	0.023	0.065	0.020	0.345	0.730	
Q4S6	**0.129**	**0.062**	**0.113**	**2.067**	**0.039**	*
Q4S7	0.029	0.064	0.025	0.455	0.650	
Q4S8	0.037	0.077	0.032	0.481	0.631	
Q4S9	0.013	0.066	0.011	0.192	0.848	
Q4S10	0.004	0.068	0.003	0.055	0.956	

Dependent variable : "Q1S8 You are happy."

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

Table 75. The result of multiple regression analysis for Q1S9

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.894**	**0.282**		**6.725**	**0.000**	***
Q4S1	**0.151**	**0.059**	**0.138**	**2.574**	**0.010**	*
Q4S2	**0.149**	**0.058**	**0.147**	**2.594**	**0.010**	*
Q4S3	0.004	0.071	0.004	0.062	0.951	
Q4S4	0.026	0.061	0.025	0.433	0.665	
Q4S5	-0.022	0.063	-0.021	-0.350	0.726	
Q4S6	0.019	0.060	0.017	0.309	0.758	
Q4S7	0.000	0.061	0.000	-0.002	0.999	
Q4S8	0.020	0.074	0.018	0.271	0.787	
Q4S9	-0.022	0.064	-0.020	-0.352	0.725	
Q4S10	0.125	0.065	0.113	1.913	0.056	

Dependent variable : "Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments."

*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, Q4S1 and Q4S2 are 5% significant.

The following table shows the result of multiple regression analysis for Q1S10. According to the table, Q4S2 is 1% significant and Q4S1 is 5% significant.

Table 76. The result of multiple regression analysis for Q1S10

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.488**	**0.281**		**5.296**	**0.000**	***
Q4S1	**0.131**	**0.058**	**0.117**	**2.235**	**0.026**	*
Q4S2	**0.180**	**0.057**	**0.172**	**3.128**	**0.002**	**
Q4S3	0.082	0.071	0.075	1.161	0.246	
Q4S4	0.006	0.061	0.005	0.097	0.923	
Q4S5	0.020	0.063	0.018	0.315	0.753	
Q4S6	0.060	0.060	0.053	0.994	0.321	
Q4S7	-0.007	0.061	-0.006	-0.118	0.906	
Q4S8	0.064	0.074	0.057	0.869	0.385	
Q4S9	-0.056	0.063	-0.049	-0.884	0.377	
Q4S10	0.092	0.065	0.081	1.411	0.159	

Dependent variable : "Q1S10 You feel that your organization contributes to the prosperity of society as a whole."

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

The results of multiple regression analysis and factor analysis are shown in the table 77.

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. As for Q1S10, it is closer to Q1S4, Q1S5, and Q1S9 because of its social nature and the structure of the whole organization. I added it to the group. As a hypothesis, we made the structure as follows, and then performed structural analysis of covariance. We hypothesized that they are related as the same group since Q1S1 and Q1S7 are significantly related to Q4S1 and Q4S2. On the other hand, Q1S6 was excluded because none of them was significant in multiple regression analysis.

Table 77. Result of multiple regression analysis and factor analysis

	0.1% significant	1% significant	5% significant
Q1S4 You feel that your organization is operating the business at an efficient cost	Q4S2		Q4S1
Q1S5 You feel that the goals of your organization and the people are aligned		Q4S1, Q4S2	
Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments			Q4S1, Q4S2
Q1S2 You are working with a sense of responsibility			Q4S1, Q4S7
Q1S3 You feel that your ability is growing		Q4S2	
Q1S10 You feel that your organization contributes to the prosperity of society as a whole		Q4S2	Q4S1
Q1S6 You are working happily			
Q1S7 You are working lively			Q4S2, Q4S10
Q1S1 You have an attachment to your job or organization			Q4S2, Q4S10
Q1S8 You are happy		Q4S2	Q4S6

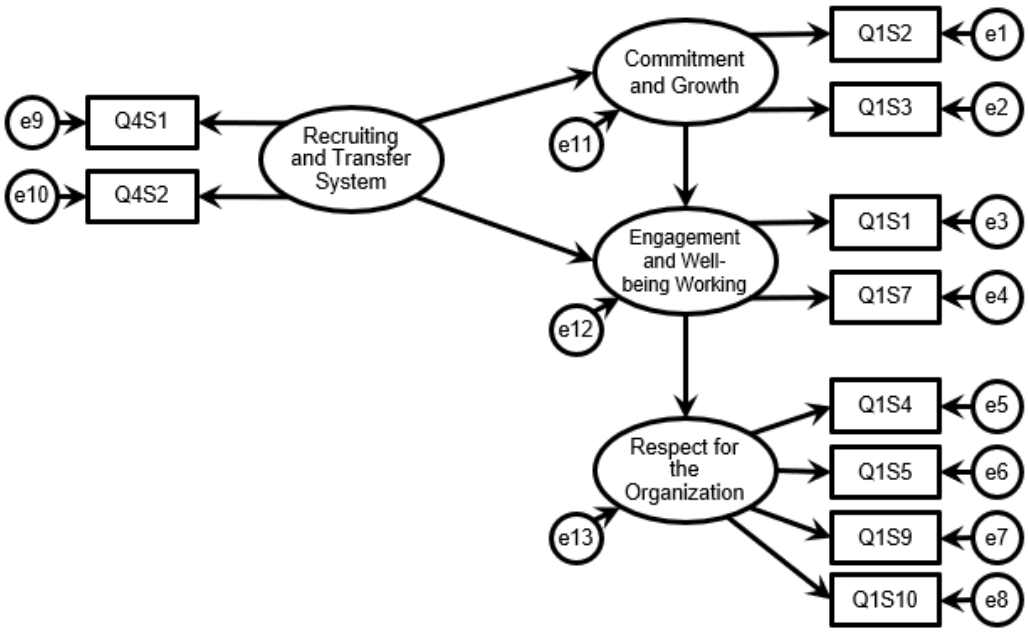

Figure 33. A hypothesis of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences

7.7.2 Confirmatory analysis of hypotheses for all employees

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 = .959, CFI = .971, RMSEA = .069, which were not sufficient, but the values that could be judged to be appropriate to some extent.

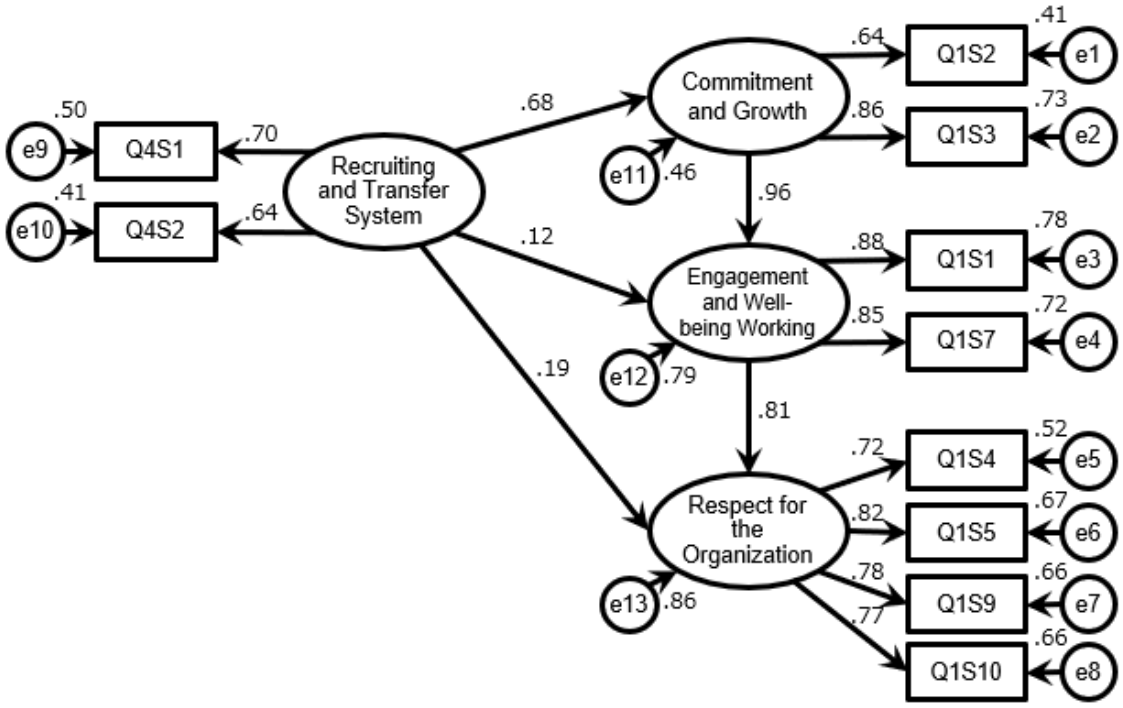

Figure 34. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for all employees in ICT industry.

The results of covariance structure analysis showed that, among HR Systems, “Recruiting and Transfer System” plays an important role in increasing HR Outcomes and Long-term Consequences. The structure is such that the systems of recruiting and transfer increase the sense of responsibility of employees, which in turn contributes to capability growth. It was also found that “Recruiting and Transfer System” 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 “Recruiting and Transfer System” seems to be the best way to generate HR outcomes and long-term consequences.

7.7.3 Comparison of IT Engineer and non-IT Engineer

We would also like to confirm the results of the covariance structure analysis identified in the previous section, as compared with the results obtained when the subjects were divided into engineers and non-IT engineers. The results are as follows.

The result of IT Engineer showed that the goodness of fit index was GFI = .939, CFI = .948, RMSEA = .083, which were not sufficient, but the values that could be judged to be appropriate to some extent.

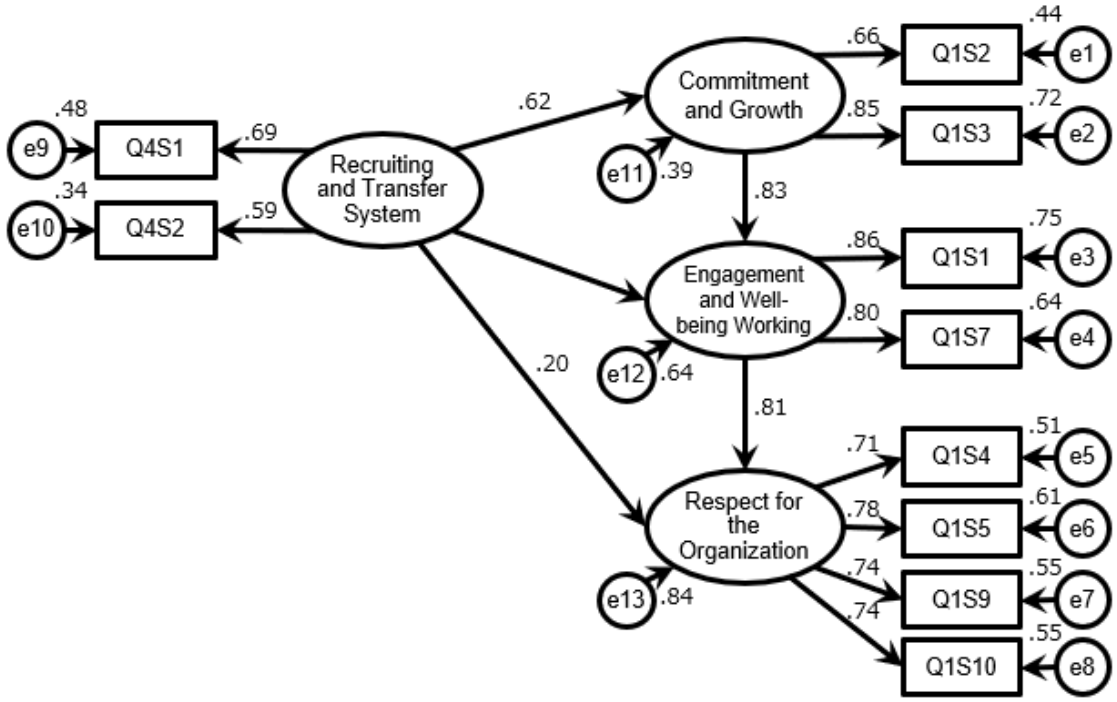

Figure 35. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for IT Engineer in ICT industry.

The result of non-IT Engineer showed that the goodness of fit index was GFI = .949, CFI = .977, RMSEA = .066, which were not sufficient, but the values that could be judged to be appropriate to some extent.

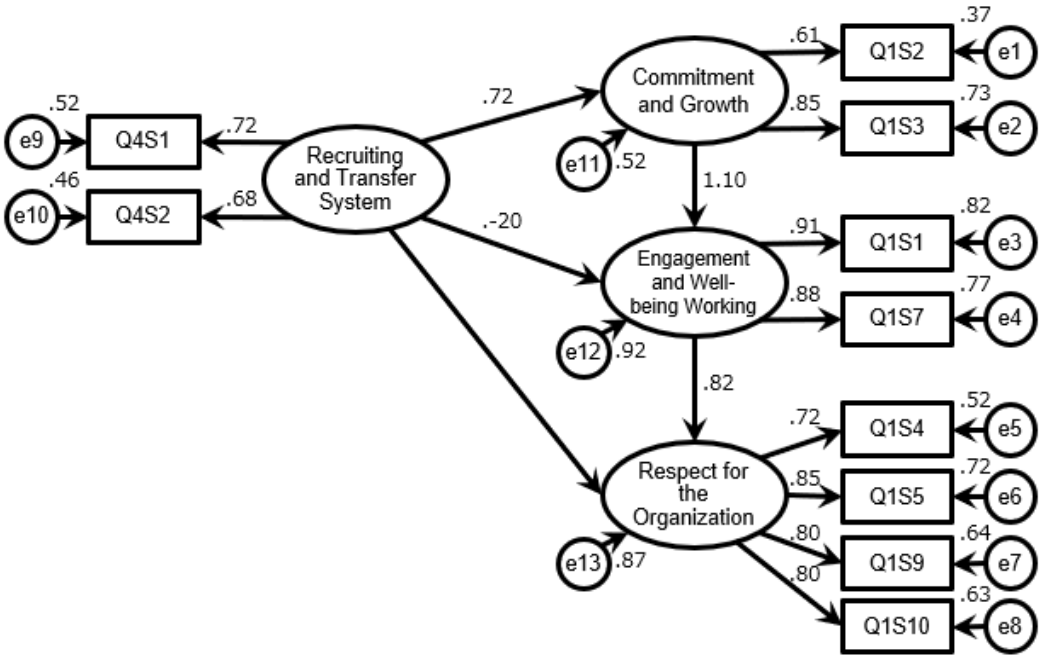

Figure 36. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for non-IT Engineer in ICT industry.

As a result, the structure fits non-IT Engineers better than IT engineers. Because non-IT Engineers design and operate current HR systems, various systems and measures are implemented according to their values. Therefore, in the future, IT engineers themselves need to think about building a highly compatible HR systems, which they want to work on it, and they need to create a structure that increases engagement with the organization.

7.8 Relationship between the result of comparison of HR systems with other companies in the same industry and HR Outcomes and Long-term consequences

7.8.1 Deriving hypotheses through exploratory analysis of all employees

We would like to conduct an exploratory analysis to clarify the relationship between satisfaction 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.

The following table shows the result of multiple regression analysis for Q1S1. According to the table, Q5S7 is 0.1% significant and Q5S10 is 1% significant.

Table 78. The result of multiple regression analysis for Q1S1

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**0.567**	**0.174**		**3.265**	**0.001**	**
Q5S1	0.104	0.063	0.086	1.640	0.102	
Q5S2	0.050	0.056	0.044	0.887	0.376	
Q5S3	0.077	0.072	0.069	1.069	0.285	
Q5S4	0.072	0.053	0.066	1.358	0.175	
Q5S5	0.010	0.053	0.010	0.190	0.849	
Q5S6	0.014	0.045	0.014	0.318	0.750	
Q5S7	**0.351**	**0.055**	**0.309**	**6.433**	**0.000**	***
Q5S8	0.028	0.071	0.025	0.398	0.691	
Q5S9	-0.011	0.049	-0.011	-0.227	0.821	
Q5S10	**0.201**	**0.066**	**0.173**	**3.047**	**0.002**	**

Dependent variable : "Q1S1 You have an attachment to your job or organization"

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

Table 79. The result of multiple regression analysis for Q1S2

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**2.819**	**0.168**		**16.755**	**0.000**	***
Q5S1	-0.033	0.061	-0.034	-0.543	0.588	
Q5S2	0.075	0.054	0.081	1.374	0.170	
Q5S3	-0.036	0.070	-0.040	-0.522	0.602	
Q5S4	0.046	0.052	0.051	0.887	0.376	
Q5S5	0.036	0.052	0.043	0.695	0.487	
Q5S6	**0.090**	**0.044**	**0.110**	**2.050**	**0.041**	**
Q5S7	**0.302**	**0.053**	**0.325**	**5.710**	**0.000**	***
Q5S8	**-0.172**	**0.069**	**-0.182**	**-2.483**	**0.013**	**
Q5S9	0.019	0.048	0.022	0.397	0.691	
Q5S10	0.114	0.064	0.120	1.786	0.075	

Dependent variable : "Q1S2 You are working with a sense of responsibility"

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

The above table shows the result of multiple regression analysis for Q1S2. According to the table, Q5S7 is 0.1% significant and Q5S6 and Q5S8 are 1% significant.

The following table shows the result of multiple regression analysis for Q1S3. According to the table, Q5S7 is 0.1% significant and Q5S2 is 5% significant.

Table 80. The result of multiple regression analysis for Q1S3

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.291**	**0.173**		**7.476**	**0.000**	***
Q5S1	0.097	0.063	0.088	1.541	0.124	
Q5S2	**0.113**	**0.056**	**0.109**	**2.018**	**0.044**	*
Q5S3	0.086	0.072	0.085	1.207	0.228	
Q5S4	0.077	0.053	0.077	1.458	0.145	
Q5S5	-0.083	0.053	-0.088	-1.555	0.120	
Q5S6	0.039	0.045	0.042	0.862	0.389	
Q5S7	**0.287**	**0.054**	**0.277**	**5.295**	**0.000**	***
Q5S8	-0.015	0.071	-0.014	-0.214	0.831	
Q5S9	-0.009	0.049	-0.010	-0.188	0.851	
Q5S10	0.112	0.066	0.105	1.700	0.090	

Dependent variable : "Q1S3 You feel that your ability is growing"

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

Table 81. The result of multiple regression analysis for Q1S4

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.125**	**0.176**		**6.405**	**0.000**	***
Q5S1	**0.165**	**0.064**	**0.149**	**2.588**	**0.010**	*
Q5S2	-0.010	0.057	-0.009	-0.169	0.866	
Q5S3	0.086	0.073	0.084	1.179	0.239	
Q5S4	0.101	0.054	0.099	1.862	0.063	
Q5S5	-0.019	0.054	-0.020	-0.344	0.731	
Q5S6	-0.020	0.046	-0.022	-0.444	0.657	
Q5S7	0.090	0.055	0.087	1.640	0.102	
Q5S8	0.016	0.072	0.015	0.221	0.825	
Q5S9	0.075	0.050	0.078	1.506	0.133	
Q5S10	**0.220**	**0.067**	**0.205**	**3.298**	**0.001**	**

Dependent variable : "Q1S4 You feel that your organization is operating the business at an efficient cost"

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

The above table shows the result of multiple regression analysis for Q1S4. According to the table, Q5S10 is 1% significant and Q5S1 is 5% significant.

The following table shows the result of multiple regression analysis for Q1S5. According to the table, Q5S7 and Q5S10 are 0.1% significant and Q5S3 is 1% significant.

Table 82. The result of multiple regression analysis for Q1S5

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**0.774**	**0.158**		**4.913**	**0.000**	***
Q5S1	0.029	0.057	0.026	0.503	0.615	
Q5S2	0.097	0.051	0.093	1.905	0.057	
Q5S3	**0.173**	**0.065**	**0.169**	**2.644**	**0.008**	**
Q5S4	0.082	0.048	0.080	1.683	0.093	
Q5S5	-0.087	0.049	-0.092	-1.798	0.073	
Q5S6	0.005	0.041	0.006	0.124	0.901	
Q5S7	**0.214**	**0.049**	**0.205**	**4.328**	**0.000**	***
Q5S8	0.025	0.065	0.023	0.384	0.701	
Q5S9	0.056	0.045	0.058	1.254	0.210	
Q5S10	**0.244**	**0.060**	**0.228**	**4.078**	**0.000**	***

Dependent variable : "Q1S5 You feel that the goals of your organization and the people are aligned."

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

Table 83. The result of multiple regression analysis for Q1S6

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.061**	**0.190**		**5.597**	**0.000**	***
Q5S1	0.042	0.069	0.036	0.614	0.540	
Q5S2	0.002	0.061	0.002	0.028	0.978	
Q5S3	0.070	0.079	0.063	0.887	0.375	
Q5S4	0.034	0.058	0.031	0.582	0.561	
Q5S5	-0.098	0.058	-0.096	-1.676	0.094	
Q5S6	0.023	0.050	0.023	0.468	0.640	
Q5S7	**0.310**	**0.060**	**0.276**	**5.204**	**0.000**	***
Q5S8	0.116	0.078	0.102	1.494	0.136	
Q5S9	0.021	0.054	0.020	0.388	0.698	
Q5S10	**0.207**	**0.072**	**0.180**	**2.872**	**0.004**	**

Dependent variable : "Q1S6 You are working happily."

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

The above table shows the result of multiple regression analysis for Q1S6. According to the table, Q5S7 is 0.1% significant and Q5S10 is 1% significant.

The following table shows the result of multiple regression analysis for Q1S7. According to the table, Q5S7 is 0.1% significant and Q5S10 is 1% significant.

Table 84. The result of multiple regression analysis for Q1S7

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**0.865**	**0.181**		**4.790**	**0.000**	***
Q5S1	0.068	0.066	0.059	1.040	0.299	
Q5S2	0.077	0.058	0.069	1.310	0.191	
Q5S3	0.019	0.075	0.018	0.252	0.801	
Q5S4	0.040	0.056	0.037	0.711	0.477	
Q5S5	-0.043	0.056	-0.043	-0.780	0.436	
Q5S6	-0.022	0.047	-0.023	-0.467	0.640	
Q5S7	**0.287**	**0.057**	**0.260**	**5.054**	**0.000**	***
Q5S8	0.112	0.074	0.100	1.512	0.131	
Q5S9	0.017	0.051	0.017	0.337	0.736	
Q5S10	**0.215**	**0.069**	**0.190**	**3.130**	**0.002**	**

Dependent variable : "Q1S7 You are working lively."

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

Table 85. The result of multiple regression analysis for Q1S8

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.547**	**0.187**		**8.293**	**0.000**	***
Q5S1	0.034	0.068	0.030	0.500	0.617	
Q5S2	0.012	0.060	0.011	0.204	0.838	
Q5S3	0.029	0.077	0.027	0.371	0.711	
Q5S4	-0.029	0.057	-0.028	-0.506	0.613	
Q5S5	0.051	0.057	0.053	0.891	0.373	
Q5S6	0.051	0.049	0.053	1.037	0.300	
Q5S7	**0.289**	**0.059**	**0.268**	**4.929**	**0.000**	***
Q5S8	0.014	0.077	0.013	0.181	0.857	
Q5S9	**0.134**	**0.053**	**0.136**	**2.545**	**0.011**	**
Q5S10	0.074	0.071	0.067	1.043	0.297	

Dependent variable : "Q1S8 You are happy."

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

The above table shows the result of multiple regression analysis for Q1S8. According to the table, Q5S7 is 0.1% significant and Q5S9 is 1% significant.

The following table shows the result of multiple regression analysis for Q1S9. According to the table, Q5S7 and Q5S10 are 0.1% significant and Q5S3 is 1% significant.

Table 86. The result of multiple regression analysis for Q1S9

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.105**	**0.165**		**6.698**	**0.000**	***
Q5S1	0.036	0.060	0.033	0.603	0.547	
Q5S2	0.026	0.053	0.025	0.491	0.624	
Q5S3	**0.189**	**0.068**	**0.187**	**2.768**	**0.006**	**
Q5S4	0.010	0.051	0.010	0.192	0.848	
Q5S5	-0.051	0.051	-0.054	-1.001	0.317	
Q5S6	-0.002	0.043	-0.002	-0.045	0.964	
Q5S7	**0.192**	**0.052**	**0.185**	**3.699**	**0.000**	***
Q5S8	0.054	0.068	0.051	0.790	0.430	
Q5S9	0.062	0.047	0.065	1.317	0.188	
Q5S10	**0.238**	**0.063**	**0.224**	**3.796**	**0.000**	***

Dependent variable : "Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments."

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

Table 87. The result of multiple regression analysis for Q1S10

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**1.053**	**0.170**		**6.181**	**0.000**	***
Q5S1	0.037	0.062	0.033	0.599	0.549	
Q5S2	0.076	0.055	0.071	1.369	0.172	
Q5S3	0.027	0.071	0.026	0.386	0.699	
Q5S4	0.077	0.052	0.075	1.475	0.141	
Q5S5	-0.048	0.052	-0.050	-0.924	0.356	
Q5S6	0.062	0.045	0.065	1.387	0.166	
Q5S7	**0.267**	**0.053**	**0.251**	**5.001**	**0.000**	***
Q5S8	0.002	0.070	0.001	0.022	0.982	
Q5S9	0.050	0.048	0.051	1.030	0.304	
Q5S10	**0.245**	**0.065**	**0.224**	**3.776**	**0.000**	***

Dependent variable : "Q1S10 You feel that your organization contributes to the prosperity of society as a whole."
*p<.05, **p<.01, ***p<.001 Bold in the table indicates significant results.

The above table shows the result of multiple regression analysis for Q1S10. According to the table, Q5S7 and Q5S10 are 0.1% significant.

The results of multiple regression analysis and factor analysis are shown in the table 88. 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. As for Q1S10, it is closer to Q1S4, Q1S5, and Q1S9 because of its social nature and the structure of the whole organization. I added it to the group. As a hypothesis, we made the structure as follows, and then performed structural analysis of covariance.

Table 88. Result of multiple regression analysis and factor analysis

Q5			
	0.1% significant	1% significant	5% significant
Q1S4 You feel that your organization is operating the business at an efficient cost		Q5S10	Q5S1
Q1S5 You feel that the goals of your organization and the people are aligned	Q5S7, Q5S10	Q5S3	
Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments	Q5S7, Q5S10	Q5S3	
Q1S2 You are working with a sense of responsibility	Q5S7	Q5S6, Q5S8	
Q1S3 You feel that your ability is growing	Q5S7		Q5S2
Q1S10 You feel that your organization contributes to the prosperity of society as a whole	Q5S7, Q5S10		
Q1S6 You are working happily	Q5S7	Q5S10	
Q1S7 You are working lively	Q5S7	Q5S10	
Q1S1 You have an attachment to your job or organization	Q5S7	Q5S10	
Q1S8 You are happy	Q5S7	Q5S9	

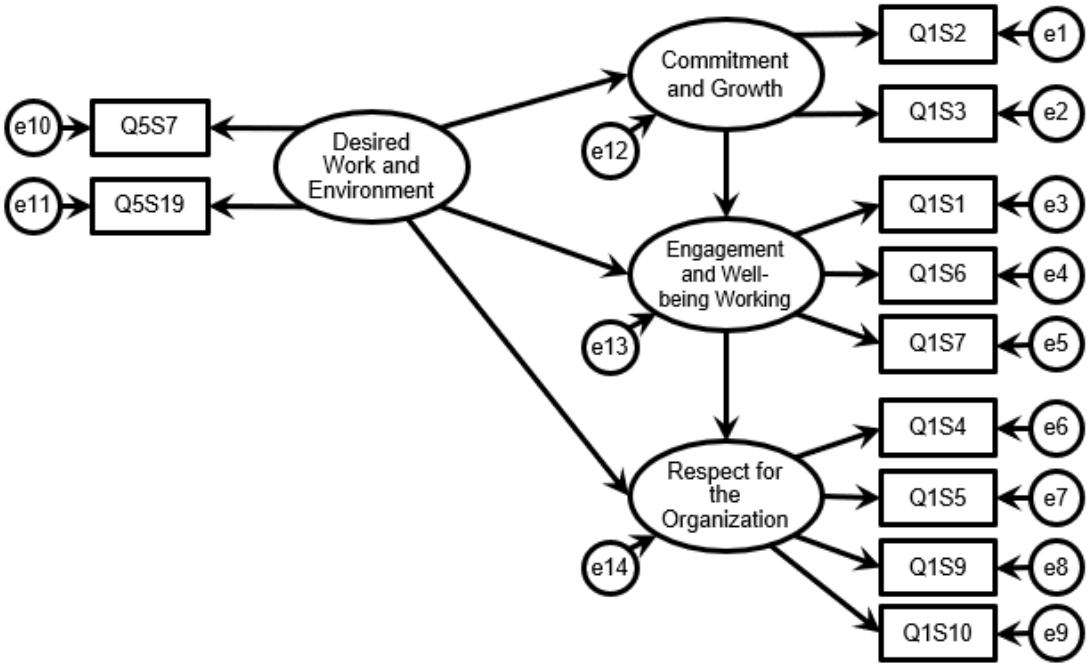

Figure 37. A hypothesis of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences

7.8.2 Confirmatory analysis of hypotheses for all employees

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 = .936, CFI = .959, RMSEA = .085, which were not sufficient, but the values that could be judged to be appropriate to some extent.

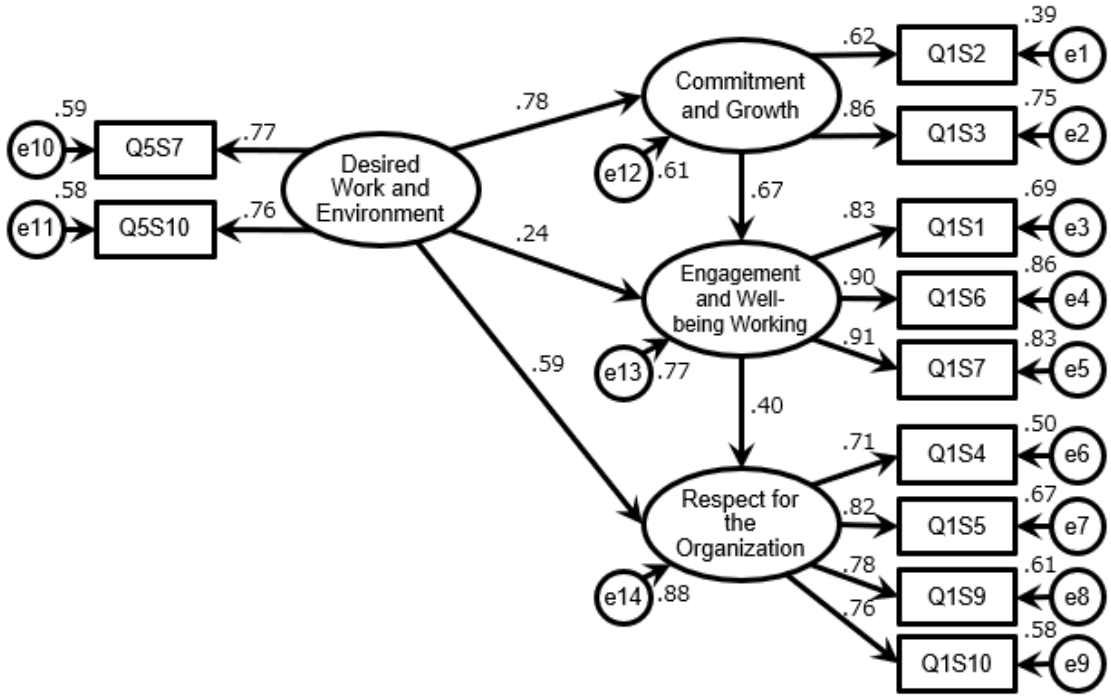

Figure 38. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for all employees in ICT industry.

The results of covariance structure analysis showed that, among HR Systems, “Desired Work and Environment” plays an important role in increasing HR Outcomes and Long-term Consequences. The structure is such that “Desired Work and Environment” increase the sense of responsibility of employees, which in turn contributes to capability growth. It was also found that “Desired Work and Environment” 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 “Desired Work and Environment” seems to be the best way to generate HR outcomes and long-term consequences.

7.8.3 Comparison of IT Engineer and non-IT Engineer

We would also like to confirm the results of the covariance structure analysis identified in the previous section, as compared with the results obtained when the subjects were divided into engineers and non-IT engineers. The results are as follows.

The result of IT Engineer showed that the goodness of fit index was GFI = .911, CFI = .933, RMSEA = .100, which were not sufficient, but the values that could be judged to be appropriate to some extent.

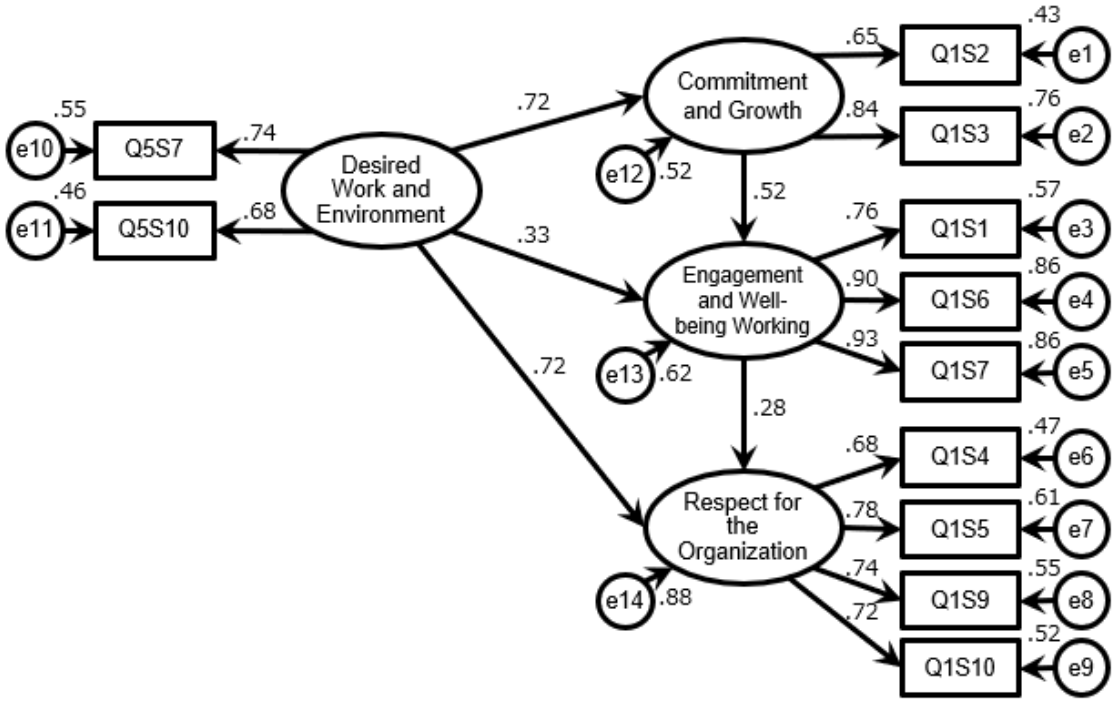

Figure 39. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for IT Engineer in ICT industry.

The result of non-IT Engineer showed that the goodness of fit index was GFI = .944, CFI = .981, RMSEA = .063, which were not sufficient, but the values that could be judged to be appropriate to some extent.

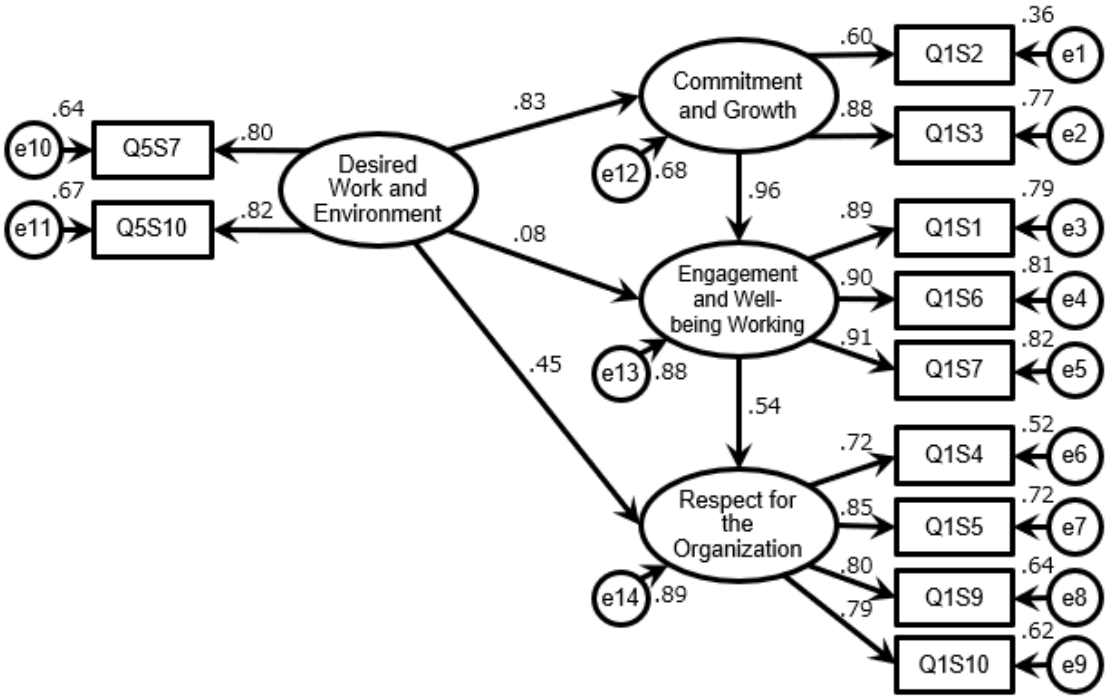

Figure 40. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for non-IT Engineer in ICT industry.

As a result, the structure fits non-IT Engineers better than IT engineers. Because non-IT Engineers design and operate current HR systems, various systems and measures are implemented according to their values. Therefore, in the future, IT engineers themselves need to think about building a highly compatible HR systems, which they want to work on it, and they need to create a structure that increases engagement with the organization.

7.9 Relationship between maturity of HR systems and HR Outcomes and Long-term consequences

7.9.1 Deriving hypotheses through exploratory analysis of all employees

We would like to conduct an exploratory analysis to clarify the relationship between satisfaction 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.

Table 89. The result of multiple regression analysis for Q1S1

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**5.067**	**0.169**		**29.964**	**0.000**	***
Q6S1	**-0.125**	**0.052**	**-0.145**	**-2.426**	**0.016**	*
Q6S2	0.102	0.056	0.118	1.832	0.068	
Q6S3	-0.092	0.070	-0.100	-1.314	0.189	
Q6S4	0.056	0.051	0.066	1.097	0.273	
Q6S5	0.022	0.063	0.024	0.347	0.729	
Q6S6	-0.018	0.053	-0.022	-0.346	0.730	
Q6S7	**-0.194**	**0.060**	**-0.198**	**-3.239**	**0.001**	**
Q6S8	-0.013	0.068	-0.013	-0.190	0.849	
Q6S9	-0.055	0.049	-0.066	-1.119	0.264	
Q6S10	-0.091	0.055	-0.104	-1.651	0.099	

Dependent variable : "Q1S1 You have an attachment to your job or organization"

*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, Q6S7 is 1% significant and Q6S1 is 5% significant.

The following table shows the result of multiple regression analysis for Q1S2. According to the table, Q6S7, Q6S9 and Q6S10 are 5% significant.

Table 90. The result of multiple regression analysis for Q1S2

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**5.272**	**0.142**		**37.174**	**0.000**	***
Q6S1	-0.049	0.043	-0.069	-1.127	0.260	
Q6S2	0.073	0.047	0.103	1.552	0.121	
Q6S3	-0.092	0.059	-0.122	-1.566	0.118	
Q6S4	-0.039	0.043	-0.056	-0.912	0.362	
Q6S5	0.045	0.052	0.061	0.858	0.391	
Q6S6	-0.070	0.045	-0.100	-1.568	0.118	
Q6S7	**-0.115**	**0.050**	**-0.144**	**-2.292**	**0.022**	*
Q6S8	-0.021	0.057	-0.027	-0.374	0.709	
Q6S9	**-0.093**	**0.041**	**-0.137**	**-2.255**	**0.025**	*
Q6S10	**0.098**	**0.046**	**0.137**	**2.124**	**0.034**	*

Dependent variable : "Q1S2 You are working with a sense of responsibility"

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

Table 91. The result of multiple regression analysis for Q1S3

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.587**	**0.160**		**28.706**	**0.000**	***
Q6S1	**-0.109**	**0.049**	**-0.138**	**-2.232**	**0.026**	*
Q6S2	**0.110**	**0.053**	**0.140**	**2.092**	**0.037**	*
Q6S3	-0.122	0.066	-0.146	-1.847	0.065	
Q6S4	0.076	0.048	0.098	1.576	0.116	
Q6S5	0.080	0.059	0.097	1.346	0.179	
Q6S6	0.018	0.051	0.023	0.354	0.723	
Q6S7	**-0.129**	**0.057**	**-0.144**	**-2.279**	**0.023**	*
Q6S8	-0.049	0.064	-0.056	-0.765	0.445	
Q6S9	-0.077	0.047	-0.101	-1.647	0.100	
Q6S10	-0.042	0.052	-0.053	-0.816	0.415	

Dependent variable : "Q1S3 You feel that your ability is growing"

*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, Q6S1, Q6S2, and Q6S7 are 5% significant.

The following table shows the result of multiple regression analysis for Q1S4. According to the table, Q6S7 is 0.1% significant and Q6S10 is 1% significant.

Table 92. The result of multiple regression analysis for Q1S4

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.454**	**0.161**		**27.700**	**0.000**	***
Q6S1	-0.007	0.049	-0.008	-0.133	0.894	
Q6S2	0.022	0.053	0.028	0.418	0.676	
Q6S3	-0.015	0.067	-0.018	-0.227	0.821	
Q6S4	0.031	0.048	0.040	0.642	0.521	
Q6S5	0.057	0.060	0.069	0.963	0.336	
Q6S6	0.067	0.051	0.085	1.321	0.187	
Q6S7	**-0.212**	**0.057**	**-0.234**	**-3.717**	**0.000**	***
Q6S8	-0.002	0.064	-0.002	-0.031	0.975	
Q6S9	-0.049	0.047	-0.064	-1.040	0.299	
Q6S10	**-0.152**	**0.052**	**-0.190**	**-2.914**	**0.004**	**

Dependent variable : "Q1S4 You feel that your organization is operating the business at an efficient cost"

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

Table 93. The result of multiple regression analysis for Q1S5

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.983**	**0.155**		**32.216**	**0.000**	***
Q6S1	-0.052	0.047	-0.065	-1.099	0.272	
Q6S2	0.045	0.051	0.056	0.874	0.383	
Q6S3	-0.022	0.064	-0.026	-0.347	0.729	
Q6S4	0.071	0.046	0.090	1.520	0.129	
Q6S5	0.060	0.057	0.073	1.052	0.293	
Q6S6	-0.023	0.049	-0.029	-0.470	0.638	
Q6S7	**-0.155**	**0.055**	**-0.171**	**-2.825**	**0.005**	**
Q6S8	-0.056	0.062	-0.064	-0.910	0.363	
Q6S9	**-0.115**	**0.045**	**-0.150**	**-2.546**	**0.011**	*
Q6S10	**-0.133**	**0.050**	**-0.166**	**-2.659**	**0.008**	**

Dependent variable : "Q1S5 You feel that the goals of your organization and the people are aligned."

*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, Q6S7 and Q6S10 are 1% significant and Q6S9 is 5% significant.

The following table shows the result of multiple regression analysis for Q1S6. According to the table, Q6S7 is 1% significant.

Table 94. The result of multiple regression analysis for Q1S6

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.666**	**0.172**		**27.189**	**0.000**	***
Q6S1	-0.052	0.052	-0.061	-0.991	0.322	
Q6S2	0.109	0.057	0.128	1.928	0.054	
Q6S3	-0.075	0.071	-0.082	-1.052	0.293	
Q6S4	0.088	0.052	0.105	1.710	0.088	
Q6S5	0.041	0.064	0.046	0.640	0.522	
Q6S6	-0.031	0.054	-0.036	-0.564	0.573	
Q6S7	**-0.208**	**0.061**	**-0.214**	**-3.415**	**0.001**	**
Q6S8	-0.105	0.069	-0.111	-1.520	0.129	
Q6S9	-0.032	0.050	-0.039	-0.649	0.516	
Q6S10	-0.057	0.056	-0.066	-1.017	0.310	

Dependent variable : "Q1S6 You are working happily."

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

Table 95. The result of multiple regression analysis for Q1S7

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.675**	**0.167**		**27.939**	**0.000**	***
Q6S1	-0.066	0.051	-0.079	-1.301	0.194	
Q6S2	0.091	0.055	0.108	1.646	0.100	
Q6S3	**-0.146**	**0.069**	**-0.164**	**-2.109**	**0.035**	*
Q6S4	0.063	0.050	0.076	1.255	0.210	
Q6S5	0.028	0.062	0.033	0.458	0.647	
Q6S6	0.020	0.053	0.024	0.373	0.709	
Q6S7	**-0.125**	**0.059**	**-0.131**	**-2.097**	**0.037**	*
Q6S8	-0.048	0.067	-0.052	-0.719	0.472	
Q6S9	-0.019	0.049	-0.023	-0.388	0.698	
Q6S10	**-0.129**	**0.054**	**-0.153**	**-2.377**	**0.018**	*

Dependent variable : "Q1S7 You are 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, Q6S3, Q6S7, and Q6S10 are 5% significant.

The following table shows the result of multiple regression analysis for Q1S8. According to the table, Q6S7 is 1% significant.

Table 96. The result of multiple regression analysis for Q1S8

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.779**	**0.167**		**28.563**	**0.000**	***
Q6S1	-0.057	0.051	-0.070	-1.123	0.262	
Q6S2	0.103	0.055	0.125	1.859	0.064	
Q6S3	-0.009	0.069	-0.010	-0.129	0.897	
Q6S4	0.025	0.050	0.031	0.502	0.616	
Q6S5	-0.014	0.062	-0.017	-0.233	0.816	
Q6S6	0.040	0.053	0.049	0.753	0.452	
Q6S7	**-0.168**	**0.059**	**-0.180**	**-2.822**	**0.005**	**
Q6S8	-0.116	0.067	-0.128	-1.723	0.086	
Q6S9	-0.039	0.049	-0.050	-0.808	0.419	
Q6S10	-0.029	0.054	-0.036	-0.543	0.588	

Dependent variable : "Q1S8 You are happy."

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

Table 97. The result of multiple regression analysis for Q1S9

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.860**	**0.156**		**31.249**	**0.000**	***
Q6S1	-0.043	0.047	-0.055	-0.916	0.360	
Q6S2	0.037	0.051	0.047	0.722	0.471	
Q6S3	-0.025	0.065	-0.030	-0.387	0.699	
Q6S4	0.080	0.047	0.103	1.707	0.088	
Q6S5	0.037	0.058	0.045	0.647	0.518	
Q6S6	0.069	0.049	0.088	1.407	0.160	
Q6S7	**-0.197**	**0.055**	**-0.219**	**-3.560**	**0.000**	***
Q6S8	-0.083	0.062	-0.095	-1.333	0.183	
Q6S9	-0.082	0.045	-0.108	-1.812	0.071	
Q6S10	**-0.125**	**0.050**	**-0.157**	**-2.484**	**0.013**	*

Dependent variable : "Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments."

*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, Q6S7 is 0.1% significant and Q6S10 is 5% significant.

The following table shows the result of multiple regression analysis for Q1S10. According to the table, Q6S7 is 1% significant.

Table 98. The result of multiple regression analysis for Q1S10

	Non-standardized Coefficient		Standardized Coefficient			
	B	Standard Error	Beta	t value	p value	Statistical Significance
(constant)	**4.920**	**0.163**		**30.233**	**0.000**	***
Q6S1	-0.037	0.050	-0.046	-0.754	0.451	
Q6S2	0.035	0.054	0.044	0.659	0.510	
Q6S3	-0.122	0.068	-0.141	-1.803	0.072	
Q6S4	0.055	0.049	0.069	1.133	0.258	
Q6S5	0.042	0.060	0.050	0.697	0.486	
Q6S6	-0.029	0.051	-0.036	-0.564	0.573	
Q6S7	**-0.176**	**0.058**	**-0.191**	**-3.051**	**0.002**	**
Q6S8	-0.005	0.065	-0.006	-0.081	0.936	
Q6S9	-0.053	0.047	-0.068	-1.117	0.265	
Q6S10	-0.034	0.053	-0.041	-0.641	0.522	

Dependent variable : "Q1S10 You feel that your organization contributes to the prosperity of society as a whole."

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

The results of multiple regression analysis and factor analysis are shown in the following table.

Table 99. Result of multiple regression analysis and factor analysis

	0.1% significant	1% significant	5% significant
Q1S4 You feel that your organization is operating the business at an efficient cost	Q6S7	Q6S10	
Q1S5 You feel that the goals of your organization and the people are aligned		Q6S7, Q6S10	Q6S9
Q1S9 You feel that your organization is able to respond flexibly to changing markets and social environments	Q6S7		Q6S10
Q1S2 You are working with a sense of responsibility			Q6S7, Q6S9, Q6S10
Q1S3 You feel that your ability is growing			Q6S1, Q6S2, Q6S7
Q1S10 You feel that your organization contributes to the prosperity of society as a whole		Q6S7	
Q1S6 You are working happily		Q6S7	
Q1S7 You are working lively			Q6S3, Q6S7, Q6S10
Q1S1 You have an attachment to your job or organization		Q6S7	Q6S1
Q1S8 You are happy		Q6S7	

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. Q1S2 and Q1S3 were excluded because multiple regression analysis showed no significant results. Q1S1 is far different from Q1S6 and Q1Q7 in content, and its content validity is weak. Therefore, Q1S1 was removed, while Q1S8 which was originally divided from Well-being was added. As for Q1S10, it is closer to Q1S4, Q1S5, and Q1S9 because of its social nature and the structure of the whole organization. I added it to the group. As a hypothesis, we made the structure as follows, and then performed structural analysis of covariance.

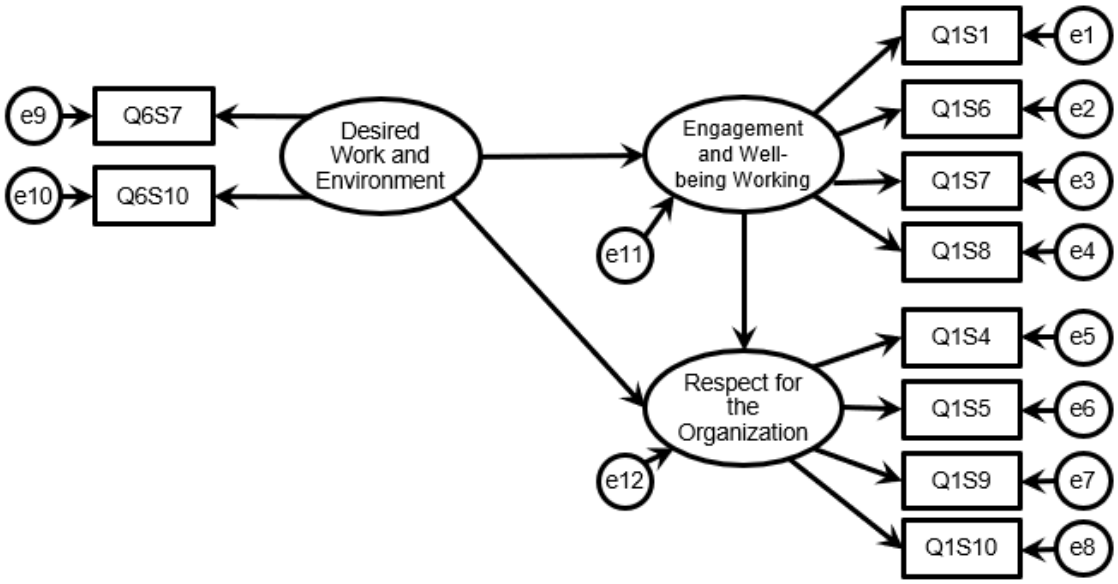

Figure 41. A hypothesis of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences

7.9.2 Confirmatory analysis of hypotheses for all employees

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 = .949, CFI = .964, RMSEA = .082, which were not sufficient, but the values that could be judged to be appropriate to some extent.

The results of covariance structure analysis showed that, among HR Systems, “Desired Work and Environment” plays an important role in increasing HR Outcomes and Long-term Consequences. It was found that “Desired Work and Environment” 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 happily and energetically, we respect for the organization. Therefore, designing HR Systems with a high level of employee satisfaction for “Desired Work and Environment” seems to be the best way to generate HR outcomes and long-term consequences.

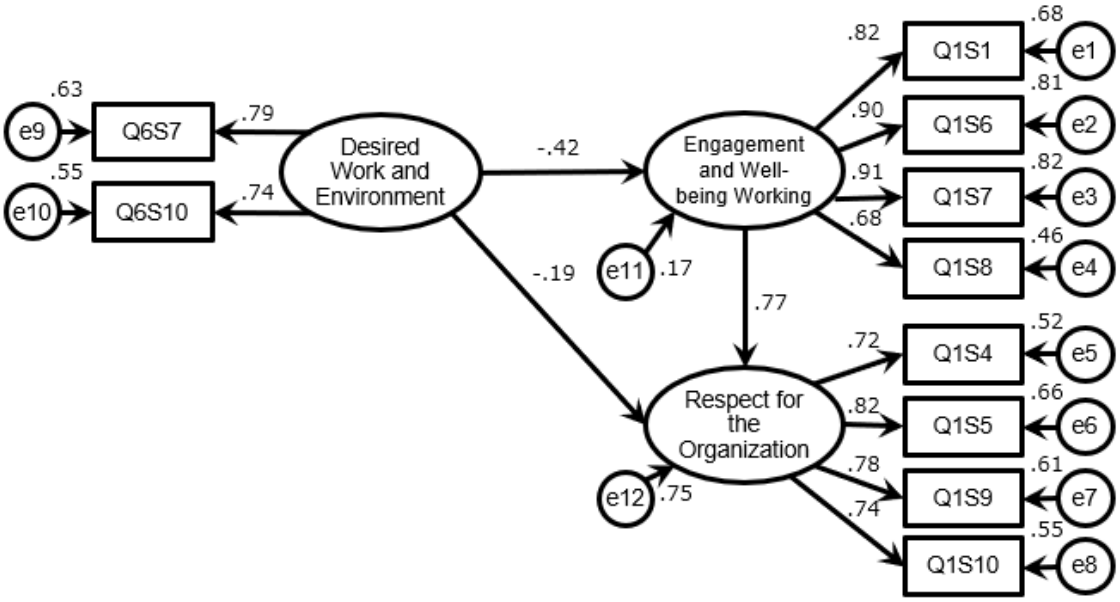

Figure 42. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for all employees in ICT industry.

7.9.3 Comparison of IT Engineer and non-IT Engineer

We would also like to confirm the results of the covariance structure analysis identified in the previous section, as compared with the results obtained when the subjects were divided into engineers and non-IT engineers. The results are as follows.

The result of IT Engineer showed that the goodness of fit index was GFI = .930, CFI = .948, RMSEA = .091, which were not sufficient, but the values that could be judged to be appropriate to some extent.

The result of non-IT Engineer showed that the goodness of fit index was GFI = .933, CFI = .965, RMSEA = .085, which were not sufficient, but the values that could be judged to be appropriate to some extent.

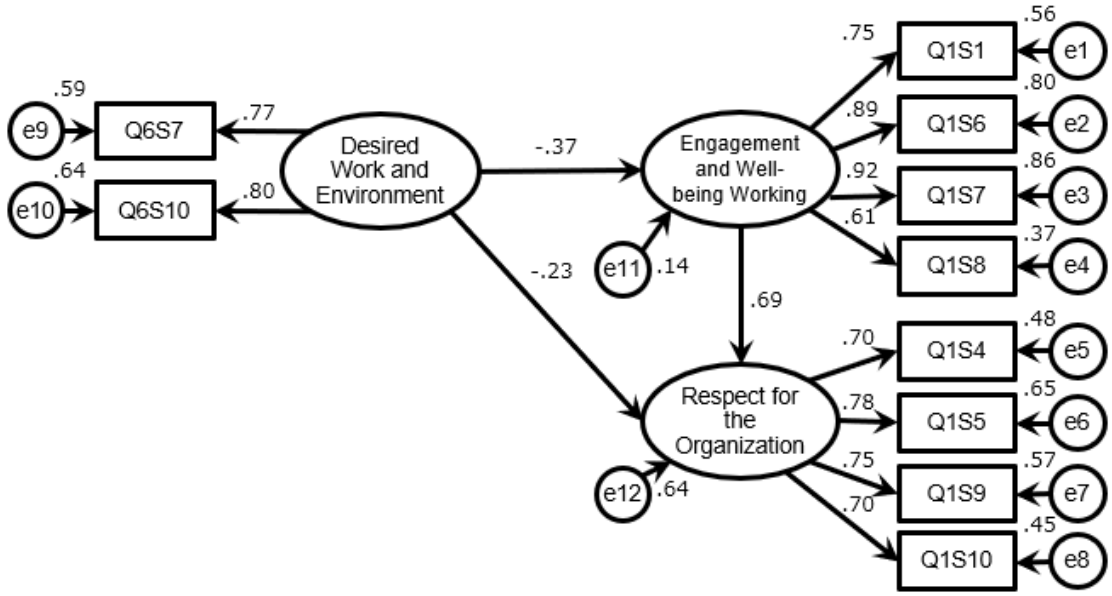

Figure 43. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for IT Engineer in ICT industry.

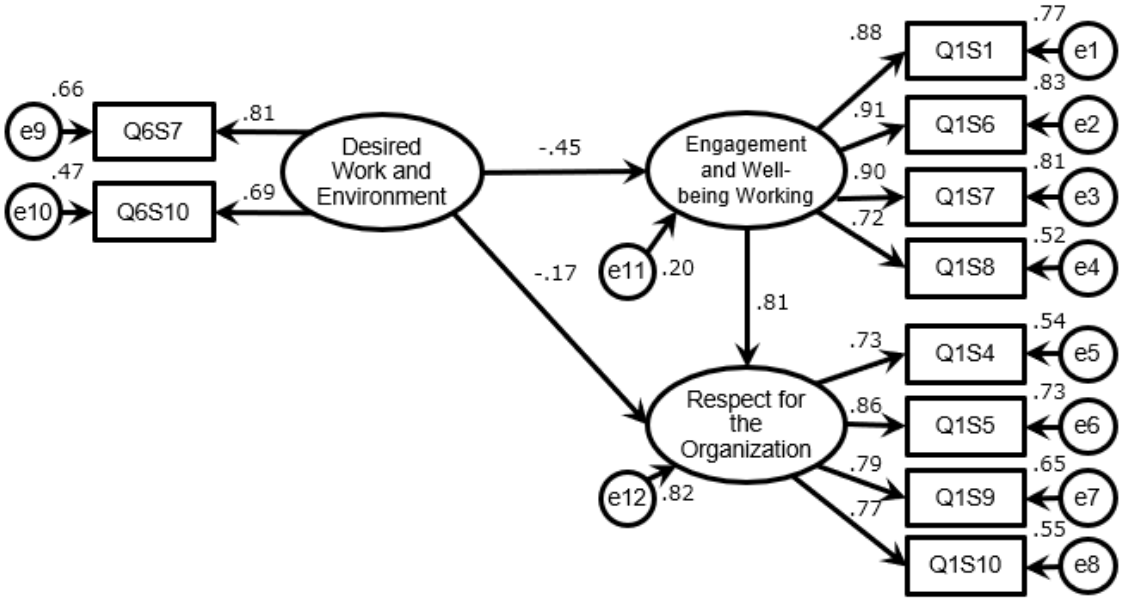

Figure 44. The result of the structure between satisfaction with HR Systems and HR outcomes and Long-term consequences for non-IT Engineer in ICT industry.

As a result, the structure fits non-IT Engineers better than IT engineers. Because non-IT Engineers design and operate current HR systems, various systems and measures are implemented according to their values. Therefore, in the future, IT engineers themselves need to think about building a highly compatible HR systems, which they want to work on it, and they need to create a structure that increases engagement with the organization.

8. Verification of the entire proposed method

8.1 Entire proposed method

As we stated, we 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.

8.2 Evaluation Procedure and Content

We explained this method for 11 people to understand it. Then, we evaluated the effectiveness of the method to discover transformation area. After they answered our questionnaire, we analyzed the results of the questionnaire. We show this verification procedure and content in Figure 45.

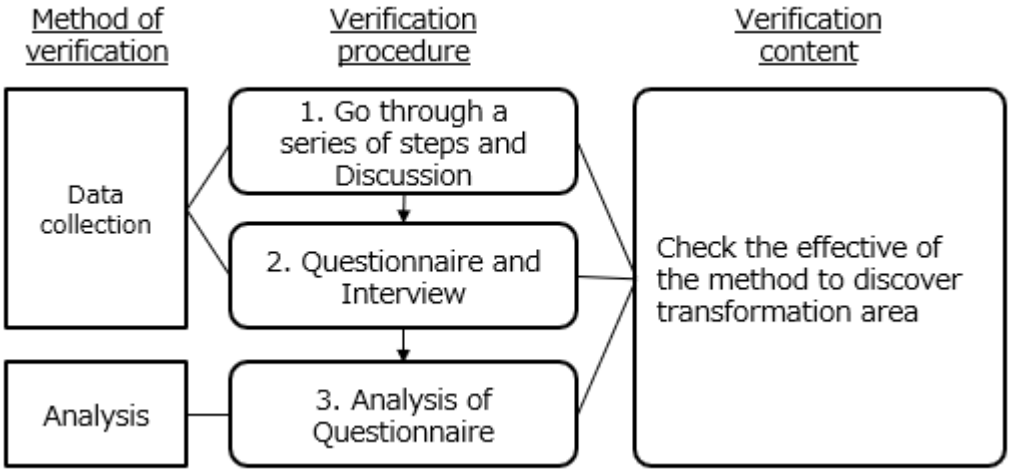

Figure 45. Evaluation Procedure and Content

8.3 Evaluation Results

We show the results of the evaluation in Table 100. From the result of No. 1, 100% of the people were able to recognize the type of organization by using the method. In addition, it was also confirmed from the result of No. 2 that 100% of the personnel could identify current HR process challenges and areas that need to be improved or eliminated. From the result of No.3, 90.9% of the people identify challenges and areas to be eliminated in their HR processes by the maturity of the process. Finally, 8 out of 11 people could identify their company's challenges and areas for improvement and elimination by comparing their company's HR processes with those of other companies.

Table 100. The evaluation result of 11 people

Evaluation method	No.	Evaluation item	Evaluation criteria	Evaluation results
Questionnaire	1	Do you know what type of organization your organization is?	Majority of positive responses	**Effectiveness** 11 of 11 gave a positive response. (100%)
	2	Does this approach identify current HR process challenges and areas that need to be improved or eliminated?	Majority of positive responses	**Effectiveness** 11 of 11 gave a positive response. (100%)
	3	Does the maturity of the process help you identify challenges and areas to be eliminated in your HR processes?	Majority of positive responses	**Effectiveness** 11 of 10 gave a positive response. (90.9%)
	4	Can you identify your company's challenges and areas for improvement and elimination by comparing your company's human resources processes with those of other companies, ?	Majority of positive responses	**Effectiveness** 11 of 8 gave a positive response. (72.7%)

9. Conclusion

9.1 Summary

The purpose of this study was to identify issues in the current HR system and discover areas to be removed in order to revise the HR System. We proposed a method based on the Harvard Model within the area of Human Resource Management. The proposed method consists of identifying problems of an HR system to eliminate and replace, and a prioritization of HR systems based on Quantitative Analysis.

As a result of each verification, the proposal can be said to achieve the research purpose of identifying issues of the current HR System and discovering transformation areas.. On the other hand, some of the points are still a bit difficult for beginners. In addition, the current HR system is geared toward non-IT engineers, so it is necessary to consider a new HR system suitable for IT engineers.

However, it is important to focus on high-priority issues such as the content of work and evaluation criteria, job description in the recruitment process, and company acceptance. We can identify the challenges and areas of obsolescence in current HR system and make changes.

9.2 Evolution of Future Research

Through this study, we discovered some challenges that could be tackled in the future through further research. Mainly:

1. During verification, the participants reported that the method was effective as a training tool. This is because even inexperienced personnel can build HR systems that take the life cycle into account and are stakeholder-aware, thereby gaining new perspectives and timelines. Therefore, there is room to test whether the method is workable.
2. Participants commented that the maturity criteria used in this approach might not only identify the maturity of the process but also identify the challenges of the current process. Therefore, we would like to verify whether the proposed method is effective not only in constructing HR systems but also in finding problems in the current processes.
3. Sato et al. found that few papers mentioned Feedback to HRM Systems from Outcomes (Sato et al., 2019b). Therefore, it is necessary to first identify the cause-and-effect relationship between the HR system of the Harvard model and short, medium, and long-term results, and then develop a method to build an HR system according to the purpose.
4. As a premise described above, a method of first setting and measuring HR Outcomes desired to be achieved is required. After that, the HR system will be built and improved upon, and the

set HR Outcomes will be monitored so that the PDCA cycle of the HR system can be turned.

5. By using multiple FFBDs extracted beforehand, it is possible to organize basic functions as Standard FFBDs. By customizing Standard FFBDs individually, it is possible to propose a method for efficiently and effectively constructing an HR system suitable for each enterprise and organization.
6. If multiple best practice cases can be collected, it will be possible to create a common FFBD model that will enable the achievement of the set HR Outcomes.
7. We have narrowed down the scope to focus on Human Resource Flow's Inflow in this paper. However, we need to expand to other HR systems to build architectural frameworks. In this process, there is room for establishing and accumulating Standard FFBD in each field and building a process in which human resources cooperate with each other to share and evolve this knowledge.
8. There is room for personnel to design incentives to voluntarily build Standard FFBD. It is also important to design incentives that encourage the development of social systems in which HR systems are developed, not only by building their own FFBDs but also by voluntarily customizing other companies' FFBDs. Once the design is complete, a society will be able to build HR systems for best practices in more companies and organizations
9. It is important to consider methods that enable managers and employees other than the personnel department to build an effective HR system using the common FFBD. This will allow employees other than human resource members to build their own HR systems that can really perform better and improve the performance of the company or organization.
10. There is room for proposing a method to allocate HR systems to the physics of non-HR employees, automation tools, and outside contractors to encourage their autonomous operation. It is possible to operate the HR system without increasing the load and man-hours by this method.
11. We need to consider providing more detailed explanations on "Separation of function and structure as room for improvement in our approach in the future.
12. When comparing HR systems, it is not necessary to target specific HR processes from other companies. Therefore, the “common FFBD” can be made on the basis of the FFBD of the collected HR system, and the “common FFBD” can be substituted by comparing it to the FFBD.
13. During the review, participants commented that "The characteristics of the way of thinking about my work (the state of being passive) became very clear, and I was able to recognize the issues.". By using this approach, we can be aware of our own challenges as well as our organizations’. Therefore, we would like to verify whether this method has a training effect

for the participants themselves.

14. Non-HR personnel may also benefit from training. In the future, we would like to verify whether personnel other than HR can design HR systems and conduct HR operations by improving capability through the training effect of the proposed method.
15. Although the method in this paper was applied to the Externalization and Combination areas of the SECI model, there is room for further development in the Internalization and Socialization areas.
16. We defined the scope of the HR system in the recruitment area, but it is also possible to consider its applicability to other reward of work systems.
17. Additionally, the following areas of future studies could be pursued based on this research:
    (1) A design method of a To-Be HR system after extracting issues of the As-Is HR system.
    (2) Specialized analysis of engineers and advanced technology personnel (AI/Data scientists, etc.).
    (3) Devising a method for the life cycle of the "Manufacturing" of the HR system.
    (4) Proposal of methods to visualize HRM results.
    (5) A design approach for decentralized, autonomous organizations where all processes are automated based on pre-defined strategies and rules.
    (6) Proposal of model-based development method for HR system by parameter setting.
    (7) Method for improving HR system using dynamic capabilities.
    (8) A Proposal Method for an HR Service System that Visualizes Employee Experience by Quantification.
    (9) Design Method of a high-quality HR System by Utilizing Common FFBD or Architecture Framework
    (10) A Method by using Organizational Architecture and Organizational Design.

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