

Title	Revisiting Japanese lifetime employment system : financial performance analysis using artificial neural networks
Sub Title	
Author	岡本, 大輔(Okamoto, Daisuke)
Publisher	Society of Business and Commerce, Keio University
Publication year	2011
Jtitle	Keio business review No.46(2011) ,p.1(1)- 23(23)
JaLC DOI	
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Notes	
Genre	Journal Article
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AA00260481-20110000-0001

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Revisiting Japanese Lifetime Employment System: Financial Performance Analysis Using Artificial Neural Networks*

By

Daisuke Okamoto

Abstract

The Japanese lifetime employment system is believed to be demised and collapsed; however, there are many companies which attach importance to long-term and regular employment. Also these companies have achieved high growth and profitability. In this paper, these facts will be shown and the Japanese lifetime employment system will be revisited by an artificial neural networks model, which can deal with a non-linear relationship, using questionnaire survey data and financial data.

Key Words

artificial neural networks; Japanese management; lifetime employment system; non-linear relationship; social relationship of a firm

Introduction

The 2007 sub-prime loan problem and 2008 “Lehman shock” in the U.S. were initially overseas financial crises, and their effect on Japan’s real economy was thought to be comparatively slight. However, restraint in consumer spending within the U.S. had a significant impact on financed automobile sales, causing automobile inventories to rapidly accumulate, idling production capacity at Japanese automobile manufacturers and exacerbating the burden of their fixed costs. This was a severe blow to the Japanese economy’s monoculture, heavily reliant as it is on the automobile industry’s overseas sales. The Japanese economy itself enjoyed favorable business conditions beginning in February 2002. In November 2006, the economic boom surpassed Izanagi boom and reached 57 months to become Japan’s longest post-war economic expansion. Undeniably, however, the Japanese felt that the economic growth was insignificant, and the boom ended in October 2007 after 69 months.¹

*Special thanks to Keio Gijuku Academic Development Funds 2010 and Keio/Kyoto University Joint Global COE Program.

¹Cabinet Office (http://www.esri.cao.go.jp/jp/stat/di/di_ken.html, accessed on 30 November 2010)

Since that time, the economy has declined continuously and in November 2009, deflation once again reared its ugly head.

These circumstances caused the employment situation to deteriorate. From the autumn of 2008 onwards, a substantial decline in contingent employment and the downsizing of part-time and temporary workers led to intensifying social instability and employment anxiety. By April 2010, the unemployment rate (seasonally adjusted) had risen to 5.1%, a high level. One can call this a slight improvement over the historical high of 5.7% recorded in July 2009, but it still reflects an extremely severe situation.² It is widely believed that the Japanese lifetime employment system, which was called one of the “Three Sacred Treasures” of Japanese management, is already a thing of the past. Yet, when one reflects on the strength of the Japanese company, which is the engine that pulls the Japanese economy, and creates long-term employment, is there not a need for them to reaffirm the value of human resources? If the environment changes, corporate strategy must also change, but is it good that everything should change? Itami (1987) suggested the formula, “system = environment × principles,” and asserts that principles do not have to change, regardless of whether the management does. For instance, the formula “environment × Peoplism” led to the lifetime employment system, but according to Itami, the principle of Peoplism need not change even if the environment changes. Without a doubt, the kind of lifetime employment practiced in the past cannot be maintained. However, this should not necessarily lead to recognizing the entire lifetime employment system as problematic and therefore necessary for change. In this study, the author will re-examine lifetime employment and long-term employment, and discuss their current status and problems. The author will also verify time-series questionnaire data and financial data bearing on the actual effects that lifetime and long-term employment will create.

Collapse of the Japanese lifetime employment system

Presently, at a time when Corporate Social Responsibility (CSR) is being stressed, the maintenance of employment is a corporate social responsibility to the closest of a company’s stakeholders—the employee (Okamoto and Umezu 2006b). This is thought to be one of the most important social relationships in corporate management, and the presidents of several companies believe this to be a manager’s first duty.

For instance, Shigenobu Nagamori, president of Nidec Corporation, has said that maintaining employment is a top priority, that employees should never be let go, that providing employment is a company’s greatest contribution to society, and that employment is the bulwark of society.³ Fujio Mitarai, chairman of the board of Canon, in a meeting of Nippon Keidanren stated that employment stability is the most important of issues.⁴ It has been widely reported that the lifetime employment system, formerly one of the Japanese management’s “Three Sacred Treasures,” has collapsed and come to an end. Looking back on history, however, the end of the lifetime employment has been announced numerous times—years ago at the time of the 1973 and 1979 oil shocks, upon the appreciation of the yen in 1985, and when Japan’s economic bubble collapsed in 1991. On the contrary, none of

²This 5.7% is the worst since the Ministry of Internal Affairs and Communications began recording statistics in 1953. The January 2010 seasonally adjusted figure was 5.6% after correction, also a low record.

³*Nikkei Business (business magazine)*, 26 October 2009 & 17 May 2010.

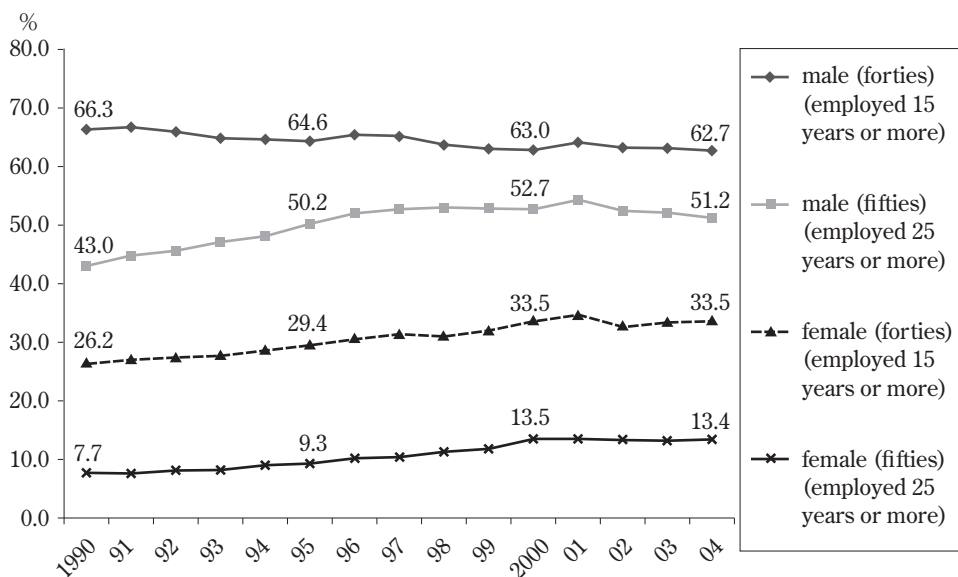
⁴*The Nikkei (newspaper)*, 27 January 2010.

these events has brought about the end of the lifetime employment system. What will happen this time?

The author will examine a variety of statistical data in an attempt to answer the above question.⁵ The percentage of long-term employed is shown in Figure 1. From the peak of Japan's asset price bubble in 1990 until 2004, the ratio of male full-time employees in their forties who had been employed for 15 years or more declined, but that decline was limited to only 3.6 percentage points (66.3% → 62.7%). During that same period, an increase was evident in the ratios of male full-time employees in their fifties who had been employed for 15 years or more, female full-time employees in their forties who had been employed for 15 years or more, and female full-time employees in their fifties who had been employed for 25 years or more. In view of this, one can say that the ratio of the long-term employed is increasing. Looking at the average years of continuous employment in Figure 2, we see that during the period of 1980 until 2007, males increased by 2.5 years and females by 2.6 years, which is, as a whole, an increase of 2.5 years. This shows an overall rising trend. There is also a definite increase in labor turnover from the asset-price-bubble year of 1990 until 2009, but as shown in Figure 3, the number of males changing jobs rose by a mere 1.2 percentage points, and the number of female job switchers was up by 1.8 percentage points. This does not indicate that changing employment became commonplace in Japanese society because most people did not switch jobs. The above clearly shows that, aside from the question of whether this was lifetime employment, the Japanese employment practice known for long-term employment is not in a state of collapse and demise.

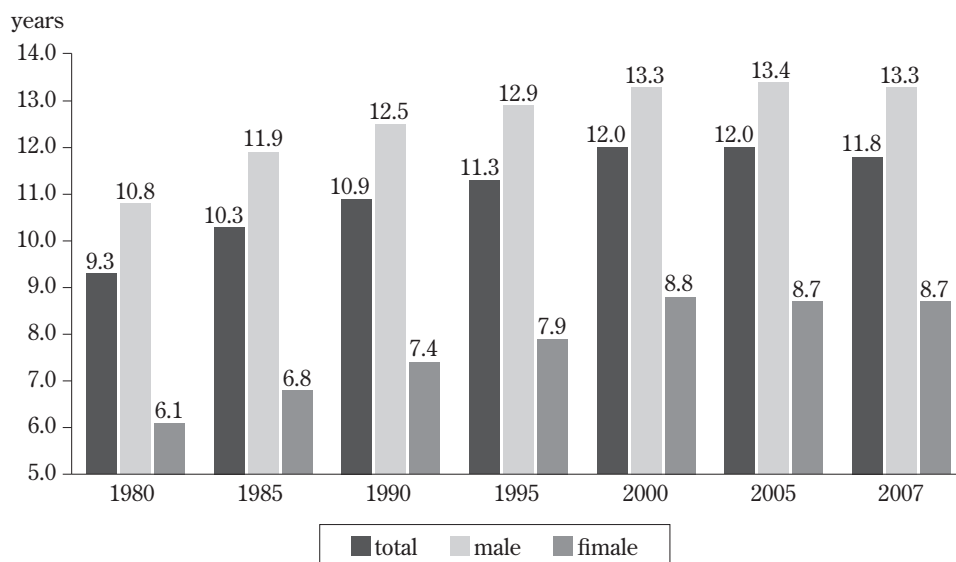
Therefore, what is the state of lifetime employment itself? According to a questionnaire

Figure 1. Proportion of the long-term employed

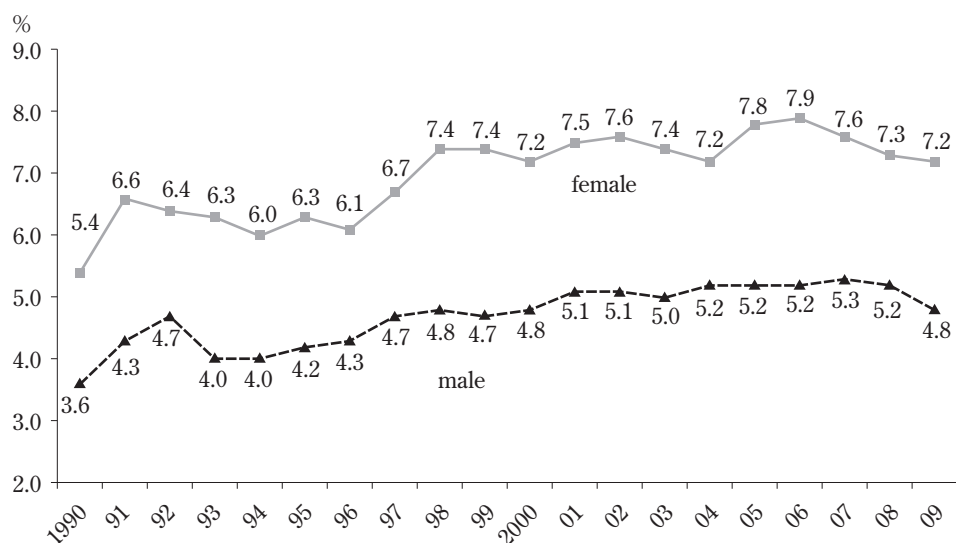


developed by the author from the data of Cabinet Office, Government of Japan
<http://www5.cao.go.jp/seikatsu/whitepaper/h18/honpenzuhyo/honpen.html>

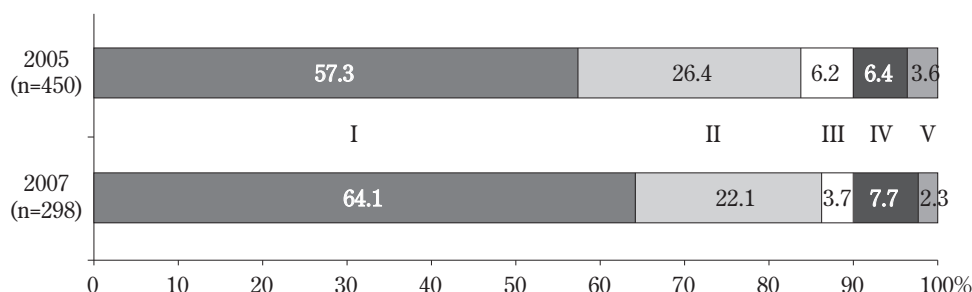
⁵For using data, see Higuchi (2004), Okubo (2007), Genda (2007), and Ebihara (2009).

Figure 2. Average years of continuous employment

developed by the author from the data of The Japan Institute for Labour Policy and Training
[\(http://stat.jil.go.jp/\)](http://stat.jil.go.jp/)

Figure 3. Labor turnover

developed by the author from the data of Ebihara (2009) and the Ministry of Internal Affairs and Communications
[\(http://www.stat.go.jp/data/roudou/\)](http://www.stat.go.jp/data/roudou/)

Figure 4. The future shape of lifetime employment

How is the Japanese lifetime employment system regarded at your company?

Please circle the one response that you think is closest to your company's thinking on this.

- | | |
|-----|--|
| I | In principle, maintain lifetime employment |
| II | Partial adjustment is inevitable |
| III | Major readjustment is necessary |
| IV | We don't adopt the system any more |
| V | N.A. |

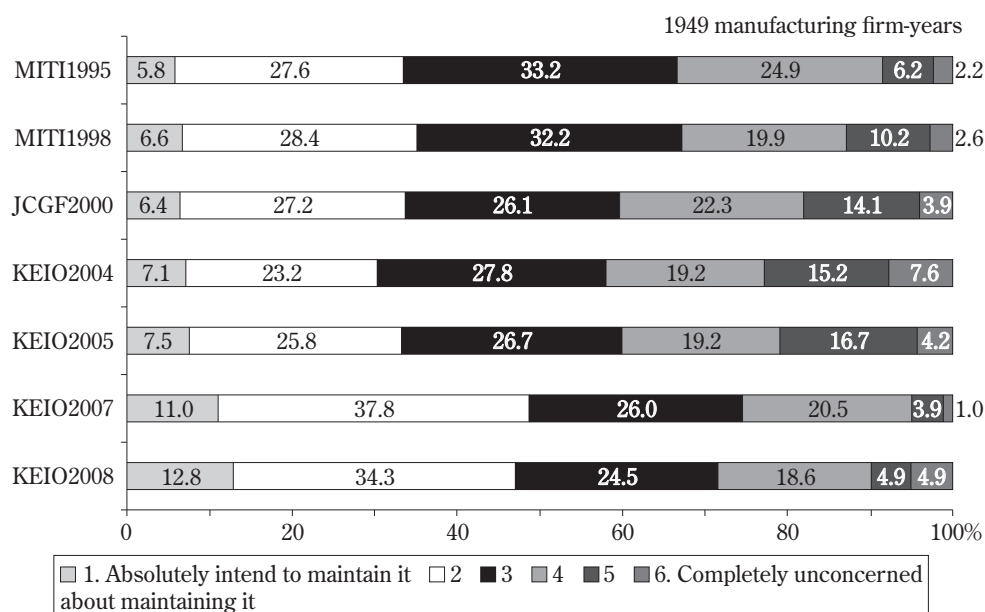
JILPT (2009)

survey conducted by the Japan Institute for Labour Policy and Training, “In principle, maintain lifetime employment” was the most common response, and a rising trend in this response was evident from 2005 until 2007 (Figure 4). The same upward trend was evident in the author's research (MITI 1997; METI 2002; Okamoto et al. 2001, 2005, 2006a, 2008, 2009). This survey, which read as follows,

“How is the Japanese lifetime employment system regarded at your company?
Please circle the one response that you think is closest to your company's thinking on this, on the continuum from 1: ‘Absolutely intend to maintain it’ to 6: ‘Completely unconcerned about maintaining it’.”

Absolutely intend to maintain it 1-2-3-4-5-6 Completely unconcerned about maintaining it.

was conducted and compared (Figure 5) on seven occasions between 1995 and 2008. Although the surveys were conducted by different institutions, ranging from the Ministry of International Trade and Industry, Japan Corporate Governance Forum to Keio University, the author personally participated in each survey, and because each survey used the same questionnaire quoted above, the data are comparable. There are no data predating 1995, but if the question had been asked while lifetime employment was the norm, responses would probably have been concentrated in number 1: “Absolutely intend to maintain it,” and in number 2. Data for 1995 shown in Figure 5 are distributed across answers 1 through 6, which show that lifetime employment had already ceased to be the norm at Japanese companies. By 2004, it was apparent that companies selecting response 6: “Completely unconcerned about maintaining it” and the next response, number 5, had been increasing steadily, and there was an emerging feeling that lifetime employment was defunct. In recent

Figure 5. Change in opinions regarding lifetime employment

developed by the author from the data of MITI(1997), METI(2002), Okamoto et al.(2001, 2005, 2006a, 2008, 2009)

years, however, that trend was curtailed, and the most recent survey in 2008 revealed over 70% (71.6%) of respondents selecting responses 1 through 3. This significantly exceeded companies selecting responses 4 through 6, which were fewer than 30% of the respondents. Needless to say, this diverges widely from mass media reports that spoke of the collapse and demise of lifetime employment.⁶

The nature of the Japanese lifetime employment system

In the previous section, the author reviewed various types of statistical data and questionnaire response data, and confirmed that the Japanese lifetime employment system has not reached a condition of collapse and demise, as is commonly reported. Despite this, it is a fact that the employment environment has changed substantially and that lifetime employment is not presently the norm as it was in the past. In this chapter, the author will review the discussion of the nature of the Japanese lifetime employment system as well as its merits and demerits, and study matters that lend themselves to reconsideration.

We normally refer to the “Japanese lifetime employment system” even though it is commonly accepted that it is not, in fact, a system. For instance, the Japan Productivity Center (JPC 1994) defines lifetime employment in the following way: “An employment practice for hiring regular employees, providing stable, long-term, continuous employment up to retirement age to new college graduates, barring special circumstances.” In fact, this

⁶Same tendencies were reported by Kato (2001) and Mitsubishi UFJ Research and Consulting (2008).

is an employment practice and not a system as it is not codified in any law or written document.

The term “lifetime employment” was coined when translation supervisor Urabe and translator Mori translated concepts in Abegglen’s *The Japanese Factory*, including concepts of “permanent employment system,” “lifetime commitment,” and “lasting commitment” as “lifetime employment (shushinkoyo).”⁷ The title of chapter 2 of the same translation (in the original, “The Critical Difference: A Lifetime Commitment”) was rendered in Japanese as “Decisive difference—a lifetime commitment.” The term “shushin” (lifetime) appears 14 times in that chapter (of the Japanese translation). However, as seen in Table 1, almost every use of this Japanese word was a translation of a different English word. Despite taking into account the fact that good English writing excludes the repeated use of the same expressions, it appears that Abegglen did not intend to stress the words “lifetime employment,” but rather the concept of a relationship that lasted a lifetime. At that time, Japanese academics were aware of long-term employment at Japanese companies; however, because it was not evident at small- and medium-sized businesses, among other reasons, they paid little attention to it (Nomura 2007). The book notes that Abegglen only saw the environment at a small number of large corporations, and that the buffer that enabled lifetime employment was short-term employment of subordinate companies and temporary workers at associated companies and affiliates. The book also mentions that the country was engaged in “drastic rationalization” in reaction to a depression. However, as a result of the economic boom of the mid-1950s and the economic boom of 1958–1961, postwar personnel cutbacks faded into memory. The coal industry’s serious employment problem was considered to have been a special factor affecting structurally weak industries. There was rapid employee turnover among blue-collar workers. Only full-time employees were “superior human resources” (and therefore, candidates for lifetime employment), and it was not considered a problem when those who failed to meet that standard were excluded from lifetime employment. Such were the values of that era, which raised a number of conditions for lifetime employment in Japan (Nomura 2007). The phrase “lifetime employment” appears only once among the translations in Table 1; however, as a result of these circumstances, it attracted a great deal of attention and

Table 1. Original terms translated into Japanese as “shushin”

page	Japanese translation	page	Abegglen (1958)
p.17.	shushin kankei	p.11.	a lifetime commitment
p.17.	shushin-teki kankei	p.11.	the permanent relationship
p.19.	shushin-teki naishi koukyu-teki jugyoin	p.13.	permanent or “eternal” employees
p.20.	shushin-teki kankei	p.14.	the lifetime relationship
p.21.	shushin-teki kankei	p.14.	the lasting commitment
p.24.	shushin-teki koyo	p.16.	permanent employment
p.25.	syushin-teki na koyou kankei	p.17.	the permanent employer-employee relationship
p.26.	syushin-teki na koyou kankei	p.17.	this permanent kind of job relationship
p.32.	shushin-teki naishi seiki no jugyoin	p.22.	employees referred to as “permanent” or “regular”
p.32.	shushin-teki kankei	p.22.	the relationship previously described
p.33.	shushin jugyoin	p.22.	permanent employees
p.33.	jugyoin to kaisha no syushin-teki kankei	p.23.	the worker-firm relationship
p.35.	shushin koyo seido	p.24.	this permanent employment system
p.36.	kosyu to hikoyousya tono aida no syushin-teki kankei	p.24.	this kind of commitment between employee and employer

⁷Abegglen (1958) and its Japanese translation (1958, 2004).

spread widely, taking on a life of its own. In reality, lifetime employment is a practice applicable to only male employees of large corporations, and there are numerous indications that a fair number of these men changed jobs in their twenties (for instance, Koike 1994). In fact, “A long-term, stable employer-employee relationship between company and employee, and the employee performance this elicits,” is the substance of the concept of lifetime employment. In addition, Kagono noted that “His (Abegglen’s) emphasis was not on whether the period of employment was long or short, but rather on the existence of a permanent ‘psychological contract’ between company and employee.”⁸ Given this perspective, we can say that no change as drastic as the collapse and demise of lifetime employment is occurring because the lifetime employment concept is common at Japanese companies even under their current circumstances.

This lifetime employment concept leaves plenty of scope for reconsideration. In fact, Toyota, Canon, and other companies are not lowering the lifetime employment flag. Companies that have announced their commitment to maintaining long-term employment and full-time employment are large in number to list here, but some of them include Toshiba, Sharp Corporation, Kao Corporation, Daikin, Yamato Transport, Ina Food Industry, Nidec Corporation, IRIS Ohyama, and Fast Retailing.

What would the reason be for this? There has already been a good deal of research into the merits and demerits of lifetime employment. If we take this as a starting point for reconsidering the concept of lifetime employment and briefly review, the following differences emerge.⁹

Merits of lifetime employment

- High morale and commitment.
- Long-term career design.
- Accumulation of firm-specific know-how and knowledge.
- Good labor-management relationships.
- Cross-training through reassignment of personnel.
- Social stability.

Demerits of lifetime employment

- Personnel expenses are a fixed cost.
- Years of continuous employment may not reflect the abilities expected in an employee with those many years of experience.
- Obsolescence of knowledge.
- Insufficiency of postings for middle-aged and older personnel.
- Burden falls on young employees.
- Higher cost of job displacement.

Of the many merits of lifetime employment, we can first mention stable employment, which brings a high level of employee commitment to the company and job. The employee and company have the same goals, which results in stronger loyalty to the company, higher morale, and increased productivity. If employee retention is stable, employee training and

⁸*President (business magazine)*, 13 April 2009.

⁹Ando and Ishikawa (1980), Urabe (1984), Abegglen and Stalk (1985), Hasegawa (1986), Odaka (1986), Itami (1987), Mroczkowski and Hanaoka (1989), Briggs (1991), Hofstede (1991), Hampden-Tumer and Trompenaars (1993), Yoshida (1993), Beardwell (1994), Holden (1994), Ito (1994), Koike (1994), JPC (1994), Chen (1995), Arai (1996), Nagano (1996), Yashiro (1997, 2007), Gill and Wong (1998), Lazear (1998), Shimizu (1998), Ichniowski and Shaw (1999), Watanabe (2000), Morishima (2001, 2008), Kono and Clegg (2002), Abegglen (2004), Baba (2004, 2005), Numagami (2004), Rowley, Benson, and Warner (2004), Sutherland (2004), Yoon (2004), Ogoshi (2006), Li and Putterill (2007), Okubo (2007), Nomura (2007), JILPT (2007, 2009), Hur (2008), Yokoyama (2008), Uchida (2009), Awasawa (2009), Lama, Chenb, and Takeuchi (2009), Nakano (2009), and Yanagawa (2009).

career design can be conducted from a long-term, systematic perspective, which is also an incentive for the development of in-house training and technology. In addition, stable employment promotes the accumulation of firm-specific know-how and knowledge as well as organizational learning. It also has the merit of reducing leaks of in-house education and training outcomes, or of proficiencies in R&D or manufacturing technology. It is easier to nurture cooperation and teamwork among people who know each other well. Further, it becomes possible to build good labor-management relationships, exercise flexibility in job rotation and work assignments, and conduct cross training. From a societal viewpoint, it allows the realization of a stable society with little stress from unemployment.

Among the demerits that have been identified, personnel expenses are fixed costs and cannot, therefore, be reduced when circumstances require it. Overmanning is, in particular, likely to occur when a business is downsizing. Pay raises are given on the basis of years of continuous employment, but the formula that years of continuous employment reflect the abilities expected in an employee with those many years of experience can no longer be applied at present, and this is a significant weakness. There is a growing number of cases in which accumulated experience is of no value, and other cases in which technological innovation renders knowledge obsolete. An insufficiency of postings for middle-aged and older employees who are in line for executive positions can emerge, and hiring reductions shift the negative impacts onto the young. There is a labor mobility problem at some companies, in that it is difficult to change employment even if an employee cannot utilize his/her talents and abilities fully, and the cost of job displacement rises. This obstructs the growth potential of new industries, while the labor force is locked into industries that are unnecessary from a societal perspective and should decline.

Lifetime employment has its merits and its demerits, and it is impossible to state categorically whether it is a good thing. However, stable employment offers extremely significant merits of high morale and commitment, and the author observes that lifetime employment, or at least long-term employment, is necessary for the realization of these merits. One of the strengths of the Japanese company is that it is an organization within which all employees can express their creativity; that is, it recognizes the abilities of some top managers as well as of ordinary employees. Also, a great deal of existing research as well as the resource-based view, which is one major trend in management studies and strategy, offer a theoretical foundation for the merits of long-term employment (for instance, Morishima 2001; Barney 2002; JILPT 2007; Numagami 2009). Oyabu (2009) contends that this makes possible the Japanese flexible contract-based model, an organizational model that presupposes long-term employment. In contrast to the Anglo-Saxon strict contract-based model in which authority and responsibility are clear and there are no areas of ambiguity regarding individual responsibility, in the Japanese organizational model, the individual's professional duties are vague, and there are areas in which responsibilities are not clearly defined. When a problem arises under this flexible contract-based model, weight is placed on the judgment of those on the work site, making it possible to take precise, complete, systematic action. Managers demonstrate the proper execution of their fundamental professional duties, such as dealing with issues and putting business policies into practice, but the specific ways in which the individuals and work sites receiving such instruction perform their professional duties are up to each person. This workplace independence is given more priority over the efficiency of strict management. It is Japanese long-term employment that makes this sort of high ability on the part of organized labor in the workplace possible. That is, long-term employment is an indispensable precondition to the high organizational strength and

personnel capabilities of the Japanese company. Teamwork in the workplace based on the human relations built when workers are employed by a single organization over the long term, and human resources development and utilization that cannot be accomplished when a company conducts human resource recruiting and short term employment through the external labor market, as with hiring job switchers and headhunting, are the source of Japanese companies' human resource competitiveness (Oyabu 2009).¹⁰ All this raises the question that if lifetime and long-term employment are responsible for the strength of Japanese companies, is it a good thing to blithely abandon them simply because the environment has changed?

As mentioned above, some of the merits of stable employment cannot be realized without lifetime employment, or at least long-term employment. Contrary, even with lifetime employment, it is important to note that it would be possible to ameliorate some of the demerits identified, including the basing of performance evaluations on seniority as well as the insufficiency of postings for middle-aged and older personnel. Notably, many are of the opinion that the seniority system should be discussed separately from the employment problem. For instance, according to the "Survey Report on the Future of the Lifetime Employment System (JPC 1994)," the reconsideration of lifetime employment suggests that an optimal personnel policy would include thorough implementation of merit-based management, overhaul of the entire pay system, and the institution of a voluntary early retirement program (a flexible retirement system).¹¹ Although there are problems with traditional lifetime employment that is combined with a seniority system, if a company changes its personnel evaluation system and leverages the merits of its existing lifetime employment system, there are great possibilities for lifetime and long-term employment.

If we look at actual companies, there are reports that many are abolishing their seniority systems even while retaining lifetime or long-term employment. A questionnaire survey conducted by the Japan Institute for Labour Policy and Training (JILPT 2007) asked the following two questions on four categories of a company: "Will your company continue to practice long-term employment or not?" and "Will your company introduce a merit-based system or not?"

- Type J Group (30.0%): Intend to remain with traditional Japanese management (Long-term employment in practice; merit-based management declined)
- Type A Group (18.2%): Intend to change to traditional American management (Long-term employment declined; merit-based management implemented)
- Type NJ Group (39.7%): Taking the new direction seen among Japanese companies (Long-term employment; merit-based management implemented)
- Type DJ Group (12.2%): Declined type NJ changes (Long-term employment declined; merit-based management not implemented)

The above clearly shows that there are, in reality, several companies that retained lifetime or long-term employment while abolishing their seniority systems.¹² Using these

¹⁰Japanese top management's "Kashi-Kari logic (indebtedness promoting trust and loyalty)" for decision-making, the Anglo-Saxon organization's "Manual System," and the Japanese organization's "Yoroshiku System ("thank you in advance" feeling without any specific words)" are almost identical approaches. For detail, see Shimizu (1986a, 1986b, 1989, 1994).

¹¹Also, Urabe (1984) and others have stated the same thing. On the contrary, however, several advocates assert mutual complementarities and balance.

¹²Similar results were reported by PRI (2003).

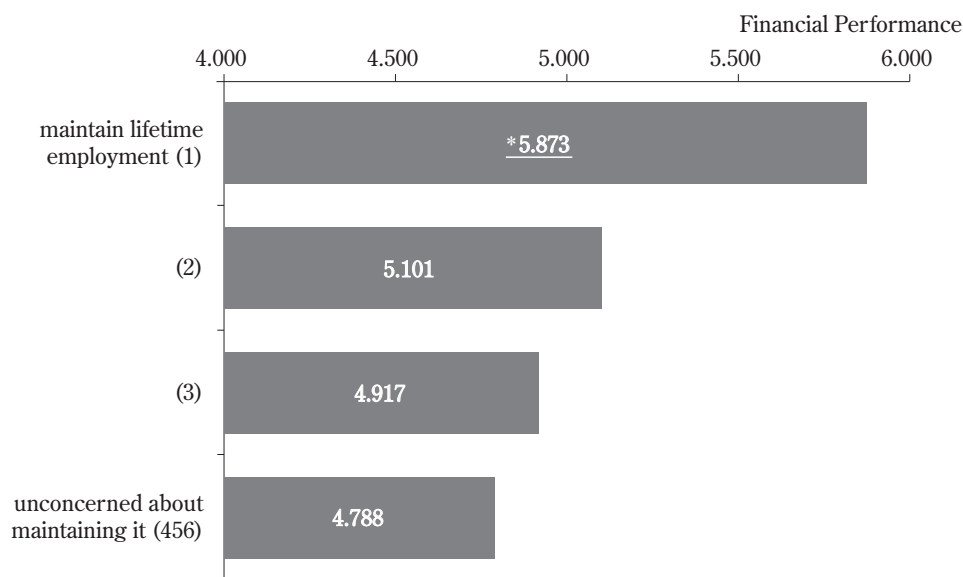
four categories, a 2-regression model analysis was conducted using rate of change in net sales over five years and rate of change in operating income over five years as dependent variables. Only rate of change in net sales showed significant results, as corporate performance in the Type NJ group and Type A group were better than that in the Type J group.¹³ The survey empirically investigated lifetime and long-term employment and their consequences, which this study proposed to reconsider; this is rare and important research. Unfortunately, however, the adjusted coefficient of determination was only 0.005, indicating that this model's explanatory power is undeniably insufficient. Research by Kawada (2008) offers another empirical analysis conducted. Using a questionnaire survey on personnel management, she investigated personnel policies and measures of concern to employees such as "The company will not reduce the workforce even if there is a downturn in the company's performance," "The company takes responsibility and assists in career development," and "The company offers dual-track careers." From these results, she found that "employees that a company wishes to retain do not quit," and, from a long-term perspective, companies that value human resources report strong performance. This study is of particular value, although Kawada did not deal directly with lifetime and long-term employment, but limited herself, regrettably, to a single-year correlation analysis of average annual stock-price growth rates. Further analysis is necessary, and a good deal of scope remains for the reconsideration of lifetime employment.

The Japanese lifetime employment system and corporate performance

Companies that value lifetime employment and strong performance

As discussed in the previous chapter, there has been a great deal of research on the merits and demerits of lifetime and long-term employment; however, only a few studies have analyzed the relationship between these and financial results such as profitability and growth potential, taking actual financial data as concrete effects. Work in this area remains insufficient. Therefore, in this chapter, the author will use financial data of multiple years to assess the concepts discussed through the previous chapter. Here, the author will assess the hypothesis that "long-term employment promote high employee performance, which are included in the concept of lifetime employment, and also high financial performance." Through the use of the author's previously discussed questionnaire surveys, the author will look at the relationship with financial data, but with a questionnaire one can only ask whether there is an intent to maintain lifetime employment. The concept of lifetime employment, including outcome variables such as the generation of high employee performance, is not explained. Accordingly, the questionnaire will merely allow an assessment of the effects that financial performance, including profitability and growth potential, exert on decisions to retain the Japanese lifetime employment system or long-term employment. In addition, giving consideration to the influence of the seniority system discussed previously, the effects that the implementation of merit-based evaluation procedures has on financial performance will be assessed. The method employed will be Quantitative Analysis for

¹³Independent variables were dummy variables of A, NJ, and DJ. Size and Industry were used as control variables. NJ had positive coefficient (statistically significant at 10% level) and A had also positive coefficient (statistically significant at 5% level). Adjusted R²=0.005.

Figure 6. Lifetime employment maintenance 2007 and Financial Performance 2009

underscore means maximum Financial Performance, asterisk means statistical significance at 5%

Qualitative Factors (QAQF).¹⁴

Figure 6 shows the relationships between 2007 lifetime employment questionnaire data and 2009 Financial Performance.¹⁵ As discussed in the previous chapter, the questionnaire offered six levels from which a choice should be made. In light of the numbers of data, subjects were regrouped into four categories (1, 2, 3, and 4 + 5 + 6), and the average values of Financial Performance of the categories were calculated and compared. The 2009 average value of Financial Performance of companies that responded to “maintain lifetime employment (1)” in 2007 was the highest. The significance level of the difference was 5%, which was statistically significant. This suggests that two years after a company decides to maintain lifetime employment, the decision contributes to a statistically significant improvement in Financial Performance. The upper table in Table 2 shows the relationship between lifetime employment questionnaire data (2000, 2004, 2005, 2007, 2008) and Financial Performance of 2009.¹⁶ The highest 2009 Financial Performance was posted by companies that had the strongest “maintain lifetime employment (1)” responses on three of the five

¹⁴This method involves performing a quantitative analysis on qualitative factors that cannot be shown in figures, such as the variables that maintain lifetime employment/merit-based evaluations. It has been used by the Committee for the Management Ability at the Ministry of International Trade and Industry for more than a quarter of a century and is used in numerous studies. For detail, see Okamoto (1996), Ando, Nitta, Ito, and Hiromoto (2007). Software: PC-QAQF ver.1.0.0.7. (Keio Univ.), Keio Neural Network Analysis ver.5.1 (Keio Univ.), SPSS ver.17.0 (SPSS Inc.). Hardware: SONY VAIO type TZ (Windows VISTA Business, Core 2 Duo (1.2G), M2GB, 32GBSSD, 160GHDD), SONY VAIO Z (Windows7 Professional 64bit, Core 2 Duo (2.8G), M6GB, 128GBSSD).

¹⁵Financial Performance was defined as follows; Profitability: ordinary income ratio to net sales (standardized into scores 0–5) Growth Potential: 4-year moving average of sale growth rate (standardized into scores 0–5) Financial Performance: Profitability + Growth Potential To indicate three variables, upper case letters will be used hereafter, i.e. Profitability, Growth Potential, and Financial Performance.

¹⁶Individual data of 1995 and 1998 surveys in Figure 5 were not obtainable because those were conducted by the Japanese government (MITI).

Table 2. Lifetime employment maintenance and Financial Performance 2009

	2000 all firms	2004 all firms	2005 all firms	2007 all firms	2008 all firms
maintain lifetime employment (1)	5.056	<u>5.211</u>	<u>*5.063</u>	<u>*5.873</u>	5.043
(2)	<u>5.222</u>	5.129	5.052	5.101	4.803
(3)	5.023	4.788	4.487	4.917	5.020
unconcerned about maintaining it (456)	4.779	4.903	4.752	4.788	<u>5.374</u>
		merit-based firms	merit-based firms	merit-based firms	merit-based firms
maintain lifetime employment (1)		<u>5.502</u>	5.581	<u>5.603</u>	<u>5.444</u>
(2)		5.061	<u>5.787</u>	5.219	4.890
(3)		4.466	4.740	5.141	5.216
unconcerned about maintaining it (456)		4.913	4.358	5.036	5.112

underscore means maximum Financial Performance, asterisk means statistical significance at 5%

surveys (2004, 2005, 2007). In addition to the data for 2007 in the bar graph in Figure 6, data for 2005 were also statistically significant. Overall, “maintain lifetime employment (1)” responses in the 2000 survey also contributed to improved Financial Performance. The “unconcerned (456)” companies had the highest performance in the 2008 survey, but the difference was not statistically significant and the performance of the “maintain lifetime employment (1)” companies was second highest. The lower table in Table 2 shows the results for just those companies that emphasized merit-based evaluations.¹⁷ Because of the small sample size, the differences were not statistically significant; however, of the three surveys that yielded usable data (2004, 2007, 2008), the companies with the strongest “maintain lifetime employment (1)” responses also had the highest 2009 Financial Performance. The 2005 survey had the second-highest Financial Performance.

A nonlinear model of the contribution of the Japanese lifetime employment system to strong corporate performance

The QAQF analysis discussed in the preceding section shows that the decision to maintain the Japanese lifetime employment system tends to boost a company’s future Profitability and Growth Potential. It was also confirmed that when that decision is combined with the elimination of the seniority system and the introduction of a merit-based evaluation, it tends to be linked to improvements in Financial Performance. However, depending on the observation times, no statistically significant results were obtained in some cases. In addition, while sample size was a factor, no statistical significance was observed in the comparisons of the effects of seniority-based evaluation systems with performance-based evaluation systems. On the whole, it is difficult to reach any clear conclusion. To further confirm the research results reported in this chapter, the author constructed a model taking lifetime employment and merit-based evaluation as predictor variables, and future Profitability and Growth potential as objective variables, and the author continued to test the relationship between them. An artificial neural network model capable of dealing with

¹⁷Those companies were respondents to categories 4 to 6 for the question as follows in the surveys of 2004, 2005, 2007, and 2008; “In your company as a whole, what organizational characteristics (organizational culture) exists as compared with other companies? Using a scale with keywords in both ends, please select the one for each that is most applicable to your company.”

Seniority system 1–2–3–4–5–6 Merit system

non-linear relationships was used for this, and a linear discriminant function model for the comparison object.

Model design

The artificial neural network model is a method developed in the engineering field that purports to recreate the neural circuitry, that is, the information processing network of the human brain. The most prominent feature of this model is that it does not use the method of hypothesizing mathematical models and estimating the coefficients as with multivariate analysis methods such as linear regression analysis and discriminant analysis. Instead, the model itself studies the relations between variables and constructs itself naturally. Accordingly, because this model does not require the step of taking a linear relationship between variables as a given when hypothesizing mathematical models, as with many traditional methods, it has the ability to deal with non-linear relationships; this is a major advantage.¹⁸ This study is intended to test the relation between lifetime employment and financial performance. However, there is no theoretical work that explicitly states formulae associated with the relation between lifetime employment and financial performance. Further, research revealing a basis for the structure of such formulae is nonexistent. Still further, linear relationships are unclear. Therefore, the optimum method is the artificial neural network analysis, which naturally creates a model by itself and deals with non-linear relationships in the process. For the sake of comparison, the author will also conduct a multiple linear discriminant analysis that deals only with linear relationships used in several of the previous research studies. The artificial neural network model itself can be used for various analyses; however, to allow comparisons with multiple discriminant analyses for this study, the only model considered was an artificial neural network model that performed exactly the same analysis as a multiple discriminant analysis but retained the capability of dealing with non-linear relationships.

At this point, the author constructed a model taking attitudes toward lifetime employment and the merit system as predictor variables/input variables, and subsequent profitability and growth potential as objective variables/output variables.¹⁹ When the author did this, because attitudes toward lifetime employment and the merit system alone will not determine future financial performance, the author added profitability and growth potential to the input variables at the time of the survey, as quasi control variables. The following two models were tested.

Model 1	Input variables:
	Lifetime Employment 2007, Merit System 2007,
	Profitability 2007, Growth Potential 2007
	Output variables:
	Profitability 2009, Growth Potential 2009

Subject companies were classified into four groups using the artificial neural network

¹⁸For details about artificial neural network model, see Okamoto (2004) and Okamoto and Umezu (2006b).

¹⁹In the artificial neural network model, variables used as predictor variables in a multiple linear regression analysis or in a multiple discriminant analysis are known as input variables. Variables used as objective variables are known as output variables. To avoid confusion or disorganization in the foregoing, the author used the terms "input variable" and "output variable" in speaking of a multiple discriminant analysis, as with the artificial neural network model.

model and discriminant function model, taking output variables as external criteria. These were low Profitability/low Growth Potential, low Profitability/high Growth Potential, high Profitability/low Growth Potential, and high Profitability/high Growth Potential. Accordingly, this model classified and identified four groups on the basis of the four input variables.

Model 2	Input variables:
	Lifetime Employment 2007, Merit System 2007, Financial Performance 2007
	Output variable:
	Financial Performance 2009

For Model 2, Profitability and Growth Potential variables used in Model 1 were added together and defined as Financial Performance, reducing a single variable for both input variable and output variable.²⁰ Classified groups were low Financial Performance and high Financial Performance. From the three input variables, two groups were classified and identified in this model.

The sample was divided into upper, middle, and lower thirds on the basis of their level of Financial Performance, Profitability, and Growth Potential. The upper third was designated as “high performing companies” and the lower third became the “low performing companies.” Data for the middle third were excluded from the analysis.²¹

Model 1

This model sought to utilize the four input variables—Lifetime Employment 2007, Merit System 2007, Profitability 2007, and Growth Potential 2007—to explain Profitability 2009 and Growth Potential 2009. First, in the classification table generated by the discriminant function model (Table 3), the lines in the “actual data” section are divided into four classifications according to the 2009 Profitability and Growth Potential. The columns under “classification by discriminant function” show the four classifications generated by multiple discriminant analysis. The diagonal row of shaded cells show correctly classified subjects, with an identification accuracy of 50.9%.²² Next, in the classification table generated by the artificial neural network model (Table 4), the identification accuracy is 64.6%. Taking non-linearity into account allows an increase in identification accuracy of approximately 14

²⁰Among the four input variables in Model 1, Profitability and Growth Potential are most highly correlated, therefore, this model is intended to suppress the adverse effects of the multicollinearity born of the high correlation between the input variables (in a linear model) (Okamoto 2009).

²¹The sample could have been divided into quarters or halves as well as thirds. However, if quarters were used, there were several companies with mid-range responses that could not be included in the sample, which caused an extreme reduction of sample size. If halves were used, because this is just dividing the sample in half, all the companies with mid-range responses are included in the sample, and the relationships between variables to be studied become ambiguous. Therefore, this study used only one-third rule. Because of this, the sample size for Model 2 was 72. Sample selection in Model 1 was conducted in the same way. Because only companies in the top and bottom thirds of both Profitability and Growth Potential were selected, sample size was reduced to 53. Because variables 0–1 were used for the artificial neural network model’s input variables, each input variable was converted as follows: (minimum value for each variable)/(maximum value - minimum value).

²²The sample in the diagonal cells was classified correctly, resulting in a calculated identification accuracy II as follows: $(11 + 5 + 5 + 6)/53 = 50.9\%$. Identification accuracy II was calculated as follows. Of the 19 sample companies placed by actual data in the low Profitability/low Growth Potential category, eight were misclassified. As with the low Profitability/high Growth Potential and high Profitability/low Growth Potential groups, half of this sample was correctly classified. Therefore, this was 0.5 percentage points. The calculation, then, is as follows: $\{(11 + 5 + 5 + 6) + 0.5 \times (1 + 2 + 2 + 1 + 4 + 3 + 2)\}/53 = 65.1\%$.

Table 3. Model 1 (Table of classifications by the discriminant function model)

P: Profitability G: Growth Potential		classification by discriminant function				
		low P & low G	low P & high G	high P & low G	high P & high G	
actual data	low P & low G	11	1	2	5	19
	low P & high G	2	5	0	0	7
	high P & low G	1	0	5	4	10
	high P & high G	6	3	2	6	17
Identification Accuracy I		50.9%	Identification Accuracy II		65.1%	
SPSS ver.17.0 (SPSS Inc.)						

Table 4. Model 1 (Table of classifications by the artificial neural network model)

P: Profitability G: Growth Potential		classification by artificial neural network				
		low P & low G	low P & high G	high P & low G	high P & high G	
actual data	low P & low G	49	1	15	11	76
	low P & high G	5	20	0	3	28
	high P & low G	2	0	29	9	40
	high P & high G	6	8	15	39	68
Identification Accuracy I		64.6%	Identification Accuracy II		78.3%	
KNNA ver.5.1(Keio Univ.)						
5-partition cross validation, learning count 20000						

Table 5. Model 1 (Input variable degree of contribution)

	artificial neural network	
Lifetime Employment (unconcerned)	-0.130	11.1%
Merit System	0.013	1.1%
Profitability	0.841	71.6%
Growth Potential	0.191	16.3%

percentage points.²³ When multiple discriminant analysis is used, classifications are performed using multiple discriminant functions. Therefore, the degree of contribution of input variables cannot be shown clearly. However, this is possible using the artificial neural network model (Okamoto 2004). Table 5, which gives the values for the input-variable degree of contribution, shows a negative value for Lifetime Employment 2007; this indicates a negative relation between variables of Lifetime Employment 2007 and those of Profitability 2009 and Growth Potential 2009. As in the last chapter, the lower the number of the choice on the lifetime employment questionnaire, the higher the value for maintaining lifetime employment that led to high profitability and high growth. This is consistent with the QAQF analysis discussed above. This variable's degree of contribution was found to be more than 10 percent of the four variables (11.1%).²⁴ Merit System 2007 also had a positive degree of contribution, confirming the finding discussed above that implementation of the merit

²³Because random numbers are used in artificial neural network analysis, a 5-partition cross validation was conducted to take those effects into account. Accordingly, the sample size was 212 ($53 \times 4/5 \times 5$). The software used for the discriminant function analysis had a cross validation option, but not a 5-partition one. Because the software and option differed, no precise comparison was possible; however, the superiority of the artificial neural network model's identification accuracy was clear.

²⁴Because a random number is used for the initial value when conducting an analysis using the artificial neural network model, the small figures in the analysis results are not very meaningful. Therefore, the result is rounded to the nearest multiple of 10 rather than using the exact percentage. For detail, see Okamoto (2004).

Table 6. Model 2 (Table of classifications by the discriminant function model)

F: Financial Performance		classification by discriminant function		
		low F	high F	
actual data	low F	25	11	36
	high F	13	23	36

Identification Accuracy I 66.7%
SPSS ver.17.0 (SPSS Inc.)

Table 7. Model 2 (Table of classifications by the artificial neural network model)

F: Financial Performance		classification by artificial neural network		
		low F	high F	
actual data	low F	99	45	144
	high F	20	124	144

Identification Accuracy I 77.4%
KNN ver.5.1(Keio Univ.)
5-partition cross validation, learning count 50000

Table 8. Model 2 (Input variable degree of contribution)

	standardized canonical discriminant function coefficients		artificial neural network	
Lifetime Employment (unconcerned)	-0.421	28.5%	-0.157	11.5%
Merit System	0.169	11.5%	0.013	0.9%
Financial Performance	0.885	60.0%	1.188	87.5%

system contributes to high profitability and high growth. However, the percentage of the degree of contribution was extremely small (1.1%). In this connection, Profitability 2007 and Growth Potential 2007 naturally have a positive relationship with Profitability 2009 and Growth Potential 2009, whose respective degrees of contribution are almost 70% (71.6%) and less than 20% (16.3%).

Model 2

There are three input variables in Model 2: Lifetime Employment 2007, Merit System 2007, and Financial Performance 2007. This model attempts to explain Financial Performance 2009 using these variables. Looking at the results of the discriminant function analysis (Table 6) conducted for purposes of comparison, as with Model 1, the model's identification accuracy is listed at 66.7%. However, the identification accuracy of the artificial neural network model (Table 7) was 77.4%, and this rises by approximately 11 percentage points when non-linearity is taken into account. The value for the degree of contribution of Lifetime Employment 2007 shown in Table 8 is a negative number, as in Model 1; this again confirms the relation between that variable and high performance. There is some difference in the degrees of contribution calculated using the discriminant function model as opposed to the artificial neural network model.²⁵ However, if we give preference to the artificial neural network model's degree of contribution in view of its high identification accuracy, and taking non-linearity into account, it is at the same level of more than 10% as in Model 1 (11.5%). Merit System's degree of contribution value is a positive number, but is also an extremely small proportion (0.9%). Again, consistently with Model 1, Financial Performance 2007 showed the largest degree of contribution of less than 90% (87.5%).

This analysis confirms that decision-making with regard to lifetime employment

²⁵Because the sample was divided into two groups, standardized canonical discriminant function coefficients are also shown.

contributes to the improvement of a company's financial performance in the future, and that the use of a non-linear model makes it possible to clarify that degree of contribution.

Discussion and conclusion

The author has often asserted that social relationships should join profitability and growth potential as the third criterion in company evaluation standards. At one time it was contended that capitalist social responsibility consisted of only achieving the economic requirement of making a profit for one's self and expanding one's business. Nothing more was required. In recent years, however, there has been a growing controversy with regard to CSR, and, as expected, dissenting opinion on the subject of social relationships has fallen silent. However, if social relationships are actually viewed as company goals, there is an insufficiency of experimental studies investigating the outcome when company management strategically enhances social relationships. The author has previously conducted a few studies of CSP-CFP,²⁶ but in this study, took up the lifetime employment system, which is widely believed to have become already a thing of the past. This issue was chosen because the maintenance of employment is an important element of the "corporate social relationship" with the company's closest stakeholder—the employee—and the author thought that there had been insufficient experimental study of outcomes when Japanese companies take another look at the lifetime employment system, which is the source of their strength.

The importance of lifetime employment, long-term employment, employment maintenance, and other social relationships as well as CSRs is clear. When one asks the opinions of Japanese managers in the workplace, an overwhelming number of people reply that they want to maintain employment if they can. Further, many Japanese managers are thinking that they would like to protect the employment of full-time employees to the maximum extent possible to come vigorously to the fore when the economy recovers. Nonetheless, if one considers that this would cause short-term increases in costs, there are numerous things that just cannot be done. A report by the Japan Association of Corporate Executives (2003) says, "In actuality, it is extremely difficult to demonstrate just how CSR is tied to a company's performance, or to establish a causal relationship. Like the chicken and the egg, not enough material is available yet to allow one to judge whether a company has energetically implemented CSR because performance is good, or whether an energetic implementation of CSR has resulted in strong performance." "Everyone realizes that 'CSR is a good thing,' but in the absence of the incentive offered by its explicit link with profits, engagement in CSR would not progress." In this study, the author analyzed the relationship between lifetime employment and financial performance as a concrete example of CSP - CFP relationship. As a result, by treating not only linear, but also non-linear relationships, the author was able to explicitly show that correlations not previously clarified were positive. In addition, the author was able to present the degree of contribution—that is, the strength of the positive correlations—in visible form.

It is possible that these analyses would be met with counter arguments along the lines of those in the Japan Association of Corporate Executives report discussed above: "Isn't the direction of the causal relationship reversed? Doesn't cause and effect flow in the other

²⁶corporate social performance vs. corporate financial performance. See Okamoto (1994, 1996), Okamoto and Umezu (2006b), and Okamoto (2009).

direction?” That is, it could be argued that it is not that performance is good because of lifetime employment, but rather that lifetime employment can be maintained because performance is good. Such a causal relationship probably exists, but even if lifetime employment is viewed as the effect of strong performance, it is conceivable that the merits of lifetime employment could subsequently come into play and boost performance in the future. Therefore, lifetime employment can be considered as both an effect and a cause. It is a virtuous cycle in which strong performance maintains lifetime employment and, in turn, lifetime employment creates strong performance. Conversely, it can also be considered as a vicious cycle in which poor performance makes it impossible to maintain lifetime employment, which further damages employee morale, resulting in further deterioration in performance. This is truly a chicken and egg situation. Nonetheless, viewed from a long-term perspective, financial performance is clearly an effect. However, if one thinks about the fact that lifetime employment is an operational decision-making element, in the long-term there is no harm in calling it a cause. In this study, this causal relationship problem was handled by establishing lifetime employment data at an earlier point in time than financial performance data.

In this study, the author reconsidered lifetime employment, analyzed the present state of lifetime employment using statistical data and questionnaire data, and used the QAQF analysis, discriminant function analysis, and artificial neural network analysis to test the relation with financial performance and to clarify its relationships. Unfortunately, there were sample size constraints, and the author acknowledges that the restricted scope of the analysis is a limitation of this study. For instance, this study presented only analysis based on questionnaire surveys, but there will be numerous issues in the future, including relations between actual years of continuous employment and financial data. These will be addressed another day. Despite these shortcomings, the author was at least able to demonstrate a positive contribution of lifetime employment to future performance. There is a deep connection between the merits of lifetime employment and the strength of the Japanese company. The author thinks that the reconsideration of lifetime employment is highly significant, and not something to be casually abandoned simply because the economy is in depression.

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Figures & Tables

Figure 1. Proportion of the long-term employed

Figure 2. Average years of continuous employment

Figure 3. Labor turnover

Figure 4. The future shape of lifetime employment

Figure 5. Change in opinions regarding lifetime employment

Figure 6. Lifetime employment maintenance 2007 and Financial Performance 2009

Table 1. Original terms translated into Japanese as “shushin”

Table 2. Lifetime employment maintenance and Financial Performance 2009

Table 3. Model 1 (Table of classifications by the discriminant function model)

Table 4. Model 1 (Table of classifications by the artificial neural network model)

Table 5. Model 1 (Input variable degree of contribution)

Table 6. Model 2 (Table of classifications by the discriminant function model)

Table 7. Model 2 (Table of classifications by the artificial neural network model)

Table 8. Model 2 (Input variable degree of contribution)