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4 Employment-Based Training in Japanese Firms in Japan and in the United States: Experiences of Automobile Manufacturers

Masanori Hashimoto

4.1 Introduction

The international competitiveness of the American economy is a critical policy concern for the United States. The key factor behind an internationally competitive economy is the ability of its labor force to adapt flexibly to continual innovation and to produce high-quality products at low cost. Such ability is fostered by training. The underlying assumption of this paper is that the stream of successful Japanese products in recent years owes much to effective private-sector training in Japan.

Recently, many American firms have adopted Japanese practices, such as the just-in-time inventory (*kanban*) system, the team-based production system, quality control circles, and training by job rotation, and the trend is likely to continue. Also, Japanese direct investment in the United States has risen substantially in recent years and may grow in the future. Yet, there has been little

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systematic discussion of how Japanese-style training and employment relations function and how suitable they are to the American labor force. An understanding of Japanese training promises to offer valuable policy lessons for improving the competitiveness of the American labor force. To help promote such understanding, this paper presents an economic theory of training and uses it to assess the initial experiences of Japanese automobile transplants in transferring Japanese employment and training practices to the American labor force.[1]

Since much of the information in this paper pertains to the automobile industry, it is useful to first note how this industry's productivity characteristics differ across the two countries. Fortunately, the relevant information is readily available in a recent publication summarizing the findings from a large project conducted at the Massachusetts Institute of Technology (Womack, Jones, and Roos 1990). It has been said that automobile workers in Japan require fewer hours of work to assembly a car, and produce higher quality cars, than their U.S. counterparts. The MIT study confirms this claim: in 1989 Japanese assembly plants built an automobile using 16.8 hours of labor on average, Japanese transplants in North America used 20.9 hours, and U.S.-owned plants in North America used 24.9 hours. The number of assembly defects per 100 vehicles averaged 52.1 for Japanese plants, 54.7 for Japanese transplants, and 78.4 for U.S. plants.[2]

There is, of course, considerable diversity in assembly productivity and quality within Japan as well as within the United States.[3] In fact, the best U.S.-owned plant in North America outperformed the worst plant in Japan: 18.6 hours for the U.S. plant versus 25.9 hours for the Japanese plant. An eye-opener is that the best U.S.-owned plant evidently produced cars of slightly higher quality (35.1 defects) than the best Japanese plant (37.6 defects) (Womack et al. 1990, 84–88). The evidence seems incontrovertible, however, that on balance Japanese automobile plants rank highest in both productivity and quality, followed by Japanese transplants, and then by U.S.-owned plants in North America.[4]

1. The focus on the automobile industry is meaningful, since in recent years about two-thirds of U.S. trade deficits with Japan have been attributed to automobile imports. Also, many aspects of Japanese manufacturing methods, e.g., "lean production," developed in this industry, and in particular at Toyota.

2. The defect figures are from the J. D. Power Initial Quality Survey as reported in Womack et al. (1990, fig. 4.4) and refer to defects traceable to the assembly plant, as reported by owners in the first three months of use.

3. Assembly hours ranged from 13.2 in the best plant in Japan to 25.9 in the worst plant. For Japanese transplants in North America, comparable figures were 18.8 and 25.5, respectively, and for U.S.-owned plants in North America, 18.6 and 30.7, respectively. See Womack et al. (1990, fig. 4.3 and 4.40).

4. The same MIT study shows that U.S.-owned plants in North America required on average fewer hours to assemble a car than plants in Europe or in newly developing countries. Defects were slightly fewer in plants in those countries than in U.S. plants, though more than in Japanese transplants.

Perhaps most significant for the current study is the finding that workers in Japanese transplants in North America, most of whom are American, produced at a quality level comparable to that in Japanese plants. Interestingly, transplant workers and workers in Japan receive similar amounts of training, far exceeding what workers in U.S.-owned plants receive, at least during the initial period of employment: new production workers in Japanese transplants receive an average of 370 hours of training as compared with 380 hours for workers in Japanese plants and a mere 46 hours for workers in U.S.-owned plants.[5] The above findings suggest that nationality per se is not what explains the difference in productivity between assembly workers in Japan and those in the United States. Rather, training, employment relations, and production organization—e.g., mass production versus lean production—are likely to be the explanatory factors.[6]

This paper views employment-based training as the primary vehicle for developing productive workers. What are the key features of a productive worker? The following remark by Alfred Marshall, from a chapter on industrial training penned more than a hundred years ago, remains to this day a fitting description of a productive worker: "To be able to bear in mind many things at a time, to have everything ready when wanted, to act promptly and show resource when anything goes wrong, to accommodate oneself quickly to changes in detail of the work done, to be steady and trustworthy, to have always a reserve of force which will come out in emergency, these are the qualities which make a great industrial people."[7]

The creation of the "great industrial people" that Marshall talked about requires close coordination between formal schooling and employment-based training.[8] Moreover, the Japanese experience suggests that effective

5. See also McDuffie and Kochan (1991) for a related discussion on training in automobile industries.

6. The main conclusion of the MIT project is that "lean production," a term coined by one of the project's investigators, is preferable to mass production (Womack et al., 1990). Most Japanese automobile manufacturers are said to practice lean production, as are other Japanese manufacturers. The just-in-time inventory (*kanban*) system, team-based production, *kaizen* (continuous incremental improvements) practice, quality control circles, and active worker participation—e.g., any worker who detects problems can stop the assembly process by pulling a cord—are some of the key features associated with lean production. According to the MIT study, the lean production method realizes the benefits of mass production (low unit cost) and of traditional craft production (quality), because it "transfers the maximum number of tasks and responsibilities to those workers actually adding value to the car on the line, and it has in place a system for detecting defects that quickly traces every problem, once discovered, to its ultimate source. . . . Mass production is designed with buffers everywhere—extra inventory, extra space, extra workers—in order to make it function. . . . In old-fashioned mass-production plants, managers jealously guard information about conditions in the plant, thinking this knowledge is the key to their power" (Womack et al. 1990, 99, 103). This last point is pertinent to this study, as my theory in section 4.2 treats reliable information exchange as the basis for productive employment relations.

7. Alfred Marshall, *Principles of Economics* (New York: Macmillan, 1920), book 4, chap. 6.

8. My focus in this paper is employment-based training in private-sector firms. Dore and Sako (1989) offer comprehensive discussions of the Japanese school system, vocational and technical training, and on-the-job training.

employment-based training must include not only technical training but also training in employment relations. The benefits from investing in technical skills are straightforward; indeed, most writers on training issues have focused on this type of training. Training in employment relations teaches employees how to communicate effectively with co-workers, how to share information and responsibilities, and how to teach fellow workers, as well as how to deal with conflict. Although such training may be difficult to measure, to ignore it would be to stop short of gaining a full understanding of training issues.

The emphasis on training in employment relations is especially appropriate when contemplating policies to strengthen U.S. industries. One often hears that promoting job security for American workers is fundamental to developing a productive work force. Although such a recommendation may have merit, job security should not hinder efficient separations. An employment-at-will arrangement, which is typical in both U.S. and Japanese labor markets, ensures separations occur if efficient. The problem is that, as my theory below demonstrates, inefficient separations also occur from time to time. An important purpose of training in employment relations is to reduce inefficient separations to a minimum. In the concluding section, I argue that this type of training should be an important component of policies on human resource management in American companies.

The paper is organized as follows. Section 4.2 presents a theory of training; sections 4.3 and 4.4 use the theory to discuss hiring and training practices in Japan and at some of the Japanese transplants in the United States. Section 4.5 offers concluding remarks.

4.2 A Theory of Training

4.2.1 A Nontechnical Outline

The theory presented in this section aims to clarify the links between schooling and training, and between technical training and training in employment relations. Figure 4.1 gives an overview of my conceptual framework.[9] The employer and the employee are assumed to invest in training in order to enhance the value of their relationship. Figure 4.1 distinguishes between two types of training, indicated in circles: (1) training to enhance the employee's technical skills and (2) training in employment relations. The independent variables are indicated in figure 4.1 as the costs associated with these investments. The cost of training in employment relations reflects the environment—the extent of heterogeneity of the work force, its ability to function cooperatively as a group, management attitudes, worker propensity for mobility, and other "cultural"

9. This conceptual framework is adapted from my recently formulated theory of employment relations in Japan (Hashimoto 1990b), which is an extension of my earlier work (Hashimoto 1981; Hashimoto and Yu 1980).

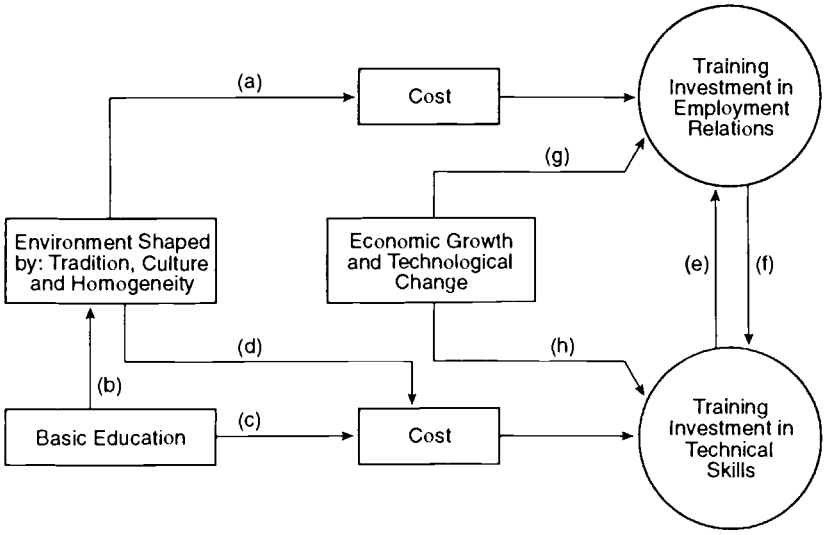

Fig. 4.1 Outline of the theory of training investments

factors (arrow a). Figure 4.1 indicates that the environment is shaped in part by formal education (arrow b). Also, the cost of training in technical skills is a function of how well basic education prepares students for training (arrow c). The next several paragraphs will develop these ideas further.

It is well known that workers with better academic skills are more efficient learners on the job.[10] Mastery of such basic subjects as language and mathematics, as well as the development of a positive attitude toward continuous learning on one's own, is a prerequisite for efficiency in postschool technical training (fig. 4.1, arrow c). Also, as noted earlier, training in technical skills is facilitated if new employees arrive with solid basic skills that vary little among the employees. If every new employee comes equipped with a solid basic education, the time needed to teach technical skills on the job is reduced, because, for example, independent study can be relied on for much of technical training.[11] In Japan, there is a tradition in which older, experienced persons teach and nurture young, inexperienced persons. Teachers who produce capable students are amply rewarded. As will be discussed later, this tradition appears to have been carried over to modern industrial training in Japan, thereby lowering the cost of technical training there (fig. 4.1, arrow d).

In addition to teaching basic skills, formal schooling teaches students to

10. Bishop (1990) finds that competence in science, language, arts, and higher level mathematics indeed is associated with success in training and high performance in hands-on-work sample tests. See section 4.3 for a discussion of the relationship between schools and employers in Japan.

11. See section 4.3 for a discussion of independent study in Japan. Also, the time saved can be directed to training in employment relations.

become good "citizens" by instilling in them skills and attitudes for effective group functioning through cooperation. This way, good formal schooling helps shape the environment, thereby affecting the cost of training in employment relations (fig. 4.1, arrows b and a). In Japan, formal education teaches traditional Japanese notions of the individual's place in society and of the cooperative attitude (Rosenbaum and Kariya 1989). Schoolchildren, for example, are taught from their earliest years to perform cooperative chores, such as serving school lunches and cleaning the classroom at the end of the day. This way, schools inculcate students with attitudes that employers look for in new recruits (Sako 1990).

According to figure 4.1, both types of investment reinforce each other. Thus, decreasing the cost of investing in technical skills increases investment in these skills, and in turn stimulates investment in employment relations (fig. 4.1, arrow e). Decreasing the cost of training in employment relations increases investment in such training, which in turn stimulates investment in technical skills (fig. 4.1, arrow f). As another source of interdependence, an exogenous increase in the benefits of technical skills increases investment in employment relations, and vice versa.

Figure 4.1 shows that economic growth and technological progress can stimulate both types of investment (arrows g and h). This prediction points to the link between training and macroeconomic and industrial policies. One might conjecture that the training incentive in Japanese firms was fostered in large part by the success of the macroeconomic and industrial policies in that country (see the comparative statics later in this section).

4.2.2 Technical Aspects

The following discussion addresses the key technical aspects of my theory; for details, see Hashimoto (1992). Training investments are assumed to be firm specific. I focus on one aspect of investment in employment relations, namely, investment in information reliability. By information reliability I mean the ability to quickly disseminate reliable information among members of a firm. I emphasize information reliability because information becomes asymmetrical once investments are made. As a result, wealth loss may occur from ex post opportunism. The ability to reliably exchange information within an employment relationship reduces such wealth loss. Such ability is determined by the background environment (see fig. 4.1). In particular, a favorable environment is assumed to be characterized by a more elastic marginal cost, as well as a low marginal cost, of investment (see the comparative statics later).

Contract flexibility is central to my model of training. It increases the returns to training investments, by allowing quick adjustments to newly emerging conditions. For analytical convenience, I distinguish among three types of contracts. An *ideal contract* would stipulate that all relevant new information be incorporated at once into contractual arrangements. The value of an ideal contract is denoted by M^*. A *rigid contract* would stipulate that no new informa-

tion be incorporated until the contract comes up for renewal. The value of a rigid contract is denoted by M_1. A *flexible contract* permits some adjustments to new information to be made automatically during the life of the contract. The value of a flexible contract is denoted by M_2.[12] Although the model is formulated in terms of wage flexibility, the analysis of flexibility in other dimensions of employment relations will be similar in spirit.

The model assumes that the employee and the employer enter into an employment relationship in the first period by specifying the wage schedule and the amounts of investment. Investments are assumed to take place during the first period. At the beginning of the second period, productivity is revealed, and the parties decide whether to stay together or to separate. In an ideal contract, the parties easily agree on the realized values of productivity, no asymmetry of information exists, and all separations are efficient. If information is asymmetric, an ideal contract may not be feasible. In employment relationships, information asymmetry seems inevitable: the employer is likely to be better informed about the employee's contribution to the firm, and the employee is better informed about his alternative value.[13] Moreover, each party may have an incentive not to reveal information truthfully. Since investments are assumed to be firm specific, the parties in this case will share the investments in order to reduce inefficient separations caused by information asymmetry (Becker 1962; Kuratani 1973; Hashimoto 1981).[14]

If information is asymmetric, an ideal contract is infeasible, and the parties choose between rigid and flexible contracts. With either contract, inefficient separations occur, reducing the incentive to invest in the employment relationship.[15] With a rigid contract, the parties agree not to exchange information in the second period. In a flexible contract, the parties try to reduce inefficient separations by agreeing on at least the approximate values of the productivity magnitudes, and, as a result, some exchange of information takes place. The information so exchanged, however, will contain "errors of measurement."

Let us represent the extent of errors of measurement by σ. My analysis results in the following general form for the expected value of a flexible contract:

$$(1) \qquad M_2 = M^* - \phi(\sigma), \text{ where } \phi(0) = 0, \phi(\sigma) > 0, \text{ and } \phi' > 0,$$

12. For mathematical expressions for M^*, M_1, and M_2, as well as other magnitudes of the model, see Hashimoto (1992).

13. In this model, I assume that only the employer knows the true inside productivity and only the employee knows the true alternative productivity.

14. An interesting new result of my model is that if the variance of the inside productivity increases relative to the variance of the alternative productivity, the optimum worker share is increased. This result hinges on the fact that, though increased uncertainty in inside productivity raises the overall wealth loss from inefficient separations, it lowers the ratio between wealth loss due to dismissals and the loss due to quits. As a result, it becomes optimal to raise the employee's sharing ratio, in order to let it do more of the work, as it were, of reducing the loss from inefficient quits. See Hashimoto and Lee (1992) for details.

15. Inefficient separations take place when parties separate even though the employee's human capital has greater value inside than outside the firm.

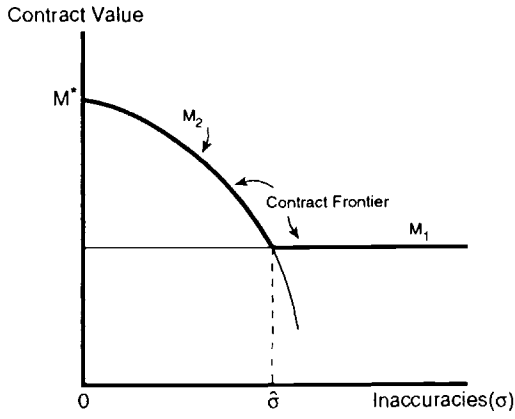

Fig. 4.2 Contract frontier

where M^* is the value of an ideal contract. Note that M_2 approaches M^* as σ approaches zero. The parties choose between rigid and flexible contracts by comparing their expected contract values. Such a comparison is represented as a contract frontier, $\hat{M}$, written as:

$$\hat{M} = \text{Max}\ (M_1, M_2). \tag{2}$$

The contract frontier is illustrated in figure 4.2. Since there is no exchange of information in a rigid contract, M_1 is independent of σ. For small values of σ, M_2 is greater than M_1, and the flexible contract dominates.[16] As σ increases, M_2 falls: the more errors of measurement there are, the lower the returns to investment. The value of M_2 eventually becomes equal to M_1 at $\hat{\sigma}$. Beyond $\hat{\sigma}$, M_2 is smaller than M_1, and the rigid contract dominates. The contract frontier is kinked at $\hat{\sigma}$, the threshold variance.

Investment in Firm-specific Technical Skills

The optimum investment in technical skills, h, is determined by equating $\hat{M}$ with the exogenous marginal cost, ω', of producing h:

$$\hat{M} = \omega'(h), \tag{3}$$

where $\omega'(h)$ is the marginal cost of investment. This cost is incurred at the time the contract is signed. Figure 4.3 portrays the relevant magnitudes.

Obviously, the greater $\hat{M}$, or the smaller ω', the larger the optimum h. If a flexible contract were chosen, a reduction of σ would increase $\hat{M}$ $(=M_2)$ and would increase the optimum h.[17] To sum up the main points so far: the smaller the σ, the more likely that a flexible contract is chosen; if a flexible contract is chosen, the smaller the σ, the larger the optimum h.

16. If σ is zero, $\hat{M}$ equals M_2, which in turn equals M^*.

17. If a rigid contract were chosen, σ would not affect $\hat{M}$, and so the optimum h would be independent of it.

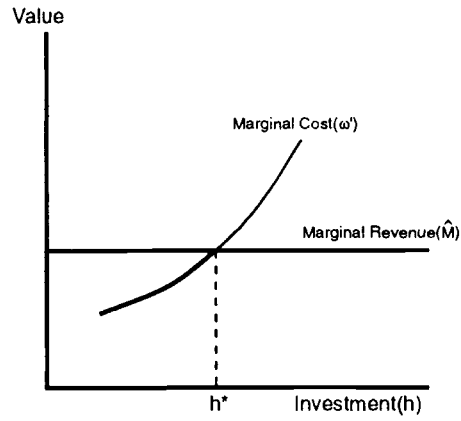

Fig. 4.3 Investment in technical skills

Investment in Employment Relations

Parties may reduce σ by spending resources on screening job applicants, decreasing the asymmetry of information, and improving the quality of communication. Call this activity an investment in $-\sigma$. The cost function for this investment is given by:

$$\lambda = \lambda(\bar{\sigma} - \sigma),\ \lambda(0) = 0,\ \lambda' \geq 0, \tag{4}$$

where $\bar{\sigma}$ is the value of σ that would prevail if no resources were spent on reducing it.[18] Equation (4) states that cost is a positive function of the amount of σ reduced and that marginal cost is upward sloping. The total return to this investment is given by:

$$\begin{aligned} R(\sigma,h) &= 0, \text{ for } \hat{\sigma} \leq \sigma \leq \bar{\sigma}, \\ &> 0,\ R_1 < 0,\ R_2 > 0, \text{ for } 0 \leq \sigma < \hat{\sigma}. \end{aligned} \tag{5}$$

Obviously, this investment is made only when a flexible contract is chosen. In that case, the parties solve the following program:

$$\underset{\sigma,h}{\text{Max}}\pi = R(\sigma,h) - \lambda(\bar{\sigma} - \sigma) = M_2 h - \omega(h) - \lambda(\bar{\sigma} - \sigma). \tag{6}$$

The first-order conditions for the optimum are:

$$\partial\pi / \partial h = M_2 - \omega' = 0, \tag{7a}$$

$$\partial\pi / \partial(-\sigma) = \partial M_2 h / \partial\sigma + \partial\lambda/\partial\sigma = 0. \tag{7b}$$

Equation (7a) equates the marginal revenue of h with the marginal cost, and equation (7b) equates the marginal revenue of $-\sigma$ with the marginal cost.

18. The threshold variance, $\hat{\sigma}$, is assumed to be less than $\bar{\sigma}$. If $\bar{\sigma} < \hat{\sigma}$, then the flexible contract will always dominate.

Figure 4.4 illustrates the solution. The function R' is the marginal revenue associated with $-\sigma$, where h^* is the optimum value of h, and λ' is the marginal cost. The marginal revenue is zero until σ is reduced by $(\bar{\sigma} - \hat{\sigma})$, becomes positive at that point, and is specified for simplicity to be horizontal until σ is reduced completely to zero, i.e., $(\bar{\sigma} - \sigma) = \bar{\sigma}$. Three outcomes are depicted in figure 4.4, which depend on the marginal cost function, λ'. If the marginal cost is λ'_a, it does not pay to reduce σ at all, and a rigid contract is chosen. If the marginal cost is λ'_c, σ is reduced entirely by $\bar{\sigma}$, and an ideal contract is adopted. If the marginal cost is λ'_b or λ''_b, the error is reduced by $(\bar{\sigma} - \sigma^*)$, and a flexible contract is chosen.

In a competitive equilibrium, the investment costs, $\omega + \lambda$, as well as the benefits, are shared between the parties, to make their individual profits zero in the long run. The employee may pay for his share of the cost either by accepting a lower wage than warranted by his productivity, in the first period, or by paying an "entrance fee" at the time of employment (Becker 1962; Kuratani 1973; Hashimoto 1981). Although investments in technical skills and employment relations lead to long-term employment attachment, the above model guarantees that efficient separations always take place as long as each party retains the right to separate.

4.2.3 Comparative Statics Discussion

Given the R' function, lowering the marginal cost, λ', increases information reliability and therefore increases contract flexibility. Given the λ' function, lowering the marginal cost of investing in h will increase investment in $-\sigma$ by

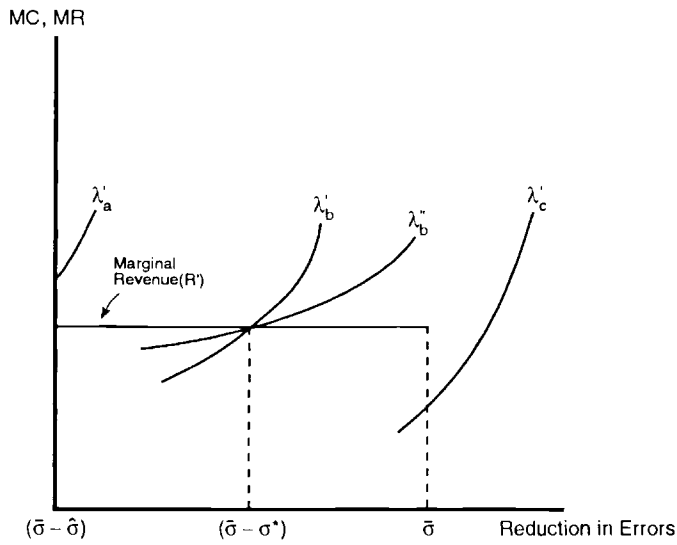

Fig. 4.4 Investment in employment relations (information reliability)

shifting R' upward. Also, the more elastic the λ' function, the greater the increase in investment in $-\sigma$ that would result from an upward shift in R'.

The marginal cost function, λ', is shaped by the background environment (see fig. 4.1). I argue that a more favorable environment is associated with a greater elasticity, as well as a lower level, of the marginal cost of investing in information reliability. A more elastic marginal cost means that an increase in investment in $-\sigma$ entails a smaller increase in total cost. Thus, an upward shift of R' increases investment more, the more elastic the λ' function. In figure 4.4, if marginal cost were λ''_b, an upward shift of R′ would increase the amount invested in $-\sigma$ more than if marginal cost were λ'_b. An improvement in the marginal returns, therefore, stimulates investment in information reliability more in a more favorable environment; that is, such an improvement interacts with the quality of environment in affecting the investment. Also, the two investment types interact with each other: the lower the marginal cost, the more that is invested in $-\sigma$, which raises M_2. An increased M_2, in turn, stimulates investment in h.

An autonomous increase in h induced by a downward shift in ω' may stimulate investment in $-\sigma$ by raising R'. Given the marginal cost λ'_a in figure 4.4, for example, it initially does not make sense to reduce σ. However, it is easy to visualize the R' function shifting upward enough to make it attractive to begin reducing σ. Obviously, if it made sense to reduce σ to begin with and if σ has not already been reduced to zero, an increase in h will lead to a further reduction in σ.

Japanese workers are said to invest more in the employment relationship, and have more flexible contracts, than U.S. workers (Hashimoto and Raisian 1989; Mincer and Higuchi 1988; Hashimoto 1990b).[19] Also, work organization and industrial relations in Japan have been found to exhibit greater flexibility than those in most other developed countries (Hashimoto 1990b). These findings can be understood as reflecting Japan's more favorable environment for investing in both h and $-\sigma$, characterized by lower and more-elastic cost functions.

Another result concerns the effect of technological progress on the incentive to invest in the employment relationship. The effects of technological progress on Japanese investments in firm-specific human capital and on earnings have received some attention in the literature (Tan 1987; Mincer and Higuchi 1988). A uniform productivity increase, widespread throughout the economy, can be shown to increase the incentive to invest in h and in $-\sigma$ by shifting R' in figure 4.4 upward without affecting the investment costs (Hashimoto 1992).

The above result suggests a reason Japanese investment in employment rela-

19. Large Japanese investments in $-\sigma$ are indicated by such time-consuming measures as joint consultations and consensus-based decision making (*nemawashi*). According to several American managers of Japanese automobile transplants in the U.S. Midwest, the time-consuming process of consensus building is one of the major adjustments that Americans have to accept to work in the "Japanese-style" work environment.

tions became pronounced in the 1960s.[20] That was the period when technology changed rapidly and the growth rate of the economy began to accelerate. An important development was the launching of a productivity enhancement campaign to increase Japan's international competitiveness by importing modern technologies from the United States and Europe.[21] The campaign, coordinated by the Nihon Seisansei Hombu (Japan Productivity Center) established in March 1955, helped guide private industries to acquire modern Western technologies, thereby leading the way to the double-digit growth rate of the Japanese economy during the 1960s.[22] Major labor unions and leftist politicians initially opposed the campaign vigorously, fearing that modern technologies would displace labor and cause high unemployment. The campaign eventually gained support from unions and politicians based on three principles: (1) to prevent unemployment of workers who would be made redundant by new technologies (the principle of job security), (2) to promote joint consultations between management and labor concerning the introduction of new technologies and related matters, and (3) to promote a fair sharing of the gains of new technologies among employers, workers, and consumers. Joint consultations and unemployment prevention have become ubiquitous features in the landscape of Japanese industrial relations.

Given the historical background of the campaign, it is reasonable to view the economic growth and technological change of the late 1950s as exogenous, for my model. The high rate of economic growth in the early 1960s further stimulated the investment in technical skills. The increased demand for technical skills, in turn, raised the benefit from increased information reliability, and this process was boosted by the low-transaction-cost environment that prevailed in Japan. These investments helped foster a strong sense of identification with, and commitment to, the company on the part of both the management and the worker (Cole 1979, 253).

4.3 Private Sector Training in Japan

The theory just presented indicates that training in technical skills and training in employment relations (information reliability) reinforce each other. The relative importance of these training investments is determined mainly by the

20. Such Japanese practices as joint consultations, consensus-based decision making, and enterprise unionism became widespread only after the late 1950s (Hashimoto 1990b).

21. An extensive treatment of the history of this campaign appears in Nihon Seisansei Hombu (1988). See also Nihon Sangyo Kunren Kyokai (1971).

22. The campaign included conferences and seminars in which top-level industrialists, bankers, scholars, and bureaucrats participated, numerous visits by Japanese managers and unionists to the United States and Europe, as well as visits by Western specialists to Japan, and active information dissemination. Between 1955 and 1956, for example, 42 missions involving 481 members were sent to observe various U.S. industries. See Nihon Seisansei Hombu (1988, chap. 4). Another organization, Nihon Sangyo Kunren Kyokai (Japan Industrial Training Association), was established in 1955. It was responsible for introducing the case-study method of the Harvard Business School to Japan in the mid-1950s.

cost functions reflecting the background environment. This theory serves as an organizing framework for understanding some of the practices at Japanese firms in Japan and in the United States. The discussions in the following two subsections are based in part on information obtained by interviewing management-level employees, both Japanese and American, at some Japanese transplants, as well as at Honda Motors in Japan. Appendix A provides profiles of these companies.[23]

Our theory stresses the link between schooling and training. The relative role of schooling and employment-based training in creating productive workers differs among countries and among industries within a country. Overall, since the end of World War II, the Japanese approach to building a productive work force has relied heavily on employment-based training, and the U.S. approach more on training offered by outside sources, such as vocational and professional schools and training institutions (Stern 1990). The Japanese approach, in my view, reflects the importance placed on training in employment relations rather than merely on technical training.[24]

In figure 4.1, the background environment is shown to critically affect private-sector training. It has been reported, with a tone of disapproval, that the Japanese felt it "most efficient to have a homogeneous work force which they believe has the same values and behavior" (Gelsanliter 1990, 94–96). My analysis suggests that an emphasis on homogeneity has economic validity. Homogeneity in literacy and numeracy, in willingness to learn new skills and to teach others, and in the ability to function as team members lowers the costs of investments in both technical skills and employment relations.[25] In this context, recall that science achievement test scores have been found to have greater coefficients of variation, as well as lower averages, in the United States than in Japan.[26] With a work force that is homogeneous in its basic knowledge and in

23. The characteristics discussed here are more visible among large firms. Large-firm practices tend to serve as the benchmark for small and medium-sized firms in Japan, however. Since most of the executives at Japanese transplants have been with their parent companies in Japan for over 10 years, they were well informed about employment and training practices at various Japanese companies. They could also offer their first-hand evaluations of how Japanese approaches may work with the U.S. labor force.

24. I hasten to add that vocational and technical schools do exist in Japan. See Dore and Sako (1989) for a informative discussion of Japanese schools, and see Levine and Kawada (1980) for an informative discussion of the role of industrial training in Japanese economic development.

25. The homogeneity argument may be appreciated with my model in the following manner: with worker heterogeneity in $\bar{\sigma}$ and in the ω and λ functions, employers would have to devise a separate contract for each employee or adopt standardized contracts, which would be suboptimal for any given employee. An American manager at a Japanese automobile transplant observed, "managers in Japan share a common background with their employees so that they, the managers, just have to point to the right direction and things get done. In America, managers have to do more to get the job done." A Japanese manager at another Japanese automobile transplant recalled that even differences in physical size among American workers posed a challenge in installing machinery in such a way as to minimize physical strains. In Japan, where the distribution of body sizes is compact, a given machine setting tends to be appropriate for a large number of workers.

26. For example, a recent international comparison of science achievement found the following: in a sample of young teenagers (mean age 14.7 in Japan, 15.4 in the United States), the mean

its willingness to learn new skills, employers can rely on on-the-job learning and self-study to train new employees.[27]

To digress, let me note an example of what appears to be a U.S. historical precedent in investment in employment relations. Henry Ford's celebrated Five-Dollar-a-Day program, introduced in 1914, contained an element of investment to deal with worker heterogeneity. In the early 1900s, most of Ford's workers were recent arrivals to Detroit, and many were new immigrants: in 1915 more than 50 languages were spoken at Ford's Highland Park plant (Womack et al. 1990, 30–31). In my view, Ford made two types of investments in employment relations to deal with worker heterogeneity. First, it is well known that he introduced an extreme division of labor in his mass production system (Raff 1988). Such an arrangement reduced, if not eliminated, the necessity for workers to communicate with one another. Second, Ford introduced a system of inspection and certification to homogenize workers with respect to certain productivity attributes. Thus, according to Raff and Summers (1987), some 150 Ford Sociological Department inspectors visited the homes of all workers in order to inculcate them with Ford values and to certify them for the Five-Dollar-a-Day program.[28]

Recruitment is the first important step in creating the right work force for successful training. Most hiring in Japan takes place in spring when students graduate from high schools and colleges. New hires arrive ready and malleable for employment-based training. Japanese employers stress academic achievement in their hiring decisions, in contrast to the U.S. situation where academic achievements rarely serve as a hiring criterion (Bishop 1990).[29] In Japan,

science score (with the coefficient of variation in parentheses) was 20.2 (24.8 percent) for Japan and 16.5 (30.3 percent) for the United States. In the tabulations for other age groups, as well as for separate scores in biology, chemistry, and physics, the Japan-United States differences in the mean and the coefficient of variation persist. See International Association for the Evaluation of Educational Achievement (1988). Bishop (1990) summarizes international comparisons of test scores in science and mathematics.

27. As Dore and Sako (1989, 80) put it, Japanese basic education "produces people capable of following carefully detailed and complex written instructions. . . . This means that a lot of learning is based on informal production of job specifications and procedure manuals meticulously written out by supervisors and used as teaching material for self-teaching by newcomers to a job. You do not just stand by Nelly; you read what Nelly has thoughtfully and meticulously written about what she knows."

28. A Ford pamphlet told workers about the importance of taking baths, living in clean, airy, well-lighted, and uncrowded surroundings, and saving to buy one's own house. Excessive drinking, gambling, untidiness, consumption of unwholesome foods, and lack of enthusiasm for regularly saving money were all potential grounds for exclusion from the program (Raff and Summers 1987, S70-S71). According to Raff (1988, 399), "the Ford Motor Company, through its famous Sociological Department, was at considerable pains to tell its employees how to think about its beneficence."

29. One possible reason for this phenomenon is that grades from American schools are not uniform in quality from school to school. In effect, grades contain too much "noise" to be useful to an employer. Since the Japanese education system is governed by the Ministry of Education, the content of courses in Japan is much more uniform among schools than is the case in the United States. As a result, course grades are more informative in Japan.

schools, which are in the best position to judge students' achievements, perform much of the screening through "semiformal" arrangements with specific employers. Many employers have established ongoing relationships with particular high schools to help recruit their graduates year after year.[30] In hiring for production and clerical jobs, for example, employers, especially large ones, rely extensively on the recommendations from high schools.[31] These recommendations are based mostly on academic achievements (Rosenbaum and Kariya 1989). In some cases, employers also administer their own tests, though this practice has become less common recently, given the shortage of high school graduates.

New recruits in Japanese firms receive concentrated orientation sessions in safety and corporate culture (*fudo*) followed by intensive training in technical skills.[32] Training does not end there, however. It continues throughout an employee's tenure in the firm. An employee becomes trained while working side by side with experienced workers and participating in consensus-based decision making and in such team activities as quality control circles and suggestion systems. In Japan, both informal and formal training lead to concrete rewards to the employees. According to a recent comparative study of manufacturing employees, employees in Japan experience significantly greater pay increments as a result of training than do those in the United States (Kalleberg and Lincoln 1988).

At Honda Motors in Japan, high school graduates spend one month in orientation training, learning safety and company philosophy. They then enter the shop floor for another month in which about 50 percent of their time is spent on technical training and the rest on production. Informal on-the-job training takes over afterward. After eight to ten years, they are evaluated and sorted into technical or management tracks, each track offering further training. Most college graduates are sent to the main office, where they are trained for a multitude of tasks, including sales and shop-floor technical skills.

Partly because of worker homogeneity in basic knowledge, much technical training in Japan relies on self-study by workers: they are asked to study manuals or books on their own.[33] At Honda Motors, for example, workers are also

30. A management-level employee at Honda in Suzuka, Japan, told me that Honda does in fact have such arrangements with several high schools. However, it also sends out recruiting brochures to other schools as well. Rosenbaum and Kariya (1989) report that in an area near Tokyo a typical high school had semiformal arrangements with about 77 employers, which is only a little over 11 percent of all employers who send job offer forms to this school. However, these 11 percent of firms hired almost half of all the work-bound graduates from this school.

31. This practice has an "experience rated" feature. Employers assign different size quotas to schools depending on their previous experiences with the school (Rosenbaum and Kariya 1989).

32. The emphasis on safety is ubiquitous in Japanese firms and transplants, perhaps underscoring the desire to protect investments in human capital.

33. It would appear, therefore, that the usual measure of training investments, in terms of time spent on the job, understates total training resources devoted to the formation of on-the-job human capital in Japan. The self-study phenomenon in Japan implies that the total resources that firms devote to employment relations relative to technical training are greater in Japanese firms than in

encouraged to keep a diary of what they learned on the job and to write down questions they want to ask the next day.[34] A manager at a Japanese automobile transplant indicated that with the American work force he cannot rely on self-study for technical training, partly because the diversity in the level of basic knowledge among the workers makes such an approach an unreliable device for training.

Training in employment relations is much less circumscribed than technical training. It requires much time to be spent on sharing information among members of the firm. In this regard, training in Japan takes place even outside the work place: Japanese employees—managers and nonmanagers alike—"socialize" frequently after work in restaurants and bars, as if with family members or close friends. Such socializing is considered to be more important for younger employees than for those with long tenure in the firm.[35] These activities promote cooperative employment relations and raise productivity. Clearly, this is one Japanese practice that will be difficult to adapt to American workers, who place greater value on time spent at leisure and with families.

The Japanese tradition of hierarchical teaching seems to have been carried over to modern industrial training. In Japanese firms, a large part of training in both technical skills and employment relations is conducted by senior workers, who consider it their duty to teach younger, less-experienced workers.[36] In fact, a key criterion for promotion in a Japanese firm is one's ability to teach coworkers. In a Japanese firm, a senior employee need not fear becoming less valuable to the firm should he end up training his subordinates to be more knowledgeable than he. On the contrary, a successful trainee is considered a credit to the senior employee, who in turn is judged to be all the more valuable to the firm. This feature is no doubt supported by the environment of "lifetime" employment, in which the newly trained worker is not a threat to the trainer's job security.[37] One of the major challenges facing Japanese automobile transplants in the United States is training their employees to be willing to teach less-

American ones. This implication, in turn, may bear on the more cooperative industrial relations that have existed in Japanese firms, in contrast to those in the United States.

34. Koike (1990) discusses a related practice in which a worker writes reports, to be discussed in workshop meetings later, on troubles he has encountered on the shop floor and on how he has dealt with them.

35. It is said that a typical Japanese "salary-man" returns home at about 11:30 P.M. almost every night. Usually, there is no overtime pay for these activities. See Valigra (1990) for an account of a typical day in the life of a Japanese worker of management rank.

36. Koike (1990) stresses the role of hierarchical teaching in the job rotation system. According to this system, a veteran worker stays close to and instructs a new worker.

37. The relationship between job security and the incentive to provide training has been recognized. Parsons (1990) reminds us that early apprenticeship contracts addressed this problem by restricting the apprentice's right to compete with the master, by specifying, for example, that the apprentice could not operate within a certain range of the master's own shop. I hasten to remind the reader of my argument that job security should not prevent inefficient separations from taking place (see section 4.5).

experienced fellow workers.[38] This finding is ironic, since Japan learned from the United States—through the General Headquarters (GHQ) of the Occupation Authority—the importance of training supervisory employees in job instruction, during the years immediately following the end of World War II (Nihon Sangyo Kunren Kyokai 1971, 330–45).[39]

Much has been said about team-based production in Japanese manufacturing.[40] An aspect often neglected in the discussion of this subject is that it is a device for investing in employment relations. At the heart of productive teamwork is the ability to share information and responsibilities. Japanese training emphasizes sharing information and responsibility to carry out a task. Imagine a situation, for example, in which a supervisor asks a subordinate worker to fix a glitch in the production process. A Japanese worker would see such a request as an opportunity to prove his value to the firm. He would take it upon himself to ask all conceivable parties for advice and information, and those asked would, in turn, be trained to provide help willingly on the spot. Should he fail to come up with a solution, he would not be penalized. Instead, if he solves, say, eight of ten problems, he will gain respect and his prospects of promotion are improved. In turn, others depend on him, when called on, to provide help. In contrast, an American worker is said to be reluctant to seek advice unless his superior specifically requests such action, and many of those contacted would be equally reluctant to cooperate by providing help and advice.[41]

A unique training device in a Japanese firm is the employee rotation system. This system is a "lifelong" process in which a worker is rotated among several assignments over many years, rather than the commonly understood practice whereby a worker performs different tasks on a regular basis, say within a week. Through the lifelong job rotation, an employee becomes trained in both technical skills and employment relations. Something resembling Japanese-

38. Many transplants judge the promotability of an employee by criteria that include the employee's ability to teach others.

39. Job instruction, job methods (methods for improvement), and job relations (interpersonal relations) were the three components of the "training within industry" (TWI) concept developed in the United States during the war years to rapidly produce a skilled work force. The TWI concept is synonymous with on-the-job training. The GHQ's guidance was patterned on the U.S. War Manpower Commission, which developed a comprehensive training approach based on TWI. The commission is said to have trained about 2 million supervisors during the war years. Japan also learned from the United States how to conduct management training, quality control, and interpersonal relations during these years. An important point, however, is that the GHQ provided only manuals and that the Japanese had to interpret them and develop their own approach (Nihon Sangyo Kunren Kyokai 1971).

40. See, for example, Womack et al. (1990, chap. 5).

41. A Japanese manager at a transplant told me of his recent experience. His American subordinate failed to complete an assignment one day. He asked the worker why he did not seek advice and information from Mr. X in another department. The worker gave several excuses, which could be summed up as "you didn't tell me to." A corollary of this experience, according to this manager, is that an American worker performs superbly on a task that is well defined and delineated.

type job rotation does exist at Honda of America Manufacturing, where an associate—a term referring to Honda employees—will be cycled through several different task areas (painting, welding, assembling, purchasing, etc.), during a period of several years. Other Japanese transplants are newer than Honda, and it is too early to tell whether they practice job rotation in the true sense.

Job rotation creates workers who are trained in intrafirm general, though firm-specific, skills. As a result, the trained worker is able to function in a multitudes of tasks and, in Alfred Marshall's words cited earlier, to "act promptly and show resource when anything goes wrong," and "to accommodate oneself quickly to changes in detail of the work done."[42] Moreover, since these skills are useful in many divisions within the firm, a decline in demand in one division is unlikely to lead to a discharge of affected workers. The resulting job security encourages the workers to invest in employment relations, to teach less-experienced fellow workers, and to welcome new technologies without resistance.[43] Also, most management-level employees were once ordinary employees within the same firm, have gone through the job rotation process, and were members of enterprise unions. As a result, these management personnel are more closely attuned to the idiosyncrasies of the firm's operations and are able, therefore, to communicate with the employees better than managers who have been with the firm for only a short period of time.

Although informal training characterizes Japan's approach, Japanese workers do receive periodic formal training as well. These formal training programs, called "off-jt" programs, typically are designed to help workers acquire theoretical knowledge relating to what they have learned through informal training (Koike 1990). In spite of the term, such training is not always conducted outside the establishment. Larger establishments are more likely to conduct it in-house as well as to offer it more frequently. Smaller firms have relied on courses taught at vocational training schools and other outside sources. According to a government survey, for example, in 1988 almost 74 percent of establishments surveyed conducted some off-jt programs. Almost 97 percent of establishments employing more than 1,000 workers conducted such training, while the comparable magnitude for establishments with 30–99 employees was 68.5 percent.[44]

Table 4.1 summarizes another result of that survey. According to column 1, most of the respondents had received formal training in the past, though male

42. A similar point was made by Koike (1984) and Aoki (1988). Aoki (1988) notes that "the multifunctionality of workers fostered by a wide range of job experience (and job rotation in particular) may enable each shop to adjust job assignments flexibly in response to the requirements of the downstream operation. . . . Further, workers trained in a wide range of skills can better understand why more defective products are being produced and how to cope with the situation as well as prevent it from recurring" (36–37).

43. Carmichael and MacLeod (1992) presents a formal model of this argument.

44. These magnitudes are from Shokugyo Kunren Kyoku (Japan Ministry of Labor), *Minkan Kyoiku Kunren Jittai Chosa Hokoku Sho* (Report on the Survey of Private Sector Training) (Tokyo, 1990).

Table 4.1 Formal Training (off-jt) in Japan, 1989

	Received Training (% of respondents)	Timing[a] (% of respondents who received training)		
		Within One Year of Employment	At Promotion Time or Job Rotation Time	Within Recent Two Years
Sex				
Both	75.3	60.5	29.3	48.8
Male	80.2	59.3	33.6	50.4
Female	60.6	66.8	10.0	42.6
Education				
Junior high school	67.7	40.9	32.1	38.4
Senior high school	70.1	52.6	29.5	46.0
Junior college	68.9	58.3	15.9	45.0
University	85.0	71.0	31.9	53.6
Years of tenure				
<5	68.1	80.0	7.2	43.9
5–10	73.3	63.7	20.1	54.0
10–20	80.4	52.6	40.8	51.8
20+	83.0	45.3	51.8	47.3

Source: Shokugyo Kunren Kyoku (Japan Ministry of Labor), *Minkan Kyoiku Kunren Jitai Chosa Hokoku Sho* (Report on the Survey of Private Sector Training) (Tokyo, 1990), table 12.

Note: This table is based on 6,929 worker respondents.

[a]Respondents can be included in more than one category.

workers are more likely than females to have received training. Many of the respondents evidently received formal training within the first year of employment, while some respondents received training around the time of promotion and/or at the time of job rotation (see cols. 2 and 3). There is a hint that education and formal training are complements to each other: workers with higher educational levels are more likely to have received formal training (see cols. 1 and 2). That off-jt programs are offered continually is indicated by the fact that workers with higher tenure levels are more likely to have received formal training, as well as by the fact that the proportion receiving training within the most recent two years is high for all tenure groups (see cols. 1 and 4).

It appears that formal training offered within the first year of employment has been increasing in Japan. According to column 2, for example, 80 percent of those with tenure of less than five years received formal training, while comparable proportions decrease for those with successively greater years of tenure. Thus, for those with tenure of 20 years or more, the proportion is a little over 45 percent. Since those not receiving training are more likely to have separated from the firm than those receiving training, the trend implicit in this column may be an underestimate of the true trend.

Table 4.2 reports on per-employee expenses for three industrial sectors. The magnitudes are relative to direct labor expense—the sum of wages and sala-

Table 4.2 **Per-Employee Labor Expenses per Direct Labor Expenses: Japan, 1988 (%)**

Firm Size (number of employees) and Expenses	All Industries	Manufacturing	Transportation Equipment
All			
Direct labor	100	100	100
Indirect labor	19.3	19.5	21.6
Training	0.5	0.4	0.3
Hiring	0.4	0.3	0.2
5,000+			
Direct labor	100	100	100
Indirect labor	24.2	23.9	24.2
Training	0.6	0.7	0.3
Hiring	0.2	0.2	0.2
1,000–4,999			
Direct labor	100	100	100
Indirect labor	19.2	19.8	18.7
Training	0.5	0.4	0.4
Hiring	0.4	0.3	0.3
300–999			
Direct labor	100	100	100
Indirect labor	17.2	17.6	17.4
Training	0.4	0.4	0.4
Hiring	0.4	0.3	0.2
100–299			
Direct labor	100	100	100
Indirect labor	16.5	15.8	15.7
Training	0.3	0.3	0.4
Hiring	0.4	0.3	0.4
30–99			
Direct labor	100	100	100
Indirect labor	15.9	15.9	20.1
Training	0.3	0.2	0.1
Hiring	0.4	0.3	0.2

Source: Rodo Horei Kyokai (Association of Labor Laws and Ordinances), *Rodo Jikan Seido To Rodo Hiyo No Jittai* (Hours of Work System and the Status of Labor Expenses) (Tokyo, 1989), table 39.

Notes: Direct labor expenses are wages and salaries, bonus payments, and other cash payments. Indirect labor expenses include payments in kind, retirement contributions, legally specified insurance premiums and other payments, training expenses, hiring expenses, expenses for providing uniforms, and others. Training expenses are expenses incurred in running training facilities, payments to instructors, honorariums, etc. Hiring expenses are expenses incurred in advertising openings, administering tests, as well as personnel expenses involved in screening and hiring.

ries, bonuses, and other cash payments. Indirect expenses per employee clearly are higher in larger establishments. Training expenses refer only to expenses associated with formal training; even then, they do not include such items as capital costs or maintenance costs of training facilities and travel costs of staff attending courses (Dore and Sako 1989, 81). However, if one is willing to assume that the reported magnitudes are positively correlated with total train-

ing costs—both formal and informal—this table becomes suggestive of the pattern of training costs incurred.[45] On that assumption, total training expenses per employee tend to be higher in larger establishments. Total training expenses are likely to be higher than hiring costs, especially since training expenses are much more likely to be understated than are hiring expenses.[46]

In summary, Japanese firms face a favorable environment for training. Technical training is facilitated by the little heterogeneity in, and the high level of, the basic skills that new employees bring from schools. Recruitment of new graduates relies heavily on the recommendations of selected schools in order to homogenize the work force in terms of basic skills, attitude toward working and learning, and personality. Such Japanese practices as team-based production, training of young workers by experienced employees, and training by job rotation expedite the diffusion of knowledge, skills, and information within a Japanese firm. These practices, a reflection of what the theory in section 4.2 referred to as investment in information reliability, result in compliant and productive work forces in Japanese firms.

4.4 Japanese Automobile Transplants

Let us turn now to adaptations of the Japanese training approach in some automobile transplants. It was noted earlier that employees' homogeneity in basic knowledge, willingness to learn new skills and to teach others, and ability to function as team members lowers the cost of their training. Creating a homogeneous work force has been perhaps the most challenging and costly task facing the transplants. They are faced with more hiring constraints in the United States than in Japan. Unlike in Japan, for example, employers cannot consider age, race, sex, or marital status in their hiring decisions. As a result, a plant's work force is bound to be more heterogeneous in the United States than in Japan.

To cope with the great heterogeneity of the American labor force, Japanese automobile transplants had first to invest many resources in creating the right environment with a brand new work force for a few thousand employees and to build their "corporate cultures" and common languages.[47] In Japan, as dis-

45. This assumption is plausible, since in Japan, off-jt is a complement to informal training: as discussed earlier, formal training is designed to offer systematic and theoretical knowledge relating to what workers experience on the shop floor.

46. Although this table refers to 1988, tabulations for other years indicate similar patterns.

47. In other words, the environment box in fig. 4.1 was made endogenous, to some extent. The heterogeneity consideration appears to have played a role in location decisions. For example, the decision by many of the transplants to locate in rural midwestern areas is said to have been influenced by the availability of a German-American work force with a strong work ethic (Gelsanliter 1990). It is worth recalling that Honda of America Manufacturing was sued for having given hiring preference to workers from the Marysville, Ohio, area to the exclusion of the more racially mixed labor pool available in nearby Columbus. The firm settled out of court in 1988 and paid $6 million to about 370 black and female workers. Since then, according to one of its managers, Honda has extended its hiring area to include Columbus and now uses a computer to randomize applications

cussed earlier, employers can rely on schools to perform much of the screening. In the United States, however, the transplants had to recruit workers, without the aid of schools. Many of them hired consultants to develop screening procedures.[48]

Perhaps because high school graduates are less likely to quit or be absent from the job (Weiss 1988) and are more likely to succeed in entry-level basic training (Lynch 1989, 1992), most transplants prefer production workers to have a high school diploma or the equivalent.[49] They prefer young workers with nonautomotive experience, at least for production workers, because of their desire to train, rather than retrain, workers in their own ways of operating.[50] The common objective was summarized by one of the transplant managers: Give us stable and dependable people with good hearts, and we can make anything of them. This objective contrasts with that of a typical American employer whose hiring decision hinges on applicants' experience, skills, and accomplishments: Can they weld?

Production-level employees were given batteries of tests, including the General Aptitude Test Battery (GATB), and tests to gauge their ability to assemble and disassemble simple mechanisms and to perform such tasks cooperatively with others. Typically, an applicant had to go through a multiphased assessment procedure (see App. B for Toyota's hiring procedure). At Subaru-Isuzu Automotive (SIA), the assessment process took more than 25 hours.[51] Only about 12 out of every 100 applicants were successful and were hired through this procedure, which included initial screening and the administration of the GATB tests, interviews, problem-solving and group discussion exercises, as-

before selecting new hires. See Higuchi (1987) and Shimada (1988) for related discussions on Japanese transplants, and see *Business Week* (October 3, 1989) for a description of screening practices at Mazda Motor Manufacturing and Diamond-Star Motors.

48. These consultants themselves went to Japan to observe Japanese practices before developing their recommendations for screening procedures.

49. Some transplants do not explicitly require a high school diploma, however. Lynch (1989) found that, in the U.S. National Longitudinal Survey of Youth, having a high school diploma raises the probability of receiving apprenticeship training or off-the-job training, e.g., being sent to business college, barber or beauty school, or a nursing program. However, she found little evidence of complementarity between schooling and on-the-job training.

50. Many skilled workers—machine maintenance workers, die handlers, or welders, for example—came from small manufacturing shops and, occasionally, from automobile-related industries. Many of the management-level employees also have nonautomotive manufacturing experience. Typically, only 5–8 percent of all employees have previous automotive experience, and the average age of the work force hovers around 35. It is reported that the transplants chose the rural Midwest because of its ethnic homogeneity—German Americans, for example—and because that they wanted to avoid hiring workers with union backgrounds (see, e.g., Fucini and Fucini 1990; Gelsanliter 1990; Shook 1988). Those I interviewed stressed the midwestern work ethic and diligence as the most important reasons for their location decision.

51. See Woroniecki and Wellins (1990) for a compact but informative discussion of SIA's hiring procedure.

sembly exercises, and reference checks.[52] Successful applicants were then placed on 90-day probationary appointments with pay, during which they were observed and trained on the job. The attrition rate during the probationary period was about 3 percent. Since then, SIA has experienced an absenteeism rate of only 3 percent.

High on the agenda of all transplants was an employee's ability to work in a team. Individualistic applicants were turned down. At Mazda Motor Manufacturing, for example, ten to fifteen applicants were put in the same room to be tested on their ability to follow directions from worksheets and to help fellow workers who fell behind.[53] Very few production-level workers were sent to Japan for training, but low-level managers—team leaders, for example—hired after intensive interviewing, were sent to Japan. There, they received training in company philosophy, management style, and technical skills.

In addition to building a homogeneous work force, the transplants shared another experience: newly hired employees had to be trained from scratch in such elementary skills as how to tighten bolts, how to assemble a simple mechanism, and so forth. A Japanese manager at a transplant stated, "In Japan, it is not necessary to begin with the basic skills, but here there is no guarantee that the new employees have good basic skills." Toyota and Nissan, for example, were faced with a work force which had especially low and varied technical capabilities.[54] These transplants worked with the state and community colleges to administer preemployment training in the general basic skills, without pay or guarantee of employment for the students. Most of the trainees ended up in the hiring pool, though not all were hired immediately. Training also took place before hiring at Diamond-Star Motors and SIA, but their trainees were paid during the training period.

For technical training, some of the transplants used elaborate formal training at the outset: at Toyota, maintenance associates received about 2,000 hours of classroom and laboratory training before production started. Others, like Honda, initially had no formal training programs for technical skills. Instead, Honda concentrated on teaching technical skills on the job, on instilling the "Honda spirit" and on teaching team building and communication skills. As Honda grew, it started to formalize the training procedure, but this was done by Honda's American employees.

In addition to initial assimilation training of new employees and subsequent

52. This procedure was developed by an American consulting firm together with the parent companies of SIA. The staff from the consulting company was sent to Japan to observe the parent companies. More than 50 state government and SIA associates spent four days receiving training on how to make accurate selection decisions. The State of Indiana assisted SIA by screening and administering the GATB tests; it also provided physical facilities and staff to conduct subsequent assessment exercises.

53. Shimada (1988) contains similar accounts regarding Honda's hiring practices.

54. Nissan declined to be interviewed. My information on Nissan is based on my interviews at the other transplants.

on-the-job training, both Honda and Toyota transplants offer a variety of formal training courses for individual development. These courses are offered at training centers, located adjacent to the main plant. There, numerous training courses are offered in basic and advanced technical skills, much like formal training courses in Japan. An important point to note is that these transplants' formal training also includes training in employment relations, a practice that differs from that in Japan, where such training is conducted informally. At Honda of American Manufacturing (HAM), for example, general training and training in voluntary involvement together account for the majority of total training hours (see table 4.3).

Toyota originated lean production and other manufacturing practices that are responsible for the success of Japanese products in international markets. Equally significant is the seriousness with which Toyota has conducted its training, as exemplified by the celebrated Toyota Kogyo Koto Gakuen (Toyota Industrial High School), which is has operated since the early 1950s.[55] True to this tradition, Toyota's plant in Georgetown, Kentucky, offers many training courses, ranging in length from one week in a quality circle to 240 hours in a basic machining course, designed for those with little or no previous formal machine-shop experience.[56] Nontechnical courses are designed for all team members, and skilled workers receive preference over others in admission to technical courses. Advanced skilled-trade courses—in machine structure (80 hours), hydraulics (80 hours), electrical equipment control (80 hours), etc.—are also offered to create multiskilled maintenance workers. Enrollment in these classes is voluntary. For promotion courses, designed to prepare team members to become team leaders and group leaders, 800 out of 1,000 team members volunteered initially—50 dropped out later—but nowadays enrollment is restricted to about 300 per year. Toyota's promotion pool consists of those who have completed these courses.

At HAM, the oldest of the Japanese transplants, training courses are classified into general training, fundamental training, voluntary involvement training, technical training, and the recently introduced technical development program modules. Table 4.3 describes Honda's training programs. Courses range in length from 4 hours (torch training) to 40 hours (maintenance). Enrollment is voluntary.

It should be emphasized that these courses are meant to complement informal on-the-job training. Also, not all of the training content and procedures

55. Training at the high school includes both on-the-job training and formal courses. Graduates from the school receive the equivalent of a high school diploma. For a useful discussion of Toyota's high school, see Sumiya and Hiroshi (1978, 220–28).

56. Toyota claims to be working toward a training pace which would allow team members to complete their required core courses by mid-1993. This pace translates roughly to a training rate of 50 hours per year for team leaders and above, or 2.5 percent of work hours each year. See Toyota's *TMM Training and Development Catalog* (Georgetown, Ky., January–December 1990). A Toyota spokesman reported that between January and June 1991, 569 employees completed skilled-trade courses and 2,620 employees completed employee development courses.

Table 4.3 Formal Training at HAM, 1990

Type	Number of Classes	Number of Associates	Total Training Hours
Employment relations training			
General	440	5,175	75,000
Fundamental[a]	30	108	3,553
Voluntary involvement (VIP)	125	1,013	8,104
Technical training			
Technical	355	3,193	25,000
Technical development program modules[b]		(Introduced in 1991)	

Source: HAM, communication to author.

Notes: In 1990, there were about 10,000 production associates at HAM. *General training* develops leadership and communication skills, management techniques, problem-solving and decision-making skills, and skills for writing performance appraisals and conducting interviews. *Fundamental training* develops technical and managerial skills. *VIP training* teaches a worker how to conduct quality circles, suggestion systems, and safety and quality award systems. (For training in quality control circles, a day is devoted to "QC" tools—i.e., charts and statistical analyses—and result assessment, and another day to advanced problem solving and quality circle training.) *Technical training* complements an associate's on-the-job training with such basic skills as welding, hydraulics, and electrical and mechanical work. HAM estimates that 10–15 percent of its associates are uninterested in ever taking any of the formal training courses; in other words, they are just there to earn their paychecks.

[a]Fundamental training is provided to team leaders. The rest of the training programs are for production associates. Ninety-nine percent of the instruction is done by experienced Honda associates. All trainees are paid wages during training; if they take courses during their off hours, they are paid overtime.

[b]This new training program, developed at HAM, is more specialized and advanced than existing technical training and has 2,000 technical modules, each lasting between one hour and five days. These modules include aluminum machining, assembly, paint, welding, stamping, plastics, casting, and other process-oriented training. Trainees will progress through the modules at their own pace. HAM claims that the purpose of these modules is to create world-class engineers out of its associates.

were imported from the parent companies in Japan. Instead, each transplant developed its own methods.[57] For example, the Japanese emphasis on self-study is not practical with the American work force, so it is not used at these transplants. Toyota's course on conflict resolution is nonexistent at Toyota in Japan. Also, Japanese manuals are said to be purposely vague and suggestive rather than detailed and literal, giving scope for thoughts, imaging, and individual comprehension. American trainees prefer seeing: Show me, give me the picture. As a result, training at the transplants makes extensive use of videos and pictures, rather than written materials, combined with a great deal of hands-on training.

4.5 Concluding Remarks

New employees in Japan receive lifelong training not only in technical skills but also in skills needed to function as team members—sharing information

57. In fact, formal training programs have been rare in Japan. As will be discussed in the next section, there has been growing interest in introducing formal training programs in Japan.

and responsibilities among colleagues and teaching other, less-experienced workers. Although much training takes place informally, Japanese workers receive periodic courses of formal training (off-jt) to gain theoretical knowledge. Larger establishments are more likely to offer off-jt programs and are more likely to conduct them within the firm. Smaller firms have relied on courses taught at vocational training schools and other outside sources. In Japanese transplants, formal training includes training in employment relations, as well as technical training (see table 4.3).

Close coordination between schools and employers in Japan facilitates a consistent flow of new, malleable employees to firms. This way, the Japanese educational system ensures the supply of educated and trainable new workers to all industries, leaving the provision of industrial training to the individual firms. The relative homogeneity in, and high levels of, mastery of academic subjects of new employees in Japan lowers the costs of investing in both technical skills and employment relations. As a result, the Japanese work force has become both cooperative and productive. The Japanese approach developed after World War II, by combining lessons from the United States with elements from Japan's own traditions and culture, and was consolidated and perfected against the background of rapid economic growth starting in the late 1950s.

Clearly, employers in Japan and the United States face different constraints in hiring and training. It appears, for example, that American workers' high propensity to move and management's failure to build trust-based employment relations have made it difficult to implement Japanese-style long-term training in many U.S. firms. An executive at a Japanese transplant noted the short-term outlook of a typical American worker, "If an American worker is praised, he will ask for a bonus or pay raise right away." Also, creating a homogeneous work force in the United States is a costly undertaking, as evidenced by the elaborate hiring procedures used by the transplants. The diversity in the U.S. work force has had its benefits—for example, in encouraging individual creativity and independent thinking. Nevertheless, by raising the cost of training investments, diversity must be a factor in discouraging investment in employment relationships. This consideration may explain why there has been greater focus on technical training than on employment relations in the United States. Training programs at several major U.S. firms, summarized by Lynch (1989), for example, are mostly directed at enhancing technical skills.

Japanese automobile transplants in the United States are still young, but it is possible to compare their training approaches with the approaches of their parent companies. In the complete absence of Japanese-style relationships between schools and industries, the transplants had to invest substantially in initial hiring. Such large initial investments are not necessary for employers in Japan. Because of the diversity in, and the low level of, the basic academic and technical skills of their new hires, these transplants must offer technical training that is much more circumscribed, and that involves more teaching of elementary skills, than their parent companies do. At the same time, judging from

the practices of Honda and Toyota, transplant employees receive extensive training in team building, communication skills, and other skills in employment relations (table 4.3).

Many transplant managers are American, and their proportion is likely to grow. In most cases, American managers at transplants report to Japanese superiors. At the same time, given the relative flatness of organizations and the prevalence of consensus-based decision making in the transplants, they have less power than typical plant managers in traditional U.S.-owned plants. Thus, some transplant managers may feel squeezed from above and below. In my interviews, I found many American managers were enthusiastic with their jobs and predicted that they would still be with the transplants in five years. But some were not so sure. Indeed, some managers quit working for transplants after only a few years, to take up positions in U.S.-owned manufacturing plants (Fucini and Fucini 1990). Through such selection processes and training, transplants are likely to end up with a kind of manager different from the traditional automobile plant manager.

In talking to both Japanese and American managers, I discovered that American managers' understanding of Japanese practices is still developing. Japanese and American managers both discussed in equal depth the role of independent study in Japanese training, the just-in-time inventory (*kanban*) system, and the *kaizen* practice.[58] However, when discussing team-based production, sharing of information and responsibility, and job rotation, American managers tended to focus on technical aspects. Few of them mentioned the nuances of these practices that Japanese managers talked about. For example, American managers tended to give a mechanical description of team-based activities—team size and team function, for example—without stressing the point that if a team member encounters difficulties, all relevant members within his or her team, and even members of other teams, willingly share the information needed to solve the problem. Job rotation is another example. American managers talked about rotating workers within teams every two hours, for example, without noting the more important aspect—lifelong learning through job rotation.

The principal components of Japanese training that have been instrumental in shaping Japan's highly productive labor force are reliance on self-study for technical training, training of junior workers by senior workers, sharing of information and responsibilities, lifelong training by job rotation, and occasional infusion of formal training throughout an employee's tenure. Can these practices be sustained with the American labor force? The experiences of the Japanese transplants do suggest that some of these practices will be adapted. The answer depends in part on how well American workers, and especially managers, learn what these Japanese practices are really about.

58. The term *kaizen* refers to making small incremental improvements continuously rather than making occasional large improvements.

Popular discussions suggest that the answer also hinges on employers' abilities to credibly foster job security and on employee commitment to long-term career development within firms. Without doubt, job security in Japan helped promote lifelong training by job rotation, teaching of junior workers by senior workers, and sharing of information. But what do job security and long-term career development mean, and how can they be developed? According to my theory, job security and long-term commitment are not synonymous with "lifetime" employment adhered to regardless of changing conditions. Rather, they refer to an arrangement in which inefficient separations are reduced to a minimum but efficient separations take place without fail.

It may be tempting to blame the employment-at-will doctrine, which gives employers and employees the right to separate unilaterally, as being responsible for the apparent lack of job security in U.S. labor markets. It should be remembered that this doctrine underpins Japanese labor markets as well, the celebrated lifetime employment notwithstanding. According to my theory, employment-at-will guarantees that separation, if it is efficient, will always take place. Since this doctrine is an inherent feature of the American labor market, the important task becomes one of reducing inefficient separations. Investment in employment relations such as the peer review systems at Honda and Toyota is a concrete example of an institutional framework that reduces inefficient separations.

Finally, to promote understanding of training issues, future efforts at data collection should address the distinction between technical training and training in employment relations. In particular, to ignore employment relations is to miss an increasingly important component of training, as more and more Western employers adopt elements of the Japanese operating style and philosophy. In Japan, the fact that most training occurs informally makes comprehensive data collection difficult. Fortunately, in the United States training tends to be formalized, as is evident even with the Japanese transplants, so data collection may be less difficult here than in Japan.

Appendix A
Profiles of Selected Japanese Automobile Manufacturers

The following are brief profiles of the automobile manufacturers I visited and are based on information I gathered by interviewing management personnel and on published sources. Conspicuously missing is Nissan, which rejected my repeated requests for a visit. Some common features of the Japanese automobile transplants are:

1. These plants are not mere "screwdriver operations," where parts imported

from Japan are assembled into automobiles. On the contrary, all contain a stamping shop, a plastic molding shop, a body shop, a paint shop, and a trim-and-final-assembly area.

2. The transplants constantly remind employees that the company is made of its people—employees of all ranks are referred to as either associates or team members and wear uniforms, which are required in some plants and "encouraged" in others. Employees of all ranks eat in the same cafeteria and park their cars in the same parking lots. All transplants have an open-floor layout for offices, though some have low partitions.

3. Production tasks at the transplants are performed in teams. A typical team consists of seven to ten team members and is responsible for a part of the manufacturing process. A typical transplant has over 150 teams on a typical day. Team leaders are selected during the assessment process, and many of them have been sent to Japan for brief training. Team leaders are paid 5–8 percent more than ordinary team members. Typically, a group of several teams is supervised by a group leader.

4. Much emphasis is placed on the importance of working as a team, nurturing trust through open communication, building quality into the product, and striving for constant improvement (*kaizen*). As noted earlier, the term *kaizen* refers to introducing small incremental improvements continuously rather than making occasional large improvements. All the transplants have various types of employee participation programs including quality control circles, suggestion systems, and improvement programs.

5. All the transplants use the just-in-time inventory (*kanban*) system. Since, in the United States, parts suppliers are located farther away from the main plants than in Japan, the level of parts inventories is higher here. Honda of America Manufacturing, for example, typically has a one-day supply of parts, but its Japanese parent has only a few-hour supply. Toyota Motor Manufacturing, U.S.A., carries a 30-day inventory of steel, but seats are manufactured and delivered by a nearby supplier in the morning for installation in early afternoon.

6. Management consists of some Americans and some Japanese (except at Nissan, whose management is 100 percent American). Workers on the shop floor are almost all American, with Japanese workers serving only as advisors, sometimes called "facilitators." Unlike in Japan, female workers are well represented on assembly lines.

7. All transplants stress the importance of job security, though none "guarantees" that there will be no layoffs.

8. Production-level employees are paid hourly wages. (Their counterparts in Japan are on salaries.) These employees start with wages that are lower than those of their counterparts at the Big Three, but when the attendance bonus and other payments are included, their wages compare well to those at the Big Three. In all transplants studied, wages increase in a series of steps. Honda of America Manufacturing, near Columbus, Ohio, has one of the more elaborate

compensation schemes, perhaps because it has been in operation the longest among all Midwest automobile transplants. The starting base hourly wage was $12.00 in October 1993 and would increase in six steps until it reached $15.90 in 18 months. In addition, pay could be augmented by an attendance bonus and profit sharing. Profit sharing at HAM is based on Honda's profits worldwide rather than on American operations alone. In 1993, an associate with three years' tenure and perfect attendance would earn a total hourly wage of $17.78 (a $16.20 base wage, a $1.00 attendance bonus, and $0.58 bonus sharing), according to HAM's brochure *Wages and Benefits* (Appendix C). In addition to wages and bonuses, HAM employees receive various insurance and assistance benefits, including shares of stock in Honda Motor Co. through a stock purchase program, and educational assistance. Such newer transplants as Subaru-Isuzu Automotive and Diamond-Star Motors were still planning to introduce elaborate compensation programs as of summer 1990.

9. With the exception of Mazda, all transplants are located in rural areas, and their work forces are young and have little previous automotive experience.

10. Except for Diamond-Star and Mazda, the work forces at these transplants are not unionized. Diamond-Star and Mazda are both organized by the UAW, but are not covered by national agreements like the one applying to the Big Three. Their agreements contain more flexibility in job assignment, fewer job demarcations, and fewer worker categories than a typical UAW contract. Both have no-strike contracts.

Diamond-Star Motors (DSM): Normal, Illinois

Diamond-Star Motors started production of Plymouth Laser and Mitsubishi Eclipse models in June 1988 as a fifty-fifty joint venture between Mitsubishi Motors and Chrysler. This plant is said to be the world's most technologically advanced, with more than 470 robots in operation (*Business Week,* August 14, 1989). It consists of a 2,000,000-square-foot building and a 1.5-mile oval test track. At full capacity, the plant can produce 240,000 vehicles per year. In October 1991, Mitsubishi acquired full ownership in DSM by buying Chrysler's 50 percent share (*Wall Street Journal,* October 30, 1991).

As of August 1990, there were about 3,000 employees, called associates, of whom 21 percent were female. Minorities constituted 11 percent. There also were about 60 Japanese employees, of whom 25 were management level. The section chief is Japanese, but direct supervision is done by an American. About 35 percent of the work force has manufacturing experience, but only 5 percent has automotive experience. Before joining DSM, many members of the work force were farmers or employees at fast-food restaurants or at small manufacturing establishments. Turnover has been about 4 percent. Most discharges have been because of absenteeism. About a third of those quitting were recalled by Caterpillar, found new jobs, or were tied movers with their spouses.

The plant has been organized by the UAW since its inception. The union

and DSM hold periodic meetings at the company level and section level within the bargaining unit to share information regarding the operations.

Honda of America Manufacturing (HAM), Inc.: Marysville, Ohio

This operation is the oldest, and therefore the most experienced and most informative, of all the Japanese automobile transplants in the United States. It started its U.S. production of motorcycles in September 1979. The production of the Honda Accord began in November 1982, at its new 1,000,000-square-foot plant built next to the motorcycle plant. In 1986, the automobile plant was expanded to 3,100,000 square feet, with production capacity reaching 360,000 cars per year. Subsequently, the Anna Engine Plant (Anna, Ohio) was added in 1987, and the East Liberty Plant (East Liberty, Ohio) started production near the Transportation Research Center (1989), which HAM bought from the state of Ohio, making total production capacity more than 500,000 cars per year. With the Anna Engine Plant producing engines and drive trains, the domestic content of Ohio-produced Hondas is said to reach over 70 percent. The Accord coupe and station wagon were designed in the United States and produced exclusively at HAM's plant in Ohio. Honda of America Manufacturing now exports to Canada, Israel, South Korea, Mexico, and Taiwan, as well as to Japan.

As of November 1990, HAM had 5,200 employees, called associates, at the Marysville Plant, of whom 33 percent were female and a little over 10 percent were minority. The Anna Engine Plant had about 1,500 associates, and the East Liberty Plant had about 1,800. Many of these employees came from such occupations as hairdresser, grocery clerk, high school teacher, and farmer. The number with previous automotive experience is very small. Honda's production associates are said to have earned about $40,000 in 1989 including overtime, which is no doubt more than what most of them had earned previously. Appendix C contains information on HAM's wages and benefits.

The Associated Development Center adjacent to the main plant contains seven classrooms (20-person capacity per room), a computer room, a graphics room, an auditorium (198-person capacity), Honda Hall (300-person capacity), laboratories, and a technical information room. Training classes are given in such technical subjects as welding, hydraulics, and robotics, as well as in the Japanese and English languages and stress management. The center runs Honda's Voluntary Improvement Programs, which include a suggestions system, quality control programs, and quality and safety award programs. In September 1990, there were over 350 such activities in progress. Under the award programs, an associate is given points for making useful suggestions, contributing to quality improvements, or spotting defects. The computer tabulates points, and the results are posted for everyone to see. The grand prize is a Honda Civic, six of which had been given away to winners as of August 1990. The center's programs appear to have provided inspiration to other transplants:

Honda's practices came up in a few of my interviews with employees of other transplants.

One of the unique features of HAM is the Associate Review Panel system, by which a discharged employee can appeal the discharge decision. The panel's primary function is to decide whether the discharge decision was made properly, rather than to serve as a grievance committee. Unlike the usual case, the panel becomes operational after an employee is discharged. A discharged employee may request a panel review within three days of discharge. The names of six nonsupervisory panelists are then chosen randomly from a tumbler. At the hearing, a mediator, the discharged associate, an Associate Relations presenter, and one senior manager are present, in addition to the six voting panelists. The discharged employee represents himself or herself, and the hearing consists only of questions and answers—no statements can be made. At the end of the hearing, only the six panelists remain in the room, and the decision is made by secret vote. So far, there have been 18 to 20 review panels per year, involving about 30 percent of terminated employees. About 20 percent of those who asked for a review have been reemployed. This system was implemented in 1985 at HAM; no similar system exists at Honda's Japanese plants.

Honda Motors—Suzuka Plant: Suzuka, Japan

This is one of Honda's five plants in Japan. It was built as Honda's third full-scale plant in 1960, to manufacture motorcycles and automobiles. As of February 1990, this plant employed 10,967 associates. Line 3 at this plant has the latest technology and served as the prototype for the East Liberty Plant in Ohio. On the day I visited, I saw no female workers on the assembly line, and the male workers looked very young (under 25 years of age). Unlike their counterparts in the United States, all associates are salaried employees. The majority of the associates have a high school or junior college background.

There is a training center in a separate building, but it consisted only of meeting rooms and halls. There was no evidence of specialized training as in the Associated Development Center at HAM. Very few people were in the center. Overall, it struck me as rather stark in comparison to its counterpart at HAM. Perhaps this atmosphere reflects the tendency for Japanese training to take place on the job in combination with independent study, rather than in classrooms. There also is a voluntary improvement program, much like the one at HAM.

Mazda Motor Manufacturing, USA, Corp.: Flat Rock, Michigan

This plant, occupying 2,700,000 square feet, is 25 percent owned by Ford. It started production of a Mazda model in September 1987 and a Ford model in January 1988. At full capacity, it can produce 240,000 cars per year. A collective agreement was signed with the UAW in March 1988. Mazda won a long-term commitment from the UAW to the principles of flexibility, efficiency, and implementation of work practices and production systems like the

ones used by Mazda in Japan (Fucini and Fucini 1990, 170). Mazda, in turn, promised the UAW to not lay off employees, except for financial exigencies, and to provide meaningful employee involvement programs.

Employees at Mazda are called team members. In September 1990, there were 500 nonunion Americans, 2,850 unionized Americans, and 150 Japanese team members. Japanese workers mostly serve as advisors, since they cannot work on the assembly line, according to the agreement with the UAW. Almost 30 percent of all workers are female, and minorities constituted a little less than 19 percent.

Mazda has kept a Support Member Pool, a pool of original applicants who were not hired initially as regular employees. Pool members are hired temporarily to meet increased labor demand. They receive the same wage rate as regular team members, but much less in benefits, and they do not receive credit toward seniority. According to the agreement with the UAW, should Mazda use the same pool member for more than three months, it must hire that person as a regular team member. In September 1990, there were about 300 members in the pool, and Mazda was using them at the rate of 50 or fewer at a time. Mazda had hired about 75 pool members as regular team members.

Subaru-Isuzu Automotive (SIA), Inc.: Lafayette, Indiana

This joint-venture plant (51 percent Fuji Heavy Industries, 49 percent Isuzu Motors) started production in September 1989. The plant occupies 2,300,000 square feet, with the capacity to produce 12,000 cars per month. It produces Subaru passenger cars and Isuzu light trucks and sports utility vehicles.

As of July 1990, SIA had 1,727 American associates, 125 regular employees from Japan, and another group of 108 or so helpers from Japan. The work force was about 24 percent female and about 5 percent black. Only a small proportion of the work force (about 8 percent) has previous automotive experience. As of July 1990, about 20 people had quit to return to their former jobs or for other personal reasons, and 5 people had been dismissed for absenteeism or falsification of applications. The mean age of the work force was about 34 years. At SIA only about 65 percent of assembly work is performed by robots in order to promote employment creation in Indiana, by agreement with the state.

Toyota Motor Manufacturing (TMM), U.S.A., Inc.: Georgetown, Kentucky

Production of Camrys began in July 1988 at this plant, which occupies 4,450,000 square feet. It is said that this plant is a clone of its parent plant in Japan, and it has relatively few robots (*Business Week,* August 14, 1989). In late 1990, TMM announced its plan to add another plant nearby, with the capacity to produce 200,000 Camrys per year (*Business Week,* December 10, 1990). It exports Camrys to Taiwan and Japan. Toyota's training center takes up 48,000 square feet and contains some ten classrooms and a "high bay" area.

As of early 1990, the plant employed 3,123 team members, of whom 25 percent were female and a little less than 13 percent were minorities. The plant had experienced a turnover rate of about 5 percent. Most were hired from Kentucky and had little automotive experience. The *Team Member Handbook* (February 1988, 102–103) states that lifetime employment is Toyota's goal, but that the "employment-at-will" arrangement governs all employment relations.

Toyota has had an elaborate system for reviewing discharge cases since late 1987. The review is carried out by the Peer Investigation Committee. Unlike Honda's Associate Review Panel, Toyota's process takes place prior to discharge. The committee consists of six team members with voting rights and is chaired by the nonvoting Employee Relations Manager. The selection of committee membership is by length of service at TMM. When an employee's behavior and performance warrant possible termination, the Employee Relations Manager reviews the facts in the case. Should he or she decide that termination is called for, the employee in question is notified of the pending action by his or her team leader. The employee then is sent home until the committee meeting is arranged. He or she receives pay for the time away from work unless he or she is later terminated. The employee in question has the opportunity to make a statement to the committee. The committee's recommendation is based on a secret ballot. Regardless of the committee's recommendation, the final decision is up to the general manager of human resources and the general manager of the employee's particular area. As of June 1991, 30 employees have gone through this process, of whom 14 were reinstated. Toyota's peer review system did not come from Japan. Rather, it was patterned after similar systems used in U.S. companies.

Appendix B

Hiring Practices at Toyota Motor Manufacturing (TMM), U.S.A., Inc.

The following information was summarized from a mimeographed document from Toyota Motor Manufacturing, U.S.A., Inc.

Since 1985, the year Toyota Motor Manufacturing decided to built a plant in Kentucky, the goal of the company has been to produce cars of the highest quality within the United States. To succeed in this endeavor, Toyota committed itself to assemble a work force of superior quality. It developed hiring guidelines that enable each candidate to demonstrate skills in every area that the company deems relevant.

Hiring in the Kentucky plant was completed in three phases. The first shift was in place in December 1988, the second shift in May 1989, and full operation started in 1991 with a total work force of 3,500 people and a payroll exceeding $100 million annually.

Toyota chooses its group or team leaders from within the company. Team members, however, are hired from the outside following very specific guidelines. The following describes the goals of the hiring process as well as the process itself.

There are five main goals in this process, the most important one being to select the best candidates. The "best candidates" are defined as those with high potential, desire, and ability to learn and good interpersonal skills. A second goal is to obtain a commitment of residence from the applicant. A third goal is that the hiring process be fair, giving all candidates ample opportunities to prove their skills in relevant areas. The fourth goal is that the process be efficient, since there is a very large number of inquiries about these jobs; the Kentucky Department of Employment Services alone listed over 200,000 such inquiries. Finally, the process must be made convenient to applicants. Therefore, the hiring process takes place all over Kentucky at the 27 offices of the Kentucky Department of Employment Services.

The hiring process itself is conducted in six parts, enabling Toyota to acquire and evaluate all relevant information about the candidates.

First, two interviews take place at the Kentucky Department of Employment Services. The first one lasts an hour and is used to describe the job and obtain information regarding the applicant's work experience and skills. Typically, the applicant fills out an application and is shown a video explaining the hiring process and describing the work environment at Toyota. The second interview assesses the candidate's technical skills and potential. For this purpose, two written tests are given. One, lasting two hours, evaluates general knowledge. A second, lasting six hours, evaluates knowledge of tool and die or general maintenance, and is given only to those candidates applying for a skilled trade.

The next two interviews are conducted at the Toyota Motor Manufacturing facilities. The first one assesses interpersonal and decision-making skills. It includes two sets of testing. One, lasting four hours, evaluates group and individual problem-solving abilities. The second one, given only to production applicants, lasts five hours and simulates a production assembly. The second interview assesses the applicant's achievements and accomplishments. This interview lasts one hour and is conducted in a group.

The next phase, a physical evaluation, takes place at the Scott County General Hospital and University of Kentucky Medical Center. Each applicant is given a two-and-a-half-hour physical examination that includes drug and alcohol tests.

The final phase of the hiring process includes on-the-job observation and coaching that lasts for six months after the candidate has been hired. This last phase evaluates the candidate's performance and further develops skills.

Appendix C
Wages and Benefits at Honda of America Manufacturing, Inc. (HAM)

The following information was summarized from *Honda: Wages and Benefits*, published by Honda of America Manufacturing.

Total Compensation

Base Hourly Wage. This is the regular hourly wage received by all production, maintenance and office clerical associates, exclusive of shift premiums and overtime.

Attendance Bonus. This bonus is paid for perfect attendance for all regularly scheduled hours during any consecutive four week period. To be eligible, associates must also clock in and clock out according to company policy.

Bonus Sharing. The Bonus Sharing Program rewards associates for their continuing productivity and efficiency with a bonus based upon Honda's worldwide corporate income. Bonus sharing amounts will vary from year to year depending in part on Honda earnings worldwide.

History of Production Wages at HAM

Table 4C.1 **Base Hourly Wage for Production Associates after 24 Months**

Year	March	September
1983	$9.80	$10.10
1984	10.50	10.90
1985	11.50	12.00
1986	12.25	12.40
1987	12.65	12.90
1988	13.20	13.45
1989	13.75	14.20
1990	14.55	14.75
	April	October
1991	14.95	15.25
1992	15.45	15.65
1993	15.85	16.20

Production Wages (October 7, 1993)

Start	3 Months	6 Months	9 Months	12 Months	15 Months	18 Months
$12.00	$13.15	$13.75	$14.45	$15.00	$15.55	$15.90

Vision Care Program

On November 1, 1990, HAM started offering a company-paid Vision Care Program for associates and their eligible dependents. Coverage includes vision examination, corrective lenses, frames, and contact lenses.

Associate Stock Purchase Program

Under this program, HAM associates may purchase shares of stock in Honda Motor Company in the form of American Depository Receipts (ADRs) with the convenience of payroll deduction. HAM will pay all broker's fees incurred for Honda Company ADRs purchased through payroll deduction. The initial enrollment for the Associate Stock Purchase program began December 1990. Payroll deduction began in January 1991.

Production Wages and Bonuses: Total Package

The annual compensation package at HAM consists of:

- Base hourly wage
- Attendance Bonus
- HAM Bonus Sharing

The following calculation assumes a production associate with perfect attendance and 3 years of service as of November 1993 (excluding shift premium and overtime).

	September 7, 1989	September 6, 1990	November 1993
Base wage	$14.20/hour	$14.75/hour	$16.20/hour
Attendance Bonus	.80/hour (equivalent)	.95/hour	1.00/hour
HAM Bonus Sharing*	.77/hour (equivalent)	.82/hour	.58/hour
Total	$15.77/hour	$16.52/hour	17.78/hour

*paid in November

In addition to wages and bonuses, HAM provides the following benefits and programs to eligible associates:

Health Care and Insurance Plans

- Medical plan
- Post-retirement medical plan
- Prescription drug benefits
- Dental plan
- Vision care
- Workers compensation
- Short-term disability insurance
- Long-term disability insurance

- Accidental death and dismemberment insurance
- Life insurance

Retirement, Savings and Compensation

- Pension plan
- 401(k) savings plan
- Flexible spending account
- Shares of stock in Honda Motor Co.
- Stock purchase program
- Social security (company's contributions)
- Holiday pay
- Vacation pay
- Bereavement pay
- Military pay
- Shift premium pay
- Jury duty pay
- Call back pay
- Reporting pay

Other Benefits and Programs

- Associate Assistance Program
- Education Assistance Program
- Honda Product Purchase Program
- Sports centers
- Honda Federal Credit Union
- Service Center
- Associate Development Center
- Uniforms
- Safety glasses and safety shoes subsidies
- Special year-end attendance gift
- Family Festival
- Associate service awards
- VIP Awards and Programs

Suggestion System	Safety awards
Quality awards	NH Circle

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