

Number of employees	Years of service	Wage rate	Total wages	Separation rates
1	10	10	10	1/2
2	9	9	18	1/3
3	8	8	24	1/4
4	7	7	28	1/5
5	6	6	30	1/6
6	5	5	30	1/7
7	4	4	28	1/8
8	3	3	24	1/9
9	2	2	18	1/10
10	1	1	10	0
55	-	-	220	19.3

New workers are recruited only at the bottom of hierarchy (usually from among new school graduates). To maintain the hierarchy, it is implicitly expected that a worker will quit voluntarily as a result of failure to compete successfully with fellow workers of the same generation and tenure. Theoretically, this should be the least efficient worker in the group. Each remaining worker can then receive a wage increase of one grade and can be promoted to higher positions. The wage fund can be maintained at the stationary level of 220 in spite of wage increases for remaining workers. Thus, the average wage rate can be maintained at the constant level of 4. Because one worker from each generation quits, the total annual rate of separation is 19.3 percent in this model. (If the maximum length of service is extended to 30, the average separation rate becomes 10 percent.) In other words, all workers who are hired after school cannot necessarily continue their employment until the age of mandatory retirement, contrary to the usual definition of lifetime employment cited above.

The growth model. For this model, the concept of stationary lifetime employment is modified. The organizational growth of a company makes it possible for all workers to expect to remain employed and be promoted each year until retirement. One of the basic characteristics of the growth model is its strong dependence on organizational growth, which in turn requires the expansion of market shares. The larger the market share of a company, the greater the opportunities for organizational growth which guarantees employment security and improvement of wages and other conditions of work. In this sense, Japanese firms tend to have stronger impetus for organizational growth, rather than increased rate of return on investment.

The stagnation model. After the oil crisis in 1973-74, most of the major firms changed their employment strategies to adjust to new market situations. They reduced employment by various measures: cutting overtime, laying off temporary workers, stopping new recruitment, not filling vacancies, and transferring workers to other shops or plants within their company as well as to related companies or subsidiaries. Some deeply depressed industries, such as shipbuilding and petrochemicals, promoted voluntary sep-

aration by offering severance payments. For example, more than 10,000 workers left Mitsubishi Heavy Industries Corporation during the years following the first oil crisis. Part-time workers with lower labor costs were recruited to fill the vacancies. As a result, organizational hierarchies tended to shrink, illustrating the stagnation model. □

—FOOTNOTES—

¹ This report is excerpted from Kazutoshi Koshiro, "Personnel Planning, Technological Changes, and Outsourcing in the Japanese Automobile Industry," a paper prepared for the Workshop on Industrial Relations and Industrial Change in the World Automobile Industry, Brussels, February 16-18, 1983. The workshop was part of an international joint project on the future of the automobile. The paper, Discussion Paper Series 83-3, May 1983, is available from the Center for International Trade Studies, Faculty of Economics, Yokohama National University, Yokohama, 240 Japan.

² The civil law requires an "unavoidable reason" to terminate an employment contract without notice. The labor standards law introduced an even tighter restriction—it permits dismissal without notice only when there is an "inevitable cause." There are no laws requiring a reason for dismissals with notice. However, legal theory has established some very strict rules concerning dismissal with notice. See T.A. Hanami, *Labour Law and Industrial Relations in Japan* (The Netherlands, Kluwer-Deventer, 1979), p. 82.

³ Kazuo Koike, "Nihonteki Koyo Kanko" ["Japanese Employment Practices"] in Toyokeizai Shinposha, ed., *Keizaigaku Daijiten [Encyclopedia of Economics]* (Tokyo, Toyokeizai Shimpō Sha, 1980), Vol. II, pp. 100-08.

⁴ Peter B. Doeringer and Michael J. Piore, *Internal Labor Markets and Manpower Analysis* (Lexington, Mass., D.C. Heath and Co., 1971).

Robots are a big success at auto plant in Japan

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In 1971, robots were first introduced in a plant at X Motor Co. in Japan.¹ During the latter half of the 1970's, the number of robots at the plant increased dramatically; by 1981, the company had 730 robots. Most of them (90 percent) perform welding operations in the body assembly shops. The company also uses robots for painting, and is considering robots for battery and spare-tire loading. Other automation, such as computer-aided design and manufacturing, transfer machines, and automobile loaders are widely used by the company.

The robots were obtained largely to do heavy, hazardous, and monotonous work for which very few workers were available during the period of high output growth. Because robots are adaptable and can simultaneously work on different models of cars, the company believed they would improve product quality and save energy and space.

Automation at X Motor Co. has contributed to improved product quality by decreasing human error and increasing mechanical reliability. The company's output increased 186 percent between 1970 and 1980, and productivity increased

139 percent. However, it is difficult to isolate the impact of robots on productivity because other factors such as rationalization of the production process, automation, improved equipment, and efforts by quality control circles also contributed to improved product quality and output. Over the 1970–80 period, expenditures for capital equipment decreased because the flexibility of robots allowed mixed production, and because of the extended life of robots.

The investment for robots is returned within 2 years. For example, cost of a welding robot is about 12 million yen, whereas the average annual wage for a welder is 5 million yen. However, the average value of depreciation per employee was 13 million yen in fiscal 1981. Total depreciable assets were 331,310 million yen, of which the value of the robots, 8,760 million yen, represents only 2.6 percent.

Each of the 730 robots at X Motor Co. replaces 0.7 worker. Because the plant has two shifts, one robot replaces 1.4 workers. Therefore, 1,022 workers or 1.8 percent of the company's total employment have theoretically been replaced by robots.

When the robots were first introduced, maintenance and operating workers were sent to robot manufacturers for technical instruction and training. Thus, these workers were able to program the robots. Although the number of workers at X Motor Co.'s body assembly shop decreased by 4 percent because of the introduction of robots, there were about the same percentage of retirements, so few, if any, workers needed to be transferred. About 100 workers were moved to new assembly lines which required the use of robots.

The welding robots improved product quality and reduced the price of automobiles, causing an increased demand for automobiles. In turn, employment in the body assembly shops increased to some extent, especially in the more skilled jobs such as operating, maintaining, and programming robots. Work injuries decreased and job satisfaction was enhanced as workers were relieved from noise, oscillation, and other job hazards.

Prior to the introduction of robots and other automation, X Motor Co. consulted with trade unions at the Central Labor-Management Consultative Council on long-term production and investment plans and matters related to technological changes. The Council's subcommittees are responsible for discussing problems relating to production, technology, overtime, transfer, improvement of work environment, health and safety conditions, and other matters which might arise during the introduction of automation. Each month, a plant's managers and union representatives can consult with the subcommittees on any of these matters.

In Japan, a trade union is organized on a company-by-company basis. X Motor Trade Union, an affiliate of the Federation of Japan Automobile Workers' Union (JAW, *Jidosha Roren*), organizes all of the plants of X Motor Co. At each plant, there is a local branch of X Motor Trade Union with several full-time officers.² Shop stewards or

chief stewards meet and negotiate with section chiefs (who are union members) or foremen on working conditions within that workshop, consulting the Central Labor-Management Consultative Council if necessary. Transfers to another workshop are negotiated between union branch officers and plant management.

Labor-management relations in the automobile industry have been cooperative and harmonious since the collapse of militant left-wing unionism in 1953. Like other unions, the X Motor Trade Union has been pursuing "3-P movements" (productivity, progress, and participation) and generally has been positive about the introduction of automation.

In recent years, however, the Federation of Japan's Automobile Workers' Union began a campaign to get X Motor Co. to sign an agreement covering the introduction of new technology. In 1982, the union submitted to management a proposal containing the following requirements.

- Consultation with the Federation of Japan Automobile Workers prior to the introduction of new technologies.
- No layoffs resulting from the introduction of robots.
- No demotions or wage reductions from the introduction of robots.
- Education and retraining for affected workers prior to, as well as after, the introduction of robots.
- A fair distribution of the fruits of increased productivity which results from the introduction of robots.

The Federation of Japan Automobile Workers demands that it be consulted even at the initial stage of planning new technologies. It contends that this proposal is not new, but merely a reflection of long established labor-management practices at X Motor Co. Although management had some misgivings, it signed a new contract in March of 1983 covering the introduction of new technologies based largely on the union's proposals.

The government is also taking a cautious approach toward robots, partly because some industrial accidents occurred while workers were programming the robots. Also, the Ministry of Labor is concerned that employment may be adversely affected if the economy continues to stagnate. □

—FOOTNOTES—

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² See Kazutoshi Koshiro, "Industrial Relations in the Japanese Automobile Industry," a paper presented at the Workshop on the Future of the Automobile, Wissenschaftszentrum, Berlin, March 1982. This paper, Discussion Paper Series No. 82–5, August 1982, is available from the Center for International Trade Studies, Faculty of Economics, Yokohama National University, Yokohama, 240 Japan. See also, Kazutoshi Koshiro, "Personnel Planning."