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New Technology and Industrial Relations in Japan

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I. The Nature of New Technology

So called advanced technology or high technology includes not only information-communication techniques, but also so a wide variety of fields such as techniques of energy, new materials, space-development and biochemistry. In this lecture I will deal with only "Microelectronics" as new technology, because Microelectronics (ME) is for the moment, the most advances among them and deems to be the center of new technology as I will explain.

What is the fundamental character of new technology? In what sense is it "new" in comparison with the stereotyped machinery? Does ist constitute an epoch, or new stage in the history of technology?

The motive function and control function of production which had been combined in human beings at the "tool stage" were separated by the emergence of machines. The former, motive function, was built into the machinery, therefore, removed from mankind and stood outside of it. However, the control function was only partly built into the ordinary machinery and the rest of the control function formed the main work of mankind. Moreover, the control function depended mainly on human ability. Therefore, the operation of the machine needed worker's skill and sensibility, though his muscular work was remarkably reduced.

In contrast with the ordinary machine, ME technology makes the control function transfer fundamentally into the machinery itself and stand it separate from human beings. For example, with the computerized NC tool-machine, codified work-information is processed by computers, which put the tools in motion through servo-mechanism and makes cutting work without human handling. Again, its scene is measured and fed back by sensor, then the errors are corrected themselves. In other words, the production process in a narrower sense – cutting work in this case – is

automatically done by the machine, therefore, extremely speaking nothing is needed of the worker except to push the button. Thus, the control function, which formerly depended mainly on human ability, is fundamentally replaced by the machinery and the latter, machinery, is equipped with something comparable to a human nervous system and brain-center. That point is a crucial difference between ordinary types of machines and that of the ME machine. And in that sense we can say that ME technology has made a new epoch in the history of technology.

It is, needless to say, the development of computer techniques that has faciliated the transfer of the control function into the machinery. In contrast to the fact that previous means of labour depended on physical-chemical principles, computers depend on logical-linguistic ones, therefore, open the way to systematically transfer knowledge of natural sciences as well as humanistic and social sciences into the machinery. But the mere emergence of the computer did not bring about the ME revolution. The use of the computer itself had already begun in 1950s. It was the emergence of the micro-processor or micro-computer (‚micom') in 1970s, and its becoming cheaper and better which allowed ME machines to spread widely and have an innovative impact of manufacturing industries. Further, Micro-computers altered the way computers were used. They altered the previous centralized form of use which depended mainly on a large computer into that of a discentralized form.

Automation was already introduced in the later half of 1950s und there was much discussion about it. The automation in the ‚ME stage' is different from the mechanical automation at that time, which was represented by the transfer machine. Although the manufacturing was automated by a transfer-machine, production was oriented toward simple mass uniform production. By contrast, automation at the ME stage is oriented toward multi-lot mass production and production can be flexibly adjusted in accordance with the change of its needs in the market [Flexible Manufacturing System: FMS].

Today, automating the factory completely, including not only the production process but also other processes such as the management of materials and inventory, inspection packing, etc., thus to realize a "manless plant", is being attempted [Factory Automation: FA]. As known well, ME technology is being introduced not only into factories, but also into offices, thus automating office work further [Office Automation: OA]. Also, it is spreading into homes and influencing various aspects of daily life. In this paper, however, I cannot discuss all fields of the problems. I should like to focus on the problems of industrial relations in the manufacturing sector.

In the following discussion, I will deal first with the quantitative influence of microelectronization: especially its impact on employment. Secondly, I will discuss its qualitative influence: mainly its impact on the content of work. Finally, the implications of its impact on the Japanese industrial relations system as a whole will be examined.

II. Quantitative Influence: Impact on Employment

The quantitative influence which we have to stress is its labour saving effect. The introduction of ME technology has the effect of reducing remarkably the number of employees. Let us take an example.

If we compare the results of FMS with those of the previous manufacturing system, the rate of saving labour is between 77 und 92 percent. In the case of Fujitsu Fanuc Co. Fuji Plant, today there are one hundred employees including white collars workers; this number is one fifth of the total employees which would be needed in the plant with the same capacity run by the previous manifacturing method. Generally speaking from the results of the FMS now in operation, the saving effects of manpower, manufacturing cost, and the number of tool machines are one fifth, one half, and one tenth, respectively [Nikei Mechanical].

In the case of the automobile industry, where the introduction of industrial robots has notably made progress, it is said that one robot for welding has the labour saving effect of 0.7 perons. In two shifts it saves 1.4 persons.

Thus, the introduction of ME technology has the effect of saving the direct workers' labour. However, very optimistic views about the effect of the new technology on employment are predominant in Japan. Much empirical research concluded that the employment problem has not suffered seriously as a result of the new technology. In the following I will examine the problem more in detail from two dimensions: first, at the firm level; secondly, at the macro level.

At the firm level the labour saving, or employment reduction, has enhanced productivity to greater extent. Although total production has increased remarkably, the number of employees has generally stagnated or even decreased. As firms try to adjust or decrease the redundancy as far as possible by ‚mild' ways such as transfer, sending-on-loan, stopping new

hiring etc., the problem rarely appears clearly in the form of dismissal, as far as regular employees are concerned. The characteristic of Japanese employment management policy is applicable to this case as well as in the case of business fluctuation: the peripheral labour force including part-time workers, subcontracting labourers etc. are discharged as soon as they become unnecessary. New jobs created by the microelectronization are in principle recruited internally by retraining those already employed. (We refer to this point later again.)

The fact that the tempo of the introduction of new technology is gradual makes it easier for the employers to adopt such mild ways mentioned above. Most research has pointed out that ME apparatuses have been introduced not rapidly but gradually for technical and economic reasons.

The more important reason is the demand creating or increasing effect of new technology. ME technology has created new demand in the market 1. by developing new products such as VTRs, word processors, calculators etc. 2. by improving the precision and quality of the previous products, and 3. by reducing their cost by enhancing productivity. The increase of employment caused by the new demand compensates for the labour saving effect. This process allows the firms to use natural attrition and relocation to adjust their employment.

In this connection two points are important. First, the life cycle of commodities is apt to become shorter owing to technological innovation. Therefore, competition concerning the development of new products among companies is keen. We can not ignore the effect of increases in employment owing to the enlargement of markets as a result of competition. Secondly, empirical research shows that firms which introduced ME machines increased employment more often than firms which did not. This is clearly due to the creation of new demand.

Next, the problems at the macro level. The effects that I mentioned in regard to the firm level are also true at the macro level, for example, demand-creating or expanding effect by the introduction of new technology. One important problem, however, is from the international view point. Japan has conspicuously increased her share of the world exporting market, basing upon her relatively high productivity in the industries connected with ME technology. Whe should not neglect the fact that such a rapid growth of exports existed as a condition which prevented a serious redundant labour power problem in Japan up to the present. In other words, Japan has ‚exported' unemployment abroad. Of course all reasons for unemployment in foreign countries cannot be attributed to this, but the argument which

overlooks this aspect of the problem, would be too optimistic, at least the view that presupposes a closed system.

Another problem is the new jobs or occupations which arise from the introduction of new technology. As is well-known, new technology brings about such new occupations as system-engineers, programmers etc., while it diminishes the need for direct labour. Software firms are set up. As mentioned already, the control function of human labour is fundamentally transferred into machinery, but setting the purpose of production and its input into the machinery still have to be done by human beings. Machines cannot execute those operations. It is the soft-engineers or information processing engineers who are in charge of doing those operations, i.e. designing information needed for the control function of machinery, and

Table 1. The Trend of Industrial Production, Employment and the Rate of Unemployment

Index: 1980 = 100

		Industrial Production incl. Mining	Total Employment	Number of the Employment (Manufacturing)	The Rate of Unemployment (%)
FRG	77	93.8	97.0	98.8	4.5
	80	100.0	100.0	100.0	3.8
	85	105.0	98.8	89.7	9.3
JAPAN	77	83.5	96.5	101.7	2.0
	80	100.0	100.0	100.0	2.0
	85	122.1	104.9	105.0	2.6
UK	77	109.0	98.5	105.6	5.7
	80	100.0	100.0	100.0	6.8
	85	103.6	92.7	78.8	13.5
USA	77	92.4	91.2	97.0	6.9
	80	100.0	100.0	100.0	7.0
	85	117.5	105.7*	95.8	7.1

Note: * figure in 1984

Source: Bank of Japan, "Internationally Comparative Statistics: Centering at the Japanese Economy". 1986

putting it into machine. Those who are employed in the new fields naturally compensate to some extent the saving effect of direct labour.

It is difficult to calculate the plus-minus effect of microelectronization on employment statistically. For to calculate that effect separately from other causal factors than microelectronization is extremely difficult. But such exact calculation is not necessary here. As far as our interest is concerned, the following table, which shows the change of the macro economy of several industrial countries might be enough. [Table 1]

It can surely be said that Japan's situation is better than other countries. The optimism common to both management and employees in Japan depends on such a fact. But in this respect I should like to make the following remark. Japan's favourable situation up to the pesent can be largely attributed to the gradual process of micronization on the one hand and to the fact that it has proceeded under an expanding market on the other hand. The latter cause has been sustained especially by the favourable growth of her export market. However, Japan faces two big problems in this respect. One is a short term problem, i.e. the sharp yen-rising since the fall of last year. The other is long term one. It is presumed that Japanese firms will change their pattern of activities from leadership in exports to theat of leadership in multinational enterprises. Firms will be expected to increase direct investment abroad and to change emphasis from domestic production to production overseas. It, of course, would reduce domestic employment considerably. This prospect will nesessarily proceed regardless of Japan's like or dislike judging from certain reasons [Miyazaki]. If so, we cannot draw so rosy a picture as up to the present about the future effect of ME on employment.

III. Qualitative Effects: Impact on the Content of Work

Next I will deal with the qualitative effects of the new technology on labour. As to them so-called ‚polarization' thesis was already advocated as one of influential hypotheses. According to this thesis new technology is apt to divide the previous work into two polar categories, i.e. one smaller in number which needs higher intelligence and skill (for example, programming, system-engineering and maintenance) and the other larger which is extremely simplified, therefore, needs little knowledge and experience. By contrast a new thesis was put forward: This deneys such polarization and

claims that the new technology rather makes the jobs enlarge and thus brings the "end of division of labour" [Kern and Schumann]. The similar two opposing views are put forward in Japan, too. The controversy has not yet come to an end. Which of them is correct? Before answering this question, I will present data on changes which have taken place at the plant level by ME, using the results of some empirical research.

According to several field surveys, workers operating the ME machines who answered that their jobs were very simple were not among the majority. Further, the answer that the job was very simple was generally less frequent among workers operating ME machines than those not operating them. Among ME machines-operating workers, 40-50 percent consider their own job highly: "very high craft-jobs to demand intelligence, skill as well as creativeness" und "high jobs which demand not so much creativeness but intelligence and skill." Again, 10-20 percent of them consider their jobs respectively as "they require intelligence, but are not different as to skill from the previous one", and "they require skill in the workshop rather than intelligence" [Umehashi]. To sum up, about 60-70 percent of ME machines-operating workers consider that their jobs need some sort of skill or qualifications whether they are intelligence or skill. The above mentioned results are based on the workers' self-estimation. So we might discount those results to some extent. But the results can be supported by another evidence.

According to research on the changes in job requirements over the last ten years from the enterprises' point of view [the Research Institute for Vocational Training], such requirements as "knowledge on quality control", "ability to inspect and measure products", "ability of setting up", "ability to find and solve problems", "knowledge on fore and after the process", "ability of communication, liaison work, reports etc." have increased in importance. Comparing the plants that introduced automatics with those which have not, it is worthy of note that such requirements as "knowledge on electricity and electronics", "ability of programming", "knowledge on self-control and sequence" have increase their importance from three to five times more in the former than in the latter.

Research carried on by the Ministry of Labour in 1982 reported as following: Among the total changes of processes caused by the introduction of new technology, the highest was "the process of requiring new skill in addition to the previous" (63%), and next came "process requiring higher level of skill" (24%). Both processes were overwhelming. By contrast, such answers as "the process needed none of the previous skill, but a new one"

and "the process needed a lower level of skill" were fifteen percent and fourteen percent of the total [Multiple-answers]. [Table 2]

Table 2. Change in Skills Required on ME Work Site

(M.A., %)

Scale of the firms	Total	Skill required changed					not so much changed
		Total	New skills have superseded previous skills	New skills as well as previous skills required	Higher level of skills required	Lower level of skills sufficient	
Total	100.0	67.5 (100.0)	(15.1)	(63.1)	24.2)	(14.2)	32.5
over 1000	100.0	72.2 (100.0)	(15.2)	(71.3)	(26.4)	(11.3)	27.2
300~999	100.0	68.8 (100.0)	(14.2)	(63.2)	(24.6)	(13.4)	31.3
under 299	100.0	65.5 (100.0)	(15.6)	(60.9)	(23.3)	(15.6)	34.5

Source: The Ministry of Labour, 1984.

In short, the new technology has made the level of skill and intelligence needed at the workplace higher as a whole. Of the latter, knowledge of electronics, self-control as well as of relative processes and problems-solving, that is to say, "system thinking" were demanded. It may not be correct to deny "polarization" totally, as the obsolescence and simplification of skill has been partially occurred. The real conditions at the plant level, however, are not as simple as what the thesis supposes. The conditions seem not to correspond with the abstract "epoch-making" characterization of the new technology. How can we reconcile the "gap" between the prospected effect on employment of introducing technology and the real needs for manpower experience by firms.

To begin with, we may point out the present character of the technology at the workplace. The cases where the factory as a whole is completely

automated do not yet prevail, but the majority at the present time are the cases in which factory-automation (FA) and other methods of production exist side by side, though much talked about FA. That is due mainly to economic rather technical reason. It is said that FA is the most suitable to medium lot production, transfer-machine to mass production and NC machine or tool machine for all types to multi-lot small production.

Therefore, workers have charge of such operations as setting up, feeding products in and out or watching their flow, and have to do these tasks, considering the relation of fore and after processes of various kinds. Again, while the precision of fabrication becomes finer, the automated processes often become rather disordered due to various reasons. In case of serious disorder specialists for maintenance are called in, but workers usually have charge of finding and taking care of minor disorders. If the specialists take charge of trivial disorders, the firm must always keep a number of personell for maintenance and that cost will amount to much money. It is more economical and rational for the firm rather to train the operators to foster their ability to deal with minor disorders or adjustments expendiently. Thus, generally speaking, the workers' skills do not deteriorate; rather their knowledge of system thinking and mechanism, ability to adapt are much more enhanced. In general, in accordance with automatization, operators take charge of several numbers of machines in contrast to the case of the previous type of machines, and their job is no longer confined to one machine but enlarged. This also enables the aforementioned work organization. What I have described above suggests that training methods or skill formation and work organization at workplace are of importance in explaining the "gap". So I will examine those points further.

New skills demanded by the new technology are usually built up by vocational training, called the "two stages system" in Japan; at the first stage a small number of workers are selected and gain new skill and knowledge through their dispatch to computer firms, education and training by engineers. Next stage they return to their workplace, instruct and transfer new skill and knowledge to their colleagues mainly by OJT. This system is, needless to say, an internal recruiting method. One research indicated fact that the content of workers' job will change over time as follows: the transfer of new skill within the enterprise proceeds according to three periods from "introduction" through "full-scale running" to "steady running" stages. These stages of operation correspond to three levels of skill transformation from the "engineer leading" through "committing to maintainers" to "committing to workers". At the last period of steady running workers

themselves do carry on such jobs as the engineers and maintainers previously did [Itoh].

In fact, workers have charge not only of operating but also trouble-shooting, maintenance, and even simple programming. According to our field survey there is a case where one big firm practices an active training scheme by which they train workers systematically to be able to cover maintenance and simple programming. (So called "studying abroad" for PM und training "Part-programmer.) Those training method are, as aforementioned, corresponding to economic rationality from the view point of the firm as well.

There are, however, the other cases in which the influence of ME on work takes a different form. For example, in the case of small and medium-sized business, it is pointed out that there can be seen a tendency towards polarization. As the small and medium-sized firms can not afford to train their employees by internal recruiting methods like big companies, they are apt to depend on the special software firms or their parent companies for higher jobs dealing with software. On the other hand, those firms often have a more short-sighted viewpoint in order to deliver their ordered products effectively. So there jobs are inclined to be fixed, thus to be polarized.

There are such cases even in big enterprises, as the labour intensive jobs derived from microelectronization, where jobs are allotted to female workers fixedly or committed on bloc by the labourers of subcontracting firm. This system allows the possibility for the enterprise to reconsider its internal recruiting system and to use the labour force on lease or to fix the differentiation of labour much more accurately when the systematization of production makes further progress in future. We will refer to this later again.

To sum up what we have discussed above.

1. Indeed, new technology changes the content of work qualitatively, but the character or direction of the changes cannot be decided by technology alone. There are some conditions and variables between technology and the way of work at the workplace. The latter takes a concrete form, being influenced by those conditions and variables, too. In other works, the polarization of jobs is not always unavoidable, but there exists certain room in which the way of work takes forms different from polarization through those conditions and variables.

2. Among those conditions and variables here we especially take note of the way the firms pursue economic rationality, given the condition of previous employment practices – speaking concretely, the combination of machine and labour force, the work organization, recruiting method of

employees, training policy etc. In addition we must take account of another factor, which is how the workers behave themselves subjectively in response to the management's conduct.

3. The new technology as a whole makes the workers' jobs enlarged and the level of their skill requirement higher. It presupposes the previous skill for the moment and requires new ones in addition to it, rather than nullifing the old skill or degrading it. Newly necessary skill are fundamental knowledge of electro engineering, self-control, quality control as well as problem solving ability and system thinking related to processes, so to speak something of a more intelligent character. Thus, the polariziation thesis does not fit the core group of workers employed in large enterprises.

4. However, what we have just spoken above is not appropriate to where the conditions are different. For example, in some small and medium sized firms and even in some parts of large firms, especially in the case of femal workers, there can be seen a tendency to polarize.

IV. How Do Industrial Relations Change?

In the last section we discussed the impact of the new technology on work. Of course, it influences more than the work itself. In this section I will deal with its influence on industrial relations, following three topics: labour market, wage system and trade unions.

1. Labour Market

The influence of the new technology on the labour market will appear in the form of changing structure of labour demand. It changes the industrial, occupational, gender compositions of the labour force.

While the proportion of the labour force in tertiary industries has already increased, microelectronization reinforces this tendency. As ME technology has a remarkable labour saving effect in the secondary industries and employment in the primary industries will be continuously decreased, the absorption of the employment will not be seen except in the increase of the tertiary industries in the long run. This tendency, at the same time, means the decrease of labourers and the increase of white collar workers. That is to say a tendency of "white-collarization" or more exactly of "grey-

collarization". Concretely speaking, while direct labourers and employees in offices will decrease, specialists, managing employees in R & D, production technology, office technology sections and employees (including maintainers) in the sales and service sectors will grow.

It is estimated that the industrial structure of occupied persons in the year 2000 will change compared with that of 1982 as follows. The proportion of primary industries will decrease from 10.4 to 4.9 percent, that of the secondary from 34.8 to 33.3 percent, while that of tertiary industries will increase from 54.5 to 61.8 percent [Economic Planning Agency, 1982]. If we divide the occopations into three categories a) R & D section, b) factory and office section, and c) sales and service section, the composition of employment in 2000 compared with that of 1982 will change, so it is estimated, from 13.5 to 18.4 in a), from 66 to 60.6 in b), and from 20.5 to 21 percent in c) [EPA, 1985]. The big shift from the factory and offices section to the R & D section is noteworthy.

In some sections of the light electro engineering industry such as semiconductor manufacturing in which many female workers were formerly employed, the demand for them has been reduced. This is due to the fact that the night shift became common there, as the firms want to recover quickly the large amount of invested capital on newly equipped expensive plants. In the financial companies, it was pointed out, the demand for a female labour force of school-leaving age began to decline. That is due to the outlook that women's office jobs in future will be decreased by the progress of office automation. On the other hand there is an effect in opposite direction, for example, in the mobilization or flexibility of the labour market. So as to the sexual composition the change will take place in complex way.

New technology will foster the flexibility of the labour market. Factory automatization and office automation generally increase the rate of fixed cost to total costs. Although automation will increase flexibility regarding what product is produced, it reduces flexibility regarding the rate of capacity utilization. Therefore, it becomes an important problem for the management to keep the flexibility better to accomodate changes in the utilization rate. Leasing equipment is one responses to this problem. Similarly, the firms will make more use of such external labour forces as leased workers, part-time workers, subcontracting labourer etc. It is, in fact, rather difficult for big business, no less than minor one, to keep always the personells as the permanent staff in software and R & D sections. Especially in software sections where work is concentrated at certain periods of time for of development and testing, thus the need for them fluctuates enormously.

On the other hand, as some kinds of information and technology are important for firms to keep in-house, they will not be able to make the jobs dealing with such matters put out totally. There will be a certain limitation of "externalization" or of using peripheral labour forces. Another factor in limiting such use of external labour is to maintain morale of the employees, too. Thus, it becomes an important task for the management to drive the "externalization" of the remaining part of the personell as far as possible so as to make the labour market more flexible, keeping the crucial part as the internal labour force as before.

One study estimated that the numbers of the non-permanent laboures will increase from 4.2 million in 1982 to about 9.37 million, i.e. from one to six to one to three [EPA, 1985]!

This tendency contains serious problems for the Japanese employment system, which has been in principle on "lifetime employment". Because it will decrease the proportion of the labour force at a steady and relatively favourable condition of employment. The progress of microelectronization will not destroy the lifetime employment system totally, but will transform it seriously.

2. *Wage System*

The Japanese wage system is, as is well know, characterized as seniority-oriented system. In my opinion its real content began to change in the latter half of the sixties and its character as living wage is now much weaker than before. Instead, the elements of work-oriented wages have been added to it, but it is not the Western type work-oriented wage based on job evaluation in a strict sense of the meaning. Because wages are not first graded by job evaluation and then each worker is placed at the so graded wages according to his skill, but rather the worker's individual attributions are still highly estimated. Though wages are graded, they are not graded by jobs themselves, but by such ***workers' attributions*** as ages, school-careers, the lenght of service etc.

Therefore, the wages are not connected rigidly with the jobs in Japan. Such flexible relation between job and wages is one of the reasons why the adjustment of employment by the labour mobility within the enterprise – reinforcement, transposition, dispatch, sending on loan and so on – are easily done in Japan. If the content of the job is changed by microelectronization, the wages to be paid the worker concerned do not alter at all for the time being.

According to the research of the Ministry of Labour [1984], the enterprises which "guarantee previous wages to the workers engaged in the process concerned after the introduction of ME machines" ist 95.7 percent of the total, and the enterprises "guarantee the same wages if the employee is transfered to another job" is 93.7 percent. Those results of the survey support the above-mentioned circumstances. We can say that the present wage system is very expedient to microelectronization. Therefore, there might be little incentive for the management to alter the wage system drastically at an enterprise which has already established a wage assessment system and the management of promotion based on it.

Of course, if the circumstances are different, there will be another more distinct response. A good example is the case of one big electric corporation. That introduced in the sixties the "according to jobs" wage system, which was much more work-oriented. Both the management and the trade union had several problems with that system because of low economic growth, an aging society and especially microelectronization. After one year of negotiations they concluded an agreement of a new Wage System in April of this year.

Under the new wage system traditional distinction between labourers and white collar workers is partly abolished and both categories are unified into one class. 'Partly' here means what the part unified is confined to the ordinary clerks, and the supervisors and managerial persons above them are excluded. The new system is reflected by the present condition that grey-collarization is progressing among the workers and the lower part of white collar workers. The importance of assessment system ist much more enhanced. On the contrary, cordial treatment both for the aged and manual workers is weakened.

Generally speaking, the Japanese wage system will transform toward the much more ability and merit oriented one in the long run.

3. Trade Unions

What we have seen above presents a very serious and difficult problems to the trade unions in the long term, however it may be good in the short term. That will be easily understood, when we think about the structual changes of the labour market. Because what tendencies of decreasing factory workers, and increasing white collar workers and peripheral labourers decreases the power of trade unions and undermines their organizational

base. To organize white collar, part-time labourers and labourers on lease is quite difficult. Because those kinds of workers generally have little interest in being organized for various reasons. However, in Japan one more reason should be added to the above-mentioned general one. As the Japanese trade unions are organized as enterprise unions, they themselves have little interest in organizing the non-regular labourers [Tokunaga, 1986]. Therefore, the organizational problems are more serious in Japan.

The rate of organized labour has decrease from about 35 percent in the sixties to under 30 percent in 1983, and 28.9 percent at present (1985). Of course, it is due not only to the structural changes but also to the other causes: among them the prevalence of "middle class" consciousness in accordance with the general increasing level of income and apathy to the unions as its consequence. Anyway, without any effective measures against it the declining tendency of union membership will be unavoidable.

To return to our subject: how do the trade unions respond to microelectronization? Each national center as well as the "industrial unions", though late comers, have dealt with the problem, setting up ad hoc committees on ME and stating their views and measures on it. As an example, the Federation of Electrical Machine Workers' Unions (FEMWU) announced the three principle regarding to ME in 1984 as follows:

1. The pre-consultation system as to the introduction of ME should be established; if the consultation with the trade union be not settled, its introduction should not be allowed.
2. At the introduction of ME it should be done not to make the term of employment and working conditions less favourable. Among others in case of that will cause such a direct influence on the employment as of bringing discharge, it should not be allowed.
3. As to the safety problem it is necessary to let the management take enough care of it. The trade unions should check the problem periodically after the introduction, too.

The FEMWU made up a "model agreement on the ME technology system" based on those principles and urged the affiliated unions to conclude it with their companies in the fall of 1985.

Concerning the unions' responses to ME, notwithstanding the differences in tone, there can be seen rather common features. First, acknowledging the necessity of the introduction of new technology, they have taken the position of demanding their share of its fruits and protection from its harmful effects. Secondly, they stress the practice of preconsultation as their most important

legitimize strategy. Thirdly, the security of employment is estimated as the highest of their demands.

Now, the problem ist how really such principles and measures are in fact practiced at firm and workshop levels. As a well known example the "Agreement on the Introduction of the New Technology" was concluded between the Nissan Motor Co. and Nissan Automobile Workers Union. But such cases as Nissan are rather exceptional.

Table 3. The Contents of the Negotiation between the Management and Trade Union on the Introduction of ME Machines

(%)

Subjects	Received only explanation	Received explanation and expressed opinions	Received explanation and amended it	No talks	N.A.
1. Introduction Scheme (machine, date etc.)	34.8	49.2	4.8	1.6	9.6
2. Transposition	9.9	37.7	6.4	23.0	23.0
3. Education and training	18.8	47.6	6.7	10.2	16.6
4. Manning	15.3	43.8	8.6	12.8	19.5
5. Safty, hygienic	7.7	33.5	8.3	28.4	22.0
6. Forms of services (Shifts etc.)	9.3	26.2	11.8	29.4	23.3
7. Working hours (rest etc.)	9.3	28.1	10.5	27.8	24.3

Source: Japan Institute of Labour, 1984.

In oftener cases the preconsultation is carried out as consultation apart from collective bargaining, and it is on the whole less effective in fact. [Table 3] According to our case study of the big electric engineering corporation the introduction of FA itself was not taken up as a subject at the regular

consultation committee, but discussed in a rather informal way, as far as its resulting transfer of the employees to another plant was concerned. Although the union demanded to conclude the agreement on ME, it was not concluded there; the management maintained that the problems would be adequately solved by the previous genereal agreements and practice. The union finally agreed with the management. The company has de facto almost a free hand as to the introduction of the new technology. This case presumably presents general conditions of the problems at the firm level.

It is in principle very hard for the trade unions to stop or regulate the introduction of new technology, as they are organized as the enterprise union. Even if the unions can succeed in making the management approve their demand to check it at the one company, and assuming that the other companies introduced it, then the company concerned will be behind the competition with the rivals. The enterprise union cannot particularly help worring about that.

At the enterprise union which usually confines its membership only to the regulat employees of the enterprise concerned, individual union members have strong consciousness of belonging to their own company. Such a consciousness is demonstrated in the most explicit way in relation to external groups or rival firms. The unions cannot neglect it. On the other hand the management succeeds in eliciting the employees' high morale and cooperation by the improvement of productivity, quality control and proposals for the betterment of the company, relying on their belonging consciousness, and paying cautions attention to the security of their employment which is the most important interest of the employees. Indeed, at the company of our case study, though the management is opposed to endorsing the unions right to speak, it always tries to hear from and communicate with the union in informal ways, and endeavours to reflect employees' demands and needs collected through such channels in deciding its policies.

The problem is that all matters are executed under the strong initiative of the management. Therefore, the presence of the trade union at the workplace is extremely weak. A good example is the problem of vocational training. The workers' interest and potential demand for education is very high, owing to the radical change of their work through microelectronization. However, the unions have scarcely paid attention to those problems, leaving the matters mainly to the employees' individual efforts and to the management, though the union dealt with education and propaganda for expanding their organization. The question who should participate in

training for higher skill and knowledge is in general decided by the management. Worker hesitates to make a proposal in the union: he assumes it rather selfish. So the union has no cause to make a formal demand. That is perhaps a reason why the potential demand among workers for higher wages corresponding to the achieved new skill does not appeared explicitly.

As I explained above, the polarization of the work itself is neither only technically decided nor unavoidable. But it does not mean that there is no possibility of it. In order to avoid polarization, it is among others crucial as to what kinds of training system is developed and how the system is managed. As the company reconsiders the lifetime employment practices and makes the labour market more flexible, so the tendency to the polarization will be intensified without adequate measures against it. Therefore it is more and more important for the trade unions to have an interest in training systems and to regulate them from their own standpoint.

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