

Diversification and Labour Strategy of a Japanese Textile Maker
: A Case Study of Practical Use of Human Resources as Intellectual Skills

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Diversification and Labour Strategy of a Japanese Textile Maker: A Case Study of Practical Use of Human Resources as Intellectual Skills*

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1. Introduction

After the Second World War, the Japanese textile industry was considered to acquire foreign currency by General Headquarters/ Supreme Commander for the Allied Powers (GHQ/SCAP), and in accordance with GHQ/SCAP's instructions, various economic measures were taken to promote the development of the industry by the Japanese government¹. As a result, textile goods accounted for 49 per cent of total export of Japan's products in 1950. After that time, the share of textile goods decreased to 18.7 per cent, since economic policy focused on the promotion of the heavy chemical industry in the 1960s. However this decline does not simply show that the position of the textile industry went down in Japanese industries, for the great transformation which brought further progress in the textile industry had been developed within the industry in that period. In short, it is the diversification of Japanese textile makers into synthetic fiber. Thus, nylon production took the place of rayon production, and Japan became top among nylon exporting countries in the world during the 1960s. It was Toyo Rayon Co. Ltd., Teijin Ltd., Asahi Kasei Co., Nippon Rayon Co. Ltd., Kurashiki Rayon Co. Ltd.,

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¹ GHQ/SCAP had occupied and controlled Japan to implement the Potsdam Declaration from September 1945 to April 1952.

Mitsubishi Rayon Co. Ltd. and Toho Rayon Co. Ltd., called “Specialised Seven”, that rendered great services to the growth of the nylon production. These companies were all Japanese textile makers that diversified from rayon fiber production into synthetic fiber production in the late 1950s².

This paper scrutinises, from a human-resources management point of view, how a Japanese textile manufacturer, that was confronted with the decline of its main business, succeeded in such diversification. In particular, as it will be shown, this paper focuses on how intellectual skills, one of the characteristics of the Japanese workplace, were used by Nippon Rayon that succeeded in diversifying into the new business in the late 1950s, despite the fact that it was a small and weak firm in the industry.

The argument of this paper mainly is based on E. Penrose’s work, *The Theory of the Growth of the Firm*, and K. Koike’s work, *Understanding Industrial Relations in Modern Japan*.

Penrose built a theory of the corporate growth from the resources-based view. After defining “resource” as “a bundle of potential services”, she mentioned that the same resource can provide a variety of different services according to use of the firm³. In addition, “at any given time the known productive services inherent in a resource do not exhaust the full potential of the resource. In other words, it is likely that increases in knowledge can always increase the range or amount of services available from any resource. Of the services available, only a few can be profitably used by a given firm at

² From the difference of raw materials and production processes, synthetic fiber mainly includes nylon, vinyl and polyester, not rayon.

³ She also pointed out that this variety of services becomes the source of the uniqueness of each individual firm. Incidentally, she defined resources as “the physical things a firm buys, leases, or produces for its own use, and the people hired on terms that make them effectively part of the firm. Services, on the other hand, are the contributions these resources can make to the productive operations of the firm.” (E. Penrose *The Theory of the Growth of the Firm, Third Edition*, New York: Oxford University Press, 1995, p.67.)

a given time”⁴. She pointed out availability of unused productive services. Hence, “A firm has an incentive not only to engage in operations large enough to eliminate pools of idle services, but also to use the most valuable specialized services as fully as possible”⁵. For human resources, especially, she mentioned “That the knowledge possessed by a firm’s personnel tends to increase automatically with experience means, therefore, that the available productive services from a firm’s resources will also tend to change”⁶. The reason why she emphasised the productive services available from human resources is that, of the available resources, personnel is a unique resource that can change the range and volume of the services through its accumulated knowledge. Moreover, the cumulative knowledge can be acquired by workers through their daily work because they possess learning capacity.

In this respect, Koike introduced the idea of “intellectual skills” to understand modern Japanese workplace and to explain the efficiency of the Japanese economy, not from cultural factors, but from a technological aspect. He defined “intellectual skills” not as craft skills, but as the ability of shopfloor workers to apply their knowledge-intensive skills based on broad experience to production process in order to improve it. The reason why intellectual skills can improve productivity is that “they can intellectually understand the structure of the machines and products and the production process, workers are able to deal remarkably well with the unexpectedly frequent changes which occur and are able to improve efficiency”⁷. Furthermore, regarding the formation of intellectual skills, he mentioned that this knowledge could be acquired not

⁴ *Ibid.*, p.76.

⁵ *Ibid.*, p.71.

⁶ *Ibid.*, p.76.

⁷ K. Koike, *Understanding Industrial Relations in Modern Japan*, 1988, London: Macmillan Press, pp.xiii-xiv.

through experiencing one type of job for a long time, but through broad on-the-job-training (OJT) to experience a wider range of operations between a few related workshops. In short, forcing on learning capability of the shopfloor workers, he pointed out the availability of unused services in a human resource.

Concerning availability of the different services in a human resource, as it will be shown, Nippon Rayon, that was required to diversify into new business while running the existing business, mainly reassigned its experienced workers to rayon department under the situation of a cutback in its operations and reallocated its young workers to new business, nylon department. The experienced workers were more familiar with production processes of the existing rayon, while the young workers could supply learn the nylon production that was different from the rayon production in the production process. In accelerating diversification under the depression of the existing main business, this reassignment of the human resources was based on availability of unused services in a human resource. It stood to reason that Nippon Rayon had an incentive to use as profitably as possible the productive services obtainable from its resources, especially under the depression of the main business. In other words, the reason for maintenance of employment depended on economic rational aspect of human resources.

This reallocation, however, was very difficult to manage. At the beginning of 1960s when the results of both departments reversed, the existing seniority-based wages by which the experienced workers were well-paid caused discontent between the young workers. Therefore, Nippon Rayon introduced skill-based management in order to prevent the morale of both sides from deteriorating. In the process of this introduction, a concept of intellectual skills was created to get consensus between two sides. Namely,

both experience of the middle-aged workers and adaptability of the young workers were understood as ability to operate their job efficiently. As a result, Nippon Rayon decided to rebuild its labour management system to broaden its worker's experience through OJT and job-rotation and to maintain its multi-skilled workers even under the depression of nylon business in the late 1960s.

Chapter 2 clarifies what labour management Nippon Rayon employed in resuming rayon after the defeat in the Second World War. Chapter 3 scrutinises, from the labour management point of view, how Nippon Rayon diversified into nylon production. Particularly, it will be examined why its young workers were reassigned to new business, nylon production. Chapter 4 considers that as the new business grew, what labour problem Nippon Rayon was faced with and how the firm altered labour management to solve the problem.

2. Resumption of Rayon Production and Wage System at Nippon Rayon

2.1. Resumption of Rayon Production

In reconstruction of Japan's economy after the Second World War, it was the textile industry that GHQ/SCAP regarded as the only Japanese industry which could acquire foreign currency. Therefore, GHQ/SCAP and Japanese government took various economic measures to reconstruct the textile industry and to promote export of Japan's textile goods. Although Nippon Rayon, which had been forced to convert rayon production into munitions under industrial readjustment during the war, restarted as Eiko Co. Ltd. in October 1945, the firm was excluded from such economic measures, due to the fact that Eiko was taken off the list of the Japanese textile industry⁸. As a

⁸ In March 1926, Nippon Rayon was originally established with a capital of ¥ 15 million

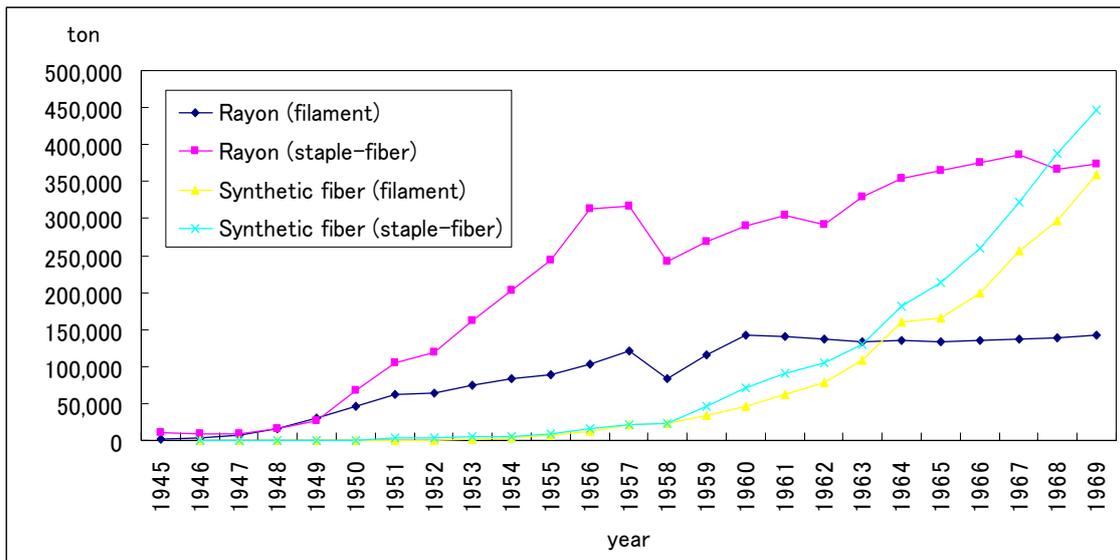
result, Eiko reemployed minimum personnel after discharging all the employees with dismissal allowances. The firm barely continued operations to produce medical supplies, whisky and construction materials with its reserved materials.

It was in November 1947, when the Japanese government permitted the firm to produce rayon fiber, that Eiko could restart rayon production. Consequently, in December 1947 Eiko returned its company name to Nippon Rayon. In February 1948, when rayon production restarted, reorganisation was carried out to support its production. Thus, rayon production was resumed at the ex-main factory, Uji factory. Moreover, Nippon Rayon, that was permitted to expand its rayon production by GHQ/SCAP in 1951, could also restart production of rayon staple-fiber and tire cord at Okazaki factory.

Japan became top among countries producing and exporting rayon staple-fiber in 1954. The chemical fiber industry became one of the most prosperous industries in Japan from mid-1955 to mid-1957 (see figure 1).

Figure 1. Domestic output by product in Japan

by Dainippon Spinners Ltd. However after the Second World War this financial combine was broken as a dissolution of the zaibatsu. After that, Nippon Rayon continued a business on its own until October 1969, when Nippon Rayon and Nichibo Co. Ltd (Dainippon Spinners changed its name in 1964) amalgamated into one big textile maker, Unitika Ltd.



Source) The Ministry of International Trade and Industry, “Annual Report of Textile Statistics” (Seni Tokei Nenpo), each year.

The Japanese rayon makers that earned a profit during this period actively invested in their plant and new technology to expand productivity. As a result, fierce competition occurred in the industry and their profit rates decreased. Facing this situation, each company started searching for new profitable business. As it will be shown, rayon depression which had started since 1957 accelerated this trend within the industry.

2.2. Wage System after resumption of rayon production

Nippon Rayon added different allowances to its basic wage for shopfloor workers in order to correspond to fierce inflation soon after the Second World War.

After resuming rayon production, Nippon Rayon revised the wage system in 1949. The new wage system of Nippon Rayon was as follows⁹.

⁹ Nippon Rayon, “Rule Book of Wages” (Chingin Kisoku), February 1949. The district

Total wages = fixed wages + extra wages

Fixed wages = (basic wages + occasional allowance + attending allowance + long-service allowance + meal allowance + family allowance + housing allowance) * district index

Extra wages = early-shift and overtime pay + late-night allowance + holiday-working allowance + allowance for maintaining two households + on-duty allowance + other allowance + clothing allowance + special duty allowance + no-working allowance

District Index in 1949

District	Index
Osaka, Tokyo	7
Nagoya, Uji, Fushimi	6.3
Himeji	5.9
Okazaki	5.5
Yonago, Gotsu, Takahashi, Hirata	4.9

The characteristic of this revised wage system was that skills of experienced workers were evaluated after a two-month employment and they were paid a maximum wage of two times of an average wage for their skills. In addition, each district index was decided by consumer's price survey (CPS).

In August 1950, the wage system was revised again. This time, the multiplication of fixed wages was changed from district index to factory-division index which was decided by the results of each factory. This alteration reflected not the difference of price index between districts, but the results of each factory grouped by product.

index reflected the difference of price index between districts in which each factory was located.

On the other hand, simultaneously with reorganization in February 1948, Nippon Rayon abolished its discriminative ranking system between white-collar workers and blue-collar workers to introduce a new classification system (see Table 1). The promotion under the new classification system was based on educational background, service length and personnel performance evaluation.

Table 1. Classification system based on seniority for male blue-collar worker of Nippon Rayon (revision in 1951)

service length (year)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
junior high school graduate	class 1				class 2				class 3				class 4				class 5				class 6										
high school graduate	class 2		class 3		class 4			class 5			class 6			class 7																	
university graduate	class 4		class 5		class 6			class 7			class 8			class 9																	

Note 1) Workers under class 3 got daily wages, whereas workers over class 4 were paid by the month.

Note 2) Although the classification was not directly connected with each managerial post, shopfloor leader was classified into class 2 to 3, foreman class 4 to 5, sub-section chief class 5 to 6, section chief class 6 to 8, general manager class 7 to 10.

Source) Nippon Rayon, “The General Situation of Labour Force and Systems” (Roumu Gaikyo Syo Seido), March 1968.

In view of a chain of wage revisions, Nippon Rayon, that succeeded in restarting rayon production, attempted to build wage system focused on the acquisition of experienced workers. In short, Nippon Rayon for which it was required to increase production to catch up with preceding manufacturers in the industry needed labour policy to obtain and keep experienced workers within the company as well as to

increase the number of employees. In this respect, it can be considered that Nippon Rayon expected skills available from experienced workers in order to improve productivity.

3. Diversification and Labour Strategy of Nippon Rayon

3.1. Rayon Depression and Diversification

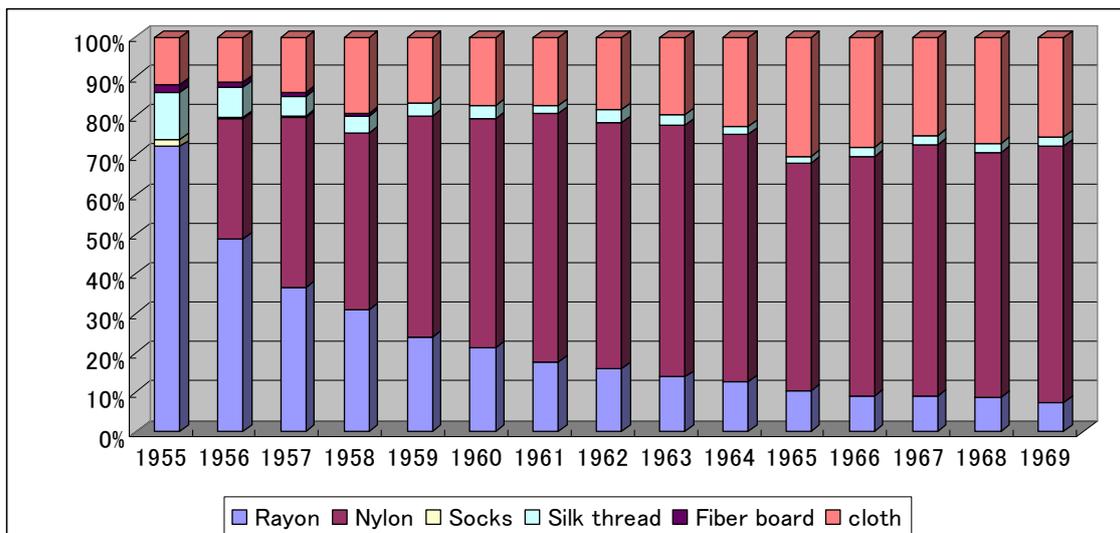
The late 1950s was a period when the Japanese rayon industry was confronted with rayon depression and the entry of rayon makers into synthetic fiber production increased. Because the slump had been continuing since the beginning of 1957, the government and the textile industry examined measures devised to deal with the problem. As a result, advice on curtailment of operations was given to rayon manufacturers. The control over rayon filament had been carried out from August 1957 to September 1962 and its cutback rate in operations reached 50 per cent in January 1958. On the other hand, the control over rayon staple-fiber had been fulfilled from April 1957 to May 1963 and its cutback rate in operations amounted to 40 per cent in April 1958. Thus, the over-supply of rayon goods that was caused by fierce competition between the rayon makers had been controlled in the late 1950s (see figure 1).

In this situation, each rayon maker accelerated search for new profitable business. Moreover, the deadline for basic patents for synthetic fiber became close to expiring and new technologies of synthetic fiber except the technological genealogies of DuPont (nylon) and ICI (polyester) were invented in European countries, so that the Japanese rayon manufacturers speeded up the diversification into synthetic fiber production by introducing foreign technologies.

In this tendency in the industry, Nippon Rayon was no exception. Nippon

Rayon concluded a technological support treaty about nylon production with Inventa A.G. in 1954. And sales of nylon goods of Nippon Rayon that began selling nylon fibers in 1955 accounted for the majority of the firm's gross sales (see figure 2).

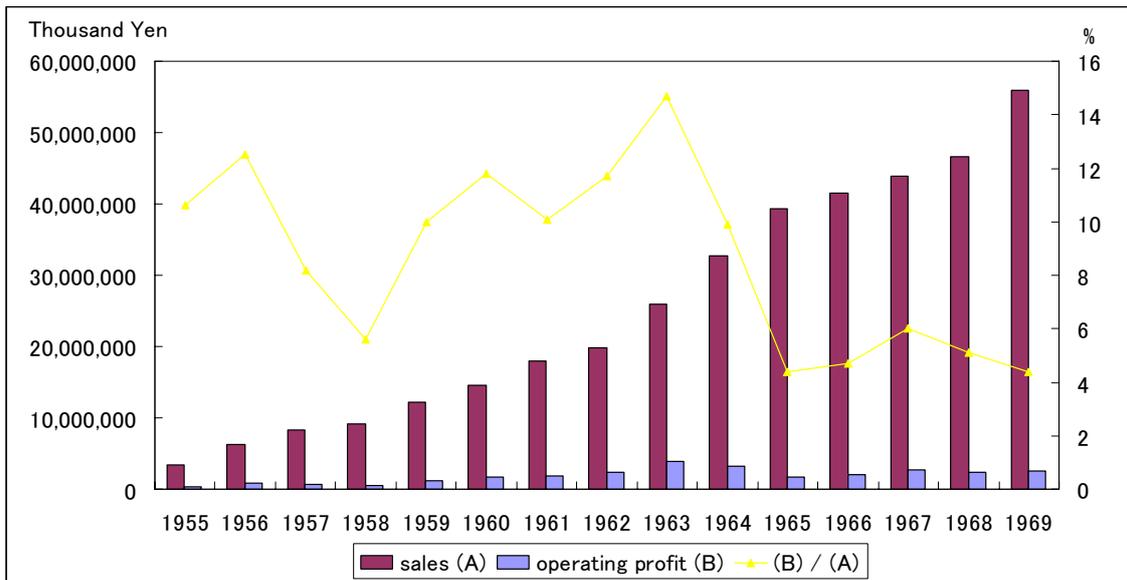
Figure 2. Sales rate by product of Nippon Rayon



Source) Nippon Rayon, "Annual Report", each year.

Since nylon business of Nippon Rayon got off to a good start, the results of the company rapidly recovered after 1958 in spite of the rayon depression (see figure 3).

Figure 3. Business of Nippon Rayon



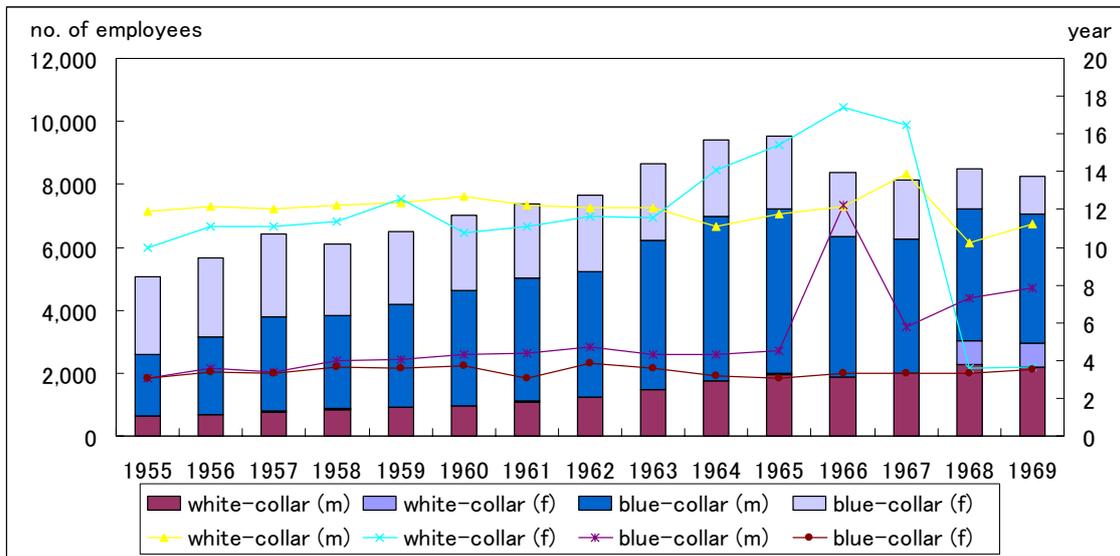
Source) Nippon Rayon, “Annual Report”, each year.

As Figure 2 and 3 show, the rapid recover of Nippon Rayon under the rayon depression in the late 1950s was a result of its nylon business growth. In 1963 the operating profit per sales of Nippon Rayon set an unprecedented record in its history. And the position of Nippon Rayon in the Specialised Seven jumped up from the lowest to the middle one.

3.2. Labour Strategy to correspond to Diversification

Nippon Rayon that was faced with the rayon slump soon after starting its nylon business firstly laid off some 300 of its male blue-collar workers in 1958. As figure 4 shows, the average of the male blue-collar worker’s service length increased, while their number decreased. It could be derived that it was the young workers without enough experience in rayon production that were laid off at that time.

Figure 4. Number and service length of employees at Nippon Rayon



Source) Nippon Rayon, “Annual Report”, each year.

After that time, however, Nippon Rayon decided not to lay off more its personnel despite the fact that the rayon depression became more and more serious. Instead, the firm transferred its human resources from rayon department to nylon department and newly hired the youth for nylon business. Focusing on the adaptability of the youth on the new production process, the firm carried out the reshuffling of its personnel. In other words, this reallocation meant that the existing rayon department consisted of older workers with experience in rayon production. In addition, all the Specialised Seven that tried to diversify into nylon production carried out the same labour strategy as Nippon Rayon. As a result of such a reassignment of human resources, the average age of the workers engaged in rayon department rose, as contrasted with that of the workers in the other chemical fiber production (see table 2).

Table 2. Average age of the textile workers by product (including white-collar)

year	Rayon (filament)			Rayon (staple-fiber)			Synthetic fiber		
	male	female	total	male	female	total	male	female	total
1957	30.0	24.0	28.0	31.0	25.0	31.0	26.0	19.0	23.0
1958	32.0	25.0	30.0	32.0	26.0	32.0	29.0	20.0	26.0
1959	32.0	25.0	30.0	33.0	26.0	32.0	26.0	20.0	24.0
1960	33.0	24.0	30.0	34.0	26.0	33.0	26.0	21.0	25.0
1961	34.0	25.0	31.0	34.0	27.0	34.0	26.0	21.0	25.0
1962	34.6	25.0	32.0	35.4	25.3	34.5	26.5	20.3	25.0
1963	35.0	25.2	32.3	35.3	25.0	34.3	27.1	19.9	25.3
1964	35.8	25.1	32.7	34.9	25.7	33.9	27.9	20.0	26.0

Source) Japan Chemical Fibers Association, *A History of the Japanese Chemical Fiber Industry*, (Nippon Kagaku Seni Sangyoshi) Tokyo: Japan Chemical Fibers Association, 1974, p.854.

Such a change in the labour force influenced existing seniority-based wages. As wages of young workers engaged in nylon department were made lower than those of middle-aged workers engaged in rayon department, despite the fact that nylon business exceeded rayon business in results, the young workers at nylon department required wages in proportion to the results of their efforts rather than to the length of their service.

Consequently, a meeting between management and labour in the chemical fibers industry (Kasen Roshi Kaigi) was held to consider revision of the seniority-based wages in December 1960, and thus the “Basic Policy of Rationalisation of Wage System” (Chingin Seido Gorika no Kihon Hoshin) was declared in February 1962¹⁰. The aim was to switchover from seniority-based wages to skill-based wages on the basis of workers’ ability to operate their job plus seniority and to reconstruct the whole labour

¹⁰ The meeting was for the first time held in 1954 to discuss industrial relations and composed of representatives of Specialised Seven and their company unions. (Japan Chemical Fibers Association, *A History of the Japanese Chemical Fiber Industry*, (Nippon Kagaku Seni Sangyoshi) Tokyo: Japan Chemical Fibers Association, 1974, p.581.)

management system as well as the wage system.

There was a different approach to the introduction of skill-based payment system between companies and trade unions in the chemical fibers industry. Both sides agreed about skill-based payment. However the firms emphasised wages in proportion to seniority, whereas the trade unions insisted on wages on a basis of “change in quality of work”¹¹. It could be stated that the trade union’s opinion reflected the young workers’ complaints. Why did the company persist in seniority-based wages? The answer might be found in the labour strategy that seven chemical fiber manufacturers carried out in developing nylon business. At first, chemical fiber makers responded to rayon depression with layoff. But as the depression grew worse, they changed the labour strategy from layoff to rearrangement of their human resources. As it has already been mentioned, the concept of reshuffling was to keep experienced workers within the existing rayon department and to transfer immature but adaptable youth to the new nylon department. That was because the firms had to accelerate the startup of the new business, making profits under the restriction of rayon production. They needed to form the existing workplace by focusing the able minority on the rayon department in order to improve working efficiency. Therefore, in order to keep workers with broad experience within the declining department of rayon production, management had considered seniority-based wages to give them incentive to work hard.

4. Skill-based Management at Nippon Rayon

4.1. Education and Training of Workers

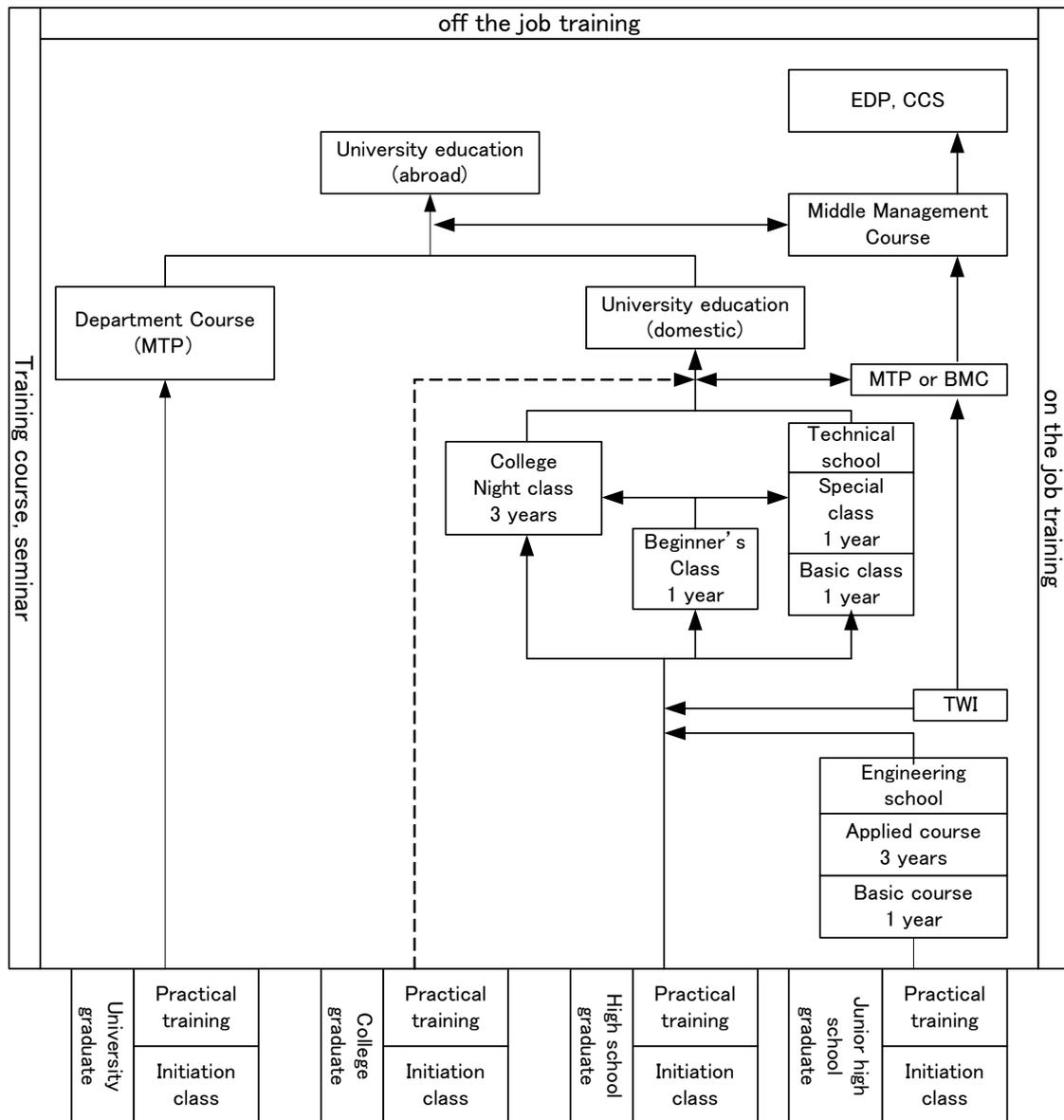
In 1954, Nippon Rayon embarked on an education and training programme

¹¹ *Ibid.*, p.857.

intended for its workers on a basis of “A Summary of Education and Training Programme” (Kyoiku Kunren Yoko). First, the firm inaugurated Nippon Rayon Okazaki Factory High School in April 1956, and then established an Engineering Department attached to the high school in April 1962. This meant that the training programme for junior high school graduates had started to improve their skills earnestly. Moreover, in November 1960, it was spread over the company-wide by setting a training section within the personnel department. Reflecting the president’s impressions run in an in-house magazine, “SEIUN” of January 1962, the Skill Training Programme has been operating since April 1962 (see figure 5). The purpose of this programme was “to improve worker’s skills and knowledge and to make young worker’s morale high by going on to college, in proportion to innovation and company growth”.¹²

Figure 5. Education and training programme after 1962

¹² Nippon Rayon, “Implementation Guidance for Technological Trainee Programme” (Gijyutsu Kensyusei Seido Jiishi Yoko), 1961.



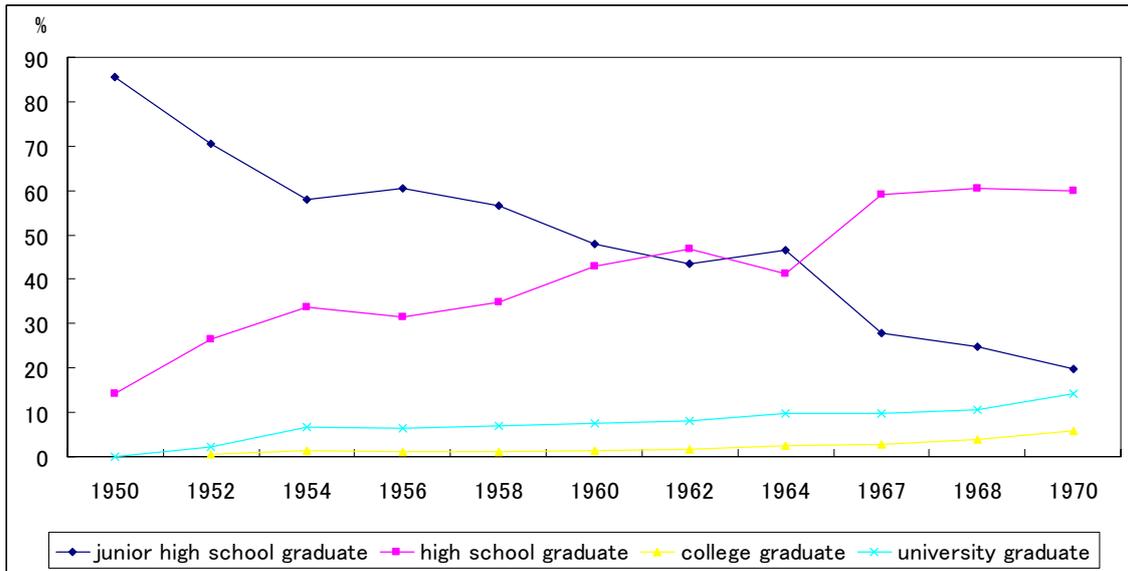
Source) Nippon Rayon, “Implementation Guidance for Technological Trainee Programme” (Gijyutsu Kensyusei Seido Jiishi Yoko), 1961.

In 1962, Nippon Rayon set every November to be the Quality Improvement Month. In addition, a Committee on Total Quality Control (TQC) was established within the firm in 1964. However, TQC activities at Nippon Rayon gradually failed due to nylon depression.

Why did education and training at Nippon Rayon become such active in the first half of 1960s? The following can be pointed out as the reason. The nylon department in which mainly young workers were engaged in the second half of 1950s grew to a new main business of Nippon Rayon by around 1960. Under the existing seniority-based wages, however, the average wage of rising nylon department was made lower than that of declining rayon department. Therefore, the young workers engaged in nylon department regarded their flexibility as an ability to learn and operate new job and required job or result-based payment rather than seniority-based payment. In fact, an additional allowance was decided in 1960 to introduce qualifications for the job¹³. As soon as the wage included qualifications for the job, junior high school graduates required the opportunity to go on to high school or college, aiming at high skills ranked as high payment. If Nippon Rayon had not met their demand, a labour turnover in its main labour force would have risen and their morale would have been low. Actually junior high school graduates that had been the main labour force in 1950s decreased in labour market of 1960s (see figure 6). This meant that young and cheap labour market had been growing tight since the late 1950s.

Figure 6. Rate of employment of new graduates by school background

¹³ The wage system newly revised in 1960 was as follows. Total wages = basic wages * division index + additional allowance + other allowances. (Nippon Rayon, “Rule Book of Wages” (Chingin Kisoku), November 1965.)



Source) The Ministry of Education, Science and Culture, “Report on Basic Investigation into School” (Gaako Kihon Tyosa Hokoku), each year.

Consequently, the reason why Nippon Rayon promoted the education and training for its young workers was its response to the decreasing supply of cheap labour force and to their morale.

4.2. Skill-based Payment

Nippon Rayon, whose nylon business has contributed to the company growth since the end of 1950s, recorded operating profit per sales unprecedented in its history in 1963. However, it had reached the peak at that time, and after that time, it continued to decline until October 1969, when it merged with Nichibo Co., Ltd. into Unitika Ltd (see figure 3). Nylon depression which began in 1964 became the trigger for the Rationalisation Plan made by the firm. Besides, the plan did not keep its subject within just cost reduction, since the depression was recognised as a structural recession and

drastic measures had been required since around 1960. Although Nippon Rayon had depended on the “Basic Policy of Rationalisation of Wage System” reported in 1962 and launched an internal investigation into its wage system, its management decided to rebuild the whole labour management system as well as wage system. Thus, the firm firstly carried out a job evaluation at rayon department and examined labour market and secondly, made a long-period plan for labour cost, definite job specifications and systematic employment policy. Finally, the company drew up the “Reasonable Personnel Plan” (Tekisei Jinin Keikaku). The main purpose of this plan was to foster workers of multi-skills by promoting job-rotation under the current number of the employees.

In the wage agreement of July 1968, Nippon Rayon took the first step towards skill-based payment. That was to include the additional allowance introduced in 1960 in the basic wages II and to introduce the qualification system from A to K. The new wage system was as follows¹⁴.

Total wages = basic wages I + basic wages II + allowances.

However, it resulted in double evaluation of the workers, because the new qualification system and the existing classification system that had applied to the basic wages I coexisted. Therefore, the firm abolished the classification system. It was explained in “Revision of Rules of Working Position” (Syokusei Kitei Ichibu Kaitei nitsuite) of 1969 that “The qualifications are divisions based on ability to operate job, and the qualification system was operated by showing skill needed at each qualification

¹⁴ Nippon Rayon, “Rule Book of Wages” (Chingin Kisoku), November 1965.

and by allotting workers of ability to meet its level to proper qualification”¹⁵. Finally, though this revision introduced skill-based wages, the seniority-based promotion until grade E remained.

4.3. Welfare Policy to support Skill-based Management

Nippon Rayon altered welfare policy to support skill-based management. A means to encourage multi-skilled workers in accordance with the “Reasonable Personnel Plan” was job-rotation. To promote the reallocation of its human resources, the firm revised its welfare policy to draw up “Total Plan of Housing” (Jyutaku Sogo Keikaku) in April 1968. A main point of the revision was that the firm purchased a house of its workers, who were transferred to a long way off, as a company house. This alteration could respond to promoting internal labour turnover.

In addition, nursery schools were built on the premises in the 1960s. This could keep its young female workers within the firm under the situation of the shrinking young labour market. Thus, Nippon Rayon carried out welfare policy to promote reallocation of its workers and their staying within the company for a long time¹⁶.

5. Conclusion

Under the situation of the rayon depression in the second half of 1950s, Nippon Rayon had to start up the new profitable business, nylon, keeping operations in the existing rayon production process efficient. To achieve it, Nippon Rayon needed to

¹⁵ Nippon Rayon, “Revision of Rules of Working Position” (Syokusei Kitei Ichibu Kaitei nitsuite), 1969.

¹⁶ Labour turnover rate of the Specialised Seven from March 1966 to February 1967 was 15.32 per cent at Nippon Rayon, 6.58 per cent at Teijin, 11.43 per cent at Toyo Rayon, 9.87 per cent at Kurashiki Rayon, 6.5 per cent at Asahi Kasei, 14.27 per cent at Mitsubishi Rayon and 24.45 per cent at Toho Rayon.

reorganise its middle-aged workers with broad experience into the core labour force at the rayon department, since the firm needed to improve working efficiency at the rayon department to make profit under the restriction of rayon production and the rayon department had to bring about the company's results as a main business until the nylon department could earn return on its investment. Therefore, Nippon Rayon hurried start-up of the new department by reassigning the immature but flexible young workers to the nylon department based on new technology. On the other hand, the existing rayon department was composed of the experienced workers to maintain its working efficiency by a few workers who understood the production process as well as the machinery.

However, when the results of both departments overturned, the young workers complained of the existing seniority-based wages that did not reflect the results of the new department. When their dissatisfaction was clearly expressed, the firm was pressed to make a choice of either seniority-based or job-based wages. The firm's first choice was to introduce an additional allowance able to reflect qualifications for the job in 1960. Moreover, Nippon Rayon prepared the education and training programme to foster its workers' skills. And then, Rationalisation Plan started under the nylon depression included the introduction of skill-based payment. In the process of embodying the plan, "Reasonable Personnel Plan" was drawn up. It aimed to foster the multi-skilled workers in order to respond to increased production and smooth diversification under the current number of the employees. Therefore, job-rotation, in-house education and training, welfare policy and skill-based payment that were principal factors in labour management system were employed and revised one by one to support skill-based management. In short, by putting the multi-skilled to the core of

labour management system, these factors were recombined at Nippon Rayon of the 1960s.

References

1. Japan Chemical Fibers Association [1974], *A History of the Japanese Chemical Fiber Industry*, Tokyo: Japan Chemical Fibers Association.
2. K. Koike [1988], *Understanding Industrial Relations in Modern Japan*, London: Macmillan Press.
3. The Ministry of Education, Science and Culture [1950-70], "Report on Basic Investigation into School".
4. The Ministry of International Trade and Industry [1945-69], "Annual Report of Textile Statistics".
5. Nippon Rayon [1945-69], "Annual Report".
6. Nippon Rayon [1949], "Rule Book of Wages".
7. Nippon Rayon [1961], "Implementation Guidance for Technological Trainee Programme".
8. Nippon Rayon [1965], "Rule Book of Wages".
9. Nippon Rayon [1968], "The General Situation of Labour force and Systems".
10. Nippon Rayon [1969], "Revision of Rules of Working Position".
11. E. Penrose [1995], *The Theory of the Growth of the Firm*, New York: Oxford University Press.
12. Unitika Ltd [1991], *A Hundred Years of Unitika*, Osaka: Unitika.