Career Inventory of White-Color Senior Technical Staffs in Japanese Regenerated Cellulose Fiber Industry in 1920s~1940s: A Case Study of Engineers Employed once by Asahi Kenshoku Company Ltd.

Kenji Kamide

SYNOPSIS: An attempt was made to disclose the role of technology diffusion through individuals. For this purpose the career inventory was as the first step constructed in details for 35 engineers who had been at least once employed by Asahi Kenshoku Company Ltd. (AKS), the first joint venture with a leading German company (Vereinigte Glanzstoff Fabriken A.G. (VGF)), which introduced the whole system of the most advanced production technology of regenerated cellulose fiber by the viscose method.

1 INTRODUCTION

Chemical fibers industry was, in the first quarter of twentieth century, founded on one of the most sophisticated technology, which Japan as a middle developed country could not master unaided and with self-education. In 1920s the basic patents of viscose rayon expired, although all these patents had not been registered in Japan and the date of expiration was not directly concerned with Japan. A number of venture business had been born in Japan, but they failed to develop further up to a stage of commercial production.¹

A few exceptions were Asahi Jinzokenshi (AJK) and Teikoku Jinzokenshi (Teijin), both formed on the basis of technical achievements of technical colleges.² ³

AJK was established by local (Kansai) capitals in 1919, attempting commercialization of continuous viscose rayon filaments, based on laboratory scale experiments of Prof. Koju Asahina (see, Fig. 3) of Osaka Technical College (now, Osaka University, Faculty of Engineering).⁴ The company suffered a technical set back (poor quality) due to luck of scientific knowledge, machinery, and know-how of the operations and also a financial set back owing to sudden stoppage of support from main financial backers, who were
heavily damaged by the post world war I depression. Its work force size was halved by large scale firing in 1919. AJK was taken over by Matazo Kita of Nippon Menka (Japan Cotton) in 1920 and reformed (concentration of man power). But it became soon evident that the technical difficulty could not be overcome within limited period. New administration changed their strategy, deciding to purchase foreign technology.5

Asahi Kenshoku (Asahi Silk Weaving) Company Ltd. (AKS), established with capital of $200 \times 10^4$ yen in 1919, was a successor of AJK. AKS purchased viscose rayon technology from German company, Vereinigte Glanzstoff Fabriken A.G.(VGF) at the cost of $1 \times 10^7$ yen, building the plant of capacity 1 Ton/day on the area of $6.27 \times 10^4 \text{m}^2$ at Zeze (now, Otsu), near Biwa Lake (Shiga prefecture, Japan) in 1922. Major viscose making and spinning equipments were imported from Germany and installed at Zeze. For the technology guidance five German engineers and technician including a female stayed there during 1923 summer and 1924 autumn.7 Technology transfer of the total system, such as patents, know-how, machines and guidance of operations, of artificial silk industry to AKS from Europe in 1923-1924 was the first epoch-making occurrence in Japan. At that time Japan had not been utterly regarded as technical rival against Europe artificial manufacturers: For example, any principal patents of large European enterprises had not been applied until 1919-1920, when Asahi introduced VGF technology.8

It had often for long been said that 1910s-1920s was the time when the viscose process gradually approached to industrial stage and its manufacturing technology was in strict secrecy and nothing was disclosed public9-12. Practically nothing appeared as research reports on xanthate and viscose process13. Then engineers in the ventures had to struggle hardly to overcome the troubles, which they encountered at development stage and that the development was not made straightforwardly, but needed the repeated trial-and-errors.14 The above statement stretched the truth. Note that to European patents are attached some precise drawings15. Japanese engineers at these days were not at the technological level, which might enable them to understand the meanings of the patents or they had not well recognized the technological importance of the patents (intelligent ownership). In short, they were too primitive to imitate the European technology. A more detailed discussion will be published elsewhere.

In 1920s Asahi Kenshoku (AKS) was a very unique company, which was a joint venture of Japan and Germany16, although the former capitals had never lost overwhelming hegemony. Engineers working at AKS had fortunately invaluable experience of learning European advanced technology. In other words, advanced foreign technology, mastered by
them at Asahi, had scarcity value and they were considered to be suitable object of headhunting, if any.

The author was interested in the following points:

(1) Had all or almost engineers worked at Asahi until their full retirement age (lifelong employment)?

(2) If not, where and how often had they transferred to?

(3) Is this kind of job change technology transfer through engineer individuals?

As a first step to answer the above questions, an attempt is made in this article to construct a comprehensive career inventory of white-color senior technical staff employed once at AJK and AKS, including before employment and after quit. Such compilation collected from hugely scattered materials is, without exception, extremely tedious and time-consuming, but the inventory, if made even if far from completeness, will supply the concrete data base to study further the fluidity of white-color engineers, the technology and the technology advancement.

2 CAREER INVENTORY

Career inventory is shown in the following order:

A ; Date of birth and that of death
B ; Academic career
C ; Business experience before joining to Asahi
D ; Job career in Asahi group ( Job rotation or promotion inside the group is shown as→
E ; Business experience after resignation from Asahi

2.1 Asahi Jinzokenshi (AJK)

Figure 1 shows the evolution and metamorphosis of Asahi Jinzokenshi (1919) to Asahi Kasei (2001).

Table 1 collects name, job position, former occupation, and date of association for all engineers at AJK in 1920. Here, code number is attached to the individual. For the sake of understanding, education system of pre world war II in Japan is illustrated in Fig. 2.

Fig. 3 shows the movement of main engineers once worked at AJK. Note that Uehata (code no 6) joined to reformed AJK in place of Asahina (code no. 1).

Code no. 1; KOHJI ASAHINA
A : Born in 1877; died in 1959

118
Figure 1 Metamorphosis of Asahi (Alliance and rupture)

Table 1 List of all engineers employed by Asahi Jinkenshi in 1920

<table>
<thead>
<tr>
<th>Name (code no.)</th>
<th>Job position</th>
<th>Former occupation</th>
<th>Year of employment</th>
<th>Year of trip abroad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koji Asahina (1)</td>
<td>Principal engineer</td>
<td>Professor, Osaka Tech. College Research Assistant, Osaka Tech. College</td>
<td>1919</td>
<td>~1911</td>
</tr>
<tr>
<td>Yoshio Kami (2)</td>
<td>Engineer</td>
<td>Graduate (1919) of Osaka Tech. College (ex-student of Prof. Asahina)</td>
<td>1919</td>
<td>1927</td>
</tr>
<tr>
<td>Toshio Sugimoto (3)</td>
<td>Engineer</td>
<td>Graduate (1920) of Osaka Tech. College (ex-student of Prof. Asahina)</td>
<td>1920</td>
<td>1925~26</td>
</tr>
<tr>
<td>Yutaka Yoneda (4)</td>
<td>Engineer</td>
<td>Graduate (1920) of Osaka Tech. College (ex-student of Prof. Asahina)</td>
<td>1920</td>
<td>1930</td>
</tr>
<tr>
<td>Haruhiko Mitsui (5)</td>
<td>Engineer</td>
<td>Graduate (1920) of Osaka Tech. College (ex-student of Prof. Asahina)</td>
<td>1920</td>
<td>(teacher)</td>
</tr>
<tr>
<td>Tokuo Takahashi</td>
<td>Engineer (Artist)</td>
<td>Brother of Mrs. Asahina</td>
<td>1920</td>
<td>(not known in detail)</td>
</tr>
</tbody>
</table>
Figure 2 Education system in pre-world war II in Japan

1913-1916
Ueda Sanshi College

1916-1919
Osaka Technical College

1919-1920
Asahi Jinken (Established)

1921
Asahi Jinken (Restructured)

1922-1924
Asahi Kensholku (Established)

1925-1926
Asahi Kensholku (Restructured)

1921

1922-1924

1925-1926

Tokyo Jinken

Azuma Kogyo

Yonezawa Tech. College

Teikoku Jinken

Asahina(1) Kami(2) Sugimoto(3) Yoneda(4) Mitsui(5)

Uehata(6) Kami(2) Sugimoto(3)

Uehata(6) Sugimoto(3)

New Members (Table 3&4)

Asahina(1) Yamada Ohtake

Yoneda(4)

Yoneda(4)

Yoneda(4)

Figure 3 Main engineers worked once at Asahi
Kenji Kamide

B: (1) Tokyo University, Applied Chemistry, 1906
    (2) Study abroad (Europe) (Germany, ~1911)
C: (1) Engineer, Osaka Arsenal, 1906~1912
    (2) Professor, Ueda Sanshi College, 1913~1915
    (3) Professor, Osaka Technical College, Department of Applied Chemistry, 1916~1918
D: Principal Engineer, AJK, 1919~1920
E: (1) Aichi Prefectural Industry Research Institute, 1920~1921
    (2) Principal Engineer, Tokyo Jinzokenshi, 1922~1925 (with Y. Yoneda)
    (3) Head, Aichi Prefectural Industry Research Institute, 1926~1927
    (4) Director & Principal Engineer → Director of Chemical Research Laboratory,
        Nisshin Rayon (est. 1933, subsidiary of Nisshin Bouseki) 1933~
    (5) Director & Principal Engineer, Nisshin Bouseki ~1942

Code no. 2; YOSHIKO KAMI
A: Died in 1940~1941
B: Ueda Sanshi College, Department of Silk Weaving, 1916
C: Research Assistant (to prof. K. Asahina) → Assistant Professor, Osaka
    Technical College, Department of Applied Chemistry, 1916~1919
D: (1) Engineer, AJK, 1919~1922
    (2) Engineer, Section Manager, Asahi Kenshoku, 1922~1926
E: (1) Travel in Europe, 1927
    (2) Technical Adviser, Nippon Rayon, 1926~1927
    (3) Silk Fiber Chemistry Laboratory (private lab. by Kami), Ueda Sanshi College,
        1929~1932
    (4) Technical Adviser, Nitto Bouseki, 1931
    (5) Technical Adviser, Bokiseizo (est. 1925 by separation from Kobe Steel, 1932~)
    (6) Plant Manager → Director & Principal Engineer, Shinko Jinken (est. 1933) (since
        then Mitsubishi Rayon)
    (7) Managing Director, Mitsubishi Rayon

Code no. 3; TOSHIKO SUGIMOTO
A: (1) Born in 1898 ; died in 1983
B: Osaka Technical College, Department of Applied Chemistry, 1919
Career Inventory of White-Color Senior Technical Staffs in Japanese......

D: (1) Engineer, AKJ, 1919~1921
(2) Section Manager, 1922~1929 \(\Rightarrow\) Senior staff, 1929 ~1930
(3) Section Manager, 1931~1934, Nobeoka Bemberg Plant, Nippon
Bemberg (est. 1929) \(\Rightarrow\) Asahi Bemberg (est. 1933) \(\Rightarrow\) Plant Manager, 1935~1943;
Director, 1940~1944
(4) Managing Director, 1944~1946, Nichitsu Chemical Industry (est. 1943)
\(\Rightarrow\) Managing Director, Asahi Chemical Industry Company, Ltd. (est. 1947)

E: President, Asahi Shokken, 1946~

Code no. 4: YUTAKA YONEDA
B: Osaka Technical College, Department of Applied Chemistry, 1920
D: Engineer, AKJ, 1920 (spring) ~1920 (autumn)
E: (1) Osaka Municipal Industry Research Institute, 1921~1922 (1.5 years)
(2) Engineer, Tokyo Jinzoken, 1922 (November) ~1925
(3) Engineer, Hiroshima Plant, Teikoku Jinzoken, 1925 (December) \(\Rightarrow\) Iwakuni
Plant, 1926 (November) \(\Rightarrow\) Chief Engineer, about 1930 \(\Rightarrow\) Plant Manager,
Mihara Plant, 1944 ~1948 \(\Rightarrow\) Director, 1948 \(\Rightarrow\) Managing Director \(\Rightarrow\) Vice
President, ~1965
(4) Chairman, Tohoku Pulp

Code no. 5: HARUHIKO MITSUI
B: Osaka Technical College, Department of Applied Chemistry, 1920
D: Engineer, AKJ, 1920 ~1922 (spring)
E: (1) Military service, 1920 (November) ~
(2) School teacher, Hohtoku School of Commerce, 1922 ~

Code no. 6: GOICHIRO UEHATA
A: Died in 1940
B: Kyoto University, Department of Chemistry, 1907
C: (1) Minami Manshu Research Institute, 1911~1916
(2) Abroad study in Europe, 1919~1920 (1 year)
D: (1) Managing Director, AKJ, 1921~1922
(2) Managing Director, 1922~1928 \(\Rightarrow\) Senior Managing Director, 1929~1932 ;
Plant Manager, Otsu Plant, 1922~1927, AKS

25
(3) ; Director, 1930～1933; Plant Manager, Nobeoka Bemberg Plant, 1931～1932, Nippon Bemberg (est. 1930)

(4) ; Director, 1933～1938 ; Inspector, 1939 ; Plant Manager, Nobeoka Bemberg Plant, 1933, Asahi Bemberg (est. 1933)

Code no. 7: EI-IChI TONOMURA
B : (1) ; Elementary education at primary school
(2) ; Passed qualification test of middle school graduation (after employment by Asahi)
(3) ; Non-diploma course, Tokyo Technical College (after resignation from Asahi)
D : Office boy ⇒ Technician, AJK, 1920～1921
E : Director, Nittobouseki
(a relative of Junkichi Tamura (Founder and Director of AJK))

Table 2 shows emergence of manufacturers of viscose rayons in Japan. Manufactures may be classified into three groups. AJK, Teikoku Jinzokenshi and Tokyo Jinzokenshi belong to the group I.

2.2 Asahi Kenshoku (AKS)

Table 3 summarizes all university graduates at AKS in 1927. Except code no.6 they were newly employed after establishment of AKS.

Code no. 8: GEN-NOSUKE ANDO
B : Kyoto University, Department of Industrial Chemistry, 1906
D : Section Manager (Research & Planning) , 1926～1927 ⇒ (Second) Plant Manager, 1927～1929, AKS
E : some dyeing company (no further information after his quit from Asahi was available)

Code no. 9: MASAYUKI YAMADA
B : Kyoto University, Department of Industrial Chemistry, 1922
D : Engineer, 1823 (July) or 1924 (Sring) , or 1925 (October) , Otsu Plant, AKS ⇒ Deputy Section Manager (Finishing), 1927 , Otsu Plant, AKS ⇒ Section Manager (Chemicals), 1933～1934 , Nobeoka Viscose Rayon Plant, Asahi Bemberg
Table 2  Emergence of manufacturers of continuous viscose rayon filaments in Japan

<table>
<thead>
<tr>
<th>Group (Year)</th>
<th>Name of Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (1919-25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Azuma Kogyo (1915)</td>
</tr>
<tr>
<td></td>
<td>Teikoku Jinzo Kenshi (1919)</td>
</tr>
<tr>
<td></td>
<td>Asahi Jinzo Kenshi (1919)</td>
</tr>
<tr>
<td></td>
<td>Asahi Kenshoku (1922)</td>
</tr>
<tr>
<td></td>
<td>Tokyo Jinzo Kenshi (1921)</td>
</tr>
<tr>
<td>II (1926-1930)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kurashiki Kenshoku (1927)</td>
</tr>
<tr>
<td></td>
<td>Dainihon Bouseki (1927)</td>
</tr>
<tr>
<td></td>
<td>Toyo Bouseki (Showa Rayon) (1928)</td>
</tr>
<tr>
<td></td>
<td>Toyo Rayon</td>
</tr>
<tr>
<td>III (1931-1936)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nippon Kagaku Seiki, Shonaigawa Rayon</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nishin Rayon, Kinka Rayon</td>
</tr>
<tr>
<td></td>
<td>Kanegafuchi Bouseki [Kanebo]</td>
</tr>
<tr>
<td></td>
<td>Kureha Bouseki, Fukushima Rayon</td>
</tr>
<tr>
<td>(1934)</td>
<td>Taiyo Rayon, Kunimitsu Rayon, Fukui Jinken, Kishiwada Jinken</td>
</tr>
<tr>
<td></td>
<td>Showa Jinken</td>
</tr>
<tr>
<td>(1935)</td>
<td>Fuji Sen-i Kogyo</td>
</tr>
</tbody>
</table>

Manufacturer to which Asahi engineers moved
Table 3  List of university graduate engineers of Asahi Keshoku in 1927

<table>
<thead>
<tr>
<th>Name(code no.)</th>
<th>University:Department</th>
<th>Year of graduation</th>
<th>Duration of service at Asahi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gen-nosuke Ando(8)</td>
<td>Kyoto: Ind. Chem.</td>
<td>1906</td>
<td>1926~1929</td>
</tr>
<tr>
<td>Goichiro Uehata(6)</td>
<td>Kyoto: Chem.</td>
<td>1907</td>
<td>1921~1940</td>
</tr>
<tr>
<td>Masayuki Yamada(9)</td>
<td>Kyoto: Ind. Chem.</td>
<td>1922</td>
<td>~ (1934)</td>
</tr>
<tr>
<td>Bukichi Tsuji(10)</td>
<td>Kyoto: Ind. Chem.</td>
<td>1923</td>
<td>1923~1945</td>
</tr>
<tr>
<td>Manso Hisatake(11)</td>
<td>Kyoto: Mech. Engrn.</td>
<td>1923</td>
<td>1924~</td>
</tr>
<tr>
<td>TokutarO Ogiwara(12)</td>
<td>Kyoto: Chem.</td>
<td>1923</td>
<td>1925~1933</td>
</tr>
<tr>
<td>Eitaro Takamatsu(13)</td>
<td>Kyoto: Ind. Chem.</td>
<td>1923</td>
<td>~ 1943</td>
</tr>
<tr>
<td>Iwao Yoshikawa(14)</td>
<td>Kyoto: Ind. Chem.</td>
<td>1924</td>
<td>~ (1937)</td>
</tr>
<tr>
<td>Taichiro Shiraiwa(15)</td>
<td>Kyoto: Chem.</td>
<td>1924</td>
<td>1927~1929</td>
</tr>
<tr>
<td>Norio Uei(16)</td>
<td>Kyoto: Ind. Chem.</td>
<td>1925</td>
<td>~ 1939</td>
</tr>
<tr>
<td>Toshio Ishino(17)</td>
<td>Kyoto: Chem.</td>
<td>1926</td>
<td>1926~1930</td>
</tr>
<tr>
<td>Shigeaki Hamada(18)</td>
<td>Kyoto: Ind. Chem.</td>
<td>1926</td>
<td>1926~1947</td>
</tr>
</tbody>
</table>

E : Kotobuki Sen-i

Code no. 10: BUKICHI TSUJI

A : Died in 1969

B : Kyoto University, Department of Industrial Chemistry, 1923

D : Engineer, Otsu Plant, AKS, 1924 (Spring) or 1925 (Spring) 49 or 1925 (Spring) 74  ⇝ Acting Section Manager (Spinning Solution), 1927 74  ⇝ Section Manager (Spinning Solution), Otsu Plant, AKS, 1928~1933 36,38,77  ⇝ Plant Manager, Nobeoka Rayon Plant, 1933~1943 78 ; Director, 1935~1944 , AKS (⇧ Asahi Bemberg Kenshi ⇝ Nichitsu Chem. Ind.) ⇝ Managing Director, Asahi Chem. Ind., 1945

E : Purge directive, 1945~

Code no. 11: MANSO HISATAKE

A : Born in 1900; died in 1948

B : (1) ; Kyoto University, Department of Mechanical Engineering, 1923 80
    (2) ; D. Engrnr.,1942, Kyoto University 80

C : Engineer, Ajigawa Tekkosho, 1923~1926

D : Section Manager (Throwstering) , Otsu Plant, AKS, 1926~1930

E : Assistant Professor, Osaka Technological University (⇧ Osaka University), 1930~1942 80 ⇝ Professor, 1942~1948, Osaka University 80,82

Code no. 12: TOKUTARO OGIWARA83
A: Died in 1971
B: Kyoto University, Department of Chemistry, 1923
D: Section Manager (Spinning Solution → Research), Otsu Plant, AKS, 1925~1932
  → Division Manager (Research), 1933, AKS
E: (1): Lecturer, Institute for Chemical Research, Kyoto University, 1936~1943 (?)
    (2): Professor, Department of Chemistry, Hiroshima Bunri University, 1943~1949 →
        Hiroshima University, 1949~1961 (?)
    (3): Lecturer, Faculty of Education, Shiga University, 1961~ (a few years)

Code no. 13: EITARO TAKAMATSU
B: Kyoto University, Department of Industrial Chemistry, 1924
D: Section Manager (Research (1935~1936); Spinning (1937~1939)) → Assistant Plant
  Manager, Otsu Plant
E: (1): Managing Director, Nippon Cellulose Industry, 1947~1950
    (2): Chairman, Tachikawa Institute

Code no. 14: IWAO YOSHIKAWA
B: Kyoto University, Department of Industrial Chemistyr, 1924
D: Section Manager (Spinning), 1933~1936, Otsu Plant, AKS → Section Manager
  (Spinning), 1937~1943, Nobeoka Rayon Plant, Asahi Bemberg Kenshi

Code no. 15: TAICHIRO SHIRAIWA
B: Kyoto University, Department of Chemistry, 1925
D: Engineer, AKS, 1927~1929
E: (1): Engineer, Teijin → Deputy Chief Engineer, 1930 → Plant Manager, Iwakuni
  Plant
    (2): Vice President, Kokoku Jinkenpulp

Code no. 16: NORIO UEI
B: Kyoto University, Department of Chemistry, 1926
D: Section Manager (Research), 1937~1939, Otsu Plant, Asahi Bemberg Kenshi
  (When Otsu plant was closed down in 1943, Uei refused to transfer to other plants of
  Asahi (for example, Nobepka Rayon Plant) and stayed the plant, which was
  purchased by Sumitomo group. After the War he was said to become teacher.)
Code no. 17: TOSHIO ISHINO
A: Born in 1903; died in 1991
B: (1) Kyoto University, Department of Chemistry, 1926
   (2) D. Engrnr., 1944, Osaka University
D: (1) Engineer ⇒ Section Manager, AKS, 1926−1929
E: (1) Lecturer, 1930−1933 ⇒ Assistant Professor, 1933−1944 ⇒ Professor, 1944−1966;
   Dean of Faculty, Osaka University
   (2) President, Himeji Institute of Technology, 1966−1969

Code no. 18: SHIGEAKI HAMADA
A: Died in 1948 (January)
B: Kyoto University, Department of Industrial Chemistry, 1926
D: Engineer, AKS, 1926−1930 ⇒ Sub-Section Manager, Nippon Bemberg (Bemberg Plant), 1931−1934
   ⇒ Section Manager, Bemberg Plant, Nippon Bemberg, 1935−1938
   ⇒ Section Manager, Nobeoka Rayon Plant, Asahi Bemberg, 1939−1943
   ⇒ Plant Manager (Nobeoka Rayon Plant), Nichitsu Chem. Ind. (est. 1943), 1944−1947
   ⇒ Director, Nobeoka Plant, 1947 (May)−1947 (June) ⇒ President, Asahi Chem. Ind. (est. 1946), 1947−1948

Table 4 collects the list of non-university graduate engineers of AKS between 1924 and

<table>
<thead>
<tr>
<th>Year of participation</th>
<th>Name (code no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1924</td>
<td>Shozo Tachikawa (19)</td>
</tr>
<tr>
<td>1924</td>
<td>Mikio Nozaki (20)</td>
</tr>
<tr>
<td>1925</td>
<td>Naohiko Matsunami (21)</td>
</tr>
<tr>
<td>1925</td>
<td>Chikayoshi Nishi (22)</td>
</tr>
<tr>
<td>1926</td>
<td>Go-ichi Hasegawa (23)</td>
</tr>
<tr>
<td>1926</td>
<td>Yoshiaki Tamura (24)</td>
</tr>
<tr>
<td>1926 ?</td>
<td>Michihiko Kawakatsu (25)</td>
</tr>
<tr>
<td>1933</td>
<td>Hisao Okamoto (26)</td>
</tr>
<tr>
<td>1934</td>
<td>Tomio Muranishi (27)</td>
</tr>
<tr>
<td>1934</td>
<td>Hidejiro Fujii (28)</td>
</tr>
<tr>
<td>1935</td>
<td>Ryo-ichi Aoki (29)</td>
</tr>
<tr>
<td>1935</td>
<td>Shozo Miki (30)</td>
</tr>
<tr>
<td>~1924</td>
<td>Hanao Maekawa (31)</td>
</tr>
<tr>
<td>?</td>
<td>Takashi Kawabata (32)</td>
</tr>
<tr>
<td>?</td>
<td>Kikuo Miyamoto (33)</td>
</tr>
<tr>
<td>~1924</td>
<td>Yoshikichi Suyama (34)</td>
</tr>
</tbody>
</table>
1935.

Code no. 19: SHOZO TACHIKAWA
A: Died in 1959
B: (1): Kyoto College of Industrial Arts, 1917
    (2): D. Engnr., 1942, Tokyo University
C: Research Assistant (to Prof. Fukushima), Chemistry Department, Kyoto University, 1917~1923 (?)
D: Assistant Engineer, 1923 (December) or 1924 (March) ⇒ Section Manager (Engineering ⇒ Spinning Solution ⇒ Investigation), 1926~1933, AKS ⇒ (Fourth)
    Plant Manager, Otsu Plant, 1933~1943, Director 1937~1941, Managing Director, 1942~1943, Asahi Bemberg Kenshi
E: (1): Founder, Tachikawa Institute, 1943~1959
    (2): President, Nippon Cellulose Industry, 1946~1950

Code no. 20: MIKIO NOZAKI
D: Assistant Engineer ⇒ Engineer (Spinning), AKS, 1924~1926
E: (1): Plant Chief, Shonaigawa Rayon (subsidiary of Toyoda Boseki (est. 1932)),
    (2): Plant Manager (Oh-i Plant) ⇒ Managing Director, Mitsubishi Rayon

Code no. 21: NAOHIKO MATSUNAMI
B: (1): Middle school (night course) ⇒ pharmaceutical school (night course)
    (2): DSci., before 1933
D: Chemist, 1925 ⇒ Section Manager (Analytical Chemistry), 1927~⇒ (Third)
    Plant Manager, Otsu Plant, 1930~1933, Division Director (Chemicals, 1933, Research, 1934), AKS
E: Toho Jinzokenshi (est. 1934), 1934 ⇒ Director, Toho Rayon

Code no. 22: CHIKAYOSHI NISHI
B: Kumamoto Technical College, 1925 (?)
D: Engineer, AKS, 1925 ⇒ Sub-Section Manager (Carbon disulfide), Nobeoka
    Rayon Plant, Asahi Bemberg Kenshi, 1933
E: Fuji Senni
Code no. 23: GO-ICHI HASEGAWA
A : Died in 1991
B : Osaka Technical College, Department of Applied Chemistry, 1926
D : Engineer, 1926 ~ , AKS ≅ Section Manager (Spinning Solution), 1937 ~ 1939 , AKS
    ≅ Kohnan Plant, Korea Nitrogen, 1943 ~ 1945
E : (1) ; Plant Manager (Hohfu Plant) ⇒ Managing Director, Nippon Cellulose Industry, 1947 ~ 1950
    (2) ; Technical Adviser to Kaneko
    (3) ; Director, Tachikawa Institute, 1951 (?) ~ 1969

Code no. 24: YOSHIACKI TAMURA
B : Kyoto College of Industrial Arts, 1926 (?)
D : Engineer, Otsu Plant, AKS, 1926 ⇒ Sub-Section Manager (Finishing; 1933 ~ 1934:
    Spinning; 1933 ~ 1936), Nobeoka Rayon Plant, Asahi Bemberg Kenshi ⇒ Section Manager
    (Spinning Solution), 1937 ~ 1938, Nobeoka Rayon Plant, Asahi Bemberg Kenshi
E : Kurehaboukenshi

Code no. 25: MICHIHICO KAWAKATSU
B : Kyoto College of Industrial Arts, 1926 (?)
D : Engineer, AKS, 1926 ~
E : Toho Rayon

Code no. 26: HISAO OKAMOTO
B : Fukui Technical College, Department of Dyeing Chemistry, 1933
D : Engineer, AKS, 1933 ~ 1943
E : (1) ; Asahi Senko, 1943 ~ 1946 (?)
    (2) ; Nippon Cellulose Industry, 1946 ~ 1950 (?)
    (3) ; Kanebo, Hohfu Plant

Code no. 27: TOMIO MURANISHI
B : Fukui Technical College, Department of Dyeing Chemistry, 1934
D : Engineer, AKS, 1934 ~ 1943
E : (1) ; Kobe Seiko (Steel), 1943 ~ 1946 (?)
    (2) ; Nippon Cellulose Industry, 1946 ~ 1950
(3); Kanebo, 1951~ ⇒ Senior Managing Director, Kanebo Acryl

Code no. 28: HIDEJIRO FUJII
B: Kyoto Pharmaceutical College, 1934 (?)
D: Engineer, Otsu Plant, Asahi Bemberg Kenshi, 1934~1943 ⇒ Noguchi Institute (Minamata), 1943~1945
E: (1); Nippon Cellulose Industry, 1947~1950
   (2); Director, Tachikawa Institute

Code no. 29: RYO-ICHI AOKI
B: Yokohama Technical College, Department of Applied Chemistry, 1935
D: Engineer, AKS, 1935~1943 ⇒ Noguchi Institute (Minamata), 1943~
E: Director, Tachikawa Institute,

Code no. 30: SHOZO MIKI
B: Kanazawa Technical College, Department of Applied Chemistry, 1935
D: Engineer, AKS, 1935 ⇒ Nobeoka Rayon Plant, Asahi Bemberg Kenshi
E: (1); Nippon Cellulose Industry, 1946~1950
   (2); Plant Manager (Rayon Plant), Kanebo

Code no. 31: HANAO MAEKAWA
B: Osaka Technical College, Department of Mechanical Engineering
D: Engineer, ASK, 1923 ⇒ Deputy Section Manager, AKS, 1924 ⇒ Section Manager (Engineering), Otsu Plant, AKS, 1926~1933 ⇒ Section Manager (Engineering), Nobeoka Rayon Plant, Asahi Bemberg Kenshi, 1933
E: Managing Director, Fuji Sen-i

Code no. 32: TAKASHI KAWABATA
D: Sub-Section Manager (Research), Otsu Plant, 1937~1939, Asahi Bemberg Kenshi
   Head Office, Asahi
E: (1); Nippon Cellulose Industry, 1947~1952
   (2); Director, Tachikawa Institute

Code no. 33: KIKUO MIYAMOTO
B: Osaka Technical College, Department of Mechanical Engineering,
D: Engineer, AKS ⇒ Sub-Section Manager, 1933～1934^112, Nobeoka Rayon Plant, Asahi
Bemberg Kenshi^107
E: Fuji Sen-i

Code no. 34: YOSHIKICHI SUYAMA
B: Ueda Sanshi College, 1924 (?)
D: Engineer, AKS, 1924～^49
E: Vice President, Mitsubishi Rayon^49

Code no. 35 is a university graduate engineer who joined Asahi in 1930s.

Code no. 35: CHUJIRO KISHIMOTO
A: Died in 1988
B: Kyoto University, Department of Industrial Chemistry, 1932
D: Sub-Section Manager, Nobeoka Rayon Plant, Asahi Bemberg Kenshi, 1937～1941^75 ⇒
Section Manager (Finishing), 1944～1947, Asahi Bemberg Kenshi (⇒ Chisso Chemical
Industry ⇒ Asahi Chemical Industry) ⇒ (Third Plant Manager (Nobeoka Rayon
Plant), 1947～1948^112^113, Asahi Chemical Industry ⇒ Noguchi Institute, 1949～^76
E: (1): Professor, Yokohama National University
(2): Japan Association of Chemical Fibers Inspection

Note: Titles of job positions utilized in Japan in 1920s～1930s have somewhat different meanings from those at the present time. In 1920～1930s administration structure of manufacturing companies was very simple: A plant manager supervised nearly 6～7 thousands of workers and a section manager managed some thousands and even under a sub-section manager some hundreds men and women worked. So, roughly speaking, sub-section manager rank in 1920s is equivalent to team leader～department head and section manager rank in 1920s corresponds to department head～general manager rank at present time.

3 MIGRATION OF ENGINEERS FROM ASAHI

3.1 Covering rate of data on the employers in AJK and ASK

Total number of the engineers at AJK in 1919 was 5(code no. 1～5), and all of them were surveyed in this article (see Table 1). After the reformation of AJK at 1920 the total
number was reduced to three (code no. 2, 3 and 6) (see Fig. 3). All of them shifted to ASK when established in 1922. Then, covering rate of the above engineers are 100% in this study. Total number of the university graduate engineers at AKS in 1927 were said to be 14, among which one (Kyohei Inoue) was not university graduate, but university graduate equivalent. In this article 12 individuals were surveyed (see Table 3). Then, covering rate of them is \((\frac{12}{13}) \times 100\) = 92%. On the other hand, total number of technical college graduates at ASK in 1927 was 21, but no member-list was available. In this article code no.
19-25, 31 and 34 are classified in the above category (see Table 4). Then, \( \frac{9}{21} \times 100 = 42\% \) was covered in this article. From the above discussion, it is evident that the further analysis on the career inventory constructed here can be considered to represent the whole.

Fig. 4 shows the frequency distribution of duration of employment at 1927 of AKS. The figure was constructed using the data of ref. 74. Majority of the employers had only career less than three years. Average duration was 1.8 years. Fig. 5 shows the age distribution of the employers of ASK at 1927. The figure was also constructed using the data of ref. 74. Almost employers were in 20s and 30s old. Average was approximately 31.4 years old.

### 3.2 Recruitment

New graduate is defined as the person who was recruited to Asahi immediately after his (or her) graduation. Among 35 individuals investigated in this article, new graduates were 19 (code no. 3, 4, 5, 10, 12, 13, 15, 17, 18, 22, 23, 24, 25, 26, 27, 28, 29, 30, 35). At first they became company trainee for a short period to receive “on the job-training”.

“Non new graduate” is the person who had previous jobs before joining to Asahi. 6 individuals (code no. 1, 2, 6, 8 (details are unclear), 11 and 19) are classified into this category. However, with respect to their previous jobs, remaining 6 persons (code no. 20, 21, 31, 32, 33 and 34) are unidentified. Job career of code no. 7 suggests strongly the existence of a kind of company apprenticeship.

Recruitment was suspended for six years between 1927 and 1932, due to Showa financial crisis (1927), great textile depression caused by damping of Italian rayon filaments exported to Japan (1929-1930), the repeal of gold embargo (removal of the embargo on the export of gold) (1930 (January) -1931 (December)), and to the Great Depression (1929-1932). In 1927 Japan Artificial Silk Association was established by the companies of Group I and Group II (Table 2) and 10-20% curtailment of the operations were planned by the association and took effect (the first cutback; 1929 (December) -1932 (November)). The thriving of Japanese rayon industry was restored again in 1933-1934, owing to sudden drop in foreign exchange rate (caused by re-embargo on the gold export). The recruitment resumed in 1934 (see, Table 3 and 4). Inspection of Table 1 shows that engineers in AJK are consisted of Prof. Asahina and his group alone, including his research assistant (code no. 2), his students (code no. 3, 4, 5) and his brother in-law. They formed a kind of Gemeinschaft. Among them 5 individuals made abroad trip (see, the last column of Table 1). This strongly suggests that Prof. Asahina's apprentices were very talented
peoples, and grown up to the engineers of the first rank through the career inventory after, joining to AJK.

From Table 3 it is clear that all university graduates came from the same university (Kyoto), indicating a strong connection of G. Uehata (code no. 6), who had been a classmate of Prof. Shinkichi Horiba and Prof. Ikuzo Fukushima at the Chemistry and Industrial Chemistry Departments, with Kyoto University through the recruitment of the some experiment assistants (code no. 19, 21, and 28) (all were graduates of technical colleges) and the co-operative researches: Dispatch of researchers (for example, code no. 17), installment of highly advanced analytical instruments (first imported to Japan) (for examples, infra-red spectroscopy and X-ray diffraction apparatus) to the university. Code no. 9, 10, 14 and 16 had completed their graduation study under the guidance of Prof. Horiba at Department of Industrial Chemistry. Note that at the time of 1921–1922 there were already other imperial universities, such as Tokyo (Science (est. 1877), Engineering (est. 1886)), Tohoku (Science) (est. 1911), and Kyushu (Engineering (est. 1911)), than Kyoto (Science & Engineering (est. 1897 and divided in 1914)).

A characteristic composition of university graduates in 1927 (Industrial chemist (code no. 8, 9, 10, 13, 14, 16 and 18); mechanical engineer (code no. 11); 9%) indicates that ASK was strongly science-oriented.

### 3.3 Probability and field of job transfer

Among 35 individuals investigated, detailed information on two persons (code no. 14 and 16) were not identified, and 28 persons migrated in midway of career from Asahi; 23 individuals transferred to textile companies (code no. 1, 2, 4, 8, 9, 13, 15, 19–28, 30–34). Among them 5 persons (code no. 13, 19, 23, 28 and 32) were spun-off from Asahi when Otsu plant was forced to shot down in 1940s. Note that no person transferred to enterprise of other discipline than textile. 5 persons moved to academic (code no. 5, 11, 12, 17, 35). Among them 4 persons became university professors. Only 5 individuals stayed at Asahi until their retirement. In this case transfer to subsidiary company from Asahi of the person after his nomination to board member is not regarded as migration except code no. 19, who had founded a textile company and a research institute. Table 5 summarizes the transfer of job of senior engineers from Asahi. 85% of them moved to others before their retirement and only 15% of them stayed until their retirement. Majority (23/28) × 100 = 82% of the transferred persons moved to textile company, particularly viscose rayon companies.
Table 5  Transfer of Jobs of senior engineers from AJK and AKS

<table>
<thead>
<tr>
<th>Total no. of persons investigated</th>
<th>33; identified</th>
<th>28; moved before retirement from Asahi</th>
<th>23; moved to industry</th>
<th>18; other textile co.</th>
<th>17; Viscose rayon co. 52%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35</td>
<td>28; moved before retirement from Asahi</td>
<td>23; moved to industry</td>
<td>18; other textile co.</td>
<td>17; Viscose rayon co. 52%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70%</td>
<td></td>
<td>5; spin-off</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5; moved to academic</td>
<td></td>
<td>4; university</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1; school</td>
<td></td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5; stayed at Asahi until retirement</td>
<td></td>
<td></td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 100%</td>
</tr>
<tr>
<td>2; unidentified</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6  Category of enterprise to which Asahi engineers transferred during 1920-1940s.

<table>
<thead>
<tr>
<th>Category</th>
<th>Code no.</th>
<th>Total no.</th>
<th>(percentage(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>1,4,15</td>
<td>3</td>
<td>(12%)</td>
</tr>
<tr>
<td>Group II</td>
<td>2</td>
<td>1</td>
<td>(4%)</td>
</tr>
<tr>
<td>Group III</td>
<td>1,7,9,15,20,21,22,24,</td>
<td>15</td>
<td>(60%)</td>
</tr>
<tr>
<td></td>
<td>25,26,27,30,31,33,34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>(dyeing) 8, (spin-off, viscose)</td>
<td>6</td>
<td>(24%)</td>
</tr>
<tr>
<td></td>
<td>13,19,23,28,32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7  Number of times of job transfer

<table>
<thead>
<tr>
<th>Times of transfer</th>
<th>Code no.</th>
<th>Total</th>
<th>(Percentage %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6,7,8,9,21,22,24,25,31,33,34</td>
<td>11</td>
<td>(38%)</td>
</tr>
<tr>
<td>2</td>
<td>5,11*,13,15,17*,19*,20,28*,30*,32*,35</td>
<td>11</td>
<td>(38%)</td>
</tr>
<tr>
<td>3</td>
<td>4,12*,23*,26,27*</td>
<td>5</td>
<td>(17%)</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1</td>
<td>(3.5%)</td>
</tr>
<tr>
<td>&gt;4</td>
<td>2</td>
<td>1</td>
<td>(3.5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>29</td>
</tr>
</tbody>
</table>

*: academic  #: spin off
As far as the university graduate engineers are concerned, among 12, three (code no. 6, 10 and 18) remained at Asahi until full retirement, seven (code no. 8, 9, 11*, 12*, 13*, 15, 17* (suffix * means transfer to university and 0 means spin-off) changed the job, and two (code no. 14 and 16. No. 16 might be regarded as a case of transfer to academic as school teacher.) were not very clear. Table 6 collects category of enterprise to which Asahi engineers transferred during 1920～1940s. In this case code no. 1 had transferred to two companies belonging to Group I and Group II and counted here twice. Code no. 2 had moved to two companies, both belonging to Group I, then counted only once. Among the engineers who migrated to large-scale viscose rayon manufacturing companies (Group I～III), 12% of them moved to Group I, 4% to Group II and 60% to Group III. Flow of technology transfer through individuals is of course not counter current, but one side current (one way traffic).

Table 7 collects number of the times of job transfer of Asahi-trained engineers. In the embryo and early development stages of viscose rayon filament industry engineers changed their job several times (code no. 2), suggesting that the frequency of movement of engineers is relatively high. Here, note that the number of times is very nominal. Twice job change seems sometimes almost similar to once. For example, Code no. 5 obeyed compulsory military service, which was counted as job transfer. Code no. 5 changed from Teijin to Kohjin pulp and also was counted as job transfer by assuming that both companies were not belonging to single group although this assumption was not ascertained. Change of university for which he worked should be distinguished from change of company, because often the former was (even now, is) accompanied with the promotion of job status (for example, lecturer → professor (code no. 12), professor → president (code no. 17). Transfer from Nippon Cellulose Industry (NCI) to Tachikawa Institute was counted as once (code no. 13, 19, 23, 28, 32). However, the president of company was the chairman of the Institute. Then, these two organizations might belong to a group. When the former was sold to Kanebo, some engineer working at the plant (Kohfu) stayed there, but in this case we regarded that they had changed jobs (code no. 26, 27).

3.4 Annual number of quitted engineers, their duration of service at Asahi and some causes of registration

Table 8 summarizes number of engineers, quitted from Asahi during 1920～1949 as a function of the year (AD) of resignation. The above period of time can be divided into four periods:
Table 8  Number of engineers quitting from Asahi during 1920–1949

<table>
<thead>
<tr>
<th>Year (AD)</th>
<th>Number of engineers quit</th>
<th>Code no</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920</td>
<td>1</td>
<td>1 (GI), 4 (GI)</td>
</tr>
<tr>
<td>1921</td>
<td>1</td>
<td>7 (GIII)</td>
</tr>
<tr>
<td>1922</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>1926</td>
<td>1</td>
<td>20 (GIII)</td>
</tr>
<tr>
<td>1927</td>
<td>1</td>
<td>2 (GII, III)</td>
</tr>
<tr>
<td>1928</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>3</td>
<td>8, 15 (GI), 170</td>
</tr>
<tr>
<td>1930</td>
<td>1</td>
<td>110</td>
</tr>
<tr>
<td>1933</td>
<td>3</td>
<td>120, 21 (GIII), 22 (GIII)</td>
</tr>
<tr>
<td>1934</td>
<td>1</td>
<td>33 (GIII),</td>
</tr>
<tr>
<td>1935</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1942</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1943</td>
<td>3</td>
<td>19*, 26*, 27*</td>
</tr>
<tr>
<td>1945</td>
<td>2</td>
<td>23*, 30*</td>
</tr>
<tr>
<td>1947</td>
<td>3</td>
<td>13*, 28*, 32*</td>
</tr>
<tr>
<td>1949</td>
<td>1</td>
<td>35°</td>
</tr>
</tbody>
</table>

*: to university, *: spin-off
GI, GII, GIII: Group I, II, III in Table

Table 9  Number of engineers who resigned after given duration of service

<table>
<thead>
<tr>
<th>Duration of employment at Asahi (year)</th>
<th>Code no.</th>
<th>No. of engineers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1, 4, 7</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>5, 15, 17*, 20</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>12*, 22</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>21, 27</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>26°</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>28°</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>23°</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>13°</td>
<td>1</td>
</tr>
</tbody>
</table>

*: to university, °: spin-off

(1) 1920–1928: Transfer to Group I (code no. 1 and 4) and II (code no. 2)
(2) 1929–1934: Head-hunting due to booming of construction of new rayon plants (Group III in Table 2). Code no. 7, 20 and 2, resigned in 1921, 1926 and 1927, respectively (in period (2)), moved finally to Group III companies in period (3).
Table 10  Causes of resignation of engineers

<table>
<thead>
<tr>
<th>Cause</th>
<th>Name (code no.)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Restructuring of the plant</td>
<td>Asahina(1), Yoneda(4)</td>
<td>1919&lt;sup&gt;56, 25&lt;/sup&gt;</td>
</tr>
<tr>
<td>(2) Suspension of operation</td>
<td>Mitsui(5)</td>
<td>1922&lt;sup&gt;61&lt;/sup&gt;</td>
</tr>
<tr>
<td>(3) Disagreement over technical opinion with supervisor (code no. 6)</td>
<td>Kami(2)</td>
<td>1925 or 1926&lt;sup&gt;26, 28&lt;/sup&gt;</td>
</tr>
<tr>
<td>(4) Disagreement over technical opinion with supervisor (code no. 10)</td>
<td>Nozaki(20)</td>
<td>1926&lt;sup&gt;38&lt;/sup&gt;</td>
</tr>
<tr>
<td>(5) Withdrawal of capitals of Nichimen from ASK</td>
<td>Ando(8), Shiraiwa(15)</td>
<td>1926&lt;sup&gt;73&lt;/sup&gt;</td>
</tr>
<tr>
<td>(6) Objection of the president (J. Noguchi) against application of doctorate</td>
<td>Matsunami(21)</td>
<td>1933&lt;sup&gt;32&lt;/sup&gt;</td>
</tr>
<tr>
<td>(7) Closure of the Otsu plant</td>
<td>Tachikawa (19) et al</td>
<td>1943&lt;sup&gt;117&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Table 11  Job status of engineers at their time of resignation from Asahi group

<table>
<thead>
<tr>
<th>Job status</th>
<th>Engineers Code no.</th>
<th>Total number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-section manager</td>
<td>15, 20, 22, 25, 33</td>
<td>5</td>
</tr>
<tr>
<td>Section manager</td>
<td>9, 11*, 12*, 17*, 24, 25*, 31</td>
<td>7</td>
</tr>
<tr>
<td>Plant manager</td>
<td>8, 13, 19*, 21, 35*</td>
<td>5</td>
</tr>
<tr>
<td>Director or Managing director</td>
<td>19*</td>
<td>1</td>
</tr>
</tbody>
</table>

*: to university  †: spin-off

Table 12  Final or semi-final job status of engineers after migration from Asahi

<table>
<thead>
<tr>
<th>Status after job migration</th>
<th>Example (Code no.)</th>
<th>Total no.</th>
<th>(percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Plant manager</td>
<td>2, 4, 20, 30</td>
<td>4</td>
<td>18%</td>
</tr>
<tr>
<td>2 Director or managing director</td>
<td>1, 2, 7, 12, 20, 21, 23*, 27, 28*, 31, 32</td>
<td>11</td>
<td>50%</td>
</tr>
<tr>
<td>3 Senior vice president</td>
<td>4, 15, 19*, 32</td>
<td>4</td>
<td>18%</td>
</tr>
<tr>
<td>4 President or chairman</td>
<td>4, 12*, 15</td>
<td>3</td>
<td>14%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

(3) 1935～1942: No transfer to other company.

(4) 1943～1947: Spin-off caused by close-down of Otsu plant.

All engineers resigned in 1943～1947 spin-off.

Table 9 collects the duration of employment at Asahi of engineers, who quitted from Asahi. Average duration is estimated to be 7.6 years. If the spin-off engineers are excluded for calculation, the average duration is 4.6 years.
Table 13  Engineers who awarded doctorate (DSci. or DEng.) after joining to Asahi

<table>
<thead>
<tr>
<th>Name (code no.)</th>
<th>Degree</th>
<th>Year</th>
<th>University</th>
<th>Academic or industrial job</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Hisatake (11)</td>
<td>D. Eng.</td>
<td>1942</td>
<td>Kyoto U.</td>
<td>Prof. Osaka U.</td>
</tr>
<tr>
<td>T. Ogiwara (12)</td>
<td>D. Sci.</td>
<td>1944</td>
<td>Kyoto U.</td>
<td>Prof. Osaka U.</td>
</tr>
<tr>
<td>T. Ishino (17)</td>
<td>D. Sci.</td>
<td>1942</td>
<td>Osaka U.</td>
<td>Prof. Tokyo U.</td>
</tr>
<tr>
<td>S. Tachikawa (19)</td>
<td>D. Eng.</td>
<td>1933</td>
<td>Tokyo U.</td>
<td>Chairman Res. Inst</td>
</tr>
<tr>
<td>N. Matsunami (20)</td>
<td>D. Sci.</td>
<td>~1933</td>
<td>Kyoto U.?</td>
<td>Director Toho Rayon</td>
</tr>
<tr>
<td>C. Kishimoto (35)</td>
<td>D. Eng.</td>
<td></td>
<td></td>
<td>Prof. Yokohama</td>
</tr>
</tbody>
</table>

Table 10 illustrates some causes of resignation.

3.5 Professional status of engineers at ASK at the time of their resignation and engineers who were awarded doctorate

The job status of engineers at ASK when they quitted from ASK was summarized in Table 11. It is interesting to note that there is no significant difference in the occurrence of job transfer among three status: sub-section, section and plant manager. Three section managers shifted to well-established universities (as lecturer grade) and after that a plant manager took to a professorship of newly up-graded university.

Table 12 collects final or semi-final status of former Asahi engineers. 50% of them became finally the member of board as director or managing director. 18 and 14% of them promoted to the senior vice-president and the top management (president or chairman), respectively. We can conclude that job transfer is somewhat vertical or ascending migration, making a prominent contrast to descending migration, popular at present time due to the business restructuring.

Table 13 summarizes the personal information of the individuals who had been awarded the doctorate after joining Asahi Kenshoku. Six persons among 35 obtained the doctorates. How unbelievably high rate at the times when the doctorate awarding to engineers working at manufacturing companies can never be supposed to be popular! Details of awardees are: Four university graduates (code no. 11, 12, 17 and 35) and two technical college graduates (code no. 19 and 21). Note that code no. 19 and 21 were experiment assistants to professors of Kyoto university before joining ASK. Rate of doctorate awarding was 30% (code no. 6, 8~18, 35) for the university graduates and 12% (code no. 3, 19~34) for the technical college graduates. Code no. 19, 20 and 35 obtained the degree while working at Asahi, and code no. 11, 12, and 17 got the degree after migration to universities as lecturer (the latter two) or assistant professor (the former).
4 CONCLUSION

Career inventory of 35 white-collar senior engineers employed once at AJK and AKS during 1920-1940s were constructed.

1 85% of them quitted from Asahi before retirement.
2 70% of them moved to industry, particularly to viscose rayon manufacturing companies.
3 Average duration of service at Asahi until resignation was 7.6 years in total and 4.6 years if spin-off case was excluded.
4 Three transfer waves were detected; 1926~1934 and 1943~1947.
5 Group III companies were greatly benefited by the transfer of engineers.
6 Four among 35 took professorships of university in Japan.
7 Doctorate was awarded to six persons.

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