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The Impact of the Japanese Management Practice**

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# **Adaptation of Lean Production in China: The Impact of the Japanese Management Practice**

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## **Abstract**

The purpose of this paper is to examine the adaptation of the lean production system in China. In a large context of worldwide Japanization, the Chinese firms paid more attention to and introduced the Toyota production system earlier than American and European firms. First Automotive Works (FAW), the prototype of the Ford production system in China, began to introduce the philosophy of Toyota production system under the direct technological instructions by Taiichi Ohno, one of the earliest proponents of the Just-in-Time method in Toyota in late 1970s. They also built a typical Toyota-style transmission plant which received technological assistance from Hino Motor Co. of Toyota Group in late 1980s. These efforts have been contributing to a great extent the evolution of the production system in FAW.

FAW invited Taiichi Ohno, who was born in China, to conduct seminars and on-the-spot technological instructions in 1977 and 1981. In FAW, Ohno not only harshly criticized the existing mass production system of FAW, but also taught FAW by showing the example of changing the lay-out of production line. Besides, FAW also sent an observation mission to learn Japanese management methods and visited ten Japanese automobile companies for five months in 1978.

The FAW Transmission Plant, which introduced Just-in-Time (JIT) method, is viewed as one of the best plants in China. FAW has attempted to adopt the lean production system that characterizes Toyota. FAW is in the middle of learning the lean production, and the transmission plant has become a typical model of this system.

Every person above manager level in FAW has the book "*The Machine that Changed the World*" (MIT, IMVP). By 1995 thirteen seminars focused on lean production had been held at the FAW Academy of Communist Party.

Technology transfer between plants is one of the serious problems in FAW. There is a unique coexistence of different production systems including those former Soviet Union, Japan, US and Germany because of the different adoption time. In general, the evolution process of production system of FAW shows an example of worldwide Japanization and a good direction for the reform of state-owned firms which are in the labor pains of building up competitiveness in an increasingly market-oriented economy in China.

Shanghai Automotive Industry Corporation (SAIC), which is viewed as one of the most successful holding company in the Chinese automobile industry, is another typical case for adopting lean production system in China.

In order to reach the quality regulation of Shanghai Volkswagen(SVW), a core joint venture company under Shanghai Automotive Industry Corporation, SAIC first established unique system 'Special Production Zone' within its subordinated factories. While it was Japan Koito Manufacturing Company that actually brought lean production into Shanghai. The largest overseas investigation delegation consisted of top managing staff from 16 makers of SAIC was assigned to Japan by the invitation of Koito Manufacturer for almost one-month actual investigation in 1992. From 1994, SAIC selected Shanghai Automobile Gear Works and other 4 factories as a breakthrough to practice 'Team Work Method', 'Just-In-Time Production', 'JIT Delivery System of

Components' and 'Systematic Supply'. In the beginning of 1995, SAIC drafted a 'New Strategic Prospect' for the forthcoming 5 or 6 years, so called 'Up and Down' (development capability-up, product cost-down). To realize cost reduction and enhance the crisis consciousness, SAIC began its promotion of lean production thoroughly.

While in the establishment duration of lean production, the conflicts existed between the traditional identity of mass production & Chinese-style production management and the identity of Toyota's JIT. The resolution of mechanism degree of technique transformation among factories, that is the degree of the lean production introduced within the whole company serially has become the biggest touchstone to test the evolution capability of FAW. On the other hand, SAIC's introduction and promotion of lean production resulted in the mutual function of inner & outer elements with the privilege of capacity improvement. This paper implies one realistic problem that is the breaking away from former management system and traditional mass production under the present planned economic system.

## **I. Introduction**

This paper aims to shed light on the adoption and adaptation of lean production system in the Chinese auto industry in a large context of evolution of production system. As unknown by the foreign researchers, the oldest Chinese auto maker, First Automotive Works (FAW) took the lead in adopting of Toyota production methods in the later half of 1970s, which was earlier than the US and European auto manufacturers. They invited Taiichi Ohno, who was born in China and Known as the earliest proponent of the Just-in-Time method in Toyota, to conduct direct on-the-spot technological instructions in 1977 and 1981. They also built a model plant of the Toyota production system with technological assistance from Hino Motor Co. of the Toyota Group in the late 1980s.

This research also attempts to illustrate the adaptation and impact of lean production system by focusing on FAW and Shanghai Automotive Industry Corporation (SAIC), which is viewed as one of the most successful company in the Chinese automobile industry.

Through these analyses, we intend to explain the development of lean production system in China. We will especially pay attention to the adaptation of this system under the transformation from a planned economy to market economy. Few studies have been conducted on how lean production functions under different economic structures.

We believe this attempt is useful both for the access to the Chinese market by foreign companies and for making international comparison of adaptation of lean production by academic researches.

## **II. Adoption the Lean Production System In China: The Case of First Automotive Works**

In order to illustrate the evolution process of the production system in FAW, this section divided three small sections--the original system of FAW, evolution of the production system through the full model change in 1986 and the company-wide improvement of lean production from the late 1970s.

### **II. 1. The Original Production System of FAW<sup>1</sup>**

In 1949 the People's Republic of China was founded. In the following year Mao Zedong visited the Soviet Union and signed the Sino-Soviet Alliance Agreement of Friendship and Cooperation with Stalin. This led China to construct its first automobile plant, First Automotive Works in Changchun in 1953. FAW was the largest of the 156 projects of technological and financial assistance that the Soviet Union undertook in China.

This symbolized the starting of the Chinese car industry. It also meant that China introduced the mass production system through the Soviet Union. When the mass production system was introduced into the Soviet Union from the mid 1920s to the 1930s, two of the three car makers in the Soviet Union received direct technological assistance from Ford. They adopted the integrated production system that incorporated the whole process from parts manufacturing to final assembly, and imitated the production technology of

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<sup>1</sup> The material in this section is based on The First Automotive Works, Zhongguo qiche gongye de yaolan, 22-59.

the American car manufacturers.<sup>2</sup> With the assistance of the Soviet Union, FAW adopted the same highly vertically-integrated production system as the Soviet car makers.<sup>3</sup> Its mother plant was the old 'Stalin Auto Plant' in the suburbs of Moscow, now the ZIL Auto Company.

FAW adopted a mass production system, which was characterized by mass production of a single product and high vertical integration. The single model FAW produced was the Jiefang (Liberation) CA10 4-ton truck, which was based on the ZIS (later ZIL) 150 4-ton truck developed in the Stalin Auto Plant in the 1940s. Since this model was nicely suited for the bad road conditions and diverse natural conditions in China, it became the major means of road transportation. It was produced for 30 years from 1956 to 1986 without full model change, and 1.28 million units were produced in total. This model dominated the Chinese car market until the late 1970s. There were three improvements on this model (in 1958, 1981, and 1982), but all of them were minor changes of the CA10.

FAW built up its production logistics in a concentrated local area through highly vertical integration. As late as in 1985 the production logistics at FAW were not much different from those in its early stage of operation. It incorporated 26 plants, including casting, forging, machining, and final assembly plants. In 1985 FAW's in-house parts manufacturing rate was 60 per cent, other parts being supplied by 95 parts makers around the country. In the same year it employed 70,000 people and produced 85,000 units of vehicles, 99 per cent of which were Jiefang trucks (including

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<sup>2</sup> Nissan Motor Co., Jidosha Sangyo Handbook [Automobile Industry Handbook], 1992/3 (Tokyo, 1993), 36.

<sup>3</sup> At the time, the Soviet Union did not have capabilities to provide China with large quantities of KD parts. This also necessitated building an integrated plant in China.



chassis of the same model).<sup>4</sup>

Chen Zutao, the first director of FAW's Engineering Department, commented on FAW's production logistics in 1983:<sup>5</sup>

The plant engineering at FAW reflected the Soviet design policy in the 1950s. The major shortcoming is it was too general. Because we wanted to build our auto industry in a short time, it was right to construct a general auto plant at that time. But we did not take the chance to move forward to mass production through specialization. That hindered the further development of the auto industry. FAW's planned capacity was 30,000 units a year. Thanks to the efforts made by employees to tap production potentials, the annual output increased to 70,000 units. But it was difficult to go beyond that.<sup>6</sup>

This rigid Ford production system was maintained in an environment in which FAW dominated the domestic market and large and medium-sized car manufacturers coexisted without competition into the early 1980s. But it

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<sup>4</sup> The State Council Research Centre for Social, Economic, and Technological Development, Yiqi zai gaige kaifang shiqi de jishu gaizao--laizi shengchan diyixian de diaocha baogao [Technological innovation of FAW in the era of reform and openness -- Report from the first-line production] (Beijing, 1988), 4-10.

<sup>5</sup> Chen was one of the major technological coordinators of FAW with the Soviet Union. He was a former president of China National Automotive Industry Corporation (CNAIC).

<sup>6</sup> The First Automotive Work, Zhongguo qiche gongye de yaolan, 39.

was forced to change after market competition intensified in the mid 1980s.

Through the overview of the history of FAW, we can see FAW is the prototype of the mass production system in China. It played an indispensable role in the development of the whole industry. The next section will be devoted to analyzing the evolution of the production system in FAW.

## **II. 2 Evolution of the Production System through the Full Model Change<sup>7</sup>**

The direct competition with Dongfeng Motor Corporation (Dongfeng) brought a chain of reactions at FAW. Its first response was to make the full model change on Jiefang in 1986, which could be regarded as a historical turning point for FAW.

The challenge from Dongfeng Motor triggered a chain of reactions at FAW. Dongfeng was a purely domestic car maker boasting the best of China's machinery-industry technology in the 1970s. In 1978, under the government's centralized plan, Dongfeng Motor put the Dongfeng (Aeolus) EQ140 medium-sized truck (5-ton) on the market. Upon entering the 1980s, Dongfeng Motor rapidly expanded its market share with the technologically superior Dongfeng EQ140, and in 1986 it eventually outstripped FAW to become the top maker.<sup>8</sup> In the same period, because of

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<sup>7</sup> This material in this section is based on Part 3 of the State Council Research Centre, Yiqi zai gaige kaifang shiqi de jishu gaizao, 129-62 unless otherwise noted.

<sup>8</sup> Production volumes at FAW and Dongfeng in selected years were: 1980--FAW: 66,000, SAW: 31,500; 1986--FAW: 61,600, SAW: 87,300; 1990--FAW: 69,400, SAW: 108,000; 1993--FAW: 170,000, SAW: 180,200. From yearly editions of Zhongguo qiche gongye nianjian [The Chinese Automobile Industry Yearbook] . For the detail about the direct competition between FAW and Dongfeng, see Chunli Lee,

the government's openness policy, foreign vehicles poured into China, changing China from a seller's market to a buyer's market.

FAW, now competing with both domestic and foreign car makers, slumped into a management crisis. The monthly sales of its Jiefang decreased from 6,000-7,000 to 200-300 units. The inventory at one time peaked at 20,000 units.<sup>9</sup> Facing this situation, FAW had to make the first full model change on its Jiefang in 30 years.<sup>10</sup>

The new product developed independently by the Changchun Automobile laboratory of FAW was the Jiefang CA141 truck (5-ton). For the first time FAW used the CAD (computer-aided design) method for product design and part of the CAM (computer-aided manufacturing) method for manufacturing.

However, although FAW has obtained technological development capability, parts makers have not. In the process of development, FAW purposely increased the proportion of ordered parts, decreasing the in-house parts manufacturing rate from 60 to 50 per cent. But there is still little involvement by parts makers in the product development process.

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Gendai chugoku no jidosha sangyo: kigyo system no shinka to keiei senryaku (The Chinese Automobile Industry: Manufacturing System and Technological Strategy ), Shinzansha Press, Tokyo, 1997.

<sup>9</sup> The State Council Research Centre, Yiqi zai gaige kaifang shiqi de jishu gaizao, 180, 296.

<sup>10</sup> According to Li Zhiguo, the first vice-president who was in charge of the model change, FAW put forward twelve proposals for model change on Jiefang in the years following its introduction in 1956. Because FAW had no authority to make the investment decisions, none of these proposals were approved. The majority of state investment was directed towards new car makers like SAW. From Zhongguo qiche gongye nianjian 1986 [The Chinese Automobile Industry Yearbook 1986], 49-50.

The full model change had a profound impact on FAW's production system. The last old Jiefang truck rolled off the assembly line on 26 September 1986, ending the 30-year history of the truck. In order to assemble and test new equipment, production stopped for 3 months until 1 January 1987, when FAW began to manufacture the new Jiefang. Because FAW had only one assembly plant producing the old Jiefang, there was little interchangeability in the existing manufacturing processes. As a result, FAW was forced to ramp up by shutting down.<sup>11</sup>

Moreover, its existing 12,000 machines, most of which were special-purpose machines for the old Jiefang, were obsolete. Except for the 4,600 units that were repaired and remodelled, over 60 per cent of the machines were abandoned. The lack of flexibility that existed in the mass production system brought about its failure. The great cost incurred by FAW in the model change led it to abandon the mass production system.

### **II.3 Adoption of the Lean Production in FAW**

The intensified market competition and the costly model change on Jiefang also forced FAW to change its production strategy. FAW has attempted to adopt the lean production system that characterizes Toyota in order to inject some flexibility into its production system.<sup>12</sup>

FAW introduced the philosophy of the Toyota production system as

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<sup>11</sup> Pattern of ramp-up: see K. B. Clark, and T. Fujimoto, Product Development Performance (Boston, 1991), 188-204.

<sup>12</sup> For the factors that make up the 'lean production' system, see J. Womack, D. T. Jones, and D. Roos, The Machine That Changed the World (New York, 1990). This paper emphasizes the Just-in-Time method, the core of this system, as compared with the traditional mass production system.

they invited Taiichi Ohno, who was born in China and Known as the earliest proponent of the Just-in-Time method in Toyota, to conduct one-week seminars and on-the-spot technological instructions in 1977 and 1981 in FAW.<sup>13</sup> In FAW, Ohno not only harshly criticized the existing mass production system of FAW, but also taught FAW by showing the example of changing the lay-out of production line. Besides, FAW also sent an observation mission to learn Japanese management methods and visited ten Japanese automobile companies for five months in 1978. This means the Chinese firms paid more attention to and introduction the Toyota production method earlier than American and European firms in a large context of worldwide Japanization.

FAW also built a typical Toyota-style transmission plant which received technological assistance from Hino Motor Co. of Toyota Group in late 1980s. These efforts have been contributing to a great extent the evolution of the production system in FAW.

According to a report in 'People's Daily', FAW has started to run trials in 9 workshops located in 5 parts plants from 1992. The transmission plant, which received technological assistance from Hino Motor Co. of the Toyota Group, is regarded as a model plant of this system.<sup>14</sup>

The FAW Transmission Plant, which introduced Just-in-Time method, is known as one of the best plants in China. FAW has attempted to adopt the lean production system that characterizes Toyota.

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<sup>13</sup> By author's interview with Li Zhiguo, the former first vice-president of production management at FAW, 6 September 1994.

<sup>14</sup> From 'FAW implements the "lean production" system: challenging the traditional mass production system', People's Daily (China), 29 May 1994.

According to a report in 'People's Daily', FAW has started to run trials in 9 workshops located in 5 parts plants from 1992. The transmission plant, which received technological assistance from Hino Motor Co. of the Toyota Group, is regarded as a model plant of this system.<sup>15</sup>

FAW implemented the 'flow production' method, changing from the original method of upstream process pushing the downstream process to that of downstream process pulling the upstream process. This method largely reduced the inter-process inventory and use of floating funds...<sup>16</sup> FAW also changed from one worker handling one machine to one worker handling several different kinds of machines. It decreased direct workers on the line by making them work to their full capacity within the work time. As a result, it increased its productivity.<sup>17</sup>

This shows that in some of FAW's plants a single worker is in charge of multiple machines and workers engage in multi-task operations. For instance, in the transmission plant a single worker handles 3 different kinds of machines.

FAW has also changed its production and parts supply methods.

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<sup>15</sup> From 'FAW implements the "lean production" system: challenging the traditional mass production system', People's Daily (China), 29 May 1994.

<sup>16</sup> Taiichi Ohno posited the method of downstream process pulling the upstream process as a basic rule of Toyota's 'kanban' method, which was designed for a smooth 'flow production'. See T. Ohno, Toyota Seisan Hoshiki [Toyota production method], (Tokyo, 1978), 58-9.

<sup>17</sup> People's Daily, 29 May 1994.

FAW changed from the big-lot production of a single product to small-lot production so as to produce multiple products, reduce inventory space, and decrease the workload of parts movement. It made an effort to stabilize the daily production volume, and changed its parts supply method from a storage to a 'kanban' delivery, which is set to match the 'tact' of production.<sup>18</sup>

In the early 1980s, the Chinese government pursued a business group policy under the influence of Japanese management practice. This policy aimed to systematize products through restructuring the whole car industry. Under the supervision of the China National Automotive Industry Corporation (CNAIC), seven large business groups were established, including the nationwide local car and parts manufacturers.<sup>19</sup> These manufacturers engaged in the OEM production of major models for the core companies like FAW and Dongfeng, thus forming the domestic production network.<sup>20</sup>

The FAW Group was established under the influence of Toyota's production strategy, in which the body assemblers of the Toyota Group engage in the consignment production of Toyota's models.<sup>21</sup> The primary

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<sup>18</sup> People's Daily, 29 May 1994.

<sup>19</sup> CNAIC is an administrative organization in charge of the overall Chinese car industry. It was first established by the government in 1964 and disbanded in 1966 when the Cultural Revolution began.

<sup>20</sup> Other core companies were Nanjing, Jinan, Beijing, and Shanghai.

<sup>21</sup> For the formation of assembler network and consignment production in Toyota, see Shiomi, H., 'The Formation of Assembler Networks in the Automobile Industry: the

objective of the FAW Group was to establish an assembler network nationwide by providing chassis made in FAW to the existing small local assemblers, which in turn engaged in OEM production of Jiefang variations.

In medium-sized trucks, in which it has a good mastery of product and production technology, FAW has formed the assembler network to expand its business organization for entry into the new regional markets. The assembler network is the group of small local assemblers engaged in OEM production of FAW's brands. These assemblers are companies independent of FAW. But the production of chassis is still concentrated in FAW. This strategy is made possible by the fact that a truck's body can be separated from its chassis.

The new production logistics at FAW consists of 28 parts manufacturing plants and 9 assembly plants. Models produced in each plant are the following:

- (1) The First Passenger Car Plant (new Red Flag, 2.2 liters);
- (2) The Second Passenger Car Plant (Audi 100, 2.2 liters);
- (3) off-road vehicle plant (from 1963, CA30 2.5t.);
- (4) medium-sized truck assembly plant (CA141 5t., CA151 6t.);
- (5) Changchun Large Truck Plant (CA155 8t.);
- (6) Changchun Small Truck Plant (1046 2t.);
- (7) Jilin Light Truck Plant (1026 1t.);
- (8) Sichuan Special-purpose Vehicle Plant;
- (9) Dalian Bus Plant (mainly producing chassis).

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Case of Toyota Motor Company, 1955-1980'. Also see Shioji, Y. 'Toyota jiko ni okeru itakuseisan no tenkai' [The evolution of consignment production at Toyota Motor Company], Keizai Ronso [Economics Review], 138 / 5, 6 (1986).



In addition to these plants, FAW set up the FAW-VW Automotive Co. Ltd in 1991 to begin the KD production of Golf and Jetta. Audi has been produced in FAW under a VW license since 1988.

In commercial vehicles FAW covers each segment of large, medium-sized, small, and light trucks with 4 basic models, and over 30 variations of the models. In passenger cars it has 3 basic models: the new Red Flag, Audi, and Golf (Jetta). All models, except VW's Audi, Golf, and Jetta, were developed by the Changchun Automobile Laboratory.<sup>22</sup> With the line-up of these 7 models FAW has established a full-line system.

All this demonstrates that FAW has made considerable efforts to increase flexibility in the production system and products in order to overcome the rigidity of its original mass production system. FAW is in the middle of learning the so-called "lean production", and the transmission plant has become a typical model of this system. Every person above manager level in FAW has the book *"The Machine that Changed the World"* (MIT, IMVP). By 1995 thirteen seminars focused on lean production had been held at the FAW Academy of Communist Party.

However, Technology transfer between plants is one of the serious problems in FAW. There is a unique coexistence of different production systems including those former Soviet Union, Japan, US and Germany because of the different adoption time. In general, the evolution process of

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<sup>22</sup> The new Red Flag is the only purely domestic passenger car in China today. FAW released this model in March 1994. The old Red Flag was the first Chinese-made passenger car introduced in 1958. Both models were developed independently by the Changchun Automobile Laboratory.

production system of FAW shows an example of worldwide Japanization and a good direction for the reform of state-owned firms which are in the labor pains of building up competitiveness in an increasingly market-oriented economy in China.

### **III. Adaptation and Popularization of Lean Production in SAIC**

This section will attempt to focus on the case of the adaptation and the impact of lean production system in Shanghai Automotive Industry Corporation (SAIC), which is viewed as one of the most successful companies in the Chinese automobile industry.

#### **III.1 The Establishment of Shanghai-VW and its Enforcement of Quality Control System**

After China's adoption of the opening policy to the outside world in the late 1970s, each enterprise in China's automotive industry began to introduce advanced techniques actively to improve its less developed technique. There is one successful case, that is the Shanghai Automotive Industry Corporation (SAIC), which established Shanghai-VW, a joint venture with Germany-VW and later realized its modern management system and large productivity by its localization of Santana cars and their parts.

In order to increase manufacturing ability of passenger cars, SAIC formally signed a contract with Germany-VW regarding the technical introduction and joint-ventured production of Santana cars in Oct. 1984 according to government policy of technical introduction. Since the establishment of Shanghai-VW, the management identity, i.e. 'Quality is

the lifeblood of Shanghai-VW' is promoted. Shanghai-VW has formulated strict quality control process of part's localization according to the standard of Germany-VW and made requirement to SAIC's subordinated companies according to the part sample of Santana car in order to guarantee the quality of Santana car. With the support of Shanghai government, SAIC's managers insist on VW's quality control standard and formed the part supply network of Santana through part localization by overcoming various difficulties according to the strategic purpose of catching up world level & increasing ability.

In order to reach VW's quality regulation, SAIC first established unique system 'Special Production Zone'. Beginning with the substitute of Craft Production system along with the introduced advanced production line, SAIC achieved the purposes like the improvement of production environment and stability of product quality by the training of employees and the inspection of operation through the arrangement of material route & on-the-spot layout or color-mode mark management.

### **III. 2 The Adaptation of Lean Production in Shanghai Koito**

It was German- VW that initially introduced mass production and quality control system into Shanghai. While it was Japan Koito Manufacturing Company that actually brought lean production into Shanghai. Shanghai-VW was definitely much influenced by VW's lean production--KVP2 that directly adopted from VW, but as far as Shanghai Automotive Industry Corporation(SAIC) concerned, it has totally begun to introduce thoroughly Japanese lean production & adopted in the whole company by taking Koito's route and concentrated on the investigation related to genuine lean production. The actual

introduction of Japanese lean production in the whole company and investigation on Japanese management by Koito's route marked the real beginning of study and popularization of genuine lean production.

"Shanghai Koito Automotive Lamp Company Ltd."(abbreviation as Shanghai-Koito) is the joint venture between Koito Manufacturing Company and SAIC, which completely adopts Japanese-style management system. The predecessor of Shanghai-Koito was Shanghai Auto Lamp Factory, which began to accept Koito's technical assistance from 1982. And the joint-ventured corporation was established in Feb. 28, 1989. Investment percentage was 50% in SAIC, 45% in Koito Manufacturing Company and 5% in Toyota Tsusho Company Limited. 70% products of Shanghai-Koito are utilized in Santana car production by Shanghai-VW, and the other 30% are provided to auto makers in Changchun, Tianjin, Jinan, Nanjing and other cities. Shanghai-Koito emphasized on-the-spot management and made every worker follow Japanese management system in the shortest possible time as it introduced advanced equipment as well.<sup>23</sup>

In its first 3 years since the establishment in 1989, Shanghai-Koito's first adoption was so called inner-company's environment preparation, 6S[Seili(adjustment), Seidon(putting in order), Seiketsu(cleanliness), Souji(cleaning), Syukan(habit),Syuyou(cultivation)], followed by the introduction of suggestion system and the purpose management system later. Then it was active in QC(Quality Control) performance.

The employment of Shanghai-Koito was 563 at the end of 1995 without labor added for 6 years after its establishment in 1989, but the sales value in 1995 was more than 19.8 times than the pre-combination

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<sup>23</sup> Taku Oshima's comments on the technique introduction and production management of Shanghai Koito, 1995.

in 1988, profits reached 13.8 times. All progresses were caused by the promotion of production and expansion of productive capacity by various endeavors and improvements. Shanghai-Koito applies the system of sending his employees to Koito(in Japan) for research and training. 20 employees will be sent every time to Koito, mainly in production spot(with each duration of 3 or 4 months).

The research assignment had been 7 times till September 1994. There was one case of lamp assembly line improved in Shanghai-Koito, which was introduced from Japan-Koito and was approved as grade A component for Shanghai-VW just after one trial production. Later on Shanghai-Koito made his improvements of this line for three times. The first improvement was the utilization of 2 special machines in the line with the productivity up to 100,000 from 65,000 set. The second was the adoption of automatic inspection equipment in order to decrease inferior products. By the third improvement, employment was reduced to 5 from 6 persons, but the productivity per day was increased to 1400 from 1200 sets with great reduction of non-efficiency operation of employees and production space.<sup>24</sup>

### **III.3 The Adaptation of Lean Production in SAIC**

Actually SAIC was confronted with lean production system at the beginning of 1990s, just as the book *The Machine That Changed The World* written by MIT's IMVP(International Motor Vehicle Program) was translated into Chinese and introduced widely in Chinese automotive industry . Since then SAIC delivered related materials including this book to each factory and invited Germany professors to

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<sup>24</sup> According to the inner pamphlet of SAIC.

give lecturers on lean production. But anyway the system was introduced through the third person without direct confrontation. The largest overseas investigation delegation consisted of top managing staff from 16 makers of SAIC was assigned to Japan by the invitation of Koito Manufacturer for almost one-month actual investigation from Oct. 1 to Oct. 31, in 1992. The delegation mainly visited Koito's factory and got deep understanding of Japanese lean production. The manager of Shanghai Automobile Electrical General Plant, member of the delegation wrote afterwards as the follows.

"I have read *The Machine That Changed The World* several times. Even though I desire to understand 'lean production', actually I didn't grasp its know-how. When I came to Japan this time, I finally got real concept of 'lean production' by one month research, 10 days lectures participation and 25 factories investigations. This is the pursuit for maximum productivity, best quality & highest interest by minim input which will keep going on. The teachers who taught us never used the phrase 'lean production', but every lecture, investigation was actually focused on 'lean production'. As one of managers in large companies, I occasionally feel pressed and anxious, which has become the incentive for me to work hard."<sup>25</sup>

Another member of this delegation, the president of Shanghai Automotive Industry Import & Export Corporation, described his impressions as the following.

"I was entirely impressed by the Japanese-style management system

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<sup>25</sup> Xun Chuanlin, Shanghai Automobile News, April 20, 1993.

through this investigation. Actually the most important factor in modern management is 'person', that should be regarded as the most valuable property. Employee's potential ability should be utilized to the greatest extent. The employee's potential ability is much more stressed in Japanese enterprises and their personal capacity is developed under the best circumstances, by which different aspects of management are improved."<sup>26</sup>

After this delegation returned to China, SAIC began to launch 'lean production' promotion campaign widely from 1993. Japanese instructors were invited to give their routine presentations in different levels to almost all participants ranging from presidents to ordinary workers within 2 years. Meanwhile, in order to introduce lean production, SAIC carried out '20 Subjects of Crisis Management' in 1993 to enhance a crisis sense of manager, in which SAIC pointed out the necessity to confront with both inner & outer crises.

Within China, even though the car productivity & localization rate of SAIC held a stronger leading position than others, the rest makers especially giant auto groups affiliated to central government quickened their pace to catch up by introducing overseas technology and equipment actively. Outside China, world car-production giants are pursuing the possibility to enter Chinese market. There is high possibility for China to join WTO recently, therefore China must recognize its confrontation with the forceful challenge of worldwide competition from now on. SAIC has laid down the basic foundation for on-the-spot management & quality control systems to certain extent by introducing management system of 'Special Production Zones' and

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<sup>26</sup> Li Zhenmin, Shanghai Automobile & Tractor, the 4th periodical, 1993.

quality control system of developed country within recent years. But there is still tremendous distinction with foreign advanced countries, regarding technical level, especially management level. It is just temporary to remain competence by low cost & mass production and is not the way to carry through. SAIC gets the conclusion that the most effective way to eliminate this distinction is to increase ability & quality and cut down the cost by actively introducing lean production & unremitting improvement.

From 1994, SAIC selected Shanghai Automobile Gear Works and other 4 factories as a breakthrough to practice 'Team Work Method', 'Just-In-Time Production', 'JIT Delivery System of Components' (small-quantity supply related time required by assembler) and 'Systematic Supply' (one large-unit supply by one maker). By one year endeavor, these makers had made outstanding achievements. For example, the circle duration of half-made products in Shanghai Automobile Gear Works reduced to 42 days from 82 with the 31% utilization reduction of circulating assets. Average production is conducted by few days instead of period of days. Labor forces are reduced 20% by training multiple-skilled workers. 'Zero Defect', one quality control method in Shanghai Huizhong Automotive Corporations is applied in almost 200 projects, with the accumulative 1400,000 yuan interest.<sup>27</sup>

### **III.4 The Thoroughly Popularization of Lean Production System in SAIC**

In the beginning of 1995, SAIC drafted a 'New Strategic Prospect'

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<sup>27</sup> According to the inner pamphlet of SAIC.



for the forthcoming 5 or 6 years, so called 'Up and Down'(development capability-up, product cost-down). In order to realize cost reduction and enhance the crisis consciousness, SAIC printed and delivered to its subordinate makers the pamphlets entitled 'Lean Production Concept & Method' & 'Team Work Method' with detailed introduction of practical cases of team performance and improvement method in Japanese enterprises that marked the beginning of thoroughly promotion of lean production.

The methods of lean production and its accomplishments presented by one maker of SAIC are mainly divided into 3 sections:

- 1) The focus on distinct 'Visible Management' of standardized operation, layout, color-code mark clarified in table, guide and hardbook in order to continue operation of 'Special Production Zones' and 'On-the-spot Management' of 6S [Seili(adjustment), Seidon(putting in order), Seiketsu(cleanliness), Souji(cleaning), Syukan(habit), Syuyou(cultivation)] for on-the-spot managing staff and workers;
- 2) The promotion of 'One Circle'(Average Production) & 'JIT Production' of products based on the equal-speed line and 'JIT Delivery System' & 'Systematic Supply' of parts with the beginning of 'Zero Stock'(storage reduction) of raw material and half-made products and the introduction of 'Board(kanban) Management';
- 3) Active adaptation of 'Team Work Method', Improvement of U-mode line of the on-the-spot layout of equipment, promotion of Equipment TPM(Total Production Maintenance), training of multiple-skilled workers, improvements aiming at 'Zero Defect' of equipment quality and increasing of 'Labor Productivity'.<sup>28</sup> In other words, in order to

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<sup>28</sup> The concepts regarding various methods of lean production by Taiichi Ohno (1978) and Monden, Y. (1991).

increase products quality and reduce the production cost, SAIC has adopted lean production thoroughly and achieved better results. It is not too early as far as the introduction time concerned, but its high speed & widens of its popularization are impressive among China's automotive industry. Followings are the two detailed cases for further reference:

First lets observe the step and its achievement of introducing 'One Circle' production measure in bead ring spot of Santana passenger car in Shanghai Automobile Forging Works. 1) Operations in working place are re-layout, back flow or neck is corrected in order to form the condition to adopt 'One Circle'; 2) The former 20 storage for half-made products among every operation are displaced, production process is circled without any stop and only one "buffer stock" is remained in last step; 3) Average production is conducted daily with the daily dual-shift capacity up to 2,400 from 1,500 and the product average storage low to 2-2.5 days from former half-month; 4) 22% workers have become multiple-skilled and the employment is reduced to 152 persons from former 180 with nearly 20% reduction; 5) The maintenance group coming from on-the-spot technicians & workers or equipment maintenance system that aims to resolve the equipment accident immediately is formed; 6) Team performance is promoted, waste is reduced by improvement and the quality is increased. Shanghai Automobile Gear Works is approved as Grade A part maker by Shanghai-VW.

Second, on the other hand aluminum radiator spot in Auto Part Factory of Shanghai Hui Zhong Automotive Component Works practiced the following team work performances. 1) Along with on-the-

spot layout and color-mode mark management, board(kanban) method is introduced and production standardization & equalization have been realized. Production circle reduced to 1 month in 1995 from 2 months in 1994. 2) Quality control professionals are not employed and all products are checked by operators themselves. The percentage of inferior quality was lowered to 0.16% from 0.96% within one year of 1995 by the introduction of material circulation control card & statistic quality control system and the whole group quality level are appointed as Grade A by Shanghai-VW. 3) Productivity has been increased by the training of multiple-skilled workers and improvement method. The employment increased to 46 persons in 1995 from 37 persons in 1994, with the productivity up to 136,800 set from 69,134 set, and average personal productivity increased to 2,974 set from 1,868 set with 59% increased. 4) Equipment accident is eliminated and the net working rate increased to 83.3% in 1995 from 78% in 1994 due to the on-the-spot team activity. <sup>29</sup>

As we may conclude from the above, it was the obvious contrast that Shanghai auto makers began to widely promote lean production system themselves, while only limited factories subordinated to FAW and Dongfeng introduced Japanese lean production in the form of top down in the late 1980s.<sup>30</sup> This may have the main following reasons: Personnel post is determined by the actual requirements together with technical introduction by the adaptation of 'Special Production Zones' from the late 1980s, which is developed step by step as the model. Excess

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<sup>29</sup> According to the inner pamphlet of SAIC.

<sup>30</sup> With the reference of Lee Chunli regarding the introduction of lean production of FAW and Dongfeng.

personnel were separated. Furthermore, the production on a large scale in FAW and Dongfeng accompanied by expansion of productive capacity and employment by enterprise combination or merging. Identity of socialism state-owned enterprise with no excess personnel and layout constraints the expansion of productive capacity. SAIC expanded its productive capacity and control increase of employment with excess personnel recruited. Therefore SAIC makers must make further improvements pressed continuously by the requirement of quality increase and cost down from technically dominating Shanghai-VW.

Finally SAIC adopted special bonus system for workers of 'Special Production Zones' from the 1980s. From 1992 Incentive system was established formulated by introducing widely 'Entire Employment Contract System'(fully employment agreement system), 'Post Enrollment System' and 'Post Wage' instead of the former employment system. In 1994 part-time workers were reformed completely for the re-assignment to production post by re-training of excess personnel or transferring to service industry, like 'the third industry'. Employment administration was further emphasized.

#### **IV. Conclusion**

So far in China, beginning with the introduction of Toyota production system directly guided by Taiichi Ohno in 1981 and the establishment of transmission machine factory in FAW technically directed by HINO FAW formulated the systematic introduction process of lean production. Later on, SAIC began to introduce lean production system through the introduction and model function of joint-ventured

Shanghai Koito from the early 1990s and has undertaken obvious process within whole company.

By the result of the direct guidelines of Taiichi Ohno in the beginning of 1980s, FAW's leadership began to focus on the Toyota production system. It is the great achievement that the new transmission factory completely technically guided by Hino Motor has combined the units of Toyota production system. It introduced separately so far and established systematic Toyota production system characterized the 'Just In Time' method within the whole factory. The resolution of mechanism degree of technique transformation among factories, that is serially has become the biggest touchstone to test the evolution capacity of FAW.

On the other hand, SAIC's introduction & promotion of lean production resulted in the mutual function of inner & outer elements with the privilege of capacity improvement. Intensive enterprise's consciousness of improving the initial conditions from historical car quality problem to craft production realized the introduction of car manufacturing technique regarding the uprising policy of car manufacturing through government's technique introduction. Since the technique introduction, higher quality standard is required both by assembly makers dominated by VW and Chinese government which emphasizes any substitute of imported qualified cars. Furthermore, China is approaching to join WTO in 1990s, and the conflict of becoming opened car brands will be apparent both for Santana car produced by SAIC and joint-produced high-class cars. Along with the serial limitation, SAIC first formulated 'Special Production Zone' and tried to promote it in order to emphasize QC management related to market environment. Later on SAIC introduced Japan's lean production and promoted it within its whole company.

Along with the previous theory's background, this paper implies one

realistic problem that is the breaking away from former management system and traditional mass production under the present planned economic system. Influenced by bi-inertia of former enterprise, the involution of production management system in China's enterprises and transformation of enterprises' system confronted with more difficulties than European and American enterprises. Actually in recent years in China along with the market economy, the problem of the deteriorated management efficiency in stated-owned enterprise has become more serious. The background of the deteriorated management efficiency mainly in manufacturing state-owned enterprise and the decrement of market competence probably is the essential problem like the insufficient consciousness of the involution of production management system rather than insufficient introduction of advanced techniques. The flexibility of production spot and introduction of advanced production management system have become matter of extreme urgency for recent China. This research of the development of production system and involution process in FAW and SAIC as "Top Two" in China's automotive industry is significant theme not historically but also realistically.

## Reference

- Lee, C., Chen, J. and Fujimoto, T., "Different Strategies of Localization in the Chinese Auto Industry: The Cases of Shanghai Volkswagen and Tianjin Daihatsu." Paper to be Presented to MIT 1996 IMVP Sponsors Meeting, Brazil, June.
- Lee, Chunli, *The Chinese Automobile Industry: Manufacturing System and Technological Strategy* (in Japanese), Shinzansha Press, Tokyo, 1997.
- Monden, Y., *New Toyota System*.(in Japanese), Kodansha Press, 1991.
- Oshima Taku, "Development of the Chinese Automobile Industry And The Strategy of Modern Japanese Automobile Parts Makers.", Josai University, Bulletin of the Department of Economics, Vol.14 No.1, June 1995.
- Ohno Taiichi, *Toyota Production System :Beyond the Scale Management* (in Japanese), Diamond Press, 1978.
- Roos, D., Womack, J. & Jones, D., *The Machine That Changed the World*. Rowson Associates, 1990.