APPENDIX I

CASE STUDIES OF JIT IMPLEMENTATION

I-A: EFFECTIVE SUPPLY CHAIN MANAGEMENT IN MARUTI SUZUKI INDIA LIMITED

*Maruti Suzuki India Limited* or simply *Maruti Suzuki* was formerly known as Maruti Udyog Limited. It is an automotive industry that was established in 1983 in Gurgaon (Udyog Vihar) of Haryana state. It has the distinction of India’s largest carmaker. It is a subsidiary of Japanese automobile and motorcycle manufacturer Suzuki Motor Corporation. Its headquarter is located at New Delhi and is looked after by Mr. R.C Bhargava as its chairman. Its estimated revenue is about US $ 6.4 billion (about Rs. 43272 crore), and it employs over 12, 900 employees. It started with its most widely acclaimed branded car Maruti 800. Presently it is producing a variety of cars both in hatchback and sedan category. In February 2012, the company obtained the distinction of selling its ten millionth vehicles in India.

The Gurgaon manufacturing facility has three fully integrated manufacturing plants spreaded over 300 acres. Besides Maruti 800, it also produced Zen, Alto, Wagon R, Zen Estilo, Omni, Ertiga, Ritz, Gypsy and Eeco of which some varieties have discontinued production. This unit also produces about 2, 40, 000 K-series engines annually.

The second unit of Maruti Suzuki was started in February 2007 in Manesar of Haryana state, and is spread over 600 acres. It increased its annual production capacity to 3, 00, 000 vehicles in October 2008 from its initial annual capacity of 1, 00, 000 vehicles. Presently it is producing 8, 00, 000 vehicles annually. The Manesar plant
produced A-star, Swift, Swift Dzire, SX 4, Ritz and Celero. Both Gurgaon and Manesar plants have a combined production capacity of 14, 50, 000 vehicles annually.

Maruti Suzuki employs all the elements of JIT very effectively because of its origin in Japan, but has emphasized recently the supplier relationships in particular. It has adopted Electronic Nagare (e Nagare) system, which is actually the sequence of production plans from the supplier to the company’s shop floor. It helps the company to collaborate with its suppliers to achieve the just-in-time objectives in its inbound side of the supply chain. In this approach, the company shares its production plans with those suppliers who are located in or around NCR of Delhi like Gurgaon, Faridabad, Ghaziabad, Sohna and others. This system was implemented in January 2003 to tackle the problems of material accumulation due to multiple sourcing, losses of procurement information and sub-model variations, and to help achieve systematic levelized production with synchronized suppliers. The e Nagare system has completely transformed the supply chain at Maruti over the last four years as S. Maitra, the Managing Executive Officer (Supply Chain) has stated. It has resulted in a two hour cycle from 30 days in the past. Using this system, multi-coloured bumpers arrive in mobile trolleys and components line up outside factory sheds and directly feeding the ever-hungry, multitasked assembly lines at its two plants at Gurgaon and Manesar.

**I-B: EFFECTIVE SUPPLY CHAIN MANAGEMENT IN MOTHER DAIRY**

*Mother Dairy* is a well-known Delhi-based dairy organization. It was commissioned in 1974 as a wholly owned subsidiary of the National Dairy Development Board (NDDB), and was initiated under the programme ‘Operation Flood’, regarded as the world’s biggest dairy development programme launched to make India a milk sufficient nation. Now the country has achieved that objective. Its revenue is about Rs.7000 crore, and has 3500 employees. Mother Dairy is an ISO 9001:2008 certified company that uses hi tech automated machines to ensure high product quality, reliability
and safety. It is presently looked after by S. Nagarajan as managing director and Anil Deo as Head, Sales. It supplies milk under brand name Mother Dairy to the majority of customers in Delhi through its large number of milk booths located in almost every part of the city.

Mother Dairy collects milk from hundreds of cooperatives located in Gujarat, Punjab, Haryana, Rajasthan and Uttar Pradesh. The milk collected from these cooperatives is transported to the Patparganj plant in East Delhi, where it is homogenized, pasteurized and then stored in special tanks until it is loaded into tankers for distribution.

Mother Dairy has a processing capacity of about 7,00,000 litres of milk per day that is distributed through about 600 booths. Besides selling milk through its booths, Mother Dairy also sells loose milk through cycle rickshaws and retail outlets to many congested areas.

Other than milk, Mother Dairy also offers over 30 flavours of ice creams, butter, paneer, ghee, cheese, curd and other milk derivatives. Its other diversified products include edible oils (under brand name Dhara), fruits and vegetables (under brand name Safal), frozen vegetables, processed foods like fruit juices, jams, pickles etc.

Managing such a large variety requires accurate methods of forecasting and demand management. Since milk is a perishable commodity with very short life cycle, logistic planning, demand estimation and production scheduling are very crucial. Having good networking with the milk cooperatives and its lasting relationships with them along with its efficient distribution requirement planning and logistics and transportation planning help Mother Dairy to provide its customers assured supply of good quality milk on a daily basis. Its committed upkeep of the processing plant, maintenance and
modernization are important aspects of JIT production. Its efficient management information system and effective material and funds flow across the different entities that are crucial for business growth and profitability are helping it to implement JIT effectively.

I-C: REDUCED SETUP TIME IN BRAKES INDIA PRIVATE LIMITED

_Brakes India Private Limited_, established in 1962, is the largest brake system manufacturer in India. Its oldest unit is located at Padi in Chennai of Tamilnadu state and has about 2840 employees. It is a TPM awarded and ISO 14001 certified company, and its products include brake actuation, clutch actuation, foundation brakes, hoses and brake fluid that are used in all types of vehicles including cars, LCV, HCV, tractors, two wheelers etc. Besides its unit at Padi, it has six more plants across the country. Its Gurgaon plant was opened in 1986 and it is relatively smaller as compared to its main units located in Tamilnadu. The Gurgaon unit is ISO 14001 certified and its main products include front disc brakes, rear drum brakes and actuation. The company is among the early adopters of JIT techniques in the country. It has adopted focused manufacturing to improve quality, cost and delivery. It constantly endeavours to improve and update the existing processes and technologies keeping in mind the basic principles of Kaizen. It uses international quality standards such as ISO 9000 and QS 9000 to produce high quality products that are supplied to about 70 leading automobile customers. It has adopted cellular manufacturing and has drastically reduced the setup time for six machines in a cell that initially varied between 4 to 16 hours. The high setup time that was found to be because of poor planning and improper procedures used in the plant used to prevent the company to bring variety of its products in the market. With reduced setup time the company was able to increase its production from 24000 to 29000 pieces per month in the cell. The use of cellular manufacturing provided increased flexibility and the plant has become more productive. Simultaneously now it has reduced lot size, reduced level of work-in-process (WIP) inventory, faster feedback on operating
performance and increased quality level. It believes in imparting regular training to its workers to make them well conversant with the latest trend in technology. Its multifunctional and multi-skilled workers ensure balanced workstations, hence utilizing machines to their fullest capacity and simultaneously reducing lead time. It ensures total customer satisfaction through its JIT deliveries.

I-D: EFFECTIVE PRODUCTION SCHEDULES IN LG ELECTRONICS INDIA PRIVATE LIMITED

*LG Electronics India Private Limited* is a wholly owned subsidiary of LG Electronics, South Korea. It is a multi-national company and its northern India unit, established in 1997, is located in Udyog Vihar on Surajpur-Kasna Road of Greater Noida of Uttar Pradesh, and is looked after by Mr. Raj Kumar as its Assistant General Manager (AGM). Its other three units are located in Bangalore, Mumbai and Pune. The company has set up world-class facilities and follows global standards to produce televisions, washing machines, air-conditioners, refrigerators, microwave ovens, mobile phones, computers and laptops. The name LG is a leading brand in Indian market. The company has implemented total quality management (TQM) by involving all its employees. It has used six sigma and 100 ppm (parts per million) quality approach to make the process defect-free and has been able to produce high quality products. In order to increase the accuracy in planning activities of sales and production, the company reviews its production, sales and inventory (PSI) and rolling sales plan (RSP) daily, followed by on weekly and monthly basis. It has resulted in meeting its market target aggressively.
I-E: IMPROVED PRODUCTION SYSTEMS IN LUCAS TVS LIMITED

Lucas TVS is a joint venture between Lucas UK and TV Sundram Iyengar & Sons (TVS). It is a Chennai-based (located at Padi) auto-electrical manufacturer which was established in 1961, and employs over 1000 employees. It is a TS 16949, ISO 14001 and OHSAS 18001 certified company, and is also the recipient of Deming Grand Prize. In July 2003, Lucas TVS became the first company outside Japan and Korea to win the JIT Grand Prix Award given by Japan for its successful implementation of JIT much ahead of several other manufacturers in the country. It has seven units including two units in Chennai, two units in Puducherry, one unit in Pune, one unit in Uttarakhand and one unit in Rewari (Haryana). It is the largest manufacturer of automotive electrical systems in India today with an annual turnover of over one billion US Dollars. The company produces alternators, starter motors, wiper motors, fan motors and blower motors along with diesel fuel injection systems, braking systems, automobile wheels and axle fasteners. Over 80% vehicles rolled out daily are fitted with Lucas-TVS products. The company is looked after by Mr. T. K. Balaji as its Chairman & Managing Director (CMD) and by Dr. N. Ravichandaram as its Chief Executive Officer (CEO).

Lucas-TVS customers include automobile companies in every category besides some engine making companies. In the category of Cars and Utility Vehicles, some important Lucas-TVS customers include General Motors India, Ford India, Hyundai Motors India, Maruti Suzuki, Honda Motors, Tata Motors, Hindustan Motors and Mahindra & Mahindra. In the Light Commercial Vehicles (LCVs) and Heavy Commercial Vehicles (HCVs) category, Swaraj Mazda, Eicher Motors, Tata Motors and Ashok Leyland are its major customers besides others. The tractors manufacturing groups include HMT, Swaraj, Escorts and Mahindra & Mahindra. In the 2 wheelers and 3 wheelers category, its important customers include LML, Yamaha Motors India, Hero Motors, TVS Motor, Bajaj Auto and Royal Enfield. In the engine and earth moving
category, its important customers include Birla Yamaha, Cummins India, Tata Cummins, Greaves Cotton and Kirloskar Oil Engines.

The company started its JIT journey in 1985 by introducing the basic elements of JIT to its employees with their active involvement. Many changes in the manufacturing systems were undertaken like strict adherence to standardized production schedules, use of group technology-based cellular manufacturing, use of Kanban systems for effective production planning and control and use of concept of ‘quality at the source’ along with total employee involvement and use of Kaizen. All these measures led to drastic reduction in inventory along with improving productivity significantly. The rejection rates came down from 10 percent to below 1 percent and the scrap rate came down to just 0.8 percent from 3 percent. It became possible because of the active involvement of company’s workers in quality circles (QC) who make about 400 suggestions every month to improve the production activities. The company’s sales per employees increased from Rs. 1.96 lakh at the time of start of JIT implementation to Rs. 13.80 lakh in 2002 when it fully implemented JIT. The company has strong technical alliance with international manufacturers and sound in-house R&D facilities, which greatly support in developing new and innovative products. It extensively uses computer-aided engineering (CAE) to improve its product design and manufacturing processes that help in new product development. Over 70% of the current sales turnover is realised from new products developed by its R&D. Now the company has improved its ability to respond to customers’ changing needs swiftly, effectively and consistently.

The Rewari unit of Lucas TVS Limited was established in 1991, and is located in the village Masani of Rewari of Haryana state. Its important products include starter motors, alternators, wiper motors, blower motors, car fan accessory, electronic ignition coils and car sensors. It is looked after by Mr. Anand K. Balaji as Managing Director.