# LOGISTICS AND SUPPLY CHAIN DEVELOPMENT : PART 1

## Lessons from Japan: Automotive and Electronic Industries

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This is the first of a three part series of articles that examines logistics and supply chain development. Part 1 discusses generic logistics issues that affect automotive and electronic consumer durable manufacturers. Part 2 examines various principles of design for logistics and supply chain. Many of the philosophies and dogmas for lean and agile manufacture are qualitative, while citing various benchmark metrics. Hence, Part 3 examines the principles of logistics and supply chain and draws conclusions from quantified results from a logistics simulation.

### INTRODUCTION

Three key value-adding business roles are now clearly distinguishable in lean and agile supply chains:

- suppliers
- final assemblers and
- distributors.

Firstly, suppliers make components and assemble sub-assembly modules. These suppliers may make products as original equipment used in consumer durable products such as motor vehicles and electro-domestic appliances. Equally the parts may be sold to consumers as wear parts, replacement and retrofit items. Secondly, final assemblers are the owners' brand name consumer durable products. The assemblers core value adding activities are product integration, customisation, final assembly and test. On the down stream side of the assemblers, the distribution channels' role is to deliver goods to points of sale or directly to consumers within an acceptable time frame.

The lean and agile supply chain paradigm is strongly associated with the automotive industry. Lean manufacturing attempts to double the value added with only half the investment and working capital, in half the time, with half the people.

Assemblers' production volume flexibility (units per time period) tends to be extremely limited. This stems from the predominantly dedicated design of the assembly line facilities. Assemblers' flexibility predominantly stems therefore from component and sub-assembly mix flexibility provided by the original equipment manufacturing supplier base.

## AUTOMOTIVE INDUSTRY

During the 1950s, Japan's auto assemblers began to work closely with their suppliers. Parts suppliers' factories and the final assembly plant were located relatively close together. Local engineering shops made as much as possible of the tooling required to build production lines. Japan eventually built up an export business to Europe and the Americas. From a logistics perspective, this down stream distribution system required large and dedicated ocean going ships to transport vehicles. Lead time to distribute these goods by sea ties up working capital.

Components that are used to make up vehicles are delivered to assemblers in relatively high-density containers. As such, the value density is increased for goods inbound to the assembly plant. As finished goods, vehicles nominally have a lower value to volume ratio in comparison to electronic goods such as computers. Japanese vehicles tended to be available in a range of colours with two trim levels: basic and luxury. This variant policy allowed the assembler to avoid producing significant volumes of many intermediate grades of trim and options. By only having two trim levels, significant reductions in stocked parts can be achieved. Given common touch points, only one assembly method and fixing component can be used.

Component commonality permits assemblers to source components from any region and deliver them to their assembly facilities that are located in any other region. This procurement flexibility serves to reduce risks associated with none availability. Simultaneously this contributes to pressure to reduce unit prices due to multiple sources that are in direct competition for supply contracts.

## ELECTRONICS GOODS LOGISTICS

Components and modules sourced for electronic products using established technologies that are made under franchise licences is similar to automotive purchasing. These goods are nominally available to assemblers from a number of suppliers while the component is popular. Manufacturers of advanced electronic goods, by contrast, have to search the world for components, modules and technologies from existing and potential sources of supply. Electronic goods generally have a relatively high value to volume ratio. Components tend to be transported on either reels or trays. The component packing value/density ratio for commodity integrated circuits, and small resistors and capacitors is extremely low. In contrast, for company specific integrated circuits this value may be significant.

The majority of advanced electronic production is automated on high-speed lines. The location of electronic assembly plants tends to be less dependent on having local suppliers than on proximity to mass markets, the availability of low cost facilities and skilled labour.

Most European producers of electronic goods have created transplant assembly facilities in Far-Eastern countries. Key objectives of these facilities are to make use of low labour and overhead costs, and to satisfy the emerging markets. Excess

capacity nominally is created to produce for export volumes of high value add devices.

Both the automotive and electronic goods sectors have been significantly influenced by the development of Japan's competitive industry. Western producers must learn some hard lessons in order to compete in every market. Weakness in any one market, for what every reason, provides a line of attack to competitors.

It is dangerous to simply ape espoused dogma without understanding in qualitative and quantitative terms the scope of the opportunities, perils and commitment needed to achieve parity and eventually, competitive advantage.

## JAPAN'S MARKET: OPEN, CLOSED OR THE BENCHMARK?

Why should Western manufacturers sell into the Japan market? To the lay person, this question seems strange. It may seem, to use the British axiom, to be selling coals to Newcastle, or selling sand to the Arabs. However, for manufacturers, selling into the Japanese market is a way of determining performance goals, direction, and expectations of an extremely quality conscious society. Manufacturers tend to consider that the Japanese market is the toughest market within which to operate. By being active and competitive in Japan, producers it might be suggested are better able to take advantage of new technology developments, be close to a major trend setting market, understand and respond to the quality challenge based on that market's standards. Features and software for products sold in Japan are up-dated frequently to make use of latest specification components and hardware.

Feedback from marketing functions in Japan suggests that Japanese consumers have a strong negative perception of electronic goods that are made in other Asian Tiger economies. Given any kind of 'risk' or doubt, marketing functions tend to report that Japanese consumers resort to Japanese brands, in particular Toyota and Panasonic.

*Panasonic and JVC are brands of the Matsushita Corporation. An interesting study of Japan's corporate infrastructure is provided by Miyashita and Russell, Keiretsu: Inside the Hidden Japanese Conglomerates McGraw-Hill (1996). [1]*

Japanese consumers by contrast do buy imported soft goods including Disney and Warner Brother's characters, and fashion clothes and accessories. The country of origin for these goods is most often from Taiwan, Korea, China, Singapore, Indonesia and Mexico. Consumers for soft goods accept this.

## AESTHETIC QUALITY

Quality requirements for aesthetic components on electronic goods sold in Japan are extreme, indeed verging on perfection. Quality standards that are accepted by consumers in other markets are insufficient to be competitive and appreciated in Japan. Japanese end users' expectations are to receive blemish free, perfect products. Even the most minor scratches, pock marks, inclusions, unevenness and lack of paint

coverage in recesses are cause for Japanese consumers to avoid a brand. As a result, retailers then tend to refrain from promoting 'risky' products for fear of loosing face with the end user.

Quality is also expressed in terms of different expectations for product size, feel and ergonomics. Essentially, if it doesn't look, feel and work like a Japanese product, then the Japanese consumer may well go for the known and trusted brand to reduce the 'risk'.

## SUPPLYING MARKET QUALITY GOODS

To gain access to Japan market, product manufacturers have a choice of five key strategies.

1. Produce look-a-like products from Japanese sources in Japan.

2. Produce European or American designed products from Japanese sources in a non-Asian Tiger country.

3. Improve Western suppliers' quality to equal or superior that of Japanese suppliers at European or American sites. Such improvement would nominally be undertaken in a programme similar to automotive supplier development methodologies.

4. Create from scratch entirely new suppliers capable of producing parts at appropriate quality and functionality levels.

5. Encourage Japanese suppliers to establish transplants in the West in order to stimulate best practices for the global market. In so doing, Western competitors could take advantage of spare capacity to acquire suitable quality parts.

Each of these strategies has its peculiar set of advantages and limitations. A summary of benefits and drawbacks for these strategies is given below.

## BENEFITS AND DRAWBACKS

Benefits of producing products from Japanese sources in Japan include:

- Access to benchmark performance and practices.
- Value of days of supply is minimised.
- Simplified inbound logistics.
- Japanese quality assurance and feedback.
- Delivery lead time and cost is minimised.
- Supplier process yield is nominally high.
- Tooling lead time is comparatively short.

- Access to suppliers with process flexibility based on rapid variant change-over to create high variety.

Drawbacks

- Unit processing cost is likely to be significantly higher than in other regions due to high fixed costs.
- Engineering design changes create significant lead time extensions for tooling.
- Communication may be difficult if the OEM working language is European.
- Technology is not exclusive to the supply network of the branded assembler.
- An assembly step with significant technical difficulty is required to achieve 'Made in Japan' labelling. It is not necessary to have Japan sourced components in a product to have 'Made in Japan' status. There is no 'Assembled in Japan' labelling.

Benefits of producing products from Japanese sources in a non-Asia Pacific (for example Europe or the United States) country include:

- Benefits as producing products in Japan.
- Close to, and under control of the assembler's design and/or manufacturing base.

Drawbacks

- Significant lead-times are introduced by transporting components from Japan, and equal lead times back to Japan.
- Rapid reduction in market retail value of goods increases obsolescence risk and significant inventory holding costs.
- Lead time to make to order products outside the existing range will be increased due to the transport costs.

Benefits of transferring quality practices to European or American sites to equal or superior to that of Japanese suppliers include:

- Knowledge and value add are in-house.
- Can be stimulus and catalyst for corporate culture improvement.
- Known challenges and inter-personal relations.
- Lower cost structure and improved quality for all markets.
- Largest markets in the world receive highest quality goods.

Drawbacks

- If implemented as part of a long series of implementation kick-offs, can increase fatique of management's improvement fads.
- Change of suppliers' location is not used to increase competitive advantage.
- Significant difficulties may be encountered due to historic baggage inherited from previous methods, approaches and culture.
- A 'them and us' situation may evolve due to emphasis on Japan.

*Reference is made to the Hawthorne Experiments by Mayo. Performance improvements were noted in that study from all persons that were treated as special cases. No matter what those researchers tried to change, or return to their original states, performance increased – all be it temporarily. At the end of the experiment, the test case workers were returned to their normal role. Their performance also returned back to normal.*

*In separate clinical trials, this effect has been demonstrated with students and teachers. The teacher is told they are special – superior. The teacher is to teach superior students. The students are told they are superior, and they have been given a superior teacher. The net effect is that students' performance is superior. If students are told they are normal/average, their performance is statistically different to that of the 'superior' students. These groups are not preselected for the test. They are drawn at random and hence the only variable is the paradigm perception of being in one group or another.*

*Clearly the influence of competition (re: Laming's Stress Model. See Lamming, R. Beyond Partnership, 1993) and being a part of the group influence behaviour. [2].*

Benefits of creating new suppliers that supply parts at an appropriate quality level include:

- No inherited culture to overcome.
- Can approach potential suppliers with similar basic technology experience in order that they become a partner.
- Supplier location can be determined by best practice logistics.
- Cost structure can be determined by market required technology selection.

Drawbacks

- Development lead time is significant.
- Personnel resourcing may create particular difficulties.
- Decision to project manage internally, manage jointly, using third party consultants or second party to manage development.
- Business start-up costs are significant.
- Exit costs may be prohibitive.

Japanese assemblers have created significant manufacturing capacity near their export markets populations. The strategy of building an assembler factory and where practicable improving the performance of the existing supply base, is the foundation of capacity growth.

In part two of this series, we examine some of the design issues that are involved in competitive logistics and supply chain development.

## REFERENCES

[1] Miyashita and Russell "*Keiretsu : Inside the Hidden Japanese Conglomerate*", McGraw-Hill, 1996.

[2] Lamming R., “Beyond Partnership”, Prentice Hall, 1993.

**About the authors**

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