SUPPLY CHAIN MANAGEMENT

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Abstract

This research shows how manufacturers instigated supplier development from a 'Japanese' perspective represented in Nissan-Renault and from a 'Western' point of view represented in General Motors GM. And also covers why they might want to develop their suppliers, what benefits it would bring.

Many sources have been studied through various means from books, to internet web pages. A range of views were reviewed such as suppliers' perspective of their customers, their relationships, and how customers are improving their suppliers' abilities to deliver quality and cut costs. This not only included the physical means of the supply chain, but also the information flow, communication and knowledge-sharing.

The research identified the main differences between the Japanese and Western Production Systems and the viability to better one another in order to gain the competitive edge.

Both GM and Nissan-Renault participated in supplier development with a hands-on approach. Some concepts are incompatible with other systems but both have used the quality circles to cut part costs.

Introduction

Supply chain management (SCM) has become a standard business principle in many organisations. Supply chains exist in both service and manufacturing organisations, although the complexity of the chain may vary greatly from industry to industry and firm to firm. Many companies are implementing SCM in an effort to increase profits and customer satisfaction. Success in an increasingly competitive marketplace depends critically on the quality of knowledge, which organisations apply to their key business processes. Supply chain depends on knowledge of diverse areas including raw materials, planning, manufacturing and distribution. Likewise, product development requires knowledge of consumer requirements, new science, new technology, and marketing. Many companies work hard to improve processes themselves; they also sometimes want to share superior

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process knowledge between companies. Within a supply chain this kind of knowledge sharing has become a common practice because it promises to enhance the competitive advantage of the supply chain as a whole, the benefit of the cooperation is mutual. Actually it is often the case that powerful companies enforce their suppliers to implement their processes to improve organizational coordination and product quality.

Supply chain as pipelines

Supply chain management is the interconnection of organizations that relate to each other through upstream linkages between the different processes that produce value in the form of products and services to the ultimate consumer. It is described as 'pipeline' just as oil or other liquids flow through a pipeline, so physical goods flow down a supply chain. Long pipelines will contain more oil than short ones. So, the time taken for oil to flow all the way through a long pipeline will be longer than if the pipeline was shorter. Stocks of inventory held in the supply chain can be thought of as analogous to oil storage tanks. So, on its journey through the supply chain pipelines products are processed by different operations in the chain and also stored at different points (Slack 2004)

Supply Chain Network

The supply chain is often represented as network; Figure 1 shows the whole elements in the supply network and explains how information flows.

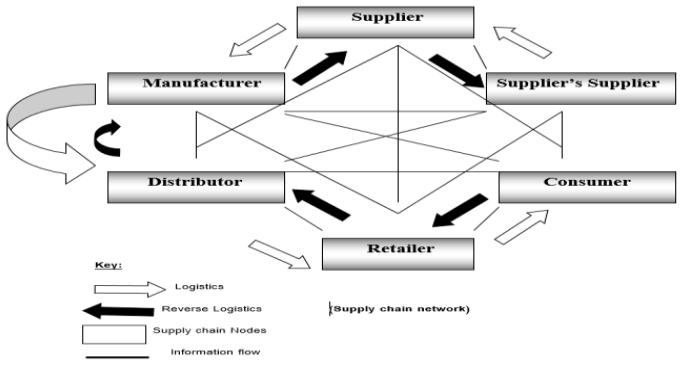

Figure1supply chain network

Objectives of supply chain management

The objective of supply chain management is to minimize the total supply chain cost to meet fixed and given demand. The total cost may be including number of points such as (Jeremy2001):

- Raw materials
- Inventory holding cost
- Transportation cost

The complexity and uncertainty that exist in the supply chain makes the concept of accurate and effective forecasting an elusive target. Many companies are however making significant improvements by using an approach that supports and facilitates the concept of supply chain management. Collaborative forecasting is a way in which the entire supply chain is a participant in decisions about the demand that will drive their activity. In instruct to include an obvious image of the supply chain; we can separate it into five similarly imperative essentials. Time, money flow, inventory management, physical material flow and information flow, which be able to be seen in Figure 2.

A winning and spirited company along with the respite principal companies encompasses all the beyond essentials.

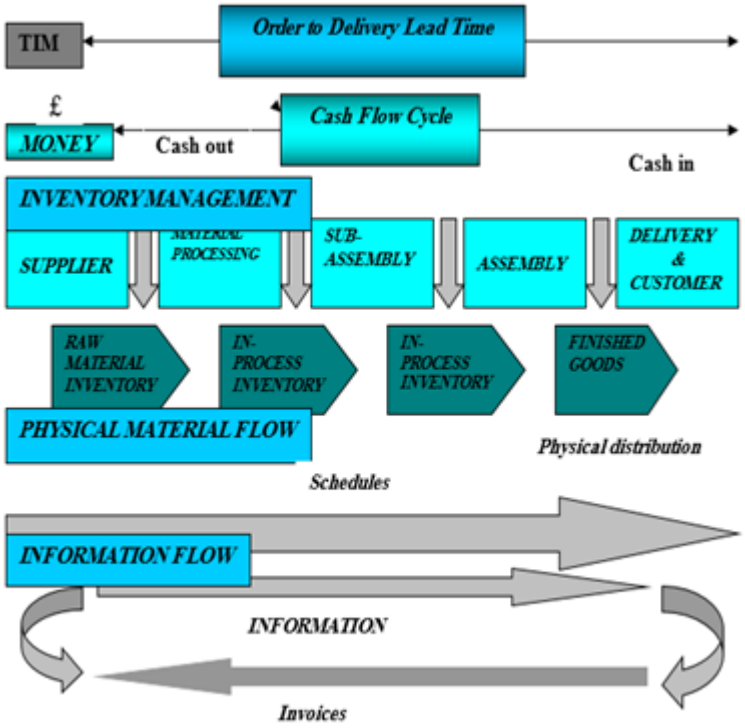

Figure 2 supply chain activity

General we can articulate that supply chain management is the management of upstream and downstream relationships with supplier and customers to delivery superior customer value at less cost to the supply chain as a whole.

Supplier development

Supplier development had made great change in the global market particularly at the end of last century. Many Manufacturers has been focused on how to develop their suppliers. In these days the biggest companies are aware that working with supplier will lead to greater success. So supplier development has become essential to any company to be competitive to improve its quality and to be in business.

However, supplier development can be defined as a bilateral effort by both the buying and supplying organisations to jointly improve the supplier's performance and/or capabilities in one or more of the following areas: cost, quality, delivery, time to market, technology. And also this term can refer to develop new supply resource. The aim of supplier development is to reduce the kind and quantity of suppliers the business need. The

long-term relationship with supplier is needed. The success of any company often depends on the performance of the suppliers. In a very real sense, suppliers perform relative to how well they are integrated within supply chain. Many companies become integrated with the suppliers; they deal with supplier as partner and sharing information and knowledge with them to better able the suppliers develop a strategy for using them. It's a good idea to assess the strengths and weaknesses of suppliers with evaluation materials. The company main focus should be developing a positive, long-term relationship with suppliers. In a JIT environment, the culture demands that suppliers should not be treated as a purely external source of components or raw materials, but part of the one process in manufacturing product. So by working with supplier the company must expect 100% quality guarantee. Figure 3 shows the issues in developing supplier relationship (Southey 2006).

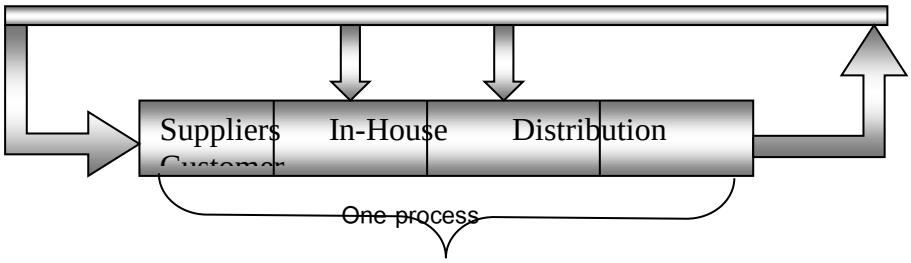

Figure 3 Supplier Development

Reasons for doing supplier development

The reasons for undertaking supply chain development are many. The aim of putting a supply chain development and management in place is to make sure that the following points are well managed:

- Management and organizational capabilities
- Relational capabilities
- Knowledge sharing and learning capabilities
- Infrastructure support

General Motors' back ground

General Motors Corporation popularly known as GM; back its roots to 1897 when olds motors Vehicle Company produced its first automobile. Nineteen years later, GM was incorporated and encompassed four automobile manufacturing operations, truck marketing firm, and Export Company.

Today, GM is one of the largest corporations in the world. In 1984, it marketed over forty different vehicle models, sold 8.3 million cars and trucks world wide and gained $ 80.5 billion in vehicle sales.

Automobile and truck production at General Motors involves shipping a broad variety of materials, parts, and components from 20,000 supplier plants to over 160 GM plants. To help reduce logistics costs at GM, the decision tool TRANSPART was developed. In its initial application for GM's Delco Electronics Division, TRANSPART identified a 26 percent logistics cost savings opportunity ($2.9 million per year). Today, TRANSPART II, a commercial version of the tool is being used in more than 40 GM plants (Blumenfeld et al. 2001)

About Nissan–Renault

Nissan is one of the world's leading brand names and as one of the largest companies in Japan its automotive division forms an integral part of its worldwide business strategy. As part of its goals to 'profitably build the highest quality cars in Europe, Nissan needs to work with technology partners it can trust to deliver the highest level of service they demand.

Renault has an equally strong brand, particularly in Europe. The second largest car manufacturer in France joined forces with Nissan with the objective of increasing its critical market share in the US. In 2000 Nissan formed an alliance with Renault, creating a powerful bi–national automotive group. The reasons for the alliance were threefold (Saunders 2002)

- To more effectively meet the challenges of the globalisation of the automotive industry
- To be more competitive, in terms of quality, cost and delivery
- To accelerate the pace of technological change in 2000 Renault/Nissan ranked among the world's top six leading automotive Groups with 9.1% of the market.

Driving force

There are many driving forces in the global marketplace, which require integrated solution. The market is increasingly time–based, with shorter product life cycles and uncertain forecasts. Customisations must be deferred as late in the manufacturing process as possible to reduce inventory and costs.

Globalisation is one of the most important driving forces. The process of globalisation has brought with it intense competition for the businesses, not only locally but internationally as well. In order to survive the firms must have quality in processes, people, products and

services. To have this requires strategic alignment of the suppliers and manufactures. The ages of globalisation have brought unique threats and opportunities for business. The exploitation of the former and to avoid the latter requires having a very integrated supply chain management with very durable and reliable relation with first tier suppliers as well as the second tier suppliers. The same is true about along the first tier and second tier customers. The customer awareness is playing a key role in shaping up many industries. The customer of the new millennium has knowledge and options available. They are more demanding now and consequently, more and more of niche markets for each product and services are developing. This requires a more integrated supply chain and a very flexible work force. This again needs strategic alignment to be effectively and efficiently achieved.

Management and Organizational Capabilities

How do the management firms achieve and complete competitive advantage? The best way to do so, is by developing dynamic-capabilities vie, to be related to the challenges posed by operating in a network context organization that are expected to take the leading role in economic and social innovations.

Quality must be high because disruption in production due to quality will slow down the incoming of materials the internal dependability of supply, and possibly cause inventory to build up the production rate.

Dependability is a prerequisite for fast throughput, or put the opposite way, it is difficult to achieve fast throughput if the supply of parts or the reliability of equipment is not dependable.

Flexibility is especially important in order to achieve small batch sizes and therefore fast throughput and short delivery lead times. As a result of excellence in the above performance objectives, cost is reduced.

Management is the most difficult of all factors to identify clearly, although it is not the most important factor.

The activities of the supplier development team should include supporting the existing supplier needs, to improve productivity and reduce defects and, where such needs are not in place, to assist in the development of improvement plans (Christopher1998).

Relational Capabilities

The return on investment formula was an indication of a company's success in terms of generating a return on the money invested.

Return on Capital Employed (R.O.C.E) = (profit/ capital employed) %

In order to maximise the profitability of a company, the focus was to lower costs and overheads so to maximise profit and to reduce capital by reducing inventories and fixed assets. The company had no real control over maximising profits or reducing capital employed and would therefore concentrate on asset and cost cutting. With 80% of cost, quality and delivery performance being determined at the development phase of a product and with Nissan spending $15 billion on parts and materials, a 5% reduction in material cost can increase the company's profit by 40% as shown in Figure 4.

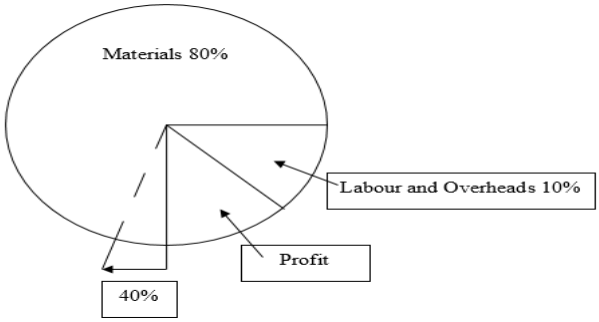

Figure 4

Materials / Profit Graph

Nissan was outsourcing more than 80% of components and GM approaching 80%, so a minor material cost reduction of 5% would render significant increases in profit. This was a major driving force why Nissan and GM seek to assist their suppliers attain cost-reduction through supplier development.

The different types of supplier development undertaken by GM and Nissan depend on the suppliers' needs and the purpose of activity, in addition to the length of the relationship and partnership.

GM and Nissan were both reducing and consolidating their supplier base with the emphasis placed on long-term relationships by retaining suppliers in the hope of doing more business. Nissan and GM tended to single-source and develop a long-term relationship with the supplier and by comparing performance of its suppliers in relation to its supplier base.

The most common approach adopted by GM and Nissan was using full-time specialists with a "hands-on" approach to develop suppliers' manufacturing processes and performance. For instance, GM's team of Kaizen Engineers were on hand to facilitate

supplier improvements through one-week workshops, and Nissan's Supplier Support Centre in Kentucky helped suppliers adopt lean manufacturing concepts.

Improved supplier relationships

Many organisations, as they grow, take on more and more suppliers. Any organisations that dose a thorough check on the number of, and nature of, its suppliers will find that there has been little attempt to rationalise. Taking a critical look at suppliers pays dividends. Maintaining large numbers of suppliers for a wide variety of goods and components prevents strategic use of the supply to be developed in which suppliers, with a degree of security in the relationship, can be persuaded to whom buying wisely is important, tend to use professional and experienced purchasing officers and buyers to manage sources of supply.

The customer seems to be responsible for the design of the products rather then the supplier. This they need to introduce new products to the market within a shorter lead-time, while also improving the designs so that they are easier to manufacture without error. Each design should have as few parts as possible, and common parts or forgings between different end products are desirable. This commonality of parts and forgings then makes it possible for the number of suppliers to be cut to a smellier number. In many make to order companies, it is the customer rather than the supplier that has responsibilities for the design of the product. Therefore, these companies do not deal with the same type of new product development and so reducing the lead-time to market is not an issue for them. If the company is asked to the design, it is often with a great deal of customer involvement. In this case, new product development lead times need to be short as they are visible to the company. Indeed, this has always been true for these companies and is recognised by the industry (Ford 2002).

Partnership

Early, many companies have realized that by integrating their supplier as a partnership in their product will develop their productivity in terms of quality, cost, and delivery on time by sharing common problems with each other, because suppliers are often have more useful information about their customers than customers themselves, and sometimes this information can be invaluable in improving internal process.

In most cases, company cannot stay in competitiveness and success in global market without support of their suppliers; their contributions can affect the overall strategy of the company. Therefore, strategic partnership can help to:

- Achieve World Class quality standards.
- Cut Lead Time and increase flexibility.
- Good Plan through long-term information.
- Reduce production down time and boost capacity.
- Improve time to market.
- Innovate through improved access to information and technology.
- Reduce stock and administrative costs bolster cash flow.
- Reduce most forms of procurement risk.

Developing partnerships with suppliers

One of the most major changes on the supply side involves new attitudes to relationships between a company and its suppliers and frequently means change in the roles of those suppliers.

Today, collaboration with suppliers in various forms of partnerships is advocated as a prescription to improve effectiveness and efficiency in the internal operations of a company. These partnerships are often assumed to offer 'win-win' situation in contrast to the adversarial attitudes that used to be typical of many supplier relationships. These earlier attitudes were based on the arm's length relations that were recommended as a way to avoid dependence on individual suppliers. Today, the importance of activities such as joint product development and the growth of integrated logistical systems between companies have increased the long-term dependency between buying companies and their suppliers. Hence companies have increasingly become a ware of the importance of the supply side of their operations and many have reconsidered their approach to supply activates in a number of ways, see Figure 5 (Ford et al. 1998).

Leadership and team working

Leadership can be briefly defined as the relation through whom one person influences the behaviour of other people. Generally, leadership is related to motivation, interpersonal behaviour and the process of communication. It is important in attempting to reduce employee dissatisfaction so they will perform jobs in the way leaders want them to be done. Team Working depends on the group of employees who are responsible for the whole

process or product. Generally, the greater the task uncertainty and the greater the need for differing skills or perspectives, the more likely it is that a team is required. The teams can be distinguished between Problem Solving Teams, Functional Teams, Cross Functional Team and Self-Managed Teams.

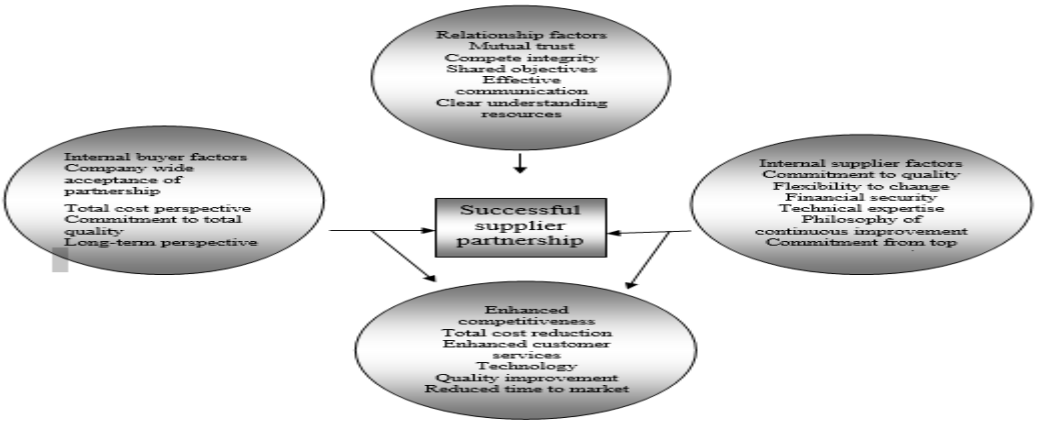

Figure 5 Successful supplier partnership

Knowledge-sharing and learning capabilities

The successful structures and collaborative relationships of the three knowledge-sharing processes -the supplier association, consulting groups and learning teams -did not appear by happenstance. Rather, Nissan established these institutions in the same order in both the United States and Japan. The intent was first to create weak, no threatening ties that could later be transformed into strong, trusting relationships. As each structure evolved and the relationships matured, the processes became a vehicle for a shared identity among Nissan suppliers. As one supplier executive put it, "We are a member of the Nissan Group. That means we are willing to do what we can to help other group members".

GM is a knowledge base solution that helps find information faster and present it the way people naturally think about it. Users can navigate through vast amounts of content and discover critical data through a dynamic visual interface. Features: visual knowledge map, advanced search, real-time authoring, and collaboration. The purpose of this course is

twofold. Initially, students will be introduced to the basic elements of organizational design, including but not limited to organization structure, administrative processes and systems, size, and product-market complexity. Then they will learn how these other elements can be configured into a range of designs alternative suited for the demand of different strategic, environmental and technological conditions. These two areas of learning will prepare students for designing organizations that can adapt to the shifting competitive forces of virtually any organizational context. This course addresses the management of importance for many firms. The process of learning is being seen as an important competitive advantage for organizations and so is managing the knowledge already possessed by the organization. Knowledge is being recognized as a critical organizational resource, and the process of learning to manage and assess the learning process and diffusion is too important for organizations to leave to chance. Thus, this course is about managing knowledge the processes of organization learning used by organizations, the tacit and explicit knowledge, the sharing and diffusion of knowledge, all the tools for doing knowledge audit. Introduction to tools for strategic management, because it comes at the beginning of the Online MBA Program, it provides an introductory view of the complexities involved in determining long-term strategies. Rather than assessing the firms' environment in terms of broadly defined opportunities and threats, we will examine the dynamics of the competitive environment, how both the pace and direction of industry change is influenced by the resources, capabilities, and competitive interaction of rival firms (Taylor&Brunt2001).

Shared knowledge of supplier

Shared knowledge of suppliers, extent of the shared understanding among product development team members of suppliers' design, process, and manufacturing capabilities, since suppliers are actively involved in key processes of integrated product development (IPD) the knowledge of suppliers' capabilities is critical for timely and cost- effective decision making in IPD. Shared knowledge of suppliers allows product development members to improve their product processes communication and collaboration among design and manufacturing engineers, and enhance customer values (e.g. fairly assessing costs of raw materials of the product supplied by the suppliers) because a substantial portion or part of their final product depends on suppliers' work.

Improved communications

Communication is an essential aspect to deal with the different parts of the organization and sending on time. Communication internal within an organisation and

external with suppliers or other persons is essential for the organisations survival in the competitive market situation. Both uncertainty and inventory levels are lowered through improved communications "within" and "between" supply chain constituents. A successful customer vendor relationship is built by exchanging information pertaining to product development for new products, product improvements, costs, demand schedules (including point of sale data), and materials and supplies needed to meet production schedules. It is crucial to relay information about end-use consumers to manufacturers back through the chain. These result in better product information about customers' needs and improved production operations.

Ongoing communication of all relevant information between all parties is vital in order to overcome distances and any cultural differences between the members of the supply chain. Information has to be accurate, timely and visible before it can replace inventory.

Case study

Over the past two years, senior managers at many automotive companies have started to implement a new business model called a digital loyalty network (DLN). The model enables firms in any industry to constantly collect and observe their customer, product and supply chain data and more precisely adjust engineering, production, distribution and sales/marketing activities to meet current and future demand. Moreover, they can use the same data to enhance their partnership with suppliers. For example, GM has put in place a number of components of a digital loyalty network, including the implementation of an integrated network connecting the company with suppliers, alliance partners, dealers and customers. GM has also adopted a new formula for managing the order-to-delivery process, has launched Web-portals for customers and suppliers and continues to enhance and support its On Star system, which allows drivers to communicate on the road with GM customer service representatives and vendors. Digital loyalty networks have three components:

- Digital – the companies use sophisticated information technologies to manage information more effectively;
- Loyalty – the system is designed to target, satisfy, and retain the most profitable customers and, in turn, use customer information and loyalty data to make the supply chain more efficient;

- Networks – the information system links suppliers, producers and customers and is continuously updated. DLN companies use information technology resourcefully to increase the effectiveness of supply chain and customer relationship management initiatives. They develop a solid network of digitized information that ties together the value chain and creates loyalty and on both the front and back end of business operations. On the supply side, DLN companies continuously monitor customer value based on feedback about customer requirements, purchase history, and potential purchases and rely on digital technology to make certain their most valuable customers are kept satisfied. They do this by managing inventory through the supply chain so that the best customers are served first, and making certain short and long-term capacity planning responds to these customer priorities. In addition to General Motors, Deloitte Research identified three other innovators in the automotive industry – Porsche, DaimlerChrysler and Renault/Nissan – that are developing certain aspects of a DLN (Wickens1989)

Infrastructure support

Nissan-Renault and GM are always looking for suppliers who have world class competitiveness in term of:

- Quality: is a necessary component so as to carry out customer satisfaction. If products are defective, it can dive to not only complaints but also a bad reputation for the company.
- Cost: offering high value and excellent utility at low prices augments product demand. The preservation of substance and energy that are a part and parcel of the cost-saving measures help protect the environment. Cost is therefore an essential criterion. Nissan and GM appreciate the concept of low pricing and practice it adherently. They demand low prices from their suppliers only after a proper reasoning than just reduction. Both companies believe that suppliers need to make every effort to constantly trim down costs and transform their reductions into lesser prices.
- Delivery: customer satisfaction comes only from knowing what a customer wants and delivering it without any questions asked. Nissan-Renault and GM believe in reliable delivery which is integral to both themselves and suppliers. The delivery is done both on time and with the right specification so that the quality is maintained.

Both companies also make it a point to work towards understanding the needs and want of their customers therefore suppliers need to be able to react flexible in production and delivery.

Supplier development and purchasing performance

Supplier development, time and accurate information is crucial to decision-making and ultimately to performance. In this respect, sharing confidential information with suppliers is found to correlate positively with the firm's overall business performance. Involving suppliers in the product design process provides them with the opportunity to work with purchasers to identify parts that can be most efficiently and effectively produced, thus increasing purchasing performance. Additionally, it has been reported that training suppliers improves supplier performance. Therefore, it should be expected that the implementation of advanced supplier development would improve the supplier performance and/or capabilities, and in turn, improve the buyer's purchasing performance.

Comparison between the western and the Japanese companies

Western

Customers help their suppliers to be competitive in the market. OEM's maintain stable short term development of their suppliers. But in North America, OEM's are less ambitious to improve their suppliers. For example, the GM's PICOS programme is only one week Kaizen workshop and is very rarely repeated for the same supplier.

Suppliers in North America may not have full faith in their customer due to the short term assistance and no appropriate gains. Suppliers in North America are reluctant is disclosing any financial or other information.

Japanese

Customers help their suppliers to be competitive in the market. OEM's maintain stable long term development of their suppliers and are more ambitious to improve their suppliers. Suppliers are controlled by techniques for customer induced learning which varies. Nissan initiated with the SBP activities and then moved on to HBP in which Nissan was very close to its suppliers in matters of investment and management plans.

Japanese and western approaches

The 'Japanese' approach required thorough buyer-supplier collaboration in order to attain efficiency right from the start. The system is designed to get it right at the first time of asking. All problems are expected to be ironed out at the product definition stage in order

for minimal disruption for the remainder of the life cycle. 'Western' companies had also wanted suppliers to get the quality right at the first time of asking. Their philosophy to initiate supplier development may have included the use of SPC and quality planning to get the quality right at first time. The aim was the same, but how they arrived differed in accordance to their production systems.

In conclusion, the terms 'Japanese' and 'Western' approaches towards supplier development may seem out of context. The Japanese companies are developing ideas generated by Henry Ford, whereas Western companies are adapting ideas originating from Japan.

The strategies of the two companies

The strategy of Nissan is to develop a number of suppliers in order to establish a good partnership for a long-term contract. Nissan is looking for regularity and a rational way of working. They are trying to standardise the parts for each model of the range to increase the stability, reduce the research costs, and have a logical way to work.

The strategy of GM is to diversify. This allows GM to look at other way to manage the supply chain. This can be interesting in the way that by looking to different systems, GM can analyse and combine all the systems to find one with a better efficiency. GM tries as well to integrate the suppliers to the GM plants, this will allow GM to build new relations with the suppliers and permit a good network of suppliers. The GM supplier network is a way to improve all the suppliers by mutual help.

Nissan philosophy and leadership (To lead or not to lead)

In the fairy-tale Peter Pan, the Lost Boys are quite content to skip merrily along behind their leader. The extent of their aspiration is to emulate him. At Nissan, a somewhat different philosophy prevails. The Japanese automaker has no intention of simply following in the wake of rivals because, according to CEO Carlos Ghosn, those who habitually follow the leader never get to be leader themselves.

In 1999, Nissan was an ailing firm. Now, the automaker rubs shoulders with Toyota and Honda as a trendsetter in the North American market. How has the company been transformed so remarkably? With a pioneering approach in which bold ventures, innovative designs and revolutionary work practices are the order of the day. As a result, Nissan boasts the best margins of the world's leading car manufacturers. Its 2002 pre-tax profit of 10.8 percent was over 7 percent higher than General Motors. (Wickens 1989)

GM's supplier development

GM considers there are benefits in mutually working with suppliers in issues such as quality, service, technology and cost. To work closely with its suppliers GM has taken the supplier development initiatives .In 1998 Automotive Industry Action Group launched the ANX network, business to business ecommerce infrastructure based on the internet technologies. GM's supplier communication website called the GM supply power is hosted on the ANX network where its suppliers can access it. GM supply power consists of (Blumenfeld et al. 2001):

- Purchase power: GM communicates with its supply base in the areas of purchasing and sourcing materials
- Quality power: GM exchanges information on quality and supplier development with its suppliers
- Engineering power: Electronic digital data exchange between GM's vehicle programs and its suppliers
- Material Power: GM communicates with its supply base in the area of production
- Finance Power: GM communicates with its supply base in the area of finance

Some of the approaches that GM has taken for its supplier development are:

- GM's export suppliers are approved with QS 9000 as a minimum requirement. GM monitors its supplier's quality process from development until the production. GM carry out audits on processes and supplier performance is reviewed on regular basis.
- Currently GM has over 150 supplier development engineers conducting workshops at supplier facilities to reduce waste and increase productivity as part of their lean implementation. In 1996 GM developed a training program for the supplier development engineers in the area of resource conservation and pollution prevention to increase the environmental awareness of these workshops in conjunction with the US Environmental protection agency, US department of energy and Business for social responsibility. In 1968 GM was the first in the automotive industry to develop a supplier diversity program, since then GM has been a leader in minority supplier development purchasing in billions from their Tier1 and Tier2 suppliers. Currently GM supports around 50 minority suppliers providing suppliers leadership direction and resources to grow their strategic capabilities. GM ensures that the minority suppliers are provided all the opportunities to do business with them. The supply diversity team has supported the minority suppliers in their growth throughout the supply chain.

GM started a strategy called co-development in which the company will use the technology innovations of their suppliers to develop the innovation at GM. The supplier is guaranteed the business which results in the period of their collaboration with the supplier after which the supplier is free to market that technology to other companies (Ford 2002).

Examples of success and failures:

GM's success in supplier development

GM has found that their supplier development workshops and the supplier environmental advisory team programs have been very valuable. The workshops have been very effective to identify the opportunities for improving the supplier's facilities and in the products supplied to GM. The action items which were implemented have resulted in several environmental improvements and savings to GM and its suppliers. The small issues and problems such as focus on energy and other environmental issues which were never before seen were picked up in these workshops and were considered for improvement which has resulted in millions of savings. For example, previously equipment was left on even when not in use and painting on unseen parts have all been improved on. Eliminating those small problems has helped save large costs on paint materials and reduction of emissions.

Failures in GM's supplier development workshops

The facility by facility approach was very tedious and labour intensive. It could only be applied with complete confidence to the action items identified. The results of the efforts were not really shared throughout the supplier company or to the supplier's suppliers

- It has been challenging for GM to apply the learning from the workshops to future actions. GM began to address this by developing ideas for use in the new and future production processes. But the workshop approach did not directly address issues such as involving the suppliers in developing new products to be designed for environment
- The suppliers have benefited from the knowledge and experience of the supplier development engineers (SDE) and also the SDE's were able to apply what they learned to other suppliers. But due to the difference in the production processes, GM's learning from the workshops usually did not apply to their own operations
- Even though the workshops helped the suppliers to become more competitive and improving their opportunities to work with GM for longer terms, the workshops did not result in a strategic partnership with the suppliers.

Trends in OEMs-supplier partnerships

To explore the potential of fractal manufacturing partnership FMP, we will start with a short review of recent evolution in OEMs and supplier partnership. The review will include the progression from JIT or "bulk delivery", to "JIT II", to "modular sequencing", to "supplier parks", and eventually, to "FMP". Through different examples from the automobile industry, we will attempt to substantiate a proposed framework and describe its characteristics.

- Just-in-time bulk delivery

  Just-in-time bulk delivery refers to the shipment of parts from the supplier to the OEM assembly plant. In this scenario, the majority of the assembly of components is completed in the OEM's plant. This requires large amounts of work space and line length within the automotive assembly plant. This type of delivery is consistent with the OEM supplying the product design and the supplier delivering the material as required. In some cases, despite the attempt to move to JIT delivery, the suppliers simply stockpiled inventories to ensure required delivery windows were maintained (Womack and Jones, 1996).

- JIT II

  Introduced and implemented for the first time by Bose Corporation, JIT II promotes a closer interaction between OEMs and their suppliers. In this mode of operation, the supplier maintains a representative in the OEM's plant who has access to the information required to make key decisions on behalf of the OEM regarding ordering and inventorying supplier components. This is a non-adversarial relationship designed to improve quality and enhance communication between OEMs and suppliers. Ultimately, JIT II promotes an environment in which both OEMs and suppliers can respond to unanticipated production changes quickly and accordingly.

- Modular sequencing

  Modular sequencing promotes an even closer relationship between the OEM and its suppliers. In this case, the supplier maintains real time information on scheduling activities in the plant. These results in improved communication and accuracy and ultimately fewer inventories on the assembly line as sequenced modules take up less storage and assembly line space in the plant. For example, Mackie Automotive supplies bumpers, cradle assemblies, instrument panels and struts to the GM Autoplex in Oshawa, Ontario. As vehicles leave the Autoplex paint shop, the sequential order is electronically transmitted to Mackie's plant five kilometres away. Mackie has two/three hours (depending on the product) to assemble and

deliver the sequenced modules to the plant. GM operators remove the parts from the shipping racks and assemble them to the vehicle

- Supplier parks

  The suppliers deliver components to the OEM through the use of automated conveyor systems. For example, Ford (Spain) developed a supplier park adjacent to its car assembly plant where many dedicated suppliers are located. In this case, the benefits include reduced material handling, the elimination of truck transportation and a further reduction in WIP. Communication and flexibility in scheduling is improved further as lead times from the supplier to the OEM are reduced.

- Fractal manufacturing partnership

  Applying the fractal principles, it is termed this new form of relationship "fractal manufacturing partnership" (FMP). FMP elevates the philosophy of "assembly within assembly", and allows the select suppliers to perform design, manufacture, and assembly operations in close proximity to the OEM assembly line. In this case the suppliers rent (or co-own) space in the OEM's plant, and assemble the products directly to the vehicle. FMP promotes the organizational structure based on a series of production silos that are arranged side-by-side and highly coordinated with each other. This approach involves a high degree of cooperation, communication, and integration of operational and managerial activities. The benefits include a further reduction in WIP inventory and instantaneous communication between the OEM and the participating suppliers.

Conclusion

Supply Chain Management is rapidly becoming the most important aspect of business success. Those who manage their supply chain effectively will flourish and prosper; those who don't may not be around in a few years.

For this reason, GM and Nissan-Renault are looking for the best ways to gain a competitive reputation and advantages by focusing on the supply chain management

Both companies must search to develop detailed market strategies by focusing on creating and capturing customer loyalty.

Optimisation promises of the company's supply chain performance can be improved it in different areas, such as, reduce supply costs which is the most important aspect of supply chain management, and this is to minimize the total supply chain cost to meet fixed

and given demand and total costs may include raw materials and inventory holding cost and transportation costs

In conclusion, the difference between the Japanese and the Western companies' approach of supply chain management and supplier management depend highly upon the background of the two cultures. When the western car manufacturers tried to have the better price for a product and put the pressure on the supplier without trying to share the information or without seeing the supplier as an associate, the Japanese Companies tried to make links with suppliers to provide trust between them and allow a quality rise, a cost reduction and a harmonisation of the two different plants. In those circumstances, the Japanese companies are more in control of their cost, quality, defect and production planning.

الملخص

يوضح هذا البحث كيف يفكر المصنعون في تطوير الموردين وذلك من خلال المنظور "الياباني" مثمتلة في نيسان–رينو ومن وجهة نظر"غربية" مثمتلة في جنرال موتورز. ويغطي أيضًا سبب رغبتهم في تطوير موردیهم ، والفوائد التي ستتحقق من ذلك.

في هذا البحث تم دراسة العديد من المصادر من خلال مراجع مختلفة من الكتب إلى صفحات الويب على الإنترنت. تمت مراجعة مجموعة من الآراء مثل منظور الموردين لعملائهم ، وعلاقاتهم ، وكيف يعمل العملاء على تحسين قدرات موردیهم على تقديم الجودة وخفض التكاليف. لم يشمل ذلك الوسائل المادية لسلسلة التوريد فقط، بل شمل أيضًا تدفق المعلومات والتواصل وتبادل المعرفة.

حدد البحث الاختلافات الرئيسية بين أنظمة الإنتاج اليابانية والغربية وإمكانية تحسين بعضها البعض من أجل اكتساب الميزة التنافسية. شاركت كل من جنرال موتورز ونيسان رينو في تطوير الموردين بأسلوب عملي. كما لوحظ ايضاً ان بعض المفاهيم لاتتوافق مع النظامين ولكن كلاهما استخدم دوائر الجودة لخفض التكاليف

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