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Implication of Critical Success Factors of Information Visibility in Supply Chain Management for Improving Customer Satisfactions

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Abstract – The automotive industry emerged in the late part of the nineteenth century. Then technological innovation, improvements, and uncertainty ruled the day. In 1900, Ranson E. Olds sold 500 cars to prove the commercial feasibility of the product. The entrepreneur Henry Ford appreciated the huge demand for a car priced such that most Americans could afford it. Ford's price sensitive strategy paid off when Model T came out in 1908. Demand that exceeded supply His strategy of mass production and extensive dealer network resulted in a market share of more than 50% in the early 1920s.

Keywords - Supply Chain, Automobile, Industry

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INTRODUCTION

Multiple companies manufactured different autos, bringing competition to the industry. Ford's company stuck to his model of mass customization. Ford continued to develop common cars (the products), which were mass-produced in long assembly lines (the process), in a vertically integrated chain (supply chain). Alfred Sloan's General Motors proved a formidable challenger as GM identified a change in the demand now that most people had cars. Customers were 2nd time auto buyers and marketing and management became the key strategic functions that differentiated GM and Ford. Sloan gave GMs operating units full autonomy, controlling production, marketing, purchasing, and engineering. A general office assured over-all coordination, control, and planning. These innovations in management became a model for much of American industries.

GM also worked on marketing to get the larger share of the auto industry. GM abandoned vertical integration and focused on building "a car for every purse and purpose". GM turned to outside suppliers and producing the largest array of products in the industry. Emphasis on research directed by Charles P. Kettering improved the performance of the various systems (axles, transmissions, etc.). The result, a car comfortable to drive and more pleasing to the eye, appealed immensely to the customers.

The Chrysler Corporation took advantage of Ford's slippage to gain a foothold in the market. By 1929 Chrysler offered four basic car lines: Chrysler, DeSoto, Dodge and Plymouth. Because Chrysler was less vertically integrated than Ford or GM, it could seek competitive advantage through flexibility in product engineering and styling. This strategy proved very successful while when the rate of technical change in the product was rapid. Once product design were stabilized, other factors such as strength of dealership and economies of scale became more important.

Later in the century, imports started to play an important part in the US market. In the specialty and luxury segment in the US, Mercedes, BMW, and Triumph played an important part. VW, by firmly establishing itself in America with dealers initially and latter with a production facility, maintained a strong market presence well into the 1970s. At that time, inflation, government price control, increase in oil prices, and consumer's loss of buying power affected the firms differently.

In the recent years, trends in the industry have been spurt by some of the issues from the past such as government regulation, competition from imports, and also now the Internet frenzy.

Government regulations have recently made the automakers revise their engine designs to control car emissions. Improvement in production systems by Toyota allowed them to enter the US market and become a key player globally. US auto companies have recently engaged in revamping their production systems to answer that challenge, and this includes shallow integration as was Chrysler's strategy in the

1930s and 1940s. Lastly, the big three auto companies in North America have combined to develop the industry's largest and dominating market exchange -this after launching ideas independently. This is to leverage the information technology available to reduce the cycle time to develop vehicles and to satisfy customer orders.

In this historical context, the rest of the paper is set. The current situation of the OEMs and suppliers is discussed, followed by how this is changing under the pressures of regulation, technology, and competition. Lastly, we discussed what in our opinion the future will bring for the industry and the players in it.

Similar to many other industries, the automotive industry is rapidly evolving. The largest forces impacting this increasing clockspeed are the globalization of competition, regulatory changes, and rapid advances in information technology. These developments are affecting all parts of the automotive supply chain. We will consider how these developments are impacting two specific players – the OEM's and Tier-1 Suppliers – and what strategies these groups might consider adopting to compete in this new environment.

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RESEARCH STUDY

The supply chain for the automobile is quite complex. Determining the boundaries of this chain is difficult because the value proposition offered by automobile manufacturers is evolving dramatically. Traditionally, the supply chain started with raw materials that went into sub-assemblies and ended with distribution of the vehicle to the final customer, excluding servicing of the vehicle. Today, the starting boundary is not much different. The end is, however, very much unclear. In a rethinking of their strategies, OEM's today are attacking untraditional areas. The chain has been extended downstream to account for many services and offerings that can now be offered due to advances in information technology.

Traditionally, the automobile was considered to be a collection of sub-systems. Different OEM's seemed inclined to focus on internally developing certain key sub-systems while outsourcing systems they didn't deem to be critical. The common thread among all OEM's, however, was that they all played an integration role and understood how these systems fit together and maintained sufficient capacity and knowledge to execute this portion of the supply chain. Below is a list of some of the key systems and who in the chain has handled that part of the chain.

Systems	Traditional Today	Tomorrow?
Interiors	OEM's	Tier-1
Engine	OEM's	OEM's, Tier-1
Transmission	OEM's	OEM's, Tier-1
Body	OEM's	OEM's
Electronics	OEM's	Tier-1

The trend definitely seems to be to outsource more of these components to Teir-1 suppliers or possibly further upstream to Tier-2 suppliers. In order to determine whether this outsourcing makes sense to the OEM's, it is helpful to use Fine's Matrix of Organizational Dependency. This matrix is helpful and forces us to consider whether a particular technology or portion of the chain might be the high value link that controls the rents or profits. To consider this point, let us look deeper into engines.

Automakers have begun to share engine technology. A combination of factors had led to this decision. Because about a third of the average car price of $22,000 is made up of the costs of the engine and drive train, automakers are deciding to outsource this part of the value chain to more efficient producers in an effort to improve their cost and profit structure. Another part of this decision is due to the regulatory environment facing the industry. DaimlerChrysler, wanting to wean itself from the gas-guzzling Mercedes engines, has formed acquired a large equity share of Mitsubishi and will use their fuel-efficient engines to meet stiff European emissions regulations set to take effect in 2008. Lastly, the common belief is that engines and their accompanying performance are much less of a differentiator and will continue to decrease in driving the final consumer purchasing decision.

The engine is becoming more and more modular. The lifecycle of an engine is still rather long and only minor changes are made during this time period. Thus, the clockspeed is rather slow. Few suppliers have the knowledge to develop engines or the capability and capacity to manufacture them. Fine's matrix would thus classify this as the worst outsourcing decision. The few suppliers may have the potential to control the rents in the supply chain if they can develop a pull for their technology. To develop a pull, engine suppliers will have to market their superior technology and reliability to the final consumer so that the brand influences the purchasing decision. Thus, OEM's should be wary if they only focus on a couple of suppliers. At the very least, OEM's should consider developing this capability in additional suppliers or continue to invest in maintaining a sufficient level of knowledge in the latest technological developments so that they don't become trapped in relying on these few powerful suppliers.

Most of the other listed sub-systems fall into the same category in the matrix. Automakers must thus be cautious of the few suppliers developing these systems. The exception is electronics. There seems to be a sufficient supplier base for these sub-systems.

Although, the make/buy matrix exposes the dangers of relying on a couple suppliers for a critical component, automakers are still pursuing this trend. Protective long-term relationships and contracts can mitigate this risk if terms are identified and disclosed early in the relationship.

The clockspeed of the automobile, which has traditionally been driven by the frequency of model and engine introductions, is being driven by the speed of the internet and the services that it has enabled. More and more, new systems are emerging that the automakers feel will drive important in driving these same purchasing decisions. Traditional purchasing decisions have been driven by such factors as styling, performance, and quality and reliability. New systems that are gaining in importance and in influencing consumer demand are multimedia and entertainment systems that offer features such as digital audio, video games, etc. Safety and security systems are also gaining in importance. Many of these systems will most likely be integrated through a standard vehicle interface. For example, GM's Onstar system maintains a standard interface via a couple of buttons on the rear view mirror. A central service center is networked with the vehicle to provide concierge services and assist the driver in the event of an emergency. They have also begun to sell a voice-based internet service via this same interface.

These services all full under the "telematics" umbrella. Telematics merge wireless and satellite based services. It is not clear if there will be a clear-cut standard interface, but many different companies are emerging to try to become the standard or one of the major ones that survives. Many companies are forming alliances to try to reap these rewards. Delphi has allied with Palm to attempt to make the Palm the standard interface to deliver voice enabled internet services to the vehicle via a communications port. GM is banking on the Onstar interface, Ford's soon to be spun off Visteon division is also involved in such an effort. These firms are allying with traditional electronic and entertainment firms such as Sony, Sega, etc. Many further services will be added in the future such as satellite delivered music service. These developments are occurring at a tremendous pace and at times seem to be directionless. However, the name of the game right now is speed and companies often times are moving rapidly because of the fear of simply falling behind. Our belief is that a standard interface should be developed to permit the modularization of many of accompanying physical hardware and services. This standardization is a necessary product due to the increased efficiencies and scale that it will provide.

SIGNIFICANCE OF THE STUDY

Net marketplaces are being hailed by Wall Street and are thought to offer tremendous potential savings to the OEM's. OEM's initially began to develop their own net marketplaces in the hope that they could build some sort of strategic advantage over their competitors. They quickly came to the realization that the supply base among the OEM's has a lot of overlap and that many of these suppliers were unwilling to invest in the knowledge and technology to support multiple exchanges. Consolidation among these exchanges was bound to occur. The complexity of a supplier operating under several differing standards is not realistic. Additionally, a net marketplace benefits from scale. The larger the size of the user base and orders made via the network, the larger the potential cost savings. Thus, a combined exchange is much more efficient.

Ford, General Motors, and DaimlerChrysler collaborated and agreed to consolidate these activities and form a single automotive exchange. Renault and Nissan have also joined this exchange. There are a few companies that are resisting this business collaboration. Volkswagen has said that it will setup an independent digital marketplace. Other companies, such as Toyota and Peugeot are waiting to make a move. They want to see whether OEM's can collaborate via these joint exchanges before deciding whether to join.

B2B refers to any systems that permit companies to communicate with one another. Thus, systems that permit companies to more efficiently develop products or pass along production orders also classifies as a B2B system. These will be explained in depth later and provide a great opportunity to improve the flow of communication and efficiency.

FUTURE TRENDS

The following points briefly describe probable trends in the automotive industry and factors that will lead to their need.

Reduced Vehicle Platforms – As consolidation occurs and scale becomes more important, cost becomes an even greater competitive focus. A reduction in vehicle platforms will allow OEM's to reduce the costs associated with a particular vehicle model.

Increased Model Variety – Even though the number of vehicle platforms will decrease, there is a demand for a greater variety of vehicles to fulfill diverse customer taste. If large OEM's are unwilling to meet these demands, niche producers will be willing to do this for a premium. Thus, the number of models per platform will explode.

Continued Consolidation – Globalization and increasing product development costs are driving the need to compete by increasing scale. This will continue and consolidation will continue. This will increase so much that some studies project as few as eight OEM's by the year 2010.

Brand Competition – The brand will become more and more of a competing factor. The many initiatives that OEM's such as Ford have begun will only multiply as they rush to build their brand years in advance of a consumer's purchasing decision.

OEM Modularization – The forces of the double-helix will continue to push OEM's to be more modularized. OEM's must accept this and make the appropriate make/buy decisions while focusing on their own brand recognition.

Reduced Development Time – While B2B initiatives are currently focused on purchasing, the focus will shift to using information technology advances to improve communication flow and bring products to market faster. This may have an even more dramatic impact on firm profitability as time-to-market becomes even more important.

Supplier Branding – As OEM's outsource many modules, suppliers will have to develop a brand name to establish a market pull for their technologies. OEM's will need to be aware of such attempts and maintain sufficient capabilities in alternative supply sources to avoid being held captive.

Supplier Relationships – The OEM integrator role will make it expensive to manage relationships with many suppliers. Thus, OEM's will reduce the number of suppliers to lower the relationship costs. The number of suppliers will be a sufficient tradeoff of the relationship costs and the costs of potentially being held captive if the suppliers are too few. Roland Berger estimate an expected global supplier base of 30-50 suppliers.

Telematics / Networking – The rapid advances in information technology will lead to the changing of the automobile as we know it. Everything will change in the name of convenience. Sometime during this century, the government will have set up an Intelligent Vehicle Highway Safety where a central computer will communicate with networked vehicles and take them to their destination. Technology must greatly improve to do this and we are many decades away from this advance. Other advances, such as remote diagnostics will come much sooner, as vehicles become networked and OEM's rush to deliver value to consumers. This is not without danger, however, as some consumers may not like to know that OEM's have access to their whereabouts at all times.

CONCLUSION

In conclusion, this is a very exciting industry and change is occurring at the fastest rate in its well-documented history. We can only speculate on what will occur and the strategies that industry players should take in response to these changes. However, we do know that the internet and information technology is great improvements possible. These changes will definitely take place as long as the entrepreneurial spirit thrives. OEM's must be aware of these events and advances and exploit the opportunities. These changes do have the potential to disruptive the current balance of power. Decisions made now will have a huge long-term impact on the future profit-holders.

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