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Assessing Supply Chain Responsiveness in the Telecom Industry
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Assessing Supply Chain Responsiveness in the Telecom Industry

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EXECUTIVE SUMMARY

One of the biggest challenges facing Original Equipment Manufacturers in the telecommunication industry is to create a supply chain able to respond to telecom operators needs. Much of the research over the years has been focused on how to improve specific aspects of supply chain responsiveness, but little has been written on how to measure responsiveness. It is clear that it is difficult for companies to improve what they cannot measure. The focus of this thesis is to fill the gap: provide a model to assess supply chain responsiveness and to develop a set of performance metrics to measure supply chain responsiveness.

Lucent demand, and in general telecom business demand is becoming difficult to predict not only because of telecom operators' changing patterns of purchasing behavior but also because of low levels of extra capacity installed in the network. Businesses in the telecom industry are under constant pressure because of ever-faster changes in the marketplace, the changing nature of competition, the fast pace of technological change, the increase in globalisation and the changes in customers' preferences. Product life cycles are getting shorter while customer expectations are increasing. In this environment, telecom operators are designing their networks based on actual demand generated by marketing campaigns rather than by network planning departments. In addition levels of extra capacity installed in telecom operators networks are lower than 10% due to return on investment efficiency measures, forcing Lucent and other equipment suppliers to be reactive to the spikes in demand caused by the telecom operators purchasing behaviour.

This thesis examined supply chain responsiveness in the telecommunication industry. We carry out this research primarily as a case study of Lucent Technologies, taking into account their current supply chain organization in 2005. Data is gathered from the company internal balanced scorecard, documents, press articles, the responsiveness literature, supply chain performance metrics literature, and interviews with five senior managers, directors and executives at Lucent, each of whom are involved in the responsiveness of the supply chain.

Supply chain responsiveness is an attribute of top performing supply chains. They possess three qualities: react speedily to sudden changes in demand or supply, adapt over time as market structures and strategies evolve and align the interests of all the firms in the supply network so that companies optimize the chain's performance when they maximize their interests. Timeliness of delivery is now seen as an order winner and not just as an order qualifier criterion and is source of higher profitability. Customer loyalty and the prices customers are willing to pay can increase as the original equipment suppliers become more responsive. Customers often purchase more goods and services from their responsive suppliers than from their less responsive suppliers even as they are paying higher prices.

This thesis provides a framework for measuring responsiveness in the telecommunications sector. This framework includes a definition of supply chain responsiveness, a responsiveness assessment model to assess supply chain responsiveness and a set of performance metrics to measure supply chain responsiveness.

This thesis defines supply chain responsiveness as the ability of a supply chain to read, react and adapt to changes in market signals. Market signals are sources of variability to which the firm must respond such as changes in demand, supply and the business environment. The ability to read is concerned with the ability to understand the market demand and supply to ensure that the right amount of goods reach the right destination at the right time. A responsive supply chain is capable of not only reading market signals but also adjusting those signals based on the business environment and other distorting effects such as the bullwhip effect. The ability to react refers to how fast a company responds to actual demand. The ability to adapt in the long-term to remain competitive is concerned with how far a company can deviate from its way of doing business emphasizing the ability to maintain a status quo despite a change.

In this thesis we have built a model to assess responsiveness. This model starts with our definition of responsiveness and recognizes three capabilities a responsive supply chain must possess; the ability to read, the ability to react and the ability to adapt. Based on this definition we identify the variables or responsiveness indicators that affect responsiveness and justified based on the literature research the causal links between capabilities and responsiveness indicators.

The ability to read actual market signals depends on the information exchange upstream and downstream in the supply chain, the data accuracy in the supply chain information systems, how the bullwhip effect amplifies demand variance as information goes up in the supply chain and the effect of the business environment. The first responsiveness indicator for the ability to read is information exchange. An increase in information exchange improves not only the amount and accuracy of information the supply chain organization has but also reduces the investment in inventory, increase product availability, improve overall service levels to the final customer and reduces information distortion across the supply chain. Information provides managers with the facts to make decisions and plays a key role in allowing firms to be responsive to customer needs. Precise knowledge about real customer demand is especially important for innovative products with short life cycles. The second responsiveness indicator for the ability to read is data accuracy. A responsive supply chain reads inventory status and purchase orders status on a real-time basis. However, that's of no much value when this data is not accurate. Inventory record inaccuracy can substantially decrease profits, requiring additional labor and inventory carrying costs and reducing our ability to react to purchase orders. Tracking and tracing accuracy of the inventory for all inbound and outbound orders, reporting on shipments, orders and products increases overall service levels while reducing delivery lead times. It is clear that an improvement in data accuracy improves service reliability. The third responsiveness indicator for the ability to read is the Bullwhip effect. It is defined as demand variation that is amplified as one goes up the supply chain. For example, the variance of the orders placed by the telecom operators to Lucent tends to exceed the variance of the demand observed by the telecom operators, and this increase in variability propagates up the supply chain to contract manufacturers and suppliers. Distorted information from one end of a supply chain to the other end leads to inefficiencies. Companies counteract the bullwhip effect by understanding its causes and establishing metrics to account for the impact of the Bullwhip effect and to establish action-plans to reduce the bullwhip effect. The fourth responsiveness indicator for the ability to read is the business environment. Keeping track and incorporating business environment indicators in the management of the supply chain improves the ability to react and adapt to changes and thus supply chain

responsiveness. In order to read the business environment, global companies should analyze not only macroeconomic variables such as the economic growth rate of the economy and political risk indicators but also account for the competitive environment and the impact of disruptions. In such as scenario Lucent is able to respond by creating capabilities inside the company to respond and by maintaining additional or extra capacity and resources that may be used

The second capability a responsive supply chain must possess is the ability to react. It depends on the length and variability of lead times, the buffer stock distributed in the supply chain network and the usage of postponement as a way to move the order decoupling point as close as possible to the final customer. The first variable in the ability to react is Lead Time Management is a critical component of effective supply chain strategies. Once a product is on the market, the ability to respond quickly to demand is crucial. Time management requires not only the measurement of average lead times for each process but also understand the sources of variability. Every business process offers an opportunity to time-management, reducing average lead times and variability makes a supply chain more responsive. The second variable in the ability to react is Buffers management. Companies carry safety stock to hedge against uncertainty about future demand, uncertainty about supplier's delivery reliability, and uncertainty about the business environment. Inventory as an asset has taken increased significance for the telecom operators as they struggle to reduce capital invested in extra capacity installed in the network. The reason is clear; after the dot-com burst telcos must justify the return on every investment in network capacity. Supply chains tend to be extended with multiple levels of inventory between the point of production and the point of consumption. By deploying the right amount of inventory in the right locations, Lucent can be more responsive to actual purchase orders. The third variable in the ability to react is Postponement. Postponement, or delayed configuration is when a supply chain carries inventory in a generic form, that is, standard semi-finished products awaiting final assembly or localization. Postponement is based on the concept of decoupling point, which is the point at which real demand penetrates upstream in a supply chain. Postponement is based on the principle of seeking to design products using common platforms, components, or modules, but where the final assembly or customization does not take place until the final market destination and/or customer requirements are known. Lucent is currently using the postponement strategy to deliver some of their equipment. The challenge is to measure the impact of postponement in their supply chain not only in terms of reduction of actual uncertainty but also the improvement in the service levels. Postponement or delayed configuration can significantly improve supply chain responsiveness.

The third capability a responsive supply chain must possess is the ability to adapt. It becomes a source of competitive advantage, as the company's products, services, and ways of doing business evolve more quickly than the competitors; the organization becomes an industry leader and remains in a leadership position by virtue of its ability to adapt. The ability to adapt depends on the speed at which the firm is able to change the product design, sourcing strategy and processes to the changing market requirements. Process flexibility concerns to the number of product that can be outsourced to each supplier and it is expressed by the number of components or equipments produced by each supplier. Process flexibility is a critical strategic network design consideration in multi-product supply chains facing uncertain demand. Process flexibility provides an alternative means of coping with demand uncertainty. By

enabling suppliers to process multiple products, a firm can allocate products to suppliers so as to meet realized demand most effectively. Sourcing provides Lucent with flexibility to manage a portfolio of contract manufacturers, suppliers and logistics operators. How fast OEMs manages the web of suppliers gives a measure of how fast OEMs adapt to market needs. Therefore, provides a supply chain with a higher level of responsiveness. Product development flexibility can be defined as the ability to develop new products and/or product enhancements in a timely and cost effective manner in response to customer or market requirement, or to exploit market opportunities or to employ technological enhancements. With high product development flexibility Lucent will be able to introduce products in response to changing customer needs or technology.

Finally we provide a multi-dimensional performance metrics system with 68 metrics to measure the 3 capabilities a responsive supply chain must possess and the 10 responsiveness indicators. We describe each metric, the unit of measurements, the types of decisions Lucent and other OEMs can make based on each metric and we link the metrics with the major business processes and sub-processes of a typical OEM.