Supply Chains and Value Networks: The Factors Driving Change and their Implications to Competition in the Industrial Sector

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ABSTRACT

This thesis examines the concept of the value network and the roles of its principal actors, defined herein as (i) buyers, (ii) suppliers, and (iii) logistics providers. Our research considers the role of each actor in the context of the value network; however, we pay particular attention to the role of the logistics provider. Content for our research was gathered from literary sources and interviews with individuals in industry and academia having experience in or knowledge of supply chain management or logistics.

We organized our research around multi-national companies having complex operations. This was based on our hypothesis that large companies, in their capacity as buyers, function as pull factors and dominant actors in supply chain systems. The companies that we selected operate in the aerospace, steel, and consumer products sectors.

A principal purpose of our research was to critique the role of logistics providers from the perspective of their capacity to (i) connect actors across the supply chain and (ii) optimize the functionality of the resulting network or extended enterprise. In order to make such evaluations, we felt it was essential to understand the perspectives of customers, which caused us to define the principal actors of a value network and, ultimately, to adopt the view of the dominant actor (the buyer), as the vantage point for our analysis.

Our research begins with an assessment of the broad issues framing the subject of supply chain management today, principally the factors of globalization, the internet, and value networks. We proceed by looking at the principal actors, giving particular attention to the needs of the buyer, in its capacity as customer. This is followed by a discussion of the value drivers influencing management thinking today and a proposed framework for establishing the foundational architecture of future network strategies. We conclude with a summary of our findings and an assessment of the role of the logistics provider.

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Chapter 1: Introduction

1.1 Thesis statement

Supply chain management, in the context of a global economy, is among the most complex challenges facing corporations today. Motivations to achieve cost efficiencies and access to new markets, in conjunction with an awareness of new capabilities derived from internet-based technologies, are forcing companies to change their operating processes and to segment their core competencies according to strategic and non-strategic capabilities. At the same time, established business practices and standards of quality, both for products and services, are changing and forcing the re-definition of performance metrics within and between companies. All of this is causing the actors who participate in supply chain management to consider, among other things, a new set of expectations and questions about the organization of 21st century supply chains and the role of logistics providers in facilitating the seamless interface of global operations.¹ This thesis is oriented around the foregoing considerations and will address the principal factors driving change in contemporary supply chain management and the anticipated implications to logistics providers.

For purposes of this research, we have assumed that supply chains consist of three principal actors.² These are the buyer (the consumer of goods and services), the supplier (the producer of goods and services), and the logistics provider (the transporter of goods).

¹ Boyson, Sandor; Corsi, Thomas M.; Dresner, Martin E.; and Harrington, Lisa H., Logistics and the Extended Enterprise, John Wiley & Sons, Inc., New York, 1999, p. 11.

² There is a basis for two. Ref. Stadtlter, Hartmut and Kilger, Christoph, Supply Chain Management and Advanced Planning, Springer-Verlag Berlin Heidelberg, New York, 2002, p. 7. The authors note that there are at least two legally distinct actors in any supply chain who are “...linked by material, information and financial flows.”
In the course of our thesis, we examine the role played by each of these actors. However, we pay particular attention to the role of the buyer, as it is the buyer who, in its capacity as customer, pulls the supply chain system by creating demand and setting the rules of engagement. Accordingly, the buyer exerts significant influence over the actions of the remaining actors.\footnote{This is one perspective. Ref. Cox, Andrew; Ireland, Paul; Lonsdale, Chris; Sanderson, Joe; and Watson, Glyn, Supply Chains, Markets and Power, Routledge, New York, 2002, pp. 20-24. The authors describe four power structures in supply chain systems: buyer dominance, supplier dominance, buyer-supplier interdependence, and buyer-supplier independence.} For this reason, we have assumed that the supply chain system is a buyer-centric network.

Throughout our research, we consider the role of logistics providers in terms of their unique capacity to connect buyers and suppliers. Perhaps more than any other actor, the logistics provider can facilitate optimization of the supply chain due to its control over the transfer of goods between locations and, more importantly, through its neutrality. Conceptually, the logistics provider, in the context of globalization, can act as the interlinking force that enables the buyer to coordinate all other actors in the supply chain, wherever they may be located. The business opportunities resulting from this development extend beyond the recent and ongoing actions of most major logistics operators to increase the scope of their products and services by offering, among other things, web-based access to information flows, such as package tracking, as well as warehouse management, capital financing, and supply chain consulting services.

The flow of goods from suppliers to buyers can assume varying degrees of complexity, depending on the nature of the goods and the capabilities of the actors who participate in
the exchange. As complexity increases, the actors must be able to exchange information to facilitate the integration of industrial processes with the flow of goods, thereby enabling the actors to react to fluctuations of demand. Such factors, in conjunction with pressures to improve operational efficiencies, are forcing companies to re-examine existing supply chain management practices and consider how to transform their supply chains into buyer-centric value networks.

From supply chains to value networks

In recent years, there has been considerable discussion and research about the evolution of supply chains into value networks. Much of this discussion has centered on new capabilities provided by internet-based technologies that enable, not only the re-design of traditional supply chains, but also the seamless interaction among actors.

We have crystallized the definition of a value network as one in which a cluster of actors collaborate to deliver the highest value to the end consumer and where each actor is responsible for the success or failure of the network. This definition re-casts the value network as an extended enterprise beginning with the end consumer and ending with the supplier. The concept implies a mutual dependency between the actors based on shared responsibility to pool core competencies and to extract the best skills from each network.

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4 Atiya, Sami and Muguiro, Jaime, Towards Internet Enabled Supply-Demand Networks, MIT Masters Thesis, June 2002, and Salhotra, Bharat [and Bitran, Gabriel R.], “Conducting the Value Network Orchestra – The Emergence of the Maestro,” Working Paper, September 24, 2002. Atiya and Muguiro discuss Internet Enabled Supply-Demand Networks (IENDN) and the integral role of collaboration within the network. Bharat [and Bitran] assert that the thrust of the value network is to encourage system, rather than sub-system, optimization (p.7) and introduce the concept of Maestro, meaning the actor who coordinates the network (p. 9).

5 Cox, et al., op cit., pp. 4-5.
participant. However, it is important to recognize that, although the network is non-hierarchical, the buyer retains control over the performance standards of the network.\textsuperscript{6}

In this context, the concept of a value network resides at the intersection of operational and commercial marketing strategies that unite the inbound and outbound flows of material. The union, however, is complicated by the gap between corporate strategies and implementation processes. It is often the case that procurement and logistics functions within organizations are not aligned with other functional areas in such a way as to foster collaboration.\textsuperscript{7} This weakens the possibility of connecting suppliers to end consumers, thereby making the collaboration between inbound and outbound logistics almost impossible. As senior executives become more aware of value network strategies and the implications of such strategies to financial performance, additional capital and labor resources are being focused on the design of value-added technologies and processes.

Looking ahead, the competitive advantage of firms in the next decade will be dependent, in part, on their capacity to develop sophisticated, but flexible, value network strategies. As the differences between international and global business models are understood, companies will be challenged to re-define expectations within and outside of their

\textsuperscript{6} The issue of hierarchy is discussed by Stadtler and Kilger, op cit. They note that, “Inter-organizational collaboration is a necessity for an effective supply chain. A supply chain is regarded as a cross between pure market interaction and a hierarchy. It tries to combine the best features of the two...Competition among members along the supply chain is substituted by the commitment towards improving the competitiveness of the supply chain as a whole.,” p. 13.

organizations and to organize a network of suppliers and logistics providers that can function seamlessly across borders. This evolution is likely to disrupt the allocation of labor resources within organizations, as non-core processes, including, but not limited to, manufacturing processes, are eliminated or outsourced to other actors in the value network who can perform those functions at lower cost or with greater efficiency.

Technology has been and will continue to be a significant enabling force in this evolution. As information technology becomes more sophisticated, enterprises will gain not only enhanced levels of functionality, but also broader and deeper visibility throughout the supply chain. This will provide companies with access to extraordinary amounts of new information, which can enhance or weaken corporate performance and, therefore, market position, depending on the capacity of the firm to interpret and use that information advantageously.

Notwithstanding the foregoing, the integration of new technologies across the value network is a daunting challenge. The principal obstacle, however, is not found in the limitations of application software, although certainly such limitations exist. The more difficult challenge is found in the capacity of companies to (i) conceptualize the value network that is advantageous to their enterprise, (ii) identify the nature and extent of changes that must be instituted within their organizations in order to pursue such a vision, (iii) effect and control process changes within their organizations, (iv) develop managerial competency across organizations (as distinguished from within their organization), and (v) define performance metrics appropriate to the new scheme.
Our report addresses these challenges in greater detail. We begin by examining the current business environment and some of the key challenges in supply chain management today. In Chapter 3, we describe the role of each actor, giving particular emphasis to the buyer, as customer and dominant actor. In order to better understand the issues and motivations of the buyer, we establish a benchmark vision of the ideal materials flow from the buyer’s perspective. Then, in Chapter 4, we examine the principal drivers of change underlying the transformation of supply chains into value networks. In Chapter 5, we suggest the central elements of next-generation information architecture and its implications to the relationships between buyers, suppliers and logistics providers. We conclude our report by summarizing the dominant service gaps in present-day supply chains and how these deficiencies might be resolved, giving particular attention to the logistics provider. Finally, we describe what role the logistics provider might play in the value network and, more importantly, the limitations of that role.

1.2 Thesis structure

Content for this report was gathered from personal or telephonic interviews and literature research. Interviews were organized with (i) functional managers employed in logistics, supply chain management, or information technology, the latter consisting of individuals having specific knowledge of logistics or supply chain management applications, (ii) business consultants, research analysts, and academics having expertise in the areas of logistics or supply chain management, (iii) a major software developer offering a range of supply chain management applications, and (iv) third-party logistics providers, one of whom sponsored the research efforts of this and other past and present theses either
directly or indirectly, as part of a multi-year relationship focused on the study of supply chain management and related topics at the Massachusetts Institute of Technology.

Interviews with business functional managers were organized in the context of large manufacturers or procurement agents having annual sales ranging from approximately $1 billion to $9 billion. This was premised on our view that such firms, in their capacity as buyers, function as the dominant actors and pull factors in supply chain systems.

Recognizing the trend towards globalization, we focused on enterprises having a multinational presence. While the biggest companies we interviewed are headquartered in the United States, Canada, Europe, or Latin America, all of the companies we interviewed have business operations in multiple locations around the world, some including Asia. This approach enabled us to gain insight into the complexity of managing a global supply chain from the perspective of the dominant actor, while it simultaneously exposed the challenges to all actors, as they attempt to understand the implications of a global operating strategy versus an international operating strategy and how the accompanying transition will affect operating practices and business relationships with each other. We selected companies that are part of a complex supply chain network and that:

- move more than 200,000 stock-keeping-units (SKUs) annually,
- have multiple industrial operations and multiple warehouses,
- operate in different countries and/or continents,
- have complex inbound and/or outbound logistics and complex manufacturing operations,
- have or desire unified procurement software and policies.
Management perspective

The topic of supply chain management means different things to different people. Most often, we encountered the notion that the principles of effective supply chain management are vested in the examples of Dell and General Motors (GM). While these organizations, and the computer and automotive sectors generally, have achieved significant success in this area, it is our view that the analysis of supply chain management must reach beyond the obvious examples. Accordingly, while cognizant of the Dell and GM models, we have focused our research on other industrial sectors, principally aerospace, steel, and consumer products.

In the course of this report, we benchmark a vision of the ideal relationships between buyers, suppliers, and logistics companies. While we hope that our report will be useful to every reader, we have tailored it for the benefit of senior executives for whom supply chain management is but one of several operational challenges. We hope that this report will give you a meaningful overview of current issues and provide a basis for establishing constructive dialogue and perhaps specific initiatives concerning the design of your company’s value network to achieve maximum competitive advantage.
Chapter 2: Factors Influencing Connectivity in Contemporary Supply Chains

Throughout our research, we encountered three recurring themes that collectively constitute an essential framework for understanding the challenges of contemporary supply chain management. These are the factors of globalization, the internet, and the value network. Accordingly, we consider these issues below in order to establish context for understanding the environmental landscape pertinent to current-day competition.

2.1 Globalization

The challenges of globalization have received increasing levels of visibility in recent years. This is partly due to recognition that the capacity of organizations to compete effectively on a global basis is directly linked to their capacity to manage global supply chains. Moreover, the task is about more than designing strategies to capture cost efficiencies. In this respect, globalization has brought with it a new commercial reasoning and a new competitive dynamic. For many companies, the issue of globalization is destined to change the conduct of their businesses and the metrics for measuring growth and perhaps corporate survival.

As the implications of globalization are understood, companies are discovering that competitive advantage may require them to decentralize production activities, perhaps across continents. The rationale supporting such motivations extends beyond the traditional objectives of securing low-cost wages or similar cost efficiencies. Indeed, contemporary initiatives may be driven by non-market strategies or a desire to gain

\[^{8}\text{Ibid, pp. 38-39.}\]
proximity to strategic business partners or markets, among other considerations. Although these developments appear to be a logical evolution of an increasingly integrated world with low trading barriers in many markets, our research suggests that the steps to institute uniform global processes within and between organizations are occurring slowly and often in a disorderly fashion. This may reflect resistance to change in some firms or simply caution about disrupting established methodologies and practices. New processes and technologies often take years to be adopted and longer still to be optimized, as exemplified by the ongoing institutionalization of internet based competencies within business enterprises.

Until recently, software suppliers have lagged behind their corporate constituents’ needs to integrate existing legacy systems with EDI and web-based applications that can support a well-functioning supply chain across global markets. Indeed, there has been a growing need to define an operational architecture that can support the capacity of buyers, suppliers, and logistics providers to share information on a real-time basis about common transactions wherever they may occur around the world. In fact, the issue of integrating supply chains across borders is among the most pressing challenges confronting

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9 Globalization requires a new understanding of core competency and how to optimize that competency to gain economic or competitive advantage across borders. Moreover, the task requires executives to develop global strategies that are responsive to the characteristics of local markets. Ref. Gupta, Anil K. and Govindarajan, Vijay, “Converting global presence into global competitive advantage,” Academy of Management Executive, 2001, Vol. 15, No. 2, pp. 45-56.

10 Federal Reserve Board Chairman Alan Greenspan noted: “During the past half-century, barriers to trade and to financial flows have generally come down, resulting in a significant broadening of world markets.” Ref. Greenspan, Alan, remarks entitled “Globalization,” Washington, D.C., October 24, 2001.

11 Electronic Data Interchange. EDI is used to refer to a private network in which two or more actors are connected in bilateral fashion. Generally, traditional EDI architecture is not flexible and cannot support dynamic multilateral relationships. EDI is expensive and rigid. Its principal advantage is security. Ref. Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., pp. 260-265.
companies today. While solutions are complex and expensive, they are nonetheless essential to the survival and growth of firms who intend to be leaders in their industry.

2.2 The impact of the internet on supply chain management

Internet-based technologies have been portrayed as essential drivers in the re-design of supply chain management. However, the benefits of these technologies have not always been as obvious as the supporting literature suggests. Certainly, the arrival of the internet has been something of a revolution. Yet, there are shortcomings. Now that the dot-com bubble has burst, companies are focused on harnessing the potential of the internet to transform business processes and to integrate companies across wide geographic areas.

In order to optimize the internet and re-design the supply chain, companies must first determine a vision of the future. Where do they want to go? What do they want to connect? What actors must participate in the dialogue? The answers to these and many related questions imply that business processes have been and will continue to change. As changes occur, there is likelihood that many existing jobs will be eliminated or moved to foreign destinations, all of which will provoke a certain level of internal resistance from labor groups that may be affected by such changes.

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13 Ibid, pp. 11-25.
Growing Complexity

Historically, the interaction between actors in the supply chain was regimented and linear.\textsuperscript{14} As internet-based technologies emerge, supply chain management is likely to become less linear and significantly more complex. Ultimately, we expect that the internet will:

- reduce total interaction costs outside of the organization, including costs to transport goods, move funds, and transfer information among actors,
- facilitate the coordination of different size companies and reduce, in particular, the barriers of entry for SMEs\textsuperscript{15} to participate in the global marketplace,
- stimulate a re-definition of the roles of each actor in the supply chain,
- re-distribute the functions of actors within the supply chain.

Collectively, these factors signal the emergence of a value network, meaning a consortium of relationships in which the role of each actor is complementary to the other actors and adaptive to the needs of the entire network. The resulting system is one where each actor occupies a different node within a web designed to respond to the needs of the customer who resides at the center of the network. A practical example is found in the widget supplier who may be required to route two identical widgets to different recipients, one being a manufacturer who uses the item as a component part in an assembly, and the second being a commercial customer of the manufacturer who needs the widget as a spare part. Although both widgets are identical, the supplier's role in each transaction is different and supportive of the manufacturer. In order to achieve such flexibility, the legacy systems of each actor must be connected to permit visibility to both inventory and transportation data. Once achieved, however, a multi-tasking capability will have been

\textsuperscript{14} Ibid, pp. 44-45.

\textsuperscript{15} Small and medium enterprises.
created within a network of disparate companies who can use the technology to gain competitive advantage by coordinating production processes, as well as the flow of goods and capital.

The role of collaboration
The relationships between buyers, suppliers, and logistics providers will change as new technologies are integrated into the supply chain system. Generally, buyers will be empowered by these changes, while the other actors in the supply chain will gain or lose competitive advantage based on their capacity to design a value network that responds to customer (buyer) needs. Hence, it follows that new value networks will outperform existing supply chains only if deeper levels of collaboration between buyers, suppliers, and logistics providers are established.

Prior research suggests that future supply chains will no longer consist of a sequence of players with rigid boundaries and predetermined roles where goods, information and funds flow separately.\textsuperscript{16} Instead, the supply chain of tomorrow will resemble an ecosystem whereby all actors in the network will collaborate to deliver the highest value to the end consumer. In this scheme, each actor is interconnected through an electronic pipeline and each is mutually responsible for the success or failure of the network.\textsuperscript{17}

\textsuperscript{16} Atiya, Sami and Muguiru, Jaime, op cit.

\textsuperscript{17} Ibid.
2.3 The new value network

In the new value network, familiar technologies and processes will be challenged or replaced. For instance, EDI interconnectivity is likely to become obsolete over the long term due to its inflexibility; and JIT\textsuperscript{18} manufacturing processes, which became dominant in the 1980’s within enterprises, are likely to re-emerge in the decade ahead as a concept applied across enterprises.

Such challenges will test the interactions of actors within the supply chain and the nature of the value propositions between actors. Increasingly, each actor will be required to redefine the value of its products or services in the context of new competitive forces. This will cause business managers to re-examine the core competencies of their companies and compel them to identify new ways to enhance such capabilities.

The outsourcing of non-core competencies is likely to continue in the decade ahead as a function of focusing the organization on those tasks having the most potential to add economic value as a consequence of eliminating duplication of processes and functions across the value chain. Progress toward such a structure will result only from cooperative and collaborative relationships among the actors. This will require new levels of trust and a willingness to share information freely between enterprises.\textsuperscript{19}

\textsuperscript{18} Just-in-Time. (See also Note 30.)

\textsuperscript{19} Poirier, Charles C., op cit., pp. 197-200.
The new vision, which is driven in part by the need to alleviate pressure on working capital and to make supply chains more responsive and flexible, will succeed only with the support and commitment of executive management.\textsuperscript{20} Based on our research, we believe that the new value network will require:

- new managerial competencies capable of working within and across firms,
- a well structured and organized definition of the core responsibilities of each actor participating in the value network, including a coherent outsourcing plan when pertinent,
- the capacity to interpret volumes of information from multiple sources and use that information to manage operations, capital, and labor,
- new metrics that enable managers to define, monitor, and evaluate internal performance, and the real-time performance of strategic network participants,
- an ability to identify strategic global markets and local capabilities,
- interconnectivity with a neutral, but highly responsive, logistics partner,
- a standardized SKU system based on a common language shared by all actors in the network,
- sophisticated IT\textsuperscript{21} systems that link all actors in the value network according to their information needs and performance responsibilities.

2.4 The role of logistics providers

If the nature of the actor relationships is destined to change, as we have outlined in the preceding sections, the role of the logistics provider in the new scheme assumes particular visibility. In a cooperative and collaborative framework in which the supply chain is re-configured and outsourcing is adopted as a means of achieving greater

\textsuperscript{20} Ibid, pp. 20-21. Poirier underscores this point, asserting that at least four participants are needed to successfully implement a new supply chain vision: the CEO, CFO, CIO, and the person having direct responsibility for the project, among others.

\textsuperscript{21} Information Technology.
efficiencies, it seems logical that the role of the logistics provider will become increasingly important to the smooth operation of the value network.\textsuperscript{22}

In order to be successful in this structure, logistics providers must contribute to the capacity of the actors within the value network to collect, process, interpret, and use information to maximize productivity and asset utilization. This means that logistics providers must communicate with all relevant actors on a real-time basis and help them to fulfill their obligations to the other actors of the network in the shortest amount of time.\textsuperscript{23}

In order to achieve this, the logistics provider must be a party to the real-time exchange of information between buyers and suppliers. This can be accomplished either by (i) developing an IT architecture that provides visibility to the data valued by customers, together with the capability to integrate the architecture to existing legacy systems, or (ii) gaining access into the IT architecture designed by others for the same purpose. The issue is one of visibility. Once established, visibility will equip the logistics provider with information that it can use to facilitate the smooth operation of the network. In the absence of this connection and the business opportunities that accompany it, logistics services will continue on their present path to commoditization, meaning that logistics companies will win or lose business based solely on price.\textsuperscript{24}

\textsuperscript{22} Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., p. 63. Handfield and Nichols note, “Integrated SCM will only increase the importance of logistics activities.”

\textsuperscript{23} Boyson, et al., op cit., pp. 11-13.

\textsuperscript{24} Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., p. 15. Handfield and Nichols note, “Buyers and logistics managers in many organizations choose suppliers and carriers on the basis of one criterion only – price.”
3.1 The actors

The transformation of supply chains into value networks is premised on the capacity of the actors to collect, process, monitor, interpret, and otherwise share information to maximize productivity and asset utilization for all participants in the network. In such a system, each actor optimizes its value by providing knowledge and services that complement the other actors. Relationships between the actors are collaborative rather than adversarial and the flow of goods, information, and capital between the actors is synchronized according to agreed-upon standards.

![Figure 1 - The Actors](image)

As noted in Chapter 1, there are three principal actors in any value network. *(Figure 1).* By understanding the knowledge base of each actor, one can evaluate information gaps between them and assess how such deficiencies might affect the network’s performance. A thoughtful analysis is likely to identify opportunities for system improvement and allow participants to re-allocate processes and responsibilities within and among the
different actors, so that each actor achieves maximum efficiencies of scale and provides the most value to the other network participants. For instance, with an in-depth understanding of the buyer’s knowledge base, a logistics provider might develop new services tailored to optimize not only transportation services between buyer and seller, but also the buyer’s internal materials management functions. Alternatively, a logistics provider might create value by providing services that satisfy the needs of multiple buyers or suppliers across different market segments.

Regardless of the opportunities that may be identified, the role of each actor and the relationships between actors are of primary importance. We believe the dominant actor in virtually every value network is the buyer by virtue of its capacity to distribute wealth through outsourcing and by its ability to create the necessary connectivity to align inbound and outbound materials flows among the value network, thereby making the entire system lean and efficient. This role vests unique powers in the buyer, most notably the ability to (i) define standards of performance, (ii) set service expectations, and (iii) admit and terminate network participants.

Notwithstanding the foregoing, the buyer’s fundamental influence over the value network does not mean that the other actors are powerless. Indeed, our research indicates that buyers are prepared to outsource large portions of control once they understand the nature of their strategic and non-strategic competencies. However, buyers must be careful not to outsource core competencies that give them strategic advantage.\textsuperscript{25} Everything else

\textsuperscript{25} Ibid, pp. 121-123.
represents a product or service opportunity for the other actors. In this context, suppliers and logistics firms should be developing unique, customer-centric solutions that assist the buyer in achieving the buyer’s strategic goals or that relieve the buyer of burdens attendant to non-strategic competencies.\footnote{26}

### 3.2 Selective transparency

In order to be sustainable, the value network must be transparent and provide each actor with simultaneous access to that information which is relevant to utilization of its internal assets.\footnote{27} This implies the need for data collection and filtration systems that communicate, on a real time basis, pertinent information about each incoming sales order to every actor in the value network who has a role in fulfilling that order. In a global economy, transparency means that each actor can experience connectivity which unites purchase orders, production processes, order fulfillment, and movement of goods between all actors in the network.\footnote{28} This does not mean that all actors obtain access to all or even the same information. Some data, including cost and pricing factors, may be invisible to certain actors. However, all actors must know of that information which is essential to their performance in the network and be able to direct their productive assets to achieving a desired outcome. Other knowledge can be shared among the actors, but only to the extent that such information is useful to the efficient operation of the network.

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\footnote{27}{Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., p. 110.}

\footnote{28}{Ibid, pp. 316-317. The authors discuss the nature and extent of information sharing between actors and related considerations.}
The essential element of transparency is not simply that it gives the actors the power to trace materials, but that it gives them the power to segment and re-organize the sub-systems of the value network so that transparency is achieved across the entire system.\(^{29}\)

In this respect, it is important to understand that transparency is not synonymous with traceability inasmuch as the latter exposes only the location of goods and not the interaction of processes.

In a transparent network, order fulfillment becomes a function of velocity, meaning the speed at which the actors in the network can complete their assigned tasks consistent with a defined standard of performance. The ideal standard (albeit unattainable) is one that would allow each actor to eliminate raw materials and finished goods inventories completely. The former would be sourced from suppliers just moments before production is scheduled to begin and the latter would be shipped to the customer just moments after production is completed. Moreover, waste within production would be eliminated fully. All of this, of course, is an utopian vision.\(^{30}\) Nonetheless, it is useful as a benchmark denoting the fundamental challenge confronting materials managers today. Companies that progress toward this vision will free up enormous amounts of working capital, thereby enabling them to re-direct those resources to other productive activities.

\(^{29}\) Salhotra, Bharat [and Bitran, Gabriel R.], op cit. p. 7. The author[s] note that the thrust of the value network is to encourage system optimization rather than sub-system optimization.

\(^{30}\) The optimal level of inventory varies by situation. The vision presented herein is an extreme view based on the principles of Just-In-Time (JIT) inventory management. In their book, Supply Chain Management and Advanced Planning, Stadlter and Kilger discuss the issue, noting that elimination of inventories is impossible, except in certain specific situations. They observe, “This means that the isolated minimization of inventories is not a reasonable objective of SCM, instead they have to be managed together with the corresponding supply chain processes. Inventories cause costs (holding costs), but also provide benefits, in particular reduction of costs of the inflow and/or outflow processes. Thus, the problem is to find the right trade-off between the costs for holding inventories and the benefits.” Ref. Stadlter, Hartmut and Kilger, Christoph, op cit., p. 37.
These types of changes will affect the way assets are utilized and distinguish the best companies from average companies.\textsuperscript{31}

3.3 Challenges of the buyer

Whereas a basic supply chain is apt to be linear and dependent on timing mechanisms (for example, the scheduling of materials movement from supplier to buyer), a value network is more likely to be elliptical and dependent on synchronization of processes and transactions between actors.

Imagine a scenario organized around a central actor that produces highly engineered products manufactured with extraordinary precision. The company has a multi-national presence; its manufacturing processes are efficient and its labor force is highly skilled. The business has limited competition and its gross margins and cash flows are strong. The company is meeting the challenges of a slow economy; yet, it anticipates that many of its business processes must evolve if the firm is to remain a key player in its industry.

Despite all of the benefits derived from JIT manufacturing processes, improvements in product quality, and the power of information technology, the company has not achieved optimal efficiency. For instance, the company operates multiple finished goods warehouses within a small geographic area, but needs only one warehouse. The company has active relationships with hundreds of suppliers, but could reduce this by two-thirds.

\textsuperscript{31} Berger, Andrew J. and Gattorna, John L., \textit{Supply Chain Cybermastery}, Gower Publishing Limited, England, 2001, pp. 16-18. The authors discuss eight cultures of value chain competitiveness and note that, "Organizations...will eventually improve the efficiency and competitiveness of their new business models by eliminating waste and time. Many will have fewer physical assets and fewer people. Leading organizations will learn to work with chosen partners to optimize the extended supply chain...", p. 17.
The company spends more time trying to track materials previously purchased than it spends placing new orders. Essentially, labor resources are entangled in outdated processes that are maintained either as a matter of necessity (e.g. because there are insufficient resources to support change) or complexity (e.g. because more efficient processes are not easily defined or are accompanied by other problems, such as union considerations).

Nonetheless, if the company, as buyer, is the dominant actor, one must ask why it has not organized a value network. Based on our research, the answer appears to have a lot to do with a firm’s capacity to (i) envision itself as a member of an extended enterprise that is the coordinating actor in a value network and (ii) organize internal and external resources to effect change. The latter includes a company’s ability to re-allocate labor resources (or to reduce labor resources) as a function of instituting process changes.

However, labor relations are just one issue. In order to transform its traditional supply chain into something more powerful, the company must also envision itself as part of an extended value network that operates around a series of common value drivers. In our example, the company estimates that millions of dollars of working capital are invested in inventory that was acquired or produced to compensate for weaknesses in the supply chain. By re-organizing the supply chain, the company will gain sustainable improvements in procurement and production processes that will induce additional savings. Such changes will have lasting effects on the way in which the company operates internally and the way in which it interacts with other actors. Recognizing this
potential, senior management has placed renewed focus on process changes that will enable the company to reclaim a meaningful portion of its working capital investments.

3.4 Connecting inbound and outbound logistics

Companies have a variety of options to move goods either inbound or outbound and generally choose to outsource transportation services whenever possible. Companies such as Exel, Ryder, UPS, and DHL, among others, specialize in transportation services and offer a variety of supplemental services, from warehouse management to financing. The degree of services provided varies among logistics firms, with some companies functioning more as transportation providers (3PLs) and some companies functioning more as consultants (4PLs). In either case, these firms exist to enhance the logistics capabilities of their clients. However, based on our research, it is our impression that not all logistics providers understand either the need to connect inbound and outbound logistics or the benefits that will result from that capability. Moreover, at least some logistics companies seem unaware that the issue of traceability is only one aspect of the operational challenges confronted by buyers and sellers.

Notwithstanding the foregoing, among the companies we interviewed, none had a seamless connection between inbound and outbound logistics. Most often, these areas were treated as separate disciplines and managed by different groups within the companies. Outbound logistics was perceived to be the easier of the two areas because it deals principally with finished goods inventories.

32 These descriptions are broad simplifications. 3PL and 4PL are abbreviations for Third-Party Logistics and Fourth-Party Logistics, respectively. The latter is a registered trademark of Accenture. Ref. Berger, Andrew J. and Gattorna, John L., ibid, (p. 203) and Aitia, Sami and Muguio, Jaime, op cit., (pp. 74-75).
Setting aside the risk of finished goods obsolescence, the main challenges in managing finished goods inventories are (i) warehouse management, (ii) order processing, and (iii) shipping. With basic IT technology, a good logistics partner can perform all of these functions with as much precision, and probably better precision, than most businesses. The same is not true for inbound logistics.

The degree of difficulty increases exponentially for inbound logistics. Whereas outbound logistics is concerned with goods disbursement from a central location, inbound logistics is concerned with aggregation of goods and services from myriad points into a central location. Management of inbound logistics represents one of the most daunting challenges confronting companies today. The ever-present challenge is about system design, meaning the organization of a network of suppliers that can fulfill the materials requirements associated with the buyer’s production and maintenance operations.

The nature of this challenge, fundamentally, is about the integration of traditional supply chain management with the buyer’s production, maintenance, and inventory control systems using electronic linkages or pipelines of data that connect users of information within the buyer’s domain, as well as across actors in the value network. A sophisticated value network should be able to interpret and manage that data for the benefit of all actors participating in the network, thus providing the capability to synchronize the flow of goods, information, and capital according to established protocols.\textsuperscript{33}

\textsuperscript{33} Berger, Andrew J. and Gattorna, John L., op cit., p. 36.
Over time, the company in our previous example should be able to reach its goal of reducing the number of suppliers it deals with directly by two-thirds. As it does so, opportunities will be created for those suppliers who are identified as strategic suppliers. These enterprises will be able to expand their businesses by organizing second-tier suppliers and delivering to the buyer a broader range of products and services. It should be noted, however, that strategic suppliers will be held accountable to the highest standards of quality and performance.\textsuperscript{34} For instance, in the new supply chain system, early deliveries will be frowned upon as much as, and perhaps more than, late deliveries.

The concepts of synchronization and collaboration are essential to understanding the dynamics of the value network and the ideal relationships between actors. The challenge is not about pressuring suppliers or logistics providers to deliver more for less.\textsuperscript{35} It is about the opportunity for these actors to re-define their products and services to meet the unique needs of their customers, the actor we refer to as the buyer. It is this notion that Arnoldo Hax and Dean Wilde address in their book, The Delta Project, wherein they describe the ways that companies compete and the ability of enterprises to distinguish themselves by providing greater levels of value-added services to their customers.\textsuperscript{36}

\textsuperscript{34} Ibid, p. 36. The authors note, “Every member of the value chain must be committed to achieving the same levels of operational excellence and continuous improvement. Each must bring measurable value to the competitive entity.”

\textsuperscript{35} Stadler, Hartmut and Kilger, Christoph, op cit., p. 37. When selecting partners, Stadtler and Kilger note, “Selection criteria should not be based solely on costs, but on the future potential of a partner to support the competitiveness of the supply chain.”

\textsuperscript{36} Hax, Arnoldo C. and Wilde, Dean L., op cit.
When the principles advocated by Hax and Wilde are applied to a buyer’s inbound logistics, the potential for creating value-added solutions for the buyer, and the value network as a whole, is extensive. This is due primarily to the complexity of systems and processes that converge on the inbound side of most manufacturing enterprises. Buyers must integrate production schedules, bills of material, supplier sources and metrics, materials catalogues, and procurement systems, among other elements, into an efficient and coordinated materials management system. For reasons that we shall discuss in the next chapter, the ideal system will link inbound and outbound logistics. This is an enormous challenge, the resolution of which will have far reaching implications to future procurement and production systems. Those actors who can facilitate progress toward this goal will occupy a central role in the value network.
Chapter 4: The Value Drivers of Change

4.1 Conceptualization and design

As noted in Chapter 3, the capacity of an enterprise to define and coordinate the actors of a value network is dependent on its ability to (i) envision itself as part of an extended enterprise and (ii) organize a system that benefits each actor through outsourcing opportunities that generate meaningful economic rewards. This implies that the network leader (which we define as the buyer) must provide the value network with the conceptual framework necessary to organize processes and relationships among actors so that value is created for each.

![Diagram of Value Drivers]

*Figure 2 – Value Drivers*

In this respect, conceptualization of the value network is itself a value driver and a sufficient catalyst for change in some organizations. However, the companies we
interviewed were focused more on a subset of principles or value drivers which collectively support the concept of the value network. While our research indicates that managers respect the importance of these principles as value drivers, not all were certain how to coordinate these drivers to transform their existing supply chain systems into well functioning value networks. This represents an opportunity for logistics providers to act as facilitating agents in the creation of extended enterprises.

During the course of our interviews, we noted that companies consistently mentioned one (or more) of three value drivers in the areas of supply chain management and logistics. These are (i) working capital and liquidity, (ii) visibility, and (iii) velocity. *(Figure 2).*

### 4.2 Working capital and liquidity

From the late 1970’s to the early 1990’s, countless companies participated in some form of business re-engineering or efficiency design strategies. Many corporations eagerly embraced JIT inventory practices, TQM\(^{37}\), and Six Sigma\(^{38}\) standards, thereby signaling a convergence of expectations and business practices around quality and performance metrics. Since the mid 1990’s, these practices have been supplemented by the promises

\(^{37}\) Total Quality Management.

\(^{38}\) Six Sigma is a methodology for measuring and achieving improvements in quality. Motorola is credited with developing Six Sigma in the 1980’s as a result of its work in TQM. Ref. Hammer, Michael, “Process Management and the Future of Six Sigma,” MIT Sloan Management Review, Winter 2002, pp. 26-32. In the article, Hammer notes, “...when there is a large gap between current and desired performance, a process will need an entirely new design. Creating one is something for which six sigma, with its analytic rather than creative orientation, is unequipped.” p. 31.
of CRM,\textsuperscript{39} which uses internet-based technologies and the power of data mining to segment customers and markets.

Notwithstanding the progress of the past twenty years, companies today confront an array of new challenges.\textsuperscript{40} At one time, companies were satisfied to have implemented JIT inventory practices. Then Dell introduced a completely new business model that made the benefits of JIT look like a consolation prize for companies unwittingly relegated to the old economy. However, despite the collapse of the internet bubble, industrial companies continue to understand the power of the internet and its potential to help firms not only re-orient the conduct of business between actors, but also extract incremental value from the network itself. By connecting the tools made available by new technology, companies have an opportunity to implement meaningful process changes that will improve their liquidity and working capital positions.

\textbf{The drive to reduce inventory through process changes}

In Chapter 3, we noted that one of the companies interviewed during our research had excess warehouse capacity. As a result, the company intends to consolidate a number of warehouses into a single facility and outsource the management of the surviving warehouse to a third-party logistics partner. This plan was conceived, in part, by


\textsuperscript{40} Boyson, et al., op cit., p. 193. The authors note, "Companies around the world have done a great deal to take cost out of their operations, to downsize and reengineer in the hopes of becoming more agile and competitive. They have discovered, however, that these kinds of internally directed changes will take them only so far. To jump to the next level of success, they must look beyond their corporate boundaries - to their supply chains. They must learn how to manage these chains - or extended enterprises - as single, albeit huge, living organisms."
motivations to improve the company’s working capital position by reducing operating costs, inventory levels, and fixed overhead. However, the anticipated savings are inconsequential in comparison to those that would be achieved by creating a coherent and well structured value network.

The company’s greatest inventory challenge is not embedded in its warehouses, but rather in a complex matrix of materials management issues on the inbound side of the business. The company manages thousands of parts and hundreds of suppliers. Every dollar invested in inventories has a carrying cost that puts pressure on the bottom line.\(^{41}\) Consequently, production managers are being challenged to free up working capital. However, they cannot achieve this using the techniques of the past twenty years (e.g. JIT, TQM, Six Sigma).

The contemporary answer to this and similar problems is rooted in the capacity of companies to change the nature and timing of material flows from suppliers. In Chapter 3, we defined the ideal standard as one that would allow each actor to eliminate raw materials and finished goods inventories completely. While this is idealistic, the practical objective is to store materials and other forms of inventory in their lowest cost forms for as long as possible and to pull them from the supplier only when they are needed. This will reduce the need for costly buffer stocks, thereby causing inventories to decline and free working capital to increase.

4.3 Visibility

In order to optimize inventory management and production schedules simultaneously, companies must be able to identify where required materials reside in the supply chain at any given moment. They also must be able to track the movement of materials through the supply chain, both inbound and outbound. While access to this information is often critical to the buyer, the functionality represented by track-and-trace web tools, such as those offered by logistics firms, is an inadequate substitute for the connectivity standards of an optimized value network.

With the foregoing in mind, it is important to recognize that traceability is only one of two forms of visibility.\textsuperscript{42} The second type of visibility is inventory visibility, meaning the capacity of an actor to electronically access the inventory status of the other actors in the value network. Equipped with this technology, a buyer would be able to check the inventory status of key suppliers throughout the supply chain through online, web-based or EDI systems architecture. This form of visibility represents a strategic advantage to firms upstream and downstream in the supply chain because it gives them information that will enable the optimization of production and marketing strategies simultaneously.\textsuperscript{43}

\textsuperscript{42} Noted by David Simchi-Levi, Professor of Engineering Systems at the Massachusetts Institute of Technology, Cambridge, Massachusetts, (April 01, 2003). Companies like The Descartes Systems Group, Inc., based in Waterloo, Ontario, Canada, provide system-to-system services that aggregate transportation tracking data from multiple sources into a single data base that can be accessed by customers to track the location of any given package, regardless of shipping company. The main shortcoming of such services is the inability to track the items contained inside the package. This information is known only to the party originating the shipment and is dependent on the proper matching of the bill of materials to the shipping order. Ref. http://www.descartes.com/.

\textsuperscript{43} For instance, network participants can monitor over and under stocking of component parts, coordinate production strategies, and set pricing strategies based on the information profiles. Handfield and Nichols note, “Increasing information visibility between supply chain participants can help all parties reach their overall goal of increased stockholder value through revenue growth, asset utilization, and cost reduction.” Ref. Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., p. 298.
The lack of such information represents a significant information gap that prohibits the efficient allocation of resources within the value network.

Our research indicates that most companies are not satisfied with this situation. In order to re-organize production processes, the actors need efficient access to better information across the entire supply chain. They need to track not just packages, but the flow of all materials and parts needed to manufacture every product. And, they need to be able to do this for all actors in the value network as a pre-condition to synchronizing the activities of each participant. Anticipated advances in technology, such as item-level RFID\footnote{Abbreviation meaning: Radio Frequency Identification. Whereas bar coding enables the identification and tracking of boxes, RFID technology allows the identification and tracking of individual items within a box. The former is dependent on the bar code being passed directly in front of an electronic scanning device that interprets the code. The latter is not dependent on such point-to-point contacts. Instead, a microchip containing a unique identification code is attached to each item. The chip emits a radio frequency that can be interpreted within a defined radius of an electronic receiver. Ref. also http://supplychain.mit.edu/innovation/research-realtime/.} technology, are expected to resolve portions of this information gap using microchips.\footnote{Some basic forms of the technology are already being used by companies like Savi Technology, based in Sunnyvale, California. Ref. http://www.savi.com/}.

The implications of RFID technology on supply chain management are promising. The concern is not whether the technology will be developed sufficiently to permit wider applications, but how the resulting volume of information will be managed.\footnote{Woods, J. “Real-Time Enterprises Need Real-Time Inventory Visibility,” Gartner Research, Gartner, Inc., Research Note, Technology, T-19-1448, February 13, 2003, p. 6.} Who will own the information? How will it be distributed? How will it change the conduct of value networks? How will it affect the value drivers of change? Our research suggests that logistics providers should pay close attention to RFID technology and how it might
affect the flow of information, and consequently, the flow of goods and capital, between actors.

4.4 Velocity

A deliberate and well-conceived collaboration of actors within a value network is sustainable only if the actors develop a bond of mutual trust that supports the exchange of pertinent information between them on a real-time basis.\(^{47}\) The resulting visibility will be pointless, however, if it is not accompanied by the capacity to use the information gathered to generate timely results. This is the velocity factor, meaning the ability of a buyer to pull needed materials through the entire supply chain as quickly and efficiently as possible.

Recognizing that each step of the production cycle adds costs to a given product, the ideal concept is to engage production processes and accumulate costs in the most efficient sequence of steps such that completion of the finished product coincides with its shipment to the buyer. The institution of such techniques across the whole supply chain is analogous to the adoption of kanban\(^{48}\) production systems within a single factory. By organizing the supply chain to support a pull system triggered by the buyer, all actors will migrate towards build-to-order manufacturing systems and away from build-to-forecast

\(^{47}\)Berger, Andrew J. andGattorna, John L., op cit., p. 36. The authors note, “Successful management of the relationships and complexities of value chain network competition requires a high degree of connectivity, trust and cross-organizational support. Speed and accuracy of information transfer is increasingly critical and is achieved through the establishment of shared language, standards and protocols.”

systems. While some view this as the Dell model, the economic advantages resulting from such techniques are as appealing to industrial sector manufacturers as they are to Dell. The companies we interviewed are working towards this goal. As they make progress, traditional supply chains will continue to be re-organized as value networks.

4.5 Functionality driven by information

Much of the vision that we have presented thus far is dependent on the use of information technology to improve the efficiency of the supply chain. That vision anticipates the evolution of a dynamic system of electronic linkages between companies that will permit them to exchange information on a real-time basis. More importantly, these linkages will allow companies to connect incoming sales orders to bills of material used in production, thereby allowing companies to optimize production schedules. While, on the one hand, companies will expose information about themselves that they are unaccustomed to sharing; on the other hand, companies will be able to act and react consistent with market demand factors. As Francis Bacon said: “Knowledge is Power.”

All actors should benefit from shared access to information within the value network. However, interconnectivity between actors must be accompanied by consistency of data

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49 One of the clear advantages of a build-to-order system is the ability to connect sales and purchase orders, which is to say that companies will be able to limit their purchases to those materials needed to fulfill sales orders. Under this scenario, the risk of waste and inventory obsolescence is reduced to inconsequential levels and labor resources are dedicated to products already committed to consumption or future service. The importance of this trend in sectors other than computers cannot be overestimated. Capital, labor and production resources will be optimized, to the extent permitted by current technology, resulting in incremental savings that can be re-allocated to other value-added activities. This promises favorable economic returns for companies and the economy as a whole.

presentation between actors and/or translation tables that clearly correlate corresponding data points between companies. As noted previously, companies will be challenged to understand how to manage and interpret the volumes of information that will be available to them; and, they will need to understand how to incorporate that information into the design of new processes. Our research indicates that companies are willing to invest in technologies that will enable such functionality, in order to (i) secure improvements in working capital and liquidity, (ii) gain visibility throughout the supply chain, and (iii) enhance velocity. The obstacle to change, however, is not that current technology is inadequate to the task or too expensive, but that the system around the technology needs to be re-designed and transformed into a new architecture.\footnote{For example, one of the companies that we interviewed has identified the goal of reducing its current supplier network by two-thirds. In order to accomplish this, the company must identify strategic suppliers who can coordinate second and third-tier suppliers, as well as perform pre-assembly functions not required under the present relationship. The company also must determine to what extent it may need visibility into the inventories of the lower tier suppliers, and it needs to re-think its own internal production processes and the role of its logistics providers. Simultaneously, the company must create a catalogue of every component included on every materials listing for every product; and, it must connect each component to a source supplier and quantify the lead time and quality standards for each item. Once these tasks are completed, the company will possess a new road map by which to manage its relationships with the other actors in the value network.} This is the focus of our next chapter.
Chapter 5: Defining the New Architecture

5.1 The internet paradox

During our interviews, we found support among managers for an operational architecture that would connect the information flows and interrelationships among buyers, suppliers, and customers. Although the managers we met were able to identify the business drivers most relevant to their companies, some were frustrated by the gap between their vision of what the architecture could be and the status of the current system.

This revealed a surprising paradox. On the one hand, we found general consensus that the internet has stimulated fresh thinking about a new design for supply chain networks and that management decisions in this area are motivated by a clear set of value drivers, as presented in Chapter 4. On the other hand, we discovered that the benefits anticipated as a consequence of the internet have been fewer and more difficult to implement than expected. More importantly, our research suggests that the conceptual elements needed for creating a sustainable architecture have not been debated sufficiently or in a systematic fashion. This is partly because the issue of supply chain integration across global operations introduces complex and puzzling problems, the solutions to which are neither obvious nor simple to implement. However, it also is true that many companies in traditional industrial sectors have been unable to transform their business drivers into a coherent architecture that connects buyers, suppliers, logistic providers, and end customers.
This prompts us to inquire why internet technologies, which have introduced new and powerful capabilities to contemporary businesses, have not been applied to resolve supply chain challenges with greater speed and success. Are there obstacles to change and, if so, what are they? Is there sufficient consensus among managers to support a new vision of the value network? What steps must be taken to create a value network?

This chapter will address these questions and present a framework for organizing the principal elements of a dynamic, buyer-centric value network for companies operating within the industrial sector. We also will evaluate the implications of our theoretical architecture in the context of the principal actors of the value network, with particular focus on the logistics provider.

5.2 Conceptual framework

Most of the managers we interviewed agreed with the vision of a supply chain that integrates buyers and suppliers with end customers. They also agreed with (i) the notion that future supply chains will not consist of a sequence of actors operating within rigid boundaries that have inflexible roles and where the flow of goods, information, and funds occurs separately and (ii) the proposition that, under the new architecture, each actor would be mutually responsible for the success or failure of the network.52

Notwithstanding the foregoing, our research revealed that companies are frustrated by the relationship of inbound and outbound logistics and the challenge of connecting them using an electronic pipeline. We noticed three levels of intuition concerning inbound and

52 Atiya, Sami and Muguiro, Jaime, op cit.
outbound logistics. The first is that outbound logistics is considered to be more relevant than inbound logistics due to its direct relationship to the company's revenue stream. The second is that inbound logistics is considered to be a cost center to be reduced. Generally, this view is rooted in external cost pressures to compete globally and, therefore, to reduce manufacturing costs by squeezing suppliers. The third is that the connection of inbound and outbound logistics represents a value proposition that, once achieved, will eliminate the inefficiencies of the existing architecture and provide the foundation for a sustainable value network.

In certain of the companies we interviewed, management's ability to change the current system was handicapped by the complexity of their task and by difficulties in defining the essential elements of the new architecture. This situation was attributable, at least in part, to the separation of procurement and commercial marketing functions within organizations and a failure by these groups to exchange information and to develop common solutions to shared problems. In some instances, this prohibited managers from distilling their third-stage intuition, concerning the linkage between inbound and outbound logistics, into a well structured process through which the company could implement a robust value network supported by a robust and logical IT architecture. Such inter-departmental divisions are not consistent with the best-practice behaviors of some firms, which integrate marketing and purchasing operations.53

The orchestration of the different actors within a buyer-centric value network is intended to fulfill the precise interests of the buyer while simultaneously creating benefits for all

actors. In this structure, the resulting interrelationships between actors are process based and dynamic. Therefore, in order to understand sustainability, one must first define the flows attendant to each process and then organize them in such a way as to maximize the efficiency of the entire network, as well as individual participants.

![Figure 3 - Buyer-Centric Value Network](image)

Figure 3 presents an image of the buyer-centric value network and its main actors, excluding the logistics provider. We will use this simplified representation to frame our discussion of the dominant relationships between buyers and suppliers. The definitions below expand on those presented in Chapter 3.
Corporate Buyer (or Maestro). The corporate buyer or maestro moves beyond pure purchasing perspectives and considerations of cost and tries to connect inbound and outbound materials flows. This buyer begins to evaluate suppliers according to their capacity to fulfill a dual role, one as the sourcing agent for inbound materials destined to be used in production (or maintenance of production assets) and one as the sourcing agent for outbound goods destined to be sold as spare parts (or as complementors to other products).

Strategic Supplier. Strategic suppliers have a direct relationship with the buyer by virtue of their providing the buyer with goods or services which the buyer considers strategic to its core business. These suppliers are usually not intermediated by a distributor.

Non-Strategic Suppliers. Non-strategic suppliers generally sell goods or services that the buyer does not consider strategic to its core business. Non-strategic suppliers may be intermediated by a distributor or a strategic supplier that acts to simplify the buyer’s procurement and warehousing requirements.

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54 Salhotra, Bharat [and Bitran, Gabriel R.], op cit.
5.3 Integrating inbound and outbound material flows

Figure 4 presents a basic architecture of supply chain flows and processes. We will use this framework to demonstrate that a sustainable value network can be constructed only if it has (i) the tools necessary to deal with the complexity of an integrated supply chain and (ii) the capability to adapt to changing demand factors, meaning that the actors have the capacity to change priorities and responsibilities in response to new information from within or outside of the network.

The flow of goods, information, and capital within any value network is dynamic. As shown on the left-hand side of Figure 4, requests for goods may be generated by internal...
or external clients.\textsuperscript{55} In either case, supply chain management must be able to respond to the unique needs of each.

Whereas material flows pertaining to production activities are considered inbound logistics; material flows pertaining to order fulfillment are considered outbound logistics. One might notice that the origins of inbound and outbound logistics, as depicted in Figure 4, are similar. In both instances, the buyer is dealing with goods that are produced by the same supplier. However, depending on the final destination of the goods, the buyer has different storage, transportation, and payment issues. A sophisticated value network will not only recognize these differences, but connect the inbound and outbound relationship by interpreting the relevant demand factors that will influence the flow of materials between the actors in response to those factors.

The principal challenge of a value network is to identify and understand the different requirement inputs from all clients (both internal and external) and to align these with the appropriate logistics functions to achieve a desired outcome. (See Figure 4). Using this capability, the value network can identify redundancies, as well as synergies, between different flows to maximize the individual and collective efficiencies of the actors. Accordingly, it is important to recognize that one can do more than segment materials flows; one can associate, to each resulting segment, a different type of logistics service (with different lead times, delivery formats, and costs) such that the needs of each network participant are fulfilled in the most advantageous manner.

\textsuperscript{55} Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., (pp. 48-50), concerning internal and external supply chains.
In the absence of rigorous segmentation practices, logistics efficiencies cannot be maximized. The resulting inefficiencies stimulate higher working capital requirements and, more importantly, reduce the capacity of managers to re-configure the flows and processes of the company.

During the course of our interviews, we found that lack of segmentation schemes inhibited companies from developing sophisticated service level agreements with their logistics providers. This deficiency represented an obstacle limiting a company’s ability to move from a build-to-forecast model to a build-to-order model. We found that the ability to segment goods and actors according to their unique characteristics can facilitate the detection of strengths and weaknesses that can be used to organize the value network consistent with best practices and defined standards. One can use such information to rationalize processes throughout the entire network, such as increasing the role of strategic suppliers by having them assume certain pre-assembly functions or interface with sub-tier (non-strategic) suppliers to relieve the buyer of non-core activities.

The managers we interviewed recognized value in these sorts of changes, but generally, such arrangements were limited in scope or not occurring at all. Based on feedback from our interviews, the deficiency appears to have a lot to do with lack of a comprehensive catalogue of materials.

Our interviews also highlighted industry disappointment with logistics providers concerning a perceived failure, on the part of logistics companies, to appreciate the
different types of materials flows and complexity associated with inbound logistics. This assessment was accompanied by doubt on the part of some industry managers that logistics providers could offer value-added services with respect to inbound materials management. Moreover, some of the logistics companies we interviewed appeared content with this conclusion, feeling that the capacity of the organization to transport goods from point A to point B remains their strategic competency. By assuming such a posture, logistics firms dismiss the potential for making the value chain more flexible and lean through services that leverage the relationships between segmentation, lead times, and working capital on the inbound side of materials management.

To some degree, the inability of the actors to identify synergies among the different types of logistics, particularly with respect to inbound logistics, is due to the limited visibility of logistics providers in this area. Consequently, logistics companies are unable to conceptualize the entire value network from the perspective of the companies they serve. (See Figure 5). In the absence of an aggressive effort to engage the operational and process issues of customers, logistics providers are destined to remain as peripheral actors outside of the value network. Over time, this posture will inhibit their capacity to assist clients in designing supply chain solutions that maximize the efficiency of the value network and will increase the likelihood of competition in the form of niche logistics providers with market strategies tailored to specific market segments.  

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56 This view was supported in an interview with the head of logistics of Artsana Group. His argument was that the only possible approach for fostering greater collaboration between logistic providers and industrial actors was to consolidate visibility of the value network. By obtaining visibility, one can create trust and the opportunity for re-thinking the flow of goods. He went on to say that the distance between the actors is so wide, at the moment, that he cannot conceive any other strategy to resolve the information gap.
5.4 Data warehouse library

Although a common topic among managers, visibility is not easy to achieve; and often, it is misunderstood. Generally, managers are concerned with one aspect of visibility, namely, cost structure. Large companies tend to deal with this concern by investing in tailor-made accounting systems and miss the connection between cost visibility and the visibility related to material and service flows. Together, they represent a multi-dimensional visibility that can enable a multi-functional capability resulting from the unification of data and processes at the item level. For companies that move hundreds of thousands of SKU's annually, item level visibility is becoming the essential unit of measure to segment data and to organize and manage process changes.\(^{57}\)

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\(^{57}\) Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., p. 85. The authors note, "...the problem of internal data integration and data validity continues to be a significant problem for organizations in almost every industry. One big issue companies struggle with is data quality and data collection. The essential problem is the need to get down to detailed "data dictionary" levels in order to define specific business processes."
Data Warehouse Library

As shown in Figure 4, the central element of a value network is the data warehouse library. We define the data warehouse library as a comprehensive electronic catalogue that contains the technical specifications of every item in the buyer’s domain, including all source components and raw materials. The catalogue also contains a listing of all suppliers who can source each item, a payments history, and a record of supplier performance, as well as a history of the frequency of purchase and usage of each item. In this sense, the data warehouse library is a dynamic population of data that accumulates historical data and accepts new data based on contemporaneous information.

As a comprehensive database, the catalogue will enable a company to track the cost profile and usage history of every item and its relationship to every finished good. Using this information, a company can segment and organize the movement of every item through every step of the supply chain. This means that a company will be able to connect inbound and outbound logistics while simultaneously optimizing the flow of materials into and out of the company’s production processes. It also means that a company will be able to re-distribute processes among different actors within the value network according to the scheme that has maximum benefit for all actors.

All of this implies that management will gain new choices, not only in the organization of processes, but in the allocation of labor and capital. Moreover, the data warehouse library will provide companies with the critical link needed to obtain visibility of material and other flows throughout the value network. Accordingly, Figure 4 portrays the data
warehouse library at the center of the new architecture, due to its essential role linking systems, such as procurement, warehouse, planning, financial, and logistics systems, among others. The catalogue serves as (i) the dictionary for each of the company’s internal legacy systems, (ii) the mechanism by which to create and integrate a record of all transactions and flows within the company and potentially throughout the value network and (iii) the source of extended range visibility, providing access to a history of all flows, lead times, and other relevant metrics for all materials passing through the company’s systems. With such functionality, the catalogue becomes the basis for network and process rationalization and the critical driver of the value network itself.

Buyer-Centric Catalogue

It is important to recognize that in this system, the catalogue is owned and controlled by the buyer. Whereas in traditional supply chain systems, the supplier controls the catalogue; in a buyer-centric value network, the buyer controls the catalogue. This arrangement mitigates the need to construct a universal standard for labeling materials and allows all actors participating in the network to interact through the common language of the catalogue. Certainly, this requires the actors around the buyer to organize themselves to read and understand the logic of the catalogue. However, it also allows them to customize services for the buyer and optimize the efficiency of the network.

It is worth noting that, through this system, the logistics provider can assume a more visible role in terms of connecting the actors of the network. However, this is possible only if the logistics provider acquires the capability to monitor how individual items
move through the systems and processes of the participating actors. In order to do this, the logistics provider must become an integral part of the process flows occurring within the value network in contrast to its customary position between buyers and suppliers, and outside of the network.

**Beyond Commodity Services**

Traditional transportation capabilities, while essential to the value network, are commodity services in the current system. Logistics providers must align themselves with the services that are meaningful to customers, such as organizing materials flows that reduce working capital requirements, performing pre-assembly functions, and connecting inbound and outbound logistics at the item level, among other things.

Our research suggests that logistics providers have not developed aggressive strategies to tackle this issue. This is partly attributable to the expectations of client companies, in the sense that many have not focused on cataloguing and segmentation at the item level as a means to re-orient production processes to gain efficiency. In most cases, we found that companies do not have catalogues or they have only partial catalogues used in connection with procurement and marketing functions. The absence of a comprehensive digital data warehouse library, limits the capacity of each actor to improve its level of sophistication within the network. In this respect, an efficient value network is dependent on the creation of a catalogue, as a foundational strategy.
During our interviews, we noted there is often a gap between the way supply chains are organized and the way information is represented on the company’s IT systems. This was due primarily to (i) lack of a common catalogue, (ii) the complexity of the underlying issues, and (iii) lack of software applications supporting connectivity between actors. The latter is changing rapidly, however, as new IT applications continue to be developed and introduced in this area.

We also noticed that logistics providers are not accustomed to operating at an SKU level. This represents a constraint for some client companies and will likely become a greater issue in the future for those companies that migrate to a value network strategy. In order to be effective, SKU level visibility must permit each actor to understand the status of any given SKU in terms of its current production stage, the sub-assembly in which it is used, the timetable for movement, and related information. As visibility increases, the actors will have greater capacity to coordinate activities and create intelligent contingency plans to avoid bottlenecks or over production.\footnote{58}

Finally, we noted that the issue of visibility is often narrowly associated with logistics visibility (e.g. track and trace technology). It is important to recognize that visibility in the value network extends far beyond the logistics provider; it extends across all actors participating in the network. In the new architecture, the actors require visibility not just from the logistics provider, but from each other. The logistics provider obtains visibility

\footnote{58 We infer the master document in this scheme to be the Purchase Order. Once the PO contains a comprehensive SKU itemization, all actors in the network can begin to use this information to coordinate processes. We believe this development would reduce the need for a common cataloguing standard.}
into the processes of the other actors, thereby gaining the opportunity to anticipate process functions and sequences, rather than responding to pick up and delivery signals.

In summary, our research indicates that the creation of a data library or catalogue is an essential first step in permitting companies to organize a buyer-centric value network. Such a repository of data will provide a basis for organizing and re-organizing processes within and between actors. It will enable companies to segment information and develop strategies to maximize operating efficiencies. And, it will provide companies with the key tool needed to transform their production orientation from a build-to-forecast model to a build-to-order model.

5.5 Product segmentation
Our research also suggests that buyer-centric catalogues represent a valuable segmentation tool in the administration of the value network. A comprehensive catalogue will enable buyers, within any value network, to segment goods according to dimensions relevant to them (e.g. according to strategic value, geography, customer, or cost profiles, among other factors). For instance, we noted in an earlier chapter that one of the companies we interviewed was in the process of reducing its direct supplier base by approximately two-thirds. In order to accomplish this, the company must analyze all of the component materials in its final products and define which goods are strategic and which are non strategic. The company anticipates that some sub-assemblies, presently built in-house, can be re-sourced to key suppliers and that other suppliers could take on additional value-added responsibilities so that the company, as buyer, can focus its
activities around its core competencies. Accordingly, the company is working to segment its suppliers, materials requirements, and processes in order to achieve this objective.\textsuperscript{59}

Similar reasoning could be applied to geographic and other forms of segmentation. By segmenting goods along strategic and non-strategic lines, and by accepting that non-strategic goods can be delivered by a non-strategic supplier, one can argue that the value network opens up an opportunity for disintermediation that may be of interest to logistics providers. In their analysis of the extended enterprise, Boyson et al. assert that "...senior management must begin by addressing the challenges of segmenting and focusing the supplier base and establishing strategic partnerships."\textsuperscript{60}

While segmentation can assume many forms, the important point is that the logistics player can design a role for itself that adds value to one or more of the other actors in the value network. This reinforces the need for logistics providers to engage the issue of visibility by developing services that allow the actors to segment and monitor the flow of goods throughout the value network. This does not mean that the logistics provider should develop a marketplace for exchanging information. Rather, it should develop strategies to immerse itself in the flow of materials in the context of an asset-based strategy that maximizes the overall efficiency of the network from inbound to outbound.

\textsuperscript{59} During the course of our interviews, one company did not possess a codification of all SKU’s comprising its final finished goods products. The lack of sub-tier SKU’s prohibited management from understanding the logistics pertaining to all the products included in the final SKU. This further prohibited management from re-organizing its suppliers in sub-assembly clusters.

\textsuperscript{60} Boyson, Sandor, et al., op cit., p. 25. The authors go on to say, “Key alliances include those with core materials and components suppliers, transportation suppliers, warehousing and distribution center service providers, and third-party logistics companies, who provide supply-chain system modeling and optimization strategies and management assistance packages to implement improvements.”
This implies that the logistics provider would benefit from organizing its services according to vertical segments, thereby becoming a facilitator of particular types of networks. In this capacity, it could leverage its capabilities to administer warehouses, connect buyers and suppliers, and perhaps organize non-strategic suppliers. Logistics providers also have an opportunity to consolidate distribution channels, especially in underserved markets, and to provide customized financial products.\(^{61}\)

### 5.6 Physical logistics issues

The preceding sections of this chapter have focused primarily on the structural issues attendant to creating a viable value network. There are additional issues related to traditional transportation activities and expediting functions that appear to impede logistics providers from delivering a higher standard of service to companies operating in global value networks.

In the most basic form of supply chain, logistics functions are controlled by the supplier who delivers goods directly to the buyer’s warehouses. In a more sophisticated system, the buyer assumes responsibility for coordinating logistics from the supplier’s warehouses. The second arrangement allows buyers to exercise greater control over the supply chain and to direct goods according to their usage requirements and other factors. While this system allows the buyer to improve the efficiency of the supply chain, it does not maximize efficiency of the supply chain. This is especially true when logistics

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\(^{61}\) Based on our research discussions, it is noted that supply chains generally appear stable, meaning that buyer-supplier relationships often are long lasting, especially where strategic suppliers are involved. This creates an opportunity to identify clusters of suppliers or customers within geographic regions so that distribution channels can be organized in the most efficient manner.
activities begin to cross borders and continents. In the current world, the value network cannot perform efficiently without having the capability to resolve global transportation issues efficiently.

![Figure 6 - Transportation Flows](image)

Figure 6 identifies the principal tasks inherent in logistics management. During the course of our interviews, we found repeated frustration on the part of companies that they were unable to outsource their logistics needs to a single service provider. It appeared that no logistics company has been able to provide integrated services on a global basis. Indeed, managers expressed dissatisfaction with the inability of logistics providers to coordinate globally. Some felt that logistics providers did not understand the difference between an international presence and global capability.

Notwithstanding the foregoing, it is certainly true that manufacturers also are working through the implications of transforming their organizations from international to global operations. However, the capacity of logistics companies to provide coordinated global transportation services is a key consideration of producers that should be noted by
logistics providers as an opportunity to create value. The task is a complicated one. Moreover, it raises the issue of defining the core competency of logistics providers.

There is an argument that the physical assets of logistics providers (trucks, ships, containers, and warehouses, among other things) are not essential to their core competency. Each of these assets can be re-characterized as a means of providing services in an open market. This distinction highlights that the real value of a logistics provider is demonstrated by its capacity to coordinate a network of assets and transportation services upon request. Ownership of the assets is not necessarily essential to this end. If this is correct, the relationship of the logistics provider to its customers is fundamental and suggests that a dominant focus of logistics providers, in the context of a value network, should be locking in their commercial relationships with the participating actors and perhaps facilitating the relationships between actors. This would stimulate segmentation efforts and force logistics providers to examine the value of their services from the perspective of customers. This further implies that value-added services are defined not by physical assets, but by the ability to interpret data and coordinate the movement of goods to maximize the efficiency of the value network. This is dependent

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62 Berger, Andrew J. and Gattorna, John L., op cit. (p. 185), note that, “The trend toward new types of supply chain service providers is likely to accelerate and be dominated by two types of company: those that specialize in owning and operating core assets and those that specialize in supply chain optimization services.”

63 Handfield, Robert B. and Nichols, Jr., Ernest L., op cit., p. 63. Handfield and Nichols discuss the role of the logistics provider in the context of integrated supply chain management. They note, “Logistics professionals will continue to be challenged to manage the movement of products across the supply chain in a timely and cost-effective manner that meets customers’ service requirements. Meeting this challenge requires a logistics strategy that encompasses the entire supply chain... The scope of the logistics strategy is now the entire supply chain (not just each individual unit in the chain). It will no longer be necessary or desirable for each supply chain member organization to manage its logistics activities independently.”
on visibility and the capacity to read and organize catalogue data in conjunction with the other actors participating in the value network.

The foregoing issue became clear during an interview with the CEO of a prominent logistics company who indicated that the company’s historical operating practices have been driven by focusing the needs of clients around the company’s asset-based capabilities, rather than understanding how to organize a complex flow of goods throughout the supply chain. In the context of global commerce, this suggests that logistics providers must shift their focus towards integration of the whole supply chain and seek ways to outsource non-core services (such as point A to point B package movement) that buyers consider a commodity service to be purchased at the lowest price.

During our interviews, we also discovered frustration about the issue of customs. Buyers appear to be willing to outsource customs processing and control issues to a third party. However, most felt that logistics providers are not capable of performing this task effectively. Part of the problem is that logistics providers are accustomed to moving bulk containers and transferring legal responsibility for the declaration of package content to the sender. While this is a reasonable practice, the origin really extends back to a time when tracking individual SKU’s was not feasible. As such, the policy adopted by logistics providers was correct because it insulated them from potential liabilities. However, the same policy now prevents them from expanding their services into an area that companies would like to outsource. Our research suggests that logistics providers
could provide these services in the context of a value network connected through an item-level data library that links the flow of goods within the entire system.

5.7 Complementary services

Commencing with the collection of goods at a given point, the logistics provider becomes the coordinator of the value network. In addition, the act of collection positions the logistics provider in a role that can organize or perform intermediate functions, such as pre-assembly, distributing, and financing. As processes become more integrated and information becomes more transparent, the logistics provider could extract additional revenues by providing value-added services to one or more members of the value network. However, these opportunities reside principally on the inbound side of logistics, an area that most logistics companies are not intimately familiar.

Logistics providers are more comfortable with outbound logistics and, in this area, have begun to provide services such as warehouse management. There are additional opportunities, however, particularly those resulting from a strategy of vertical integration in specific industry and geographic segments. In some respects, there is a tremendous opportunity for logistics providers to assume the functions performed by companies now operating as distributors or to align themselves with distributors in specific market segments. Buyers and suppliers also have a need for logistical support with respect to the distribution of non-strategic goods that complement core product lines, but that must be coordinated with the delivery of core products. There also is an opportunity for logistics
providers to become the link between inbound and outbound logistics for the actors within a given value network.

Finally, one cannot avoid mentioning financial services as part of the potential product offerings of logistics companies. Although important to most companies, financial instruments are not part of the structural design of value networks. This is not to suggest that financial flows do not play an important role in the value network. However, based on our interviews, access to new sources of capital was less relevant than the financial benefits of making the entire supply chain more efficient. Part of this assessment is a function of our interview population, which predominantly consisted of large global businesses. Nonetheless, our research also indicates that buyers concur with the notion that some companies, particularly lower tier suppliers, could benefit from access to capital provided by logistics companies.

Even though some logistics firms are providing limited forms of financing, it is difficult to assess how this line of business can be scaled effectively in the absence of an integrated value network. Indeed, the central characteristic of a value network (as we have proposed it) is the data library which links information between actors. In the absence of this information, the financing of transaction flows by logistics companies is not much more appealing than it is for third-party banking institutions. As information flows between actors become more transparent, it appears reasonable to conclude that logistics providers will have an opportunity to expand their financial product offering, provided they are embedded in the mechanics of the value network.
It is equally important to recognize that access to more and better information will not resolve all issues. Financing products are oriented fundamentally around issues of risk management. In this respect, the financing equation in a global environment is more complicated than in a relatively static local market. Protection of collateral rights and security interests is no less important in foreign markets than in domestic markets. In addition, lending relationships, which often are sensitive to local factors, must be designed to accommodate global relationships and collateral interests that may move across borders. Collectively, the foregoing considerations suggest that logistics companies are likely to discover a growing opportunity to offer financial products to customers; however, this will be accompanied by complex structural challenges associated with cross-border financing arrangements.
Chapter 6: Conclusions

6.1 Balancing vision and priorities

During the course of our interviews, we found that the participants in a given supply chain may be viewed as disconnected service providers or as complementors whose collective capabilities provide unique strategic advantages in comparison to other supply chain networks. The implication is that certain supply chain systems function as ecosystems, while others remain segregated and linear. In the context of the eco-system, a weak participant compromises the integrity of the entire system, thereby prompting rapid reactions from the other actors and pressure for the weak actor to restore performance. If performance is not restored, the strong actors are required to replace the weak actor quickly and efficiently.64

In this model, the relationships between actors are defined by more than transactions. There is a high level of mutual dependence between actors and an expectation that business managers have the capacity to work across organizations.65 The system is supported by sophisticated communication and information linkages that permit each actor to focus its resources according to its own best advantage and, if properly utilized,

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64 Berger, Andrew J. and Gattorna, John L., op cit., p. 36. The authors note, “...value chain competition requires a willingness to acquire or drop partners on the basis of performance.”

65 Handfield, Robert B. and Nichols, Jr., Ernest L., Introduction to Supply Chain Management, Prentice-Hall, Inc., New Jersey, 1999, p. 1. The authors note, “...organizations now find that it is no longer enough to manage their organizations. They must also be involved in the management of the network of all upstream firms that provide inputs (directly or indirectly), as well as the network of downstream firms...”
to the advantage of the other actors in the network. This collaborative approach is fundamental to the success of the value network.\footnote{66}

At the outset of our thesis, we asserted that the functionality of the value network is dominated by a central actor who is the buyer. If our hypothesis is correct, it is the buyer who will challenge the other actors to respond to a new set of expectations and performance metrics in supply chain management. However, this does not mean that the other actors are powerless in their capacity to anticipate the implications of change and the definition of value-added network solutions.

Recognizing that our research is oriented around the role of the logistics provider, we conclude our thesis by defining the gaps between logistics providers and the other actors, most notably, the buyer; and, we recommend possible focus areas that logistics providers might consider when developing new service offerings. Before proceeding, however, we continue in the next section with a recap of the principal elements covered in the preceding chapters.

6.2 Summary of premises

We began our thesis by introducing the principal actors in supply chain management (the buyer, supplier, and logistics provider) and the concept of the value network. We excluded the automotive and IT sectors from our interview population and focused our research on industrial sector enterprises facing medium to high-complexity challenges in supply chain management. And, we noted that globalization is an important factor in

\footnote{Berger, Andrew J. and Gattorna, John L., op cit., pp. 35-36.}
terms of its influence on traditional corporate operating strategies and the design of value networks that can operate efficiently across borders.

As network complexity increases, the actors are challenged to exchange greater levels of information in order to align the flow of goods with industrial processes and to coordinate responses to fluctuating demand. In a value network, the buyer retains the key role of defining performance standards for the network and, by extension, the performance standards of the extended enterprise.

In Chapter 1, we argued that the competitive advantage of industrial firms in the next decade will depend on their capacity to develop value network strategies and, ultimately, that these strategies must connect inbound and outbound logistics. This concept, in conjunction with continuous pressures to improve operational efficiencies, is forcing companies to re-examine their existing supply chain management practices. Moreover, it is causing each company to define its role in the value network and to define the extent to which an extended enterprise scenario will require it to re-formulate its business value proposition. Some companies will respond favorably to these developments, while others will migrate towards niche markets or slide into practices of commoditization.

Figure 7 presents a modified version the value network introduced in Chapter 4. At the center of the diagram are the drivers of the buyer. These are (i) working capital efficiency, (ii) velocity, which is the ability of a buyer to pull needed materials through the entire supply chain as quickly and efficiently as possible and (iii) visibility, which
allows the buyer to simultaneously optimize inventory management and production schedules across companies. While our research indicates that managers respect these principles as value drivers, not all are certain how to transform these objectives into the pillars of a well functioning value network.

As noted in Chapter 3, the capacity of an enterprise to define and coordinate the actors of a value network is dependent on its ability to: (i) envision itself as part of an extended enterprise and (ii) organize a system that benefits each actor through outsourcing opportunities that generate meaningful economic rewards. This implies that the buyer, in its capacity as network leader, must provide the value network with the conceptual framework necessary to organize processes and relationships among actors so that value is created for each participant.

![Diagram](image_url)

*Figure 7 – Drivers, Vision and Relationships within the Value Network*
6.3 The Gap

As a result of our interviews, we noted a gap between the value drivers that motivate business managers and how these drivers fit into the extended enterprise. This problem is depicted in Figure 7 by isolating the value drivers at the center of the diagram. While the value drivers have the potential to sustain the vision of the value network, they are surrounded by obstacles that prohibit the buyer from transforming those objectives into a functioning reality. In order to realize its goal, the buyer needs to (i) envision itself as part of an extended enterprise, (ii) define processes that maximize the contribution of each actor to the network, (iii) define the links between inbound and outbound logistics, and (iv) define specific service level requirements and performance metrics for each actor.

As stated in Chapter 2, future supply chains will not be represented by a sequence of players having predetermined roles and operating within rigid boundaries, where goods, information, and funds flow separately.\(^67\) Instead, the next-generation supply chain will resemble an eco-system whereby all actors in the network collaborate to deliver the highest value to the end consumer. In this scheme, each actor is mutually responsible for the success or failure of the network.\(^68\) Accordingly, Figure 7 shows the buyer’s vision surrounded by the other actors in the network that are directly influenced by it, including the buyer’s customers. All participants are influenced by and have influence on the buyer’s vision.

\(^{67}\) Atiya, Sami and Muguiro, Jaime, op cit.

\(^{68}\) Berger, Andrew J. and Gattorna, John L., op cit., pp. 35-36.
The outermost circle (in Figure 7) depicts the logistics provider which, among the actors in the network, is the only one that can act as a neutral intermediary figure connecting all the participants. Conceptually, the logistics provider should be able to enhance the productive capacity of the other actors, synchronize the flows of goods and perhaps capital, and interpret information and signals on behalf of the entire network. In this context, synchronization must be defined around the capacity of the actors to re-define their products and services to meet the unique needs of their respective customers.

The arrow between the buyer and the logistics provider (in Figure 7) denotes the essential relationship between these two actors. The logistics provider and the buyer are uniquely connected by the buyer’s need to move goods. However, the buyer has several choices in fulfilling its transportation requirements. Thus, the fundamental question is whether any logistics provider can leverage its unique position, as connector of the actors, to enable the buyer to transform its value drivers from conceptual objectives to actual processes. If it can do this, a logistics provider can support the creation of a viable value network in which buyers, suppliers, and end customers are connected seamlessly.69

Similarly, it is reasonable to ask whether suppliers are better positioned to become facilitators of the network. Based on our interviews, buyers seem more comfortable with suppliers as business partners, in terms of their capacity to provide value-added services to the buyer. However, there is concern about the neutrality of suppliers from the perspective of managing competition and confidentiality. Conversely, the logistics

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69 Poirier, op cit., discusses the need for seamless connections between actors, noting that, “Partners in an extended supply chain must map the sequence of steps occurring in the end-to-end linkage so the logistics and coordination process become seamless and as effective as possible,” p. 114.
provider is positioned as a neutral party and can use its neutrality to gain competitive advantage; however, neutrality alone is not sufficient to compel buyers to view logistics providers as more than movers of goods.

Logistics providers will not be able to make a substantive contribution to the value network if they do not understand the complexity of the interconnected processes and operating activities of buyers and suppliers. Our research suggests that some logistics providers possess a superficial understanding of these issues and only a basic understanding of the vision represented by the extended enterprise. This limits their capacity to envision how to contribute to the network and how to leverage their asset infrastructure to greatest effect. Accordingly, in order to fulfill a value-added role to buyers, logistics providers must extend their capabilities beyond the limited scope of recent product offerings, such as on-line package tracking, warehouse management, and basic forms of capital financing and supply chain consulting services.

Furthermore, our findings suggest that logistics providers either do not recognize the gap represented in Figure 7 or consider it a barrier resulting from the buyer’s inability to articulate its goals coherently. This position dismisses the dynamic nature of the value network, which begins with the identification of the buyer’s drivers and evolves over time. Moreover, the process of evolution is continuous and sometimes complex because it requires the integration of internal and external resources. Thus, while the arrival of new technology in recent years has introduced a new dimension of complexity, it also has challenged all actors to understand how to embrace and organize change to strengthen
their competitive position. This implies the need for all actors to re-visit the definition of core competencies within their organizations and to leverage their existing assets to gain strategic advantage.  

In order for logistics providers to truly understand how to add value to complex manufacturing organizations, they must understand the entire flow of materials going through the actor we call the buyer. This implies that logistics providers must understand the complexities of the entire supply chain, meaning inbound as well as outbound logistics. Once it has achieved this, the logistics provider will be positioned to optimize the flow of goods and information within the value network and thereby close the gap between the buyer's value drivers and the vision represented by the extended enterprise. In the absence of such a strategy, logistics providers will be restricted to their traditional role of moving packages.

Moreover, it is important to note that the implicit neutrality of the logistics provider is central to its capacity to integrate itself into the extended enterprise. The logistics provider can act as the interconnecting link only if the buyer perceives that the logistics provider is not compromised by conflicting interests. Accordingly, we do not believe that logistics providers should pursue either a B2B or marketplace strategy. The logistics provider must operate in roles that are either neutral or otherwise authorized by the buyer who orchestrates the value network. In this manner, the logistics provider will

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70 Handfield, Robert B. and Nichols, Jr., Ernest L., Supply Chain Redesign, op cit., pp. 121-123.

71 Ibid, p. 63.

72 Business to business.
secure the confidence of the buyer and establish the basis for introducing complementary services to the network that simultaneously extract higher margins and reinforce entrance barriers.

Finally, the gap between the value drivers of companies and the vision represented by the value network appears especially pronounced in the industrial segments that were the focus of our research. We selected companies that have business operations in multiple locations around the world based on the view that this approach would enable us to gain insight into the complexity of managing a global supply chain from the perspective of the dominant actor. Moreover, this approach promised to expose the challenges faced by all actors, as they attempt to understand the implications of a global operating strategy versus an international operating strategy and how that transition will affect operating practices and business relationships between actors.

Our findings indicate that logistics providers have not developed service offerings that satisfy complex industrial actors. More importantly, by not taking a pro-active stance with these market segments, logistic providers have compromised their ability to deliver significant prospective services to these markets. The situation is compounded by a lack of understanding of the problems faced by these actors and reluctance on the part of business managers to view logistics providers as fully qualified business partners, at least not in the same sense as a strategic supplier. Consequently, logistics providers are viewed as having little depth and as unlikely sources of innovation. This reinforces the
perception that logistics providers are mostly one dimensional service providers that are best evaluated by the metrics of service range, price, and on-time delivery.

6.4 Reducing the Gap

The two flows depicted in Figure 8 represent mirror images of the inbound and outbound logistics of the extended enterprise. The mirroring effect reinforces the notion of transparency and its importance in the value network. Through transparency, each actor in the network experiences connectivity to the others and gains visibility to purchase orders, production processes, order fulfillment, and the movement of goods. This connectivity is essential to managers responsible for coordinating production processes across the value network. Our research suggests that logistics providers who seek to act as facilitators in the next generation of supply chain management must incorporate the principals of item-level transparency in their design of new services.

![Figure 8 - Procurement and Sales Flows Symmetry](image_url)

Figures 9 and 10 (below) together represent one view of how logistics providers might envision the process flows of their customers. The tables are divided horizontally.

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73 Berger, Andrew J. and Gattorna, John L., op cit., p. 36.
between planning, execution and content management. Planning management means the actions associated with the production and sale of every product. Execution management means the actions required to implement plans. Content management means the actions necessary to manage the data warehouse library referred to in Chapter 5. Each action is represented by a box which indicates the type of legacy system that supports it. The shaded boxes are used to identify the activities that the logistics provider is capable of performing with respect to both inbound and outbound logistics.

As shown in Figure 4 (Chapter 5), the central element of a value network is the data warehouse library which is a comprehensive electronic catalogue containing the technical specifications of every item in the buyer’s domain. With access to this data, a company
can position itself to connect inbound and outbound logistics and thereby re-distribute processes among different actors within the value network according to the scheme that has maximum benefit for all actors. Accordingly, Figures 9 and 10 portray the data warehouse library (represented by content management, supplier profiles and CRM) as the supporting element of the new architecture, by virtue of its capacity to link systems, including, procurement, warehouse, planning, financial, and logistics systems, among others. The catalogue serves as (i) the dictionary for each of the company’s internal legacy systems, (ii) the mechanism by which to create and integrate a record of all transactions and flows within the company and potentially throughout the value network and (iii) the source of extended range visibility, providing access to a history of all flows, lead times, and other metrics for all materials passing through the company’s systems.

*Figure 10 – Sales Flows*
In the foregoing architecture (*Figures 9 and 10*), the catalogue becomes the basis for network and process rationalization and the critical driver of the value network itself. It is worth noting that, through this system, the logistics provider can assume a more visible role in terms of connecting the actors of the network. However, this is possible only if the logistics provider acquires the capability to monitor how individual items move through the entire system. In order to do this, the logistics provider must become an integral part of the processes occurring within the value network in contrast to its customary position between buyers and suppliers, and outside of the network.

Figure 11 integrates the information flows between buyers, suppliers and logistics providers in the context of the extended enterprise. In this scheme, inbound and outbound logistics activities are consolidated into a single flow supported by a multi-tiered foundation consisting of (i) customer relationship management practices (ii) item-level specifications (from the data warehouse library), (iii) transaction documentation (sales and purchase orders), and (iv) consolidated shipment information. The ability to function in this system is dependent first on one’s capacity to envision the complexity of the systems and information flows between the actors and second on one’s ability to provide value-added services to the network. Accordingly, logistics providers must consider the architecture of their clients when formulating new service offerings to ensure that such services respond to the needs of the other actors to synchronize processes across the value network.
6.5 The future of logistics

Our research indicates that logistics providers are perceived as neutral actors and could become ideal partners in a buyer-centric value network. The largest players in the industry possess the infrastructure and financial resources that make them appealing business partners. Nonetheless, logistics providers generally are perceived as lacking the

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74 Berger, Andrew J. and Gattorna, John L., op cit., p. 25. The authors describe the profile of a best partner which is informative here. “The key characteristics of being a best partner are being easy to do business with and possessing a strong focus on operational excellence for those processes that one partner needs from another. Partners in supply chains are learning to play a new competitive game of supply chain versus supply chain. This level of competition requires technology that spans the extended supply chain and facilitates end-to-end synchronization. It requires alliances with the best-in-class for all capability requirements, operational excellence and cross-functional integration at the individual company level, coordination, cooperation, data sharing, focus on end-to-end processes and elimination of sub-optimized processes.”
ability to understand the fundamental business processes of their clients. Consequently, many potential clients do not actively engage logistics providers to resolve process challenges. Conversely, many logistics providers have been passive in terms of developing an in-depth understanding of client process challenges and, as a result, have reinforced the perception of their having limited capabilities.

Our research was organized around companies that operate in the traditional industrial environment based, in part, on the assumption that logistics providers would easily understand the needs of this group. This was premised on the tendency of industrial companies to run repetitive manufacturing operations and to deal with a relatively stable cluster of suppliers and customers. Moreover, we anticipated that logistics providers would be pursuing innovative market strategies in these market segments. While they have introduced various new service offerings in recent years, we discovered a general level of dissatisfaction with the range of services offered by logistics providers, coupled with a perception that only a few logistics providers understand the challenges of globalization.

The reason for this assessment seems to be oriented around the perception that logistics providers (i) are best suited to serve local markets, (ii) are bilateral in their approach, (iii) do not recognize the complexity of the value network and the scope of services necessary to support it, (iv) do not have true integrated global capabilities, despite assertions to the

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75 Ibid, p. 73. The authors observe that "...traditional logistics companies are generally lagging in developing capabilities to partner in dynamic supply chain networks. For many, managing contracts, assets and industrial relations have been core competencies, and they have less experience with new requirements for technology, planning and service development competencies. To remain competitive, these traditional providers will have to undergo significant organizational change."
contrary, (v) are unable to track item-level SKU’s, and (vi) are unable to deal effectively with the issues of customs and materials expediting. Conversely, we noticed that companies like Kuehne & Nagel are respected for their capacity to analyze sub sectors of the economy and organize strategies within specific geographic areas.

One possible explanation for the foregoing is that logistics providers, until recently, have enjoyed the benefits of a relatively protected marketplace and have acquired dominant positions that are difficult to challenge in the short run. Industry revenues have been generated from the traditional business proposition of moving packages and there have been few incentives to develop other more complex services. In this respect, one could argue that the relationship between logistics providers and potentially profitable clients is doomed by default. More specifically, the risk for the major current logistics providers is that their dominance will be ceded to others over the long run, as a consequence of a failure to anticipate the fundamental process changes occurring in industry today and the trend towards value networks.

Notwithstanding the foregoing, the opportunities for logistics providers in the next decade are real and meaningful. In order for logistics providers to integrate themselves in the new value network, our research suggests that they must (i) invest themselves in understanding the requirements of the actors belonging to the network (ii) actively pursue a feasible architecture to enable the functionality of the extended enterprise (e.g. pursue capabilities that will enable all network actors to interact through the buyer’s catalogue), and (iii) develop business strategies oriented around specific industry, market and
customer segments. Any failure in this regard will subject logistics providers to the consequences of commoditization.

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76 The issue fundamentally is about the strategic and competitive strategies to be pursued by logistics providers. Hax and Majluf, expanding upon the concepts of Michael Porter, describe three generic strategies, which are pertinent here. These are (i) overall cost leadership, meaning a strategy oriented around cost advantages in comparison to competitors (ii) differentiation, meaning a strategy oriented around a product or service that is unique in comparison to competitors, and (iii) focus, meaning a strategy oriented around a particular buyer group, product segment or geographic market that services the particular target very well.

Hax and Majluf go on to note, "What is important to realize is that virtually every activity in the value chain is a potential source for pursuing either cost leadership or differentiation. At the same time, not all of them have the same significance in achieving the desired competitive advantage. Therefore, the process of selecting a competitive position starts with an understanding of the industry structure, the selection of the appropriate generic strategy, and the identification of the crucial activities within the chain that will allow the business to achieve the corresponding sustainable advantage." Ref. Hax, Arnoldo C. and Majluf, Nicolas S., The Strategy Concept and Process, Prentice Hall, New Jersey, 1996, pp. 123-124.

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