

2 SUPPLY CHAINS (SC)

2.1 THE DEFINITION OF A SUPPLY CHAIN (SC)

There is no universal definition for a Supply Chain (SC) and definitions that do exist, change as the SC understanding evolves. Definitions are also subject to the point of view or approach used. A good technical definition for a supply chain is a network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer. In a broad sense a supply chain consists of two or more legally separated organisations, linked by materials, information and financial flows [Stadtler and Kilger, 2000]. In simple terms a supply chain is the movement of materials in response to the demand of a product [Hoffman and Sarwar, 2001]. By the nature of the definition, supply chains are found in the mining, food and beverages, clothing and textile, furniture and appliances, retail, building, construction, engineering, electronics and electrical industries, to name but a few. The product referred to is not limited to a pre-assembled or manufactured commodity that is sold over the counter, but can be a consumable such as water and electricity or a service such as equipment availability and reliability.

The traditional supply chain model consists of seven steps from five functions as shown in the figure 1 [DNA SC] below.

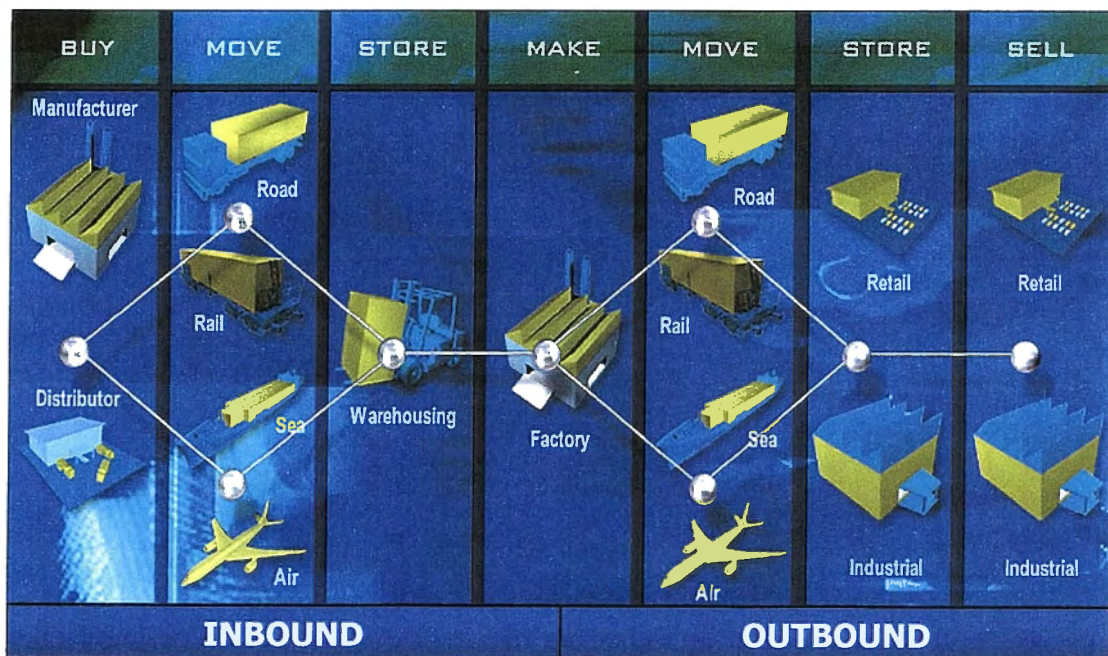


Figure 1: Traditional Supply Chain Model

2.2 THE BUILDING BLOCKS OF A SUPPLY CHAIN

One can argue that the traditional supply chain has been in existence since the inception of trade and commerce. It is true but the concept has afforded companies the benefit of viewing their business from a different vantage point and giving the manufacturing process structure through five functions. We need to understand that the traditional supply chain supports a product manufacture cycle from start to finish. The five functions within a supply chain are:

- BUY commonly referred to as Sourcing and Procurement
- MOVE commonly referred to as Logistics
- STORE commonly referred to as Inventory and Warehousing
- MAKE commonly referred to as Manufacturing or Production and
- SELL commonly referred to as the Demand Signal.

In its simplest form sourcing and procurement is a process of obtaining materials or goods from suppliers in the correct quality and quantity. Once buying has taken place there is a requirement to move the goods from supplier to manufacturer. This is called logistics and is the process of moving goods and materials by road, air, rail, shipping or a pipeline. Once received, the manufacturer will store the goods on his premises, necessitating storage and inventory management. The next step is to manufacture the product through a process of planning, scheduling and production, based on several inputs such as raw materials available, demand for a product, etc. Finished goods will be transferred to warehouses and distributed to retail outlets, frequented by the end user.

The traditional supply chain recognises two distinct phases within the production cycle. Viewed from the manufacturer, the inbound supply chain is about buying, moving and storing raw materials for production. The outbound supply chain takes care of distributing the final product to the customer and end user (move, store and sell).

In the past, traditional supply chains were managed in different operational "silos". Presently we still see organisations based on this management concept with a Buying Department, Stores, Production or Manufacturing, a Marketing Department, etc.

2.3 SUPPLY CHAIN MANAGEMENT (SCM)

The origins of the concept supply chain management are unclear, but its development was initially along the lines of physical distribution and transport. Supply Chain Management (SCM) is defined as the task of integrating organisational units along a supply chain and coordinating materials, information, and financial flows in order to fulfil customer demands with the aim of improving competitiveness of a supply

chain as a whole [Stadtler and Kilger, 2000]. In lay terms it is all about supply meeting demand [Hoffman and Sarwar, 2001].

For SCM to improve the competitiveness of a supply chain, it requires a far greater influence in an organisation than just focusing on the physical execution within the five functions of buy, move, store, make, and sell.

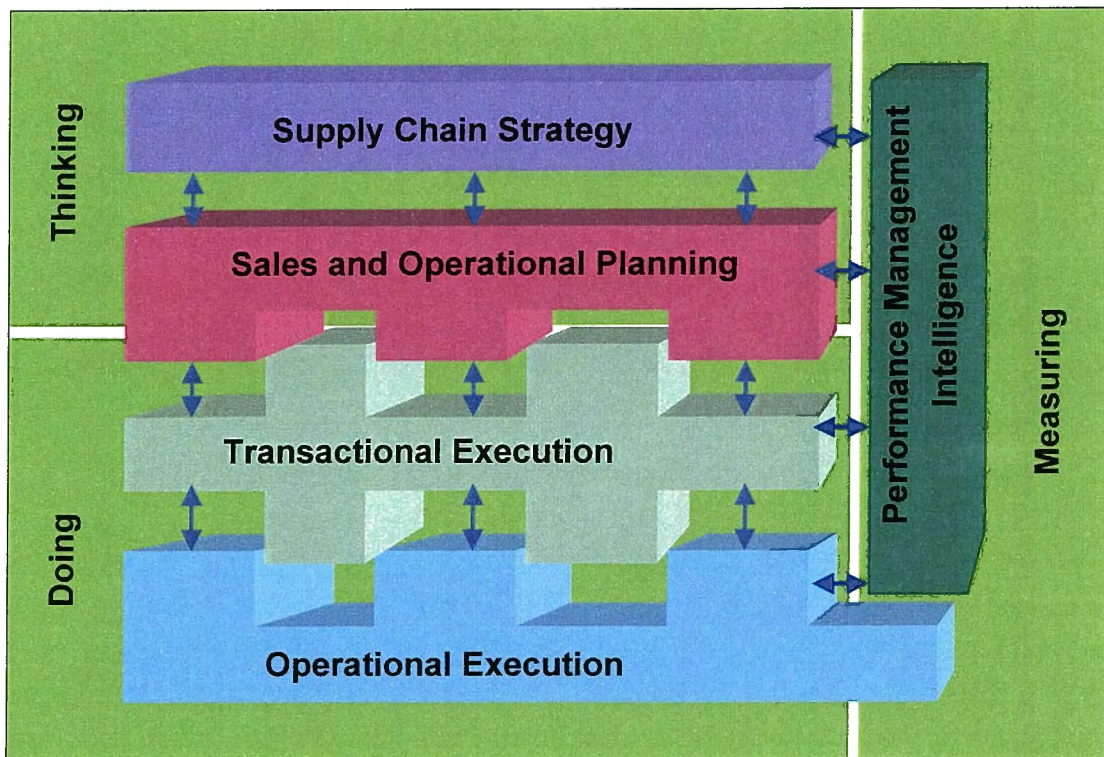


Figure 2: Supply Chain Management Focus – Delivering an Integrated Solution

Supply chain management requires a holistic and integrated approach if it is to be successful. Its foundation is based on vision and execution with a continuous cycle of measurement and improvement. Figure 2 [DNA SC] shows this as Thinking, Doing and Measuring. There are five building blocks to SCM. They are:

1. Supply Chain Strategy
2. Sales and Operational Planning
3. Transactional Execution
4. Operational Execution
5. Performance Management Intelligence

Each level is positioned according to the principles that make it happen. Supply chain strategy is placed within the thinking domain while operational execution is placed in the doing and measuring domain. To

bridge the divide between strategy and execution, we have two additional functions of "sales and operational planning" and "transactional execution". What figure 2 does not show is a time-line associated with each level of supply chain planning. Supply chain strategy determines the high-level business direction that a company will follow for the next two to five years. Measurement of results, and success of a supply chain strategy, can only be done over quarters or years and planning is at an aggregated level. "Aggregated" means that planning takes place with input from all business units but decisions are made to benefit the company, and may come at the expense of individual business units. Sales and operational planning takes place on a tactical level within a business and focuses on planning and optimisation for the next three to 24 months. Planning is at a group level and results are measured over weeks or months. Transactional and operational execution focuses on scheduling, execution, and control for the next one to three months. Results of transactional and operational execution are measured in days, or hours, and used to fine-tune the short term planning cycle.

Supply chain management has developed into a vital aspect for companies striving to improve their competitive edge and profitability. It is therefore not surprising that supply chain management has become the number one strategic priority for manufacturing executives [Valdero White Paper, 2001]. Where once it was an internal function of a company, it has developed into a business solution that crosses the company boundaries to include suppliers and the customer. Surveys conducted at companies identify eight business objectives for supply chain improvements, integration and optimisation [Bryce and Useem, 1998, Cook, DeBree and Feroletto, 2001, Stephens, 1999]. They are:

1. Increased profits
2. Increased market share / greater competitiveness
3. Increased sales volumes
4. Increased growth rate
5. Increased customer satisfaction
6. Increased product quality
7. Reduced time to market / faster product development
8. Reduced costs

As shown in figure 3 [Stephens, 1999], companies cite customer satisfaction, cost reduction, improved profits, improved product quality, and increased sales as the major drivers in undertaking SC optimisation. When asked to determine which SCM functions were likely to produce the greatest benefits, companies tended to value traditional supply chain activities for their area of focus. Figure 4 [Stephens, 1999] shows that the traditional supply chain functions of purchasing, inventory management, transportation and warehousing, were considered high-value areas. The exception is "demand forecasting" which is a relatively new discipline in SCM. Given the importance of customer satisfaction as

a business objective it was expected that the areas of manufacturing and product development would feature more prominently in the SCM effort.

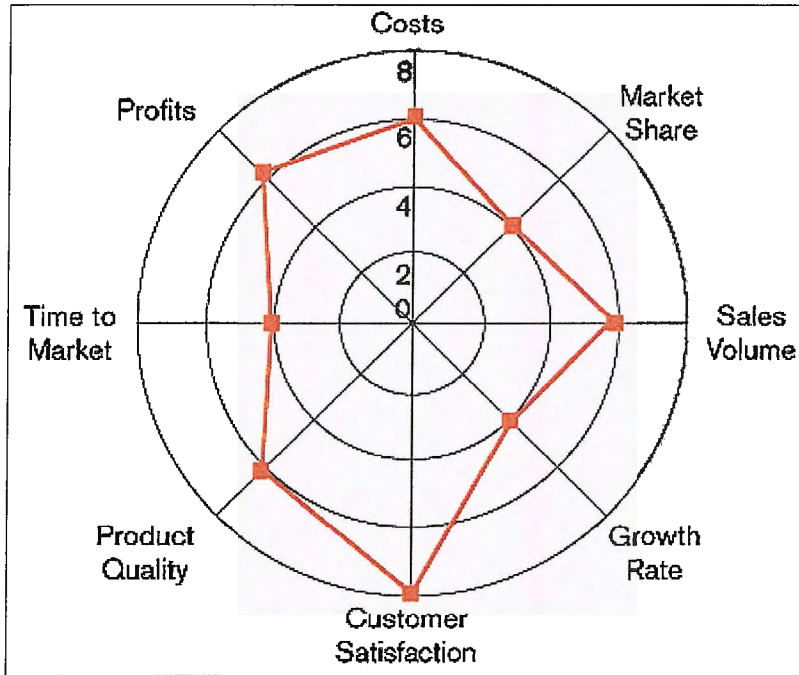


Figure 3: Major Drivers for SCM Optimisation

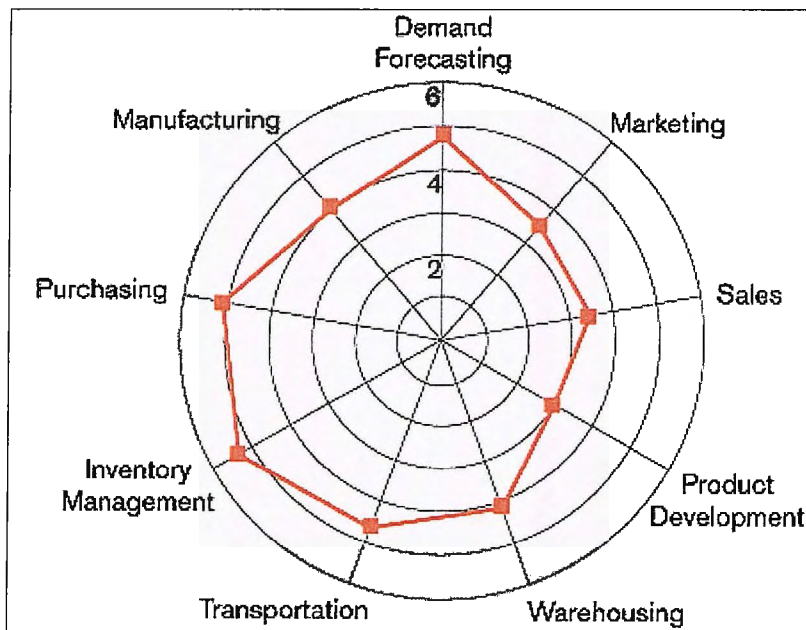


Figure 4: Perceived High Value SC Activities

It was assumed that the weighting might be skewed based on systems or processes that were required and not yet in place. In other words, the absence of a purchasing system might provide an

overwhelming argument to implement one. Data collected however, indicated that the “most valued” systems were already in place at the majority of companies. There are several reasons why high-value supply chain functions have remained the same for “new” supply chain paradigms when compared with the classical supply chain methodologies.

- The company’s approach and attitude towards supply chain management (core versus non-core business).
- Organisational structures that operate as business silo’s i.e. procurement, inventory, etc.
- Supply chain solutions that fail to integrate across an organisation.
- Legacy or “wrong fit” software that does not support SC business objectives.
- Complexity of supply chain solutions.

What does it truly mean to improve, integrate and optimise the supply chain? Figure 5 [DNA SC] plots the level of integration to the business value gained. Suffice to say that one can write a book about this slide, but the message is clear that SCM is about getting the fundamentals correct (or improving them), followed by integration between business departments, business organisations, suppliers and optimisation with networking and collaboration.

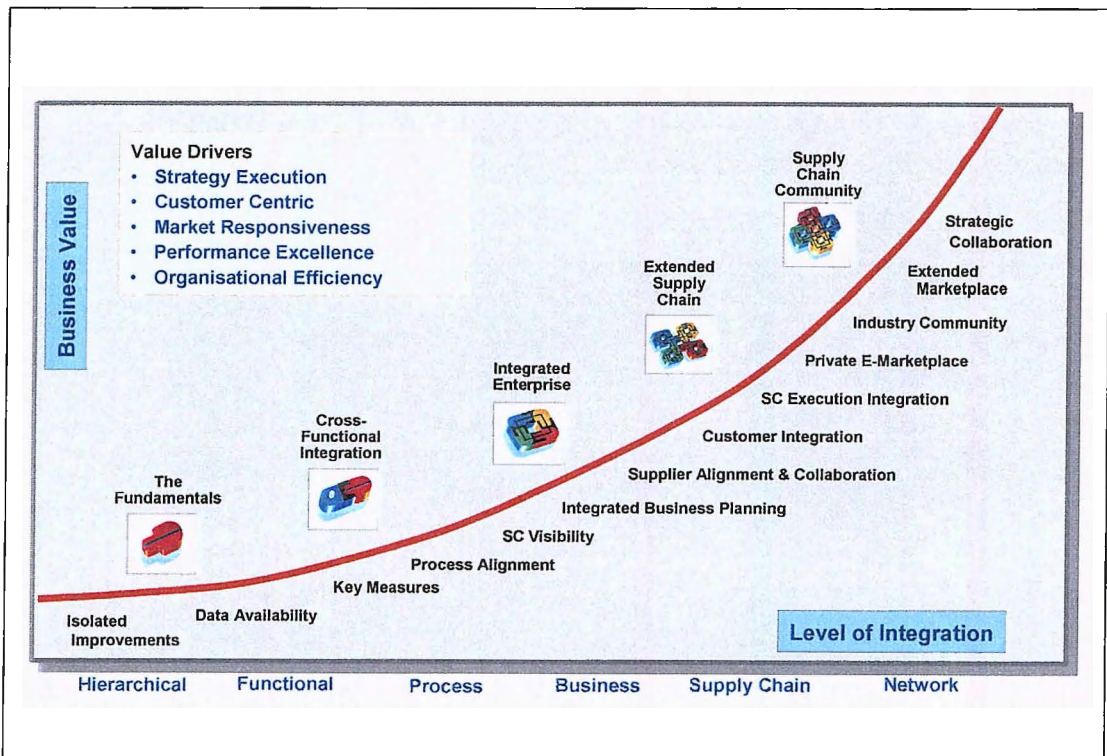


Figure 5: Business Value Resulting from SC Improvement, Integration and Optimisation

2.4 THE NEED FOR SUPPLY CHAIN OUTSOURCING AND ALLIANCES

A growing number of companies have come to realise the benefits of outsourcing supply chain activities to specialised service providers. We treat outsourcing as an outside company's provision of products or services associated with a major function or activity of a user organisation [Bryce and Useem, 1998]. Activities such as transportation, freight forwarding, customs clearing, procurement, insurance, inventory management, warehousing, and distribution are popular outsourced activities. The reason for outsourcing?

- Companies want to focus on core capabilities, eliminating from their direct control those activities that can be done more efficiently and effectively elsewhere.
- The changing face of business; what is core or peripheral today may not be several years down the line.
- Companies find it hard to keep abreast with the increased complexity and competitive world of buying, selling and moving. The rapid change in industry standards makes it attractive to deal with organisations whose entire focus is on supply chain operations.
- Customers are increasing their expectations of their suppliers / manufacturer / service providers.
- Managers perceive outsourcing as a vehicle for achieving strategic goals.

Companies have several business options to choose from when considering partial, or total, supply chain outsourcing. The options available are:

- Single Service Providers (SSP)
- 3rd Party Logistics (3PL) Service Providers
- 4th Party Logistics (4PL) Service Providers

Single Service Providers (SSP) are independent operators who are contracted by companies requiring specific supply chain services e.g. a trucker or warehousing facility. A single service provider is usually the result of an organisation operating in "silos" that contracts part of their activities to various suppliers of service along the supply chain.

Companies that provide a service of combined, specific activities along a supply chain are called **3rd Party Logistics (3PL) Service Providers**. For instance, they may handle all the logistics from A to B, transport, warehousing, dock loading etc. 3PL service provision naturally evolved from single service providers as companies experienced outsourced supply chain problems and inefficiencies.

However, outsourcing different parts of the supply chain to different service providers (3PL or single service providers) usually results in a more inefficient overall system. While there may be a saving in one area of the supply chain, increased costs may be incurred in another area. The most common shortfalls in 3PL outsourcing arose as providers:

- lacked capabilities to provide a complete integrated solution
- faced financial limitations due to margin pressures
- struggled to meet escalating service requirements (leading technologies, qualified professionals, project design, implementation and start-up capacity, advances in strategy and business processes).

For these problems the concept of **4th Party Logistics (4PL) Service Providers** was conceived. A 4PL is a supply chain integrator that assembles the resources, capabilities, and technology of its organisation with those of other organisations to create a comprehensive integrated supply chain service capable of assessing, designing, building and running innovative supply chain solutions. The results lead to an optimised supply chain operation. The concept of 4PL service providers is a relatively new development in the supply chain industry. Andersen Consulting dubbed the phrase 4PL and called 4PL activities “a breakthrough solution in the supply chain environment”. The combining of asset optimisation, physical logistics management, and risk management, all aimed at improving total supply chain effectiveness, is at

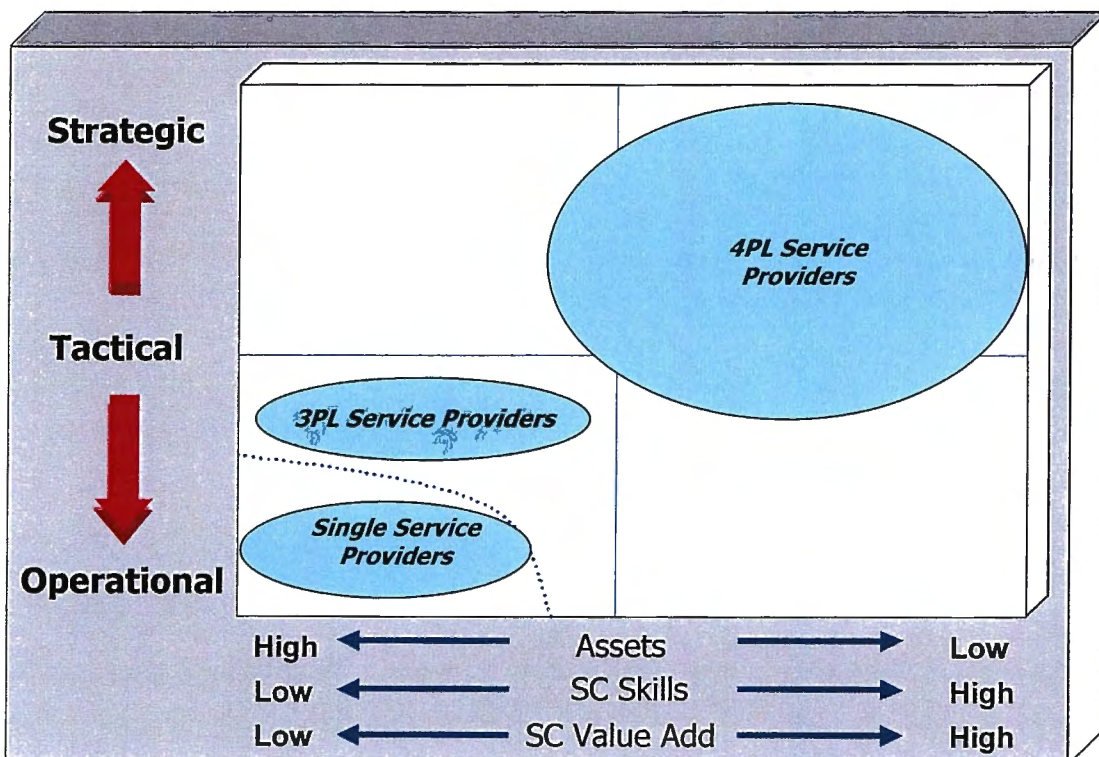


Figure 6: Single, 3PL and 4PL Service Provider Positioning

the core of 4PL operations. While 3PL operations are asset dependent, 4PL operations are knowledge-based. The value-add of a 4PL service provider is reflected in figure 6 [DNA SC]. Single service providers are operationally focussed with few tactical, and no strategic, advantages to offer a company. 3PL service providers are better placed to provide a tactical advantage. Due to their positioning relative to competitors and upstream / downstream 3PL partners that service the same company, they are unable to provide integration and optimisation required for an efficient supply chain. 4PL service providers are strategically focused with few tactical and no operational advantages. What is clear is that all providers have a role to play in fulfilling the total supply chain

There are numerous functions within supply chain activities that single, 3PL and 4PL service providers can offer. Appendix A is an attempt to ring fence service providers in terms of function, SC value-add and focus. Table 1 is an extract from Appendix A to further the discussion. Although Appendix A is a comprehensive list of supply chain activities and functions, it by no means represents the total number of industry services available. Services available are subject to the interpretation of each service provider and the way that they want to position themselves within the supply chain market.

SUPPLY CHAIN ACTIVITIES	SUPPLY CHAIN FUNCTIONS	S	3	4	ASSETS	SC SKILLS	SC VALUE ADD	FOCUS
		S P	P L	P L				
INVENTORY MANAGEMENT & WAREHOUSING								
Inventory Management								
	Inventory Management		√		Low	Low	Medium	Ops/Tactic
	Vendor Managed Inventory		√		Low	Low	Medium	Ops/Tactic
	Product Life Cycle Management		√		Low	Low	Medium	Ops/Tactic
	Consignment Stock Management		√		Low	Low	Medium	Ops/Tactic
	Cataloguing			√	Low	Low	Low	Operational
	Inventory Optimisation		√	√	Low	Medium	Medium	Ops/Tactic

Table 1: Supply Chain Service Provider’s Matrix – Extract from Appendix A

Neither is the attempt to ring fence the value add and focus of a service provider hard and fast. The purpose of the table is to give the reader a general overview of the supply chain market and the way service providers complement each other.

Who is in the market for outsourcing, and what profiles do these companies have? One study of 55 major American companies [Bryce and Useem, 1998] revealed that both cost structure and business performance mattered. High cost producers are more likely to outsource, and so too are companies with below-par performance records. Another study found that smaller enterprises and higher-wage companies also more frequently contract out. Inexpensive access to costly services helps to explain the first whilst access to a less-costly workforce, the second. Most contracts are structured according to a

Service Level Agreement (SLA) to protect and motivate both parties. You will typically find a reduction in cost (to the user organisation), increased service levels, technology and time lines listed as SLAs.

As with all business arrangements there are advantages and disadvantages and a manager needs to be informed as to the strengths and weakness of his decisions. To be forewarned is to be forearmed. Outsourcing can yield both longer-term gains and immediate payoffs [Bhatnagar and Viswanathan, 2000, Bryce and Useem, 1998]. The benefits include:

- Reduced service costs that free up capital for alternative use.
- When the less costly service is deployed in value-creating areas, savings from outsourcing should accrue to investor wealth in the long term.
- Lower costs equal better margins and improved cash flow in the short term.
- Increased earnings per share for a listed company due to savings.
- Providers typically service many clients and often achieve lower unit costs than is achievable by a single company.
- Specialist providers can afford to invest more in new technologies and innovative practices than can many user enterprises.
- Brand, or reputation, value can improve when products and services are more competently delivered by providers than by the company.
- Allows quick entry / exit from a market to conserve capital.

Companies enter into outsourcing agreements for strategic gains as well [Bhatnagar and Viswanathan, 2000, Bryce and Useem, 1998]. Strategic benefits include:

- Added value may come from an outsourcing contract if it provides for good complementarities between a user's and a provider's capabilities; if it allows the user to stay abreast of fast-changing technologies; and if it allows the user to draw on the results of capabilities it could not develop itself.
- Company value can also be enhanced when management attention is more focussed on strategic issues and less on daily operational problems or organisational conflicts.
- Outsourcing makes it easier to adopt new technologies more rapidly and better cope with seasonal variation in business demand.
- Outsourcing can improve competitive positioning by allowing the firm access to world-class expertise not available internally.
- Outsourcing can make available a complementary asset or resource that, when combined with those of the company, produce synergies that can be profitably exploited.
- Outsourcing can provide a way to learn the specialised skills of the provider, especially if staff from the two companies work closely.

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- Outsourcing could be required in order for a company to simply maintain a competitive position or recoup market position.

Some clients have not realised many of the expected benefits from an outsourced arrangement [Bryce and Useem, 1998]. Problems that a company may experienced include:

- Outsourcing falls far short of expectations and more than half of companies have brought back at least one outsourced activity.
- Only a third of companies have actually realised benefits from a vendor's expertise.
- Costs did not fall but actually increased under the contract.
- Other studies find managers complaining several years into major outsourcing deals that the contracts were at times too unwieldy and inflexible to yield sustained value.
- Some managers came to regret that the vendor's employees work full-time inside the user organisation, but did not display the same commitment and dedication shown by inside staff.
- Hollowing out of the corporation. As companies turn their know-how in one area after another over to providers in the name of lower cost or improved strategy, the largely invisible and unanticipated cumulative consequences might be that companies find they have gone too far.
- With their value generation activities no longer under their own roof, enterprises find they no longer possess the cutting edge means to create innovative products, develop fresh services, or find new profit zones.
- Cost savings and other immediate advantages come at the sacrifice of future evolution of capabilities in core areas.
- By distinct outsourcing, a company may underestimate the importance of coordination and integration of these and other activities for achieving superior performance
- Over a length of a contract it may amount to the transfer of a core technology to the provider

An outsourcing arrangement must be based on Service Level Agreements and all contracts must contain a performance measurement of the relationship and business success. SLA's are meant to keep all parties honest and motivated. A reduction in cost for the user of the outsourced service is the most common SLA around, and so it should be, but consider the challenges of gauging costs of savings:

- Savings are not consistent from year to year, with large gains often achieved at first but diminishing returns recorded thereafter.
- Environments are rapidly changing, making it difficult to compare savings several years after an outsourcing contract against the cost of inside operations that have been discontinued several years earlier.

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- Savings are not always localised and are spread across many units; aggregating the total benefits can therefore be elusive.
 - Since outsourcing is often motivated for reasons other than cost reduction, good information on cost reduction is sometimes simply not compiled.
 - Some companies purchase outside services from the outset, as often seen among start-up enterprises, providing no inside baseline for comparison.

To make things more interesting there are several contradictions in outsourcing. For example, clients keep saying they want the lowest cost (bid offer) but then criticise the lack of flexibility, value proposition, process management, IT capabilities, etc. A dispute remains as to whether outsourcing for strategic advantage should entail contracting out core or non-core business. Some researchers contend that real leverage comes from moving a user's core assets into the hands of providers: the latter's greater efficiency will enhance a central source of the user's advantage in the market. Others counter that this removes an asset that the user must know well itself and evolve on its own, if it is to stay competitive.

Outsourcing differs from a strategic alliance or partnership in that it represents a predominantly one-way flow of resources or services from one party to another. Under outsourcing agreements, one company purchases the ongoing provision of a product or service from another without taking a direct financial stake. An alliance, by contrast, usually requires a contribution of resources, including capital, by both parties to a new and autonomous entity. Alliances are typically stronger relationships since they allow more readily for the transfer of new technology and less readily for one company to move into the other's market. It signifies a new, long term, and important relationship between two enterprises. Flexibility and risk sharing that comes with alliances are particularly valuable for companies that are facing rapid growth, frequently changing technologies, and substantial risks of failure.

In conclusion, outsourcing through a single service provider, 3PL, 4PL or using a partnership, joint venture or alliance all have an upside and a downside and challenges. Most of the time the benefits are not tangible or measurable. What is never documented are the people and the personalities behind successful business ventures and their will to make things happen and succeed.

2.5 DNA SUPPLY CHAINS— AN EXAMPLE OF SC SPECIALISTS

The single, 3PL and 4PL service provider business model performs well in the vibrant economies of Europe and North America. Due to the magnitude of the supply chain market, service providers exist and have a role to play and complement each other through joint ventures and alliances. In contrast the African supply chain market is a different environment. The supply chain market demands a high level of sophistication through innovative solutions and technology to counter the problems of poor

infrastructure, business approach, remoteness and industry size. A different approach to supply chain management is therefore required.

DNA Supply Chain Investments Limited is an example of a local listed company that incorporates the single, 3PL and 4PL business model to provide supply chain solutions for South Africa and Africa. Through its widespread intellectual capital and hands-on expertise in supply chain evaluation, design, management and implementation, DNA provides integrated supply chain solutions to many of Africa's blue chip and multinational companies. What sets DNA apart from the traditional approach to supply chain management (as a 4PL), is their belief in taking operational responsibility and accountability for the ongoing implementation and management of SC solutions. Their success lies in the company structure. DNA Supply Chains is comprised of a number of companies with best of breed (practices) supply chain skills and capabilities. While each company is a leader in its field, together they form a formidable provider of supply chain management solutions. DNA continually assimilates and acquires intelligence and expertise into the organisation in order to maintain its competitive advantage as industry leaders in every aspect of the supply chain. Expertise and hands-on know-how ranges from sourcing and procurement, to demand planning, inbound logistics, inventory optimisation, inventory management, risk management and outbound logistics. The company's access to state of the art technology and leaders in the field of supply chain software development and implementation ensures that all of these niche areas are developed to optimum potential. The DNA supply chain services are best represented by figure 7 [DNA SC].



Figure 7: DNA Across the Entire Supply and Demand Spectrum

DNA Supply Chains sees a typical supply chain as consisting of five basic functions, namely: buy, make, move, store and sell. Each of these functions consists of a strategic level, a tactical level and an operational level. DNA's partnership with customers starts at the strategic and tactical levels. Assistance is given to customers in evaluating their needs (strategic design) while optimal supply chain solutions are planned and designed and implemented accordingly (solution design and collaborative planning).

In some instances, DNA also manages the operational level by carrying out some hands-on operation or managing the specialists that are brought on board (outsourced supervision). By acting as a megafaceted partner whose function it is to deploy its own specialists to become part of the entire supply chain operation, DNA relieves company management of an involvement that often takes up to 60 % of its time. With DNA shouldering this responsibility, client executives are enabled to concentrate on the firm's core business. Working as a team the two parties can identify new profit centres, improve forecasting and add value where only costs accrued in the past. The result of DNA's management of supply chains have resulted in some of the following statistics for its clients:

- Increased turnover
 - up to 15 % growth in turnover
 - up to 20 % increase in customer service resulting in increased sales
- Improved efficiencies
 - reductions in working capital and overhead levels
 - up to 40 % decrease in distribution costs
 - up to 30 % improvement in handling efficiencies
 - up to 90 % reduction in lead times
 - up to 40 % reduction in trans-African lead times
 - up to 80 % reduction in shrinkage
 - up to 50% reduction in inventories, leading to higher service levels and decreased obsolete stock loss
 - up to 100% increase in service productivity

2.6 CONCLUSION

A supply chain is the movement of materials in response to the demand of a product. The traditional supply chain consists of five functions namely buy, move, store, make, and sell and is the perfect fit for a production environment. With the fuller understanding of supply chains has come the need to better manage and optimise them. This discipline is called supply chain management and is all about supply meeting demand.

Supply chain management has become a vital aspect for companies striving to improve their competitive edge and profitability and the most important strategic priority for manufacturing executives. Outsourcing the supply chain is a popular option and has definite advantages. The main advantage is that it allows companies to focus on core capabilities, eliminating from their direct control those activities that can be done efficiently and effectively elsewhere. To this extent a company has the choice of using single, 3PL, and 4PL service providers. All play an important role in a total supply chain solution. Outsourcing has its drawbacks and a manager going this route must weigh up the advantages and disadvantages very carefully.

DNA Supply Chain Investments Limited is an example of a local listed company that incorporates the single, 3PL and 4PL business model to provide supply chain solutions for South Africa and Africa. What sets DNA apart from the traditional approach to supply chain management (as a 4PL), is their belief in taking operational responsibility and accountability for the ongoing implementation and management of SC solutions. In the SC environment a competent company used to outsource the supply chain function will enable the client's executives to concentrate on the company's core business.