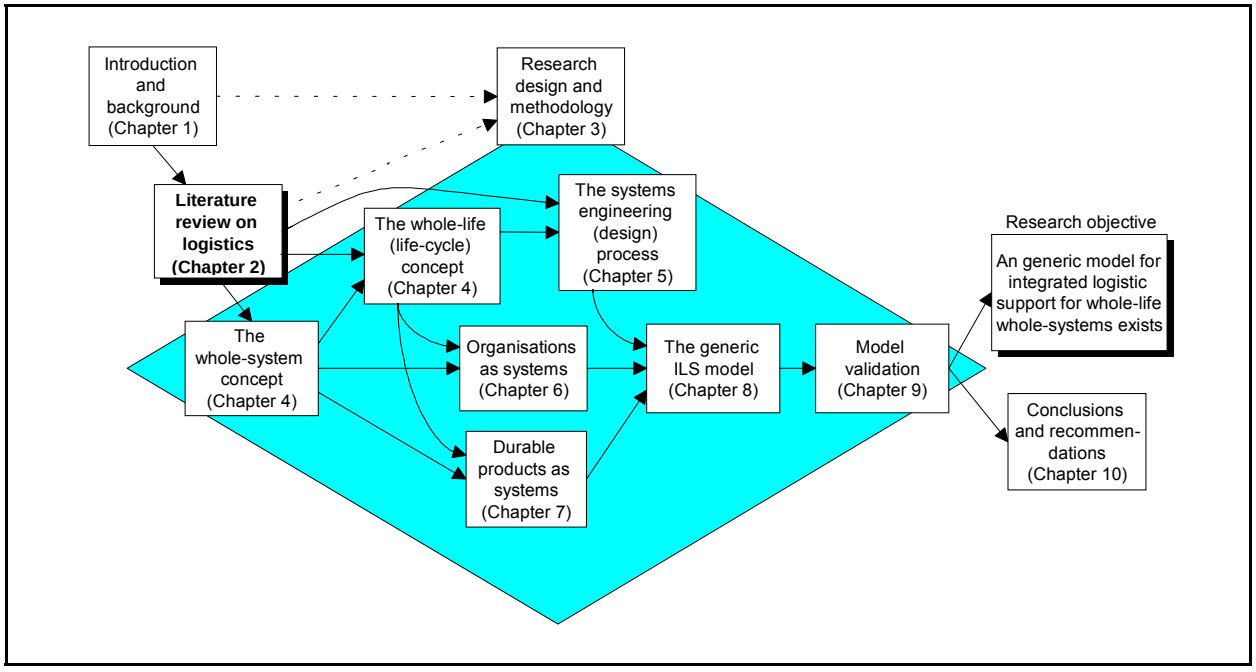
Chapter 2

Logistics - The undefined overly defined concept

"I don't know what the hell this logistics is that general Marshall is always talking about, but I want some of it!"

Admiral King [Gourdin, 2002]



2.1 Purpose and outline of the chapter

The purpose of this chapter is show that even though a large number of definitions for logistics in some form or another exist, the concept of logistics is still a very confusing one. Most definitions of logistics seem to contradict one another, and when the meaning of the definitions are analysed, the confusion becomes even more. Taking it one step further, when the goals for logistics associated with some definitions are analysed, the situation becomes ridiculous at times. Furthermore, models explaining logistics are limited to the definition they try to explain or are totally oversimplified.

The chapter starts out by taking a historical view on logistics, followed by some dictionary definitions, after which some older and more recent views of logistics are investigated. Some logistics models are investigated to demonstrate the need for an integrated logistics model. The chapter concludes by confirming the problem statement posed in Chapter 1.

2.2 A historical perspective on logistics

Logistics is as old as the world itself. The word logistics is derived from the Greek word *logistikos*, which means to be adept or skilful in calculation. Even though the concept of the calculation of requirements for support may be connected to the meaning of the word, it does not provide us with anything more concerning the origin of the word logistics [De Klerk,1993:5].

Since the earliest times logistics has been associated with supplying masses of people with their needs. One of the first examples of a massive logistics exercise (even though not called logistics) can be found in Exodus 16, where the Lord supplied Israel with quails and manna in the desert. This in itself was not the logistical exercise, as it was a Godly act, but it must have been a huge logistical exercise to set up camp, provide water, firewood for cooking and heating and to provide waste services. No mean feat if you consider that there were 603 550 men above the age of twenty, all that were able to go forth to war in Israel, excluding the Levites [Numbers 1:46-47]. This seems to be one of the first examples where logistics is associated with a military force.

Examples where the role of logistics has been described with regard to its importance to the ultimate success of a military campaign are Sun Tzu Wu in *The Art of War* (500 BC), Alexander the Great, the Romans, Napoleon and Hitler. Both Napoleon and Hitler failed with their attempts to invade Russia because their supply lines were too long and could easily be disrupted, in their case partially at least by the harsh reality of the winter weather [Gourdin, 2001:1-2].

Lambert, Stock and Ellram [1998:5] state that logistics as an area of study first gain attention in the early 1900's with the distribution of farm products, as part of the organisational strategy and as a way of providing time and place utility to goods sold. These authors further link the success of the Allied victory in WWII to logistics, as well as in the Persian Gulf War in 1990-1991 [op cit]. The first dedicated text books appeared in the 1960's, and this period (1956 to 1965) is regarded as the period of conceptualisation of logistics, including the application of the systems approach [Bowersox, Closs and Helferich, 1986:7]. 1966 to 1970 was a period to test logistics for relevancy, where for most of the time, the logistics concepts became reality and passed the test of time [op cit: 9-10]. The next period, 1971 to 1979, was the period where logistics became institutionalised within countless private and public enterprises, despite the changing priorities, the most significant being environmental concerns and the energy crisis [op cit: 11-12]. The period from 1980 to 1990 experienced significant political and technological change such as transportation deregulation, the introduction of microcomputer technology and the communication revolution [op cit: 12-14]. In the final part of the previous century and the beginning of the third millennium, logistics concepts that came to the fore are globalisation [Bloomberg, LeMay and Hanna, 2002:6], supply chain management and enterprise resource management (ERP).

2.3 Logistics definitions

The most basic definition for logistics comes from the Webster Dictionary [Webster,1963]: *"The procurement, maintenance, and transportation of military material, facilities, and personnel."* Another very basic definition can be found in the Oxford Paperback Dictionary [1979]: *"The organization of supplies and services"*, while The South African Pocket Oxford Dictionary [1987] defines logistics as: *"The art of supplying and organising (orig. military) services and equipment etc."* A more recent Webster Dictionary definition is [Webster, 1988]: "*The aspect of military science dealing with the procurement, maintenance, and transportation of military material, facilities and personnel*". From a clinical definition point of view, logistics is very much viewed as an activity related to the military and military operations, probably because of the fact that *"logistics is firmly rooted in the historical doctrine of war"* [Gourdin, 2001:2]. Closely associated with the previous definitions, the US

Air Force defines logistics as *"The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, logistics pertains to those aspects of military operations which deal with (a) design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of material; (b) movement, evacuation, and hospitalization of personnel; (c) acquisition or construction, maintenance, operation disposition of facilities; (d) acquisition or furnishing of services"* (Compendium of Authenticated Systems and Logistics Terms, Definitions, and Acronyms, 1981:401). In this definition we find for the first time that reference is made to the life-cycle cycle. Also of note is that this definition also includes maintenance as a pertinent activity part of logistics.

The Council of Logistics Management (CLM) offers the following definition: *"Logistics is the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of conforming to customer requirements"* [Lambert and Stock, 1993:4 and Blanchard, 1998:3]. Ballou (1987:7) adds a descriptor to logistics and provides the following definition: *"Business logistics deals with all move-store activities that facilitate product flow from one point of raw-material acquisition to the point of final consumption, as well as the information flows that set the product in motion for the purpose of providing adequate levels of customer service at a reasonable cost"*.

The Society of Logistics Engineers (SOLE) defines logistics as *"The art of science and management, engineering, and technical activities concerned with requirements, design, and supplying and maintaining resources to support objectives, plans and operations"* [Blanchard, 1992:4]. Interesting to note that in this definition, logistics is considered an *art* of science and management, engineering and technical activities, which makes it very open for different interpretations.

To make things even more complicated, another definition is provided for integrated logistic support (ILS) in the *DSMC Integrated Logistic Support Guide* [Blanchard, 1998:3]: *"Integrated logistic support is a disciplined, unified, and iterative approach to the*

management and technical activities necessary to (1) integrate support considerations into system and equipment design; (2) develop support requirements that are related consistently to readiness objectives, to design, and to each other; (3) acquire the required support; and (4) provide the required support during the operational phase at minimum cost".

From a marketing perspective, Christopher [1992:xi] provides a definition for marketing logistics: *"Logistics is the process of strategically managing the acquisition, movement and storage of materials, parts and finished inventory from suppliers through the organization and its marketing channels, in such a way that current and future profitability is maximized through the cost-effective fulfilment of orders".*

Viewing it form an operations management side, Chase, Aquilano and Jacobs, [2001:339] provides the following definition: *"Logistics is a term that refers to the management of functions that support the complete cycle of material flow: from the purchase and internal control of production materials; to the planning and control of work-in-process; to the purchasing, shipping and distribution of the finished product".*

Bloomberg, LeMay and Hanna [2002:6] provides the following definition: "*Integrated logistics is defined as the process of anticipating customer needs and wants; acquiring capital, materials, people, technologies, and information necessary to meet those needs and wants; optimizing the goods- and service-producing network to fulfill customer requests; and utilizing the network to fulfill customer requests in a timely way".*

To summarise, it seems as if logistics can be categorised in at least two dimensions, namely those logistics activities that relate to the military and military operations, and those logistics activities relating to movement of material from point of origin to point of consumption to ensure that proper business can be conducted.

2.4 Existing logistic models

2.4.1 Components of logistics management

Lambert, Stock and Ellram [1998:3] define logistics management as *"Logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point of consumption for the purpose of conforming to customer requirements"*, a definition gleaned from the Council of Logistics Management. Of interest is that these authors provide this definition for logistics *management*, whilst the Council of Logistics Management uses (almost) exactly the same definition to define just *logistics* [Blanchard, 1998:3]. Lambert, Stock and Ellram [1998:4-5] subsequently provide a model for what they call components of logistics management, shown in Figure 2.1.

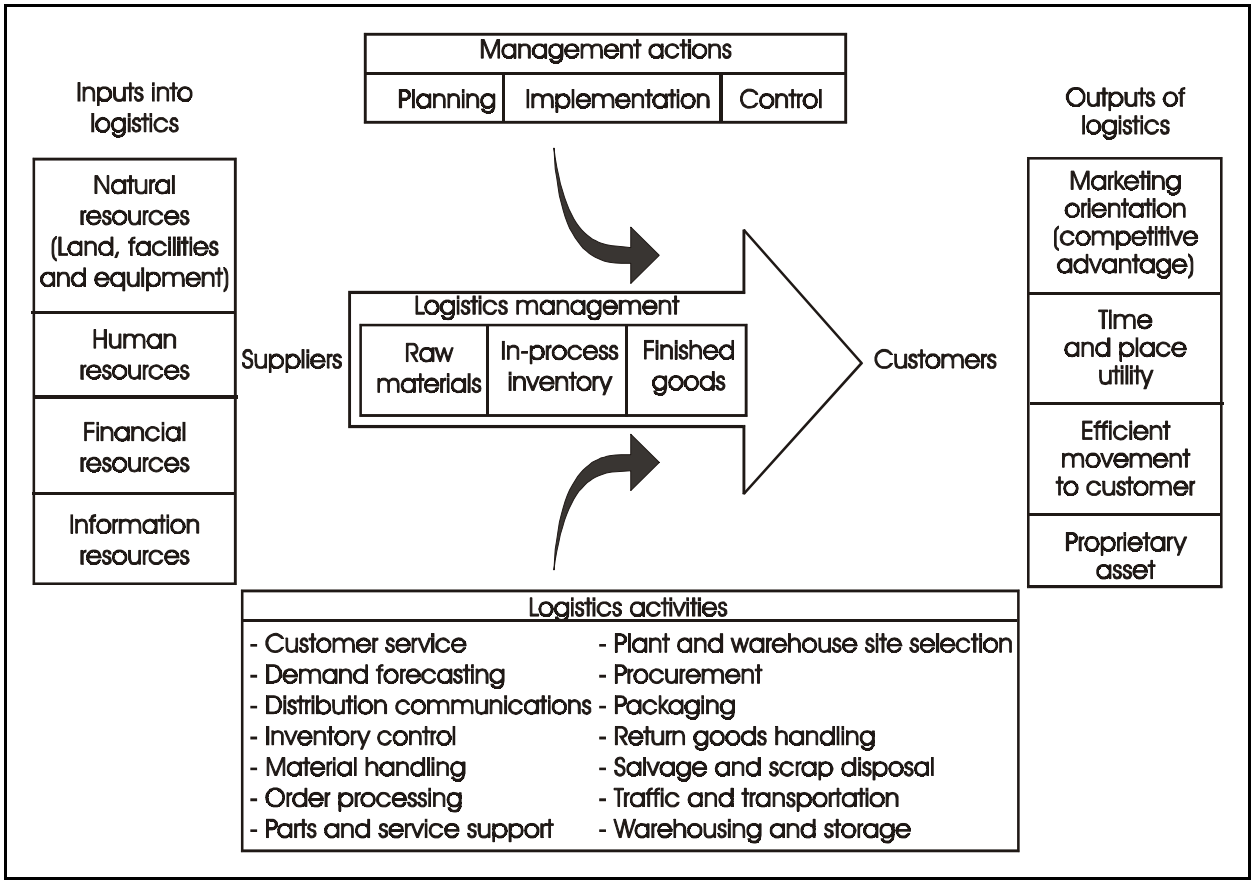


Figure 2.1: Components of logistics management
[Lambert, Stock and Ellram, 1998:5]

This model is primarily in support of the definition they use for logistics management and focuses on the flow of material (business logistics) from supplier through the organisation to the customers. These authors provide a breakdown of the inputs into logistics, the management actions applied to the flow process where logistics management is applied to the flow of raw material, in-process inventory and finished goods, as well as a breakdown of the output of logistics. They also provide a list of typical logistical activities that need to be managed. No indication is given of the life-cycle or system approach to the logistics management and activities.

2.4.2 The scope of business logistics

Ballou defines three primary activities for logistics. They are transportation, inventory maintenance and order processing. The relationships between these activities are shown in Figure 2.2. The concepts of transportation and order processing are straight forward. However, inventory maintenance needs some clarification. Inventory maintenance refers to those activities that allows one to provide time value by keeping finished goods inventory. As one cannot keep finished goods of a service, the model is not applicable to

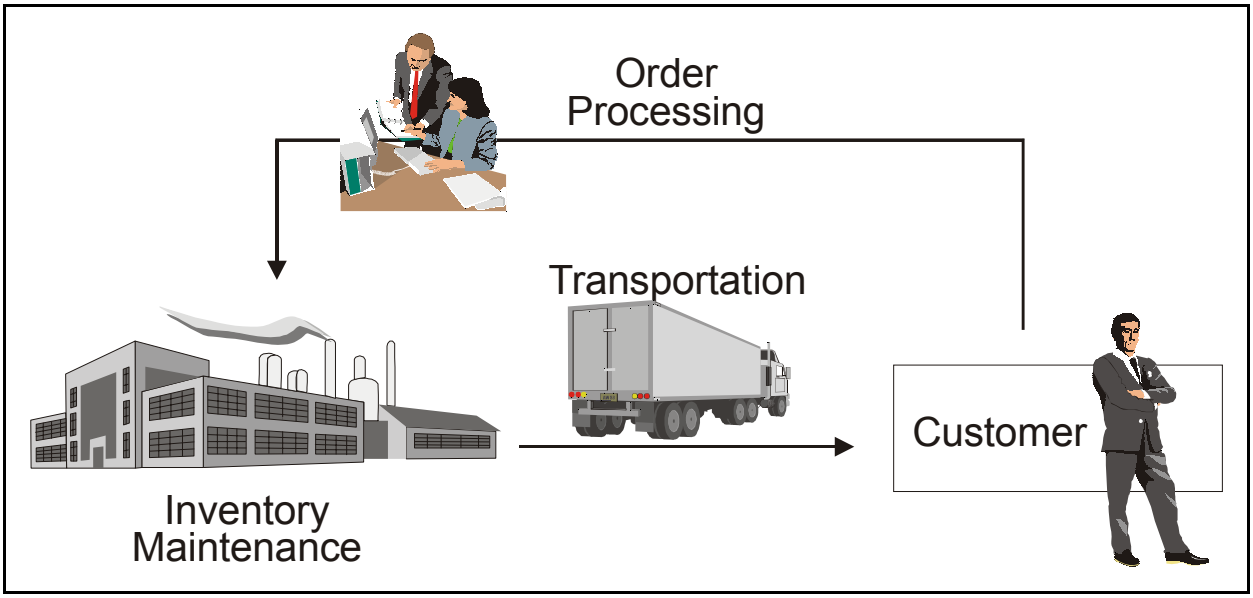


Figure 2.2: The relationship of the three primary logistic activities to serving a customer - the "Critical Loop" [Ballou, 1987:8]

service industries. However, if the definition of inventory maintenance is changed to those scheduling and inventory activities required to fill an order, whether it is filling the order from stock, through MRP scheduling or using the JIT philosophy, it can be made applicable to the make-to-order (and thus service) environment as well. A further refinement of Ballou's three primary activities is to link a number of organisations together in the supply chain, which is shown in Figure 2.3.

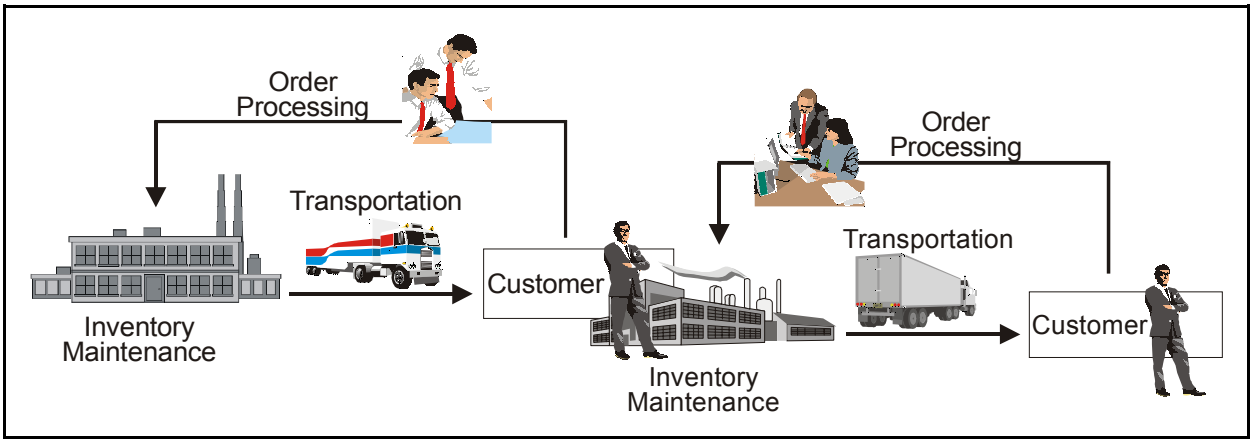


Figure 2.3: The three primary logistic activities creating the supply chain
Adapted from Ballou [1987:8]

It is now obvious that when one considers the organisation in the middle of Figure 2.3, everything to the left is the physical supply or materials management, whilst everything to the right is physical distribution.

Ballou [1987:17-18] proposes a model of integrated logistics as shown in Figure 2.4 and calls it the scope of business logistics. His idea of integration relates to the integration of materials management (physical supply) and physical distribution, which also brings closer ties with the operations function. This model, although emphasising different aspects than the model of Lambert, Stock and Ellram (as discussed in § 2.4.1), is also a model of material flow from point of origin to point of consumption. As is the case with the model of Lambert, Stock and Ellram [1998:4-5], a life-cycle and systems approach is not deemed important enough to include a time and system integration dimension within the model.

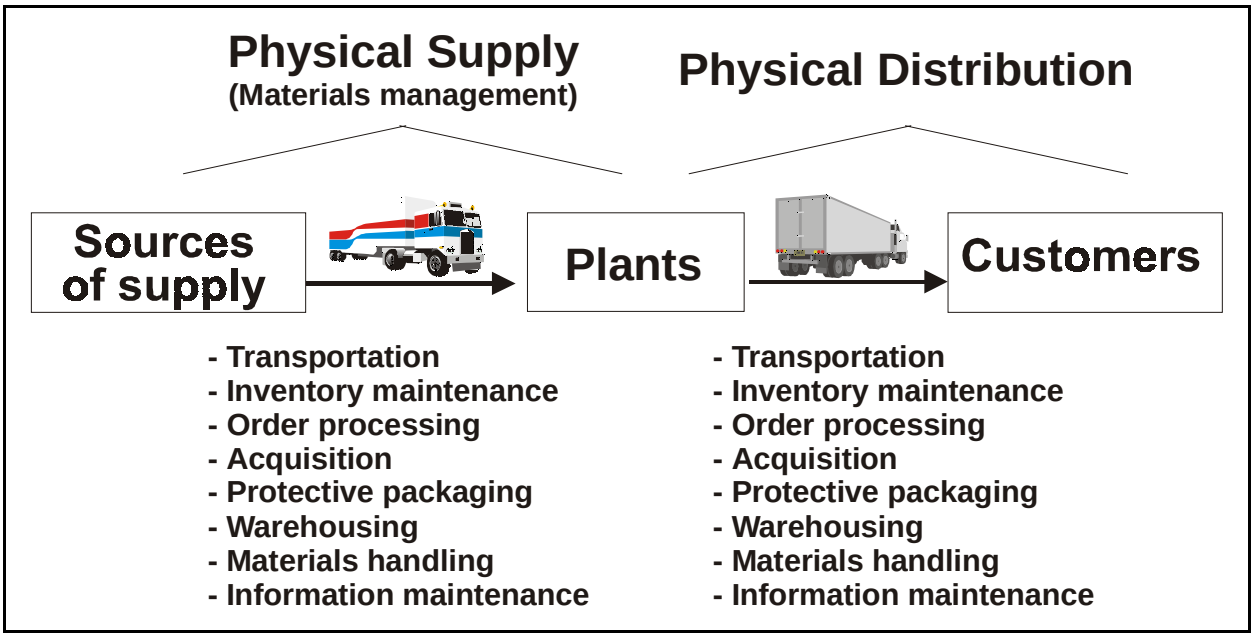


Figure 2.4: The scope of business logistics
Ballou [1987:18]

Of note is that all activities of the physical supply are exactly the same as the activities of physical distribution. The integration point which is not immediately visible is at order processing. Order processing of the physical supply deals with the dependent demand items, which are calculated from the order processing of the physical distribution, or independent demand. The independent demand is derived from actual customer orders and forecasts. This approach is similar to the value chain concept of Porter [1990:40-42] which will be further discussed in Chapter 6.

2.4.3 Logistics in the system life-cycle

Blanchard [1998:11] seems to be the only author to specifically address logistics in the life-cycle. The model he proposes (shown in Figure 2.5) is one that this author subscribes to. The problem with Blanchard's model is that it does not show sufficient detail and that it limits its focus to only parts of the overall system. His main emphasis is on the system/product and the support capability design. Furthermore, no clear distinction is made between the managerial and technical logistics activities.

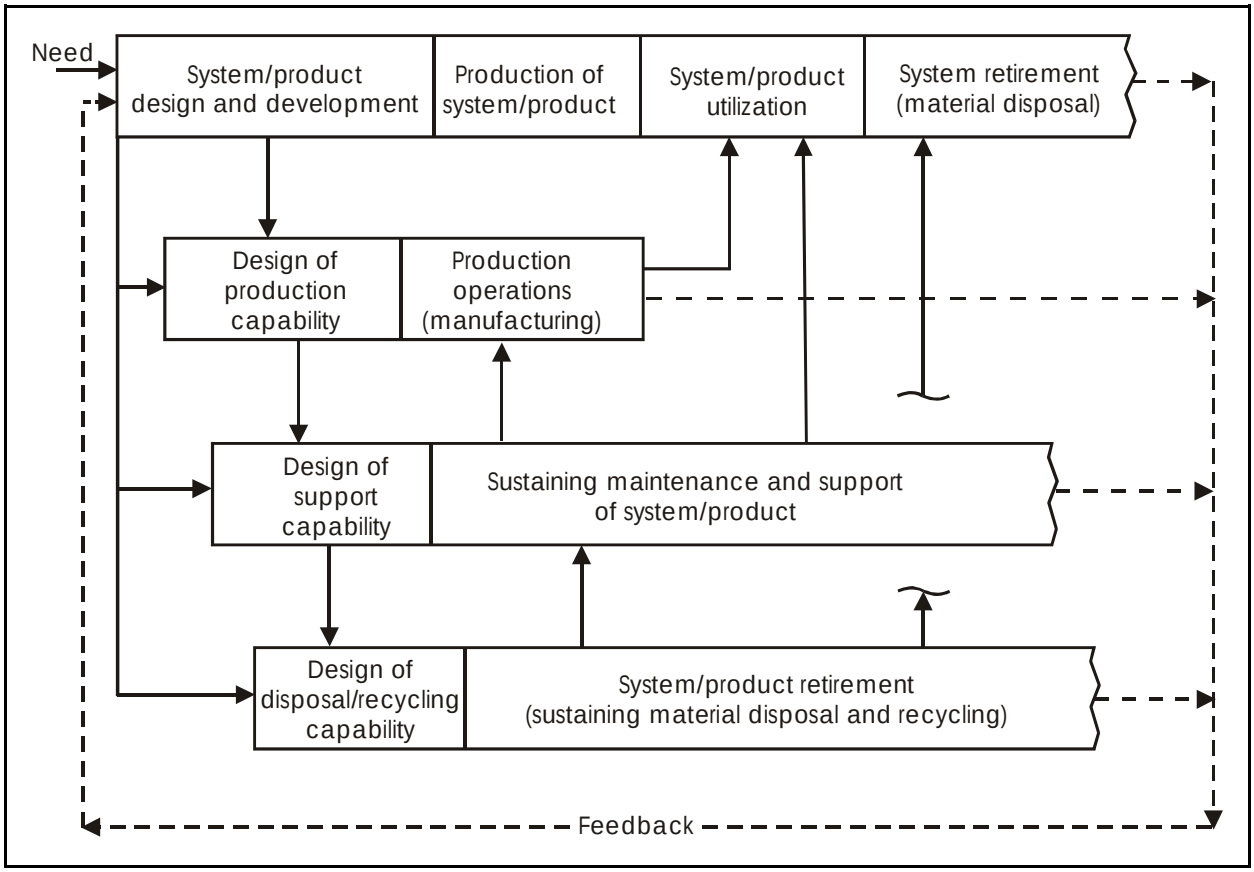


Figure 2.5: The interrelationships of the life-cycle phases in system development [Blanchard, 1998:11]

This model supports the idea of simultaneous or concurrent engineering, and can be enhanced by extending it to different system hierarchy levels, for example the design of the production capability will also require the design of its own production capability (in other words the ability to construct the production capability), design of the production capability support function, and the design of the disposal/recycling function of the production capability. The ideas conveyed on a high level within this model will be used as the foundation for the proposed model resulting from this research.

2.5 Confirmation of the problem statement

The above definitions and models of logistics confirm the magnitude of differences when logistics is viewed. This is further compounded by the fact that very few authors actually ask the question why logistics is needed within the organisation. Green [1991:3] is correct

in saying that integrated logistic support is crucial to the ability of a system to serve its intended purpose, but then categorically state that *"the goal of logistics is to reduce the burdensome cost of logistics through better management, organization, and utilization of all resources to the maximum extent possible"* [op cit: 6]. If the above goal is to be true, then logistics should be eliminated as that would result in the lowest (i.e. zero) logistics cost. Furthermore, if maximum utilisation is to be strived for as part of this goal, material should be moved for the sake of utilisation even if the demand does not justify material movement. It implies using a transportation system to move material that does not need movement, only adding to overall costs. Trying to achieve maximum utilisation of resources at all times as a system measurement is to disregard the system nature of organisations and supply chains.

If such confusing and contradicting statements are made within the writings of one author, trying to make sense of many more viewpoints seems to be very difficult. The question that immediately follows, is what makes this attempt at clarifying the concept of logistics different to those that have tried before? The answer is that the major difference lies with taking a systems and life-cycle approach (dynamic complexity) as opposed to try and functionalise logistics (detail complexity). This is what this thesis attempts to do.

2.6 Chapter summary

Logistics has been with mankind since the beginning of time even though its formal definition only came much later. Different phases of the interest in logistics on the man-made environment have been identified, and the effects and impact of logistics can be measured and quantified within each phase. However, some very contradictory definitions exist that create confusion as to exactly what this thing called logistics is. This confusion is attributed towards functionalising logistics as opposed to taking a systems and life-cycle approach to understanding logistics.