Integrated Logistics Support Management for Systems Life Cycle Support

Faculty of Economic and Management Sciences
NWU Business School

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INAUGURAL LECTURE NOTES

Compiled by: Prof JA Meyer

Concepts in discussion:

Background and Introduction to Integrated Logistics Support Management

Given how quickly and continuously everything is changing in the new economy, it is essential to understand analytically the functioning of supply chains and to be able to know what strategies will produce the best results. Greater attention to creating supply chain solutions that are effective and efficient are required. Logistic management had orginated from the Defence environment. SCM originated from the business needs originating from the ILSM especially from the startegic management perspective. Thus, applied ILSM utilises the current accepted business practices of the SCM ut extends and needs to extend the ILSM functioning beyond what is currently considered the basic requirements of the Logistics ambit in SCM to wit the ill-defined Inbound and outbound logistics. A definitive move back to the basic ILS approach of Operational and Engineering Logistics is essential (https://www.futurelearn.com/info/courses/principles-global-management-logistics-assets/0/steps/65241 accessed 28 June 2021).

The term logistics is from French: “logistique”, a military officer Jomini, in his Summary of the Art of War captured the activities of supply and maintenance of “lodgings”. It is derived from either Greek (“logistikos” from the Greek mathematics) (https://en.wikipedia.org/wiki/Logistics accessed 28 June 2021).

Oxford Dictionary (on-line) defines it as "the detailed organization and implementation of a complex operation". As such, logistics is commonly seen as a branch of engineering that creates "people systems" rather than "machine systems“. Evolvement is found in the inventory control and management, then material management, then logistics and now supply chain and value chains. THUS Value chain and supply chain originates from this basic premise. (https://www.saloodo.com/logistics-dictionary/inbound-logistics/ accessed 28 Jun 2021)

Logistics need to be considered form a SYSTEMS approach and include all elements of the system. Included are: equipment, related facilities, material, software, data, services and personnel requirement as required for operations and engineering support. Within the scope of the **SCM**, logistics maintains two aspects – **INBOUND and OUTBOUND** logistics https://www.shipbob.com/blog/inbound-and-outbound-logistics accessed 28 June2021).

Origins of Supply Chain Management may be considered along the evolution of two parallel paths.

- Supply management emphasis from industrial buyer
- Logistics and customer service emphasis from wholesalers and retailers

This led to the focus on improving supply chain capabilities with initiatives such as Third-party service providers (3PLs), Integrating logistics, client/server SCM software and ultemately Enterprise Resource Planning (ERP). Today (In the Industry 4.0 Economy) the move is away from Globalisation and towards environmental sustainability with consideration of and for social impacts of supply chains. Sustainability becomes important as it facilitates the ability to meet the needs of current supply chain members

without hindering the ability to meet the needs of future generations. In this the shareholders Triple Bottom Line may still be considered within the ambit of people, planet and profits.

Continuous Improvement as a strategy is essential in the context f the ILS/SCM as effectiveness and efficiency needs to be improved. The benefits of this continuous improvement is thus:

- Streamlining processes to eliminate wasteful activities or steps cuts fixed and variable costs.
- Those same streamlining efforts yield better output quality, more timely delivery, and other customer wants… revenues increase as demand increases.
- Profit potential appears at lower volumes, thus opening new market opportunities.

PROBLEM STATEMENT AND PROPOSED SOLUTION

The problem identified is that in todays environment of the 4th IR,ICT developments such as augmented reality, need for process improvements and leaning of processes, the SCM System Life Cycle effectiveness has experienced a decline in support effectiveness thus sustainability. Life Cycle Effectiveness depends on appropriate RAM and cost magement parameters. Whereas the solution may be found in the introduction and integration of the ILSM for System Life Cycle Support.

SCM INBOUND LOGISTICS

In the SCM Inbound Logistics primarily focussing on transportation, storage and receiving of goods into a business (goods procurement for production). Its elements primarily consist of (https://www.shipbob.com/blog/inbound-and-outbound-logistics accessed 28 June2021):

- Purchasing materials (sourcing or buying of raw materials/products)
- Receiving
- Reverse logistics
- Order processing
- Product picking and packing

SCM OPERATIONS LOGISTICS

In the SCM Operational Logistics is primarilty the issuance of stock to production for the manufacturing of products/systems. The elements are (https://www.shipbob.com/blog/inbound-and-outbound-logistics accessed 28 June2021):

- MRP's
- Bill of Materials
- Stock Issues
- Re-order initiation
- Quality assurance

SCM OUTBOUND LOGISTICS

In the SCM, Outbound Logistics entails the receiving, storage, distribution & transportation of goods from production to client/users. These elements are (https://www.shipbob.com/blog/inbound-and-outbound-logistics accessed 28 June2021) :

- Client order processing (warehouse management system)
- Product picking and packing (WMS)
- Distribution planning

- Shipping/Transportation

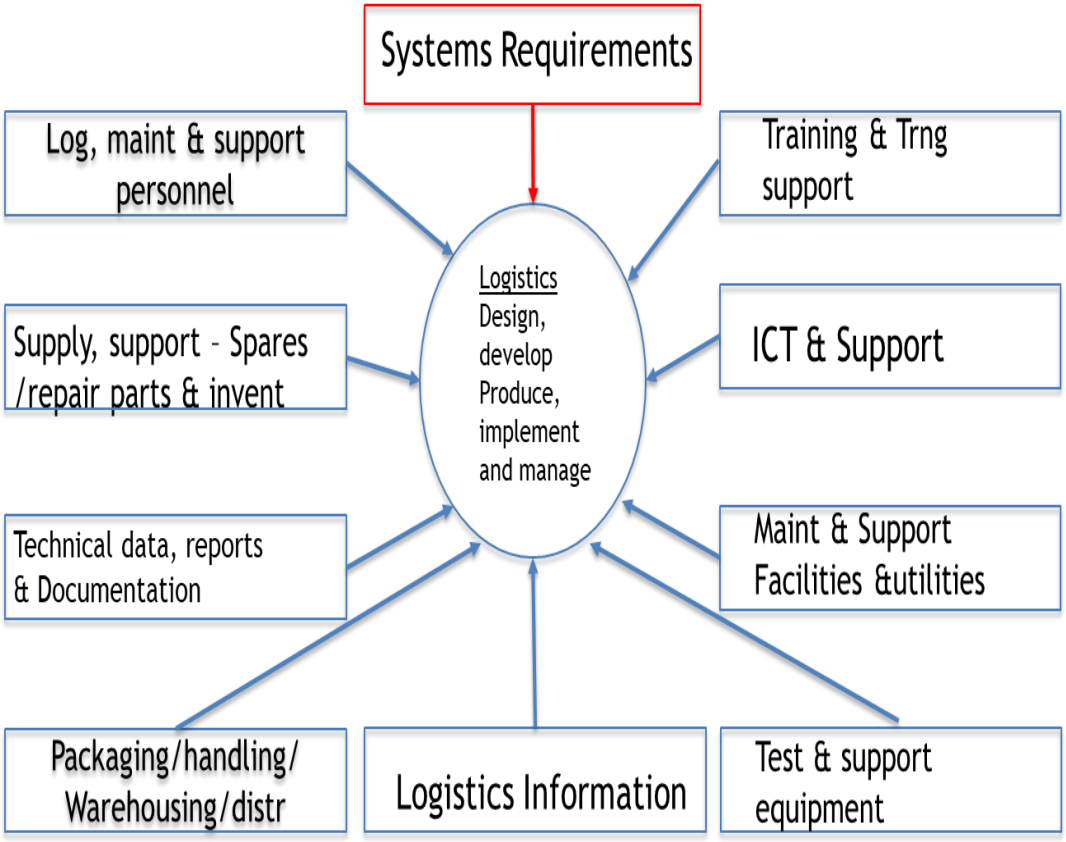
SCM FUNCTION vs LOGISTICS MANAGEMENT

From current point of view, PROCUREMENT is a single support function. Supported by:

- ICT/IT/IS (4th IR) – (Organisational)
- Human Resources (organisational)
- Infrastructure (organisational).

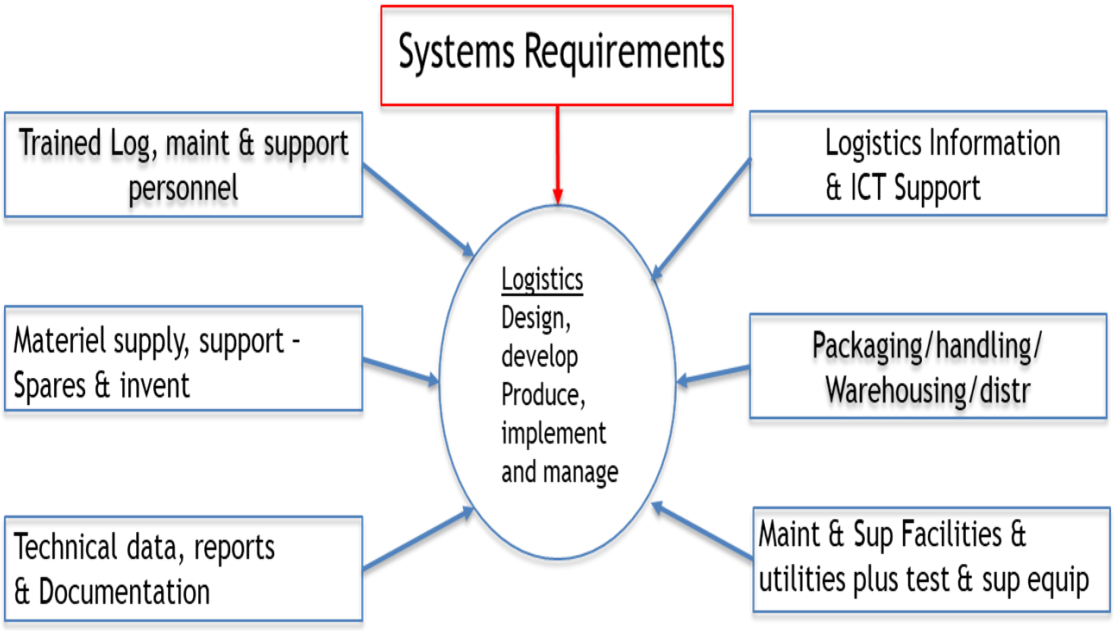
Marketing and sales as well as SERVICE are considered seperate entities in support of the total value chain (https://www.google.com/search?q=inbound+logistic+components&oq=inbound+logistic+components&aqs=chrome..69i57j0i10l2j0i10i395j0i10j69i60l3.6976j1j7&sourceid=chrome&ie=UTF-8, accessed 28 June 2021)

BLANCHARD: ELEMENTS OF OPERATIONAL LOGISTICS (Fig 5)



(Source: Blanchard 2014:12)

LOGISTICS FUNCTIONS RATIONALISED



(Meyer, 2016)

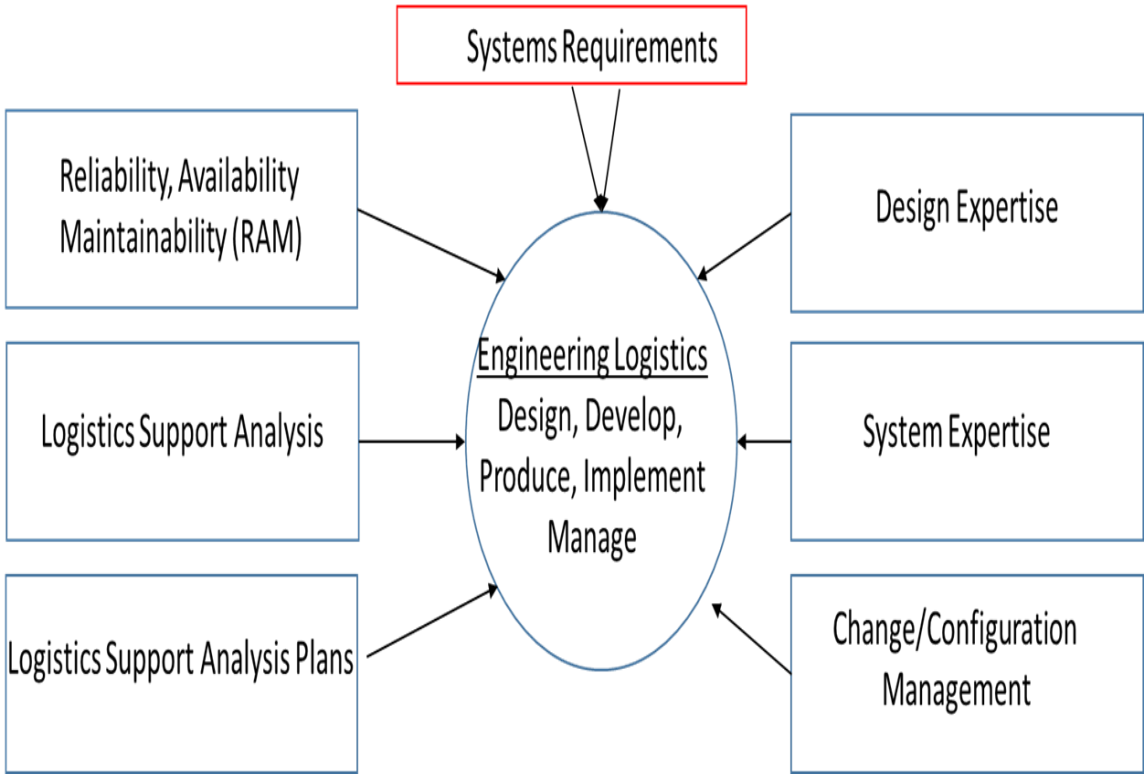
SYSTEMS ENGINEERING AND LOGISTICS ENGINEERING

Essentially SE is engineering with focus on designated areas:

- Systems approach with top-down approach (big picture approach)
- Life cycle approach which include systems design systems expertise with operationalised focus (e.g. maintenance during operations, support and disposal)
- Identification of systems requirements, focus on design and development goals. Focus on front-end analysis.
- Interdisciplinary effort with regards the various design aspects of the product design components.

Engineering logistics on the otherhand, applies the system engineering logistics principles. Engineering Logistics operationalises the requirements from systems engineering principles and relates these to the functional approach. This then forms the basis of the engineering logistics needs and execution.

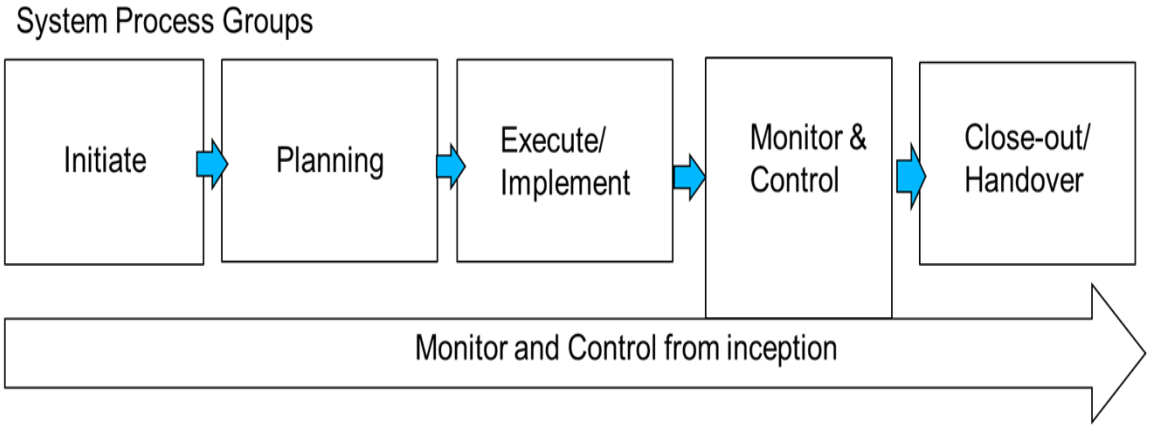
ENGINEERING LOGISTICS COMPOSED



(Source: Adapted from Blanchard:2014:46)

LOGISTICS IN THE SYSTEM LC

Logistics always in the systems perspective must be considered from a holistic approach. Consider the Initiation Phase of any activity, then planning, then execute/implement and then close-out AND UNDERLYING all these activities are MONITORING AND CONTROLLING (Schwalbe, 2014:83).



(Source: Schwalbe 2014:83)

The ILS Management integrates the activities of the Operational and Engineering logistics for optimal product and/or system support. Operational Logistics focusses on use and support and systems in need to support Engineering Logistics focussed on design, form, fit and function activities (Meyer, 2016).

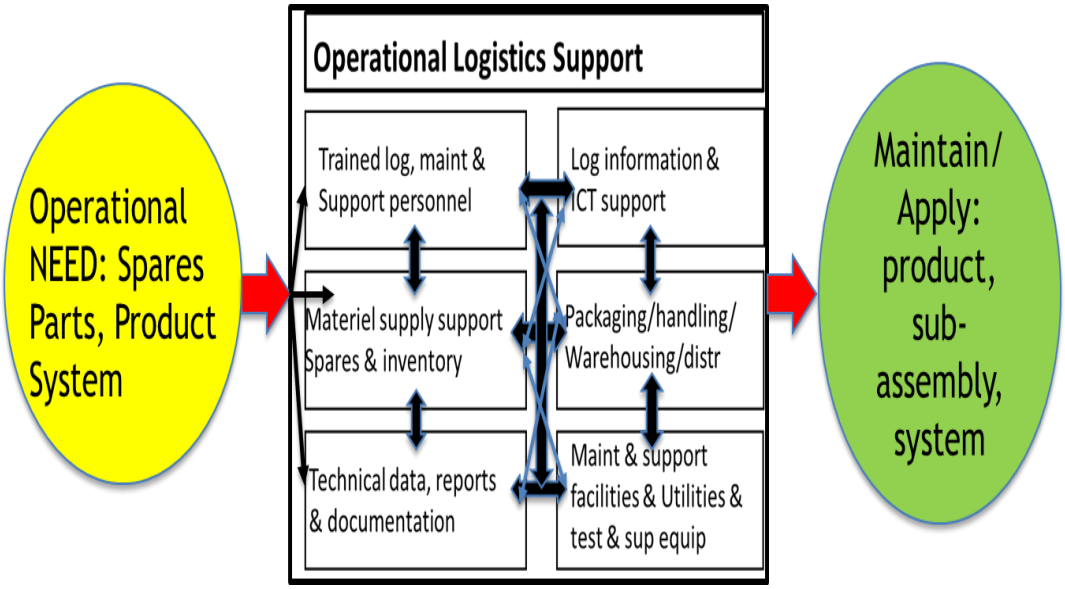
Operational and Engineering Logistics extend to the support equipment and all function within the existing value chains – supply chains. ILSM integration application in system/product support leads to LC support

SYSTEM SUPPORT REQUIREMENTS

Criteria is development as input to design and maintenance of product and support equipment. This is augmented by continuous evaluation of alternative design configuration through design reviews. Also under continuous eva;uation will be the determination maintenance resource requirements in a given design augmented by monitoring and control of support infrastructure with focus on continuous improvement (MIS). THUS DESIGN FOR SUPPORTABILITY (R&M) IN THE LC and THUS ILSM TO SUPPORT LC (THROUGH AVAILABILITY).

OPERATIONAL LOGISTICS INTEGRATION

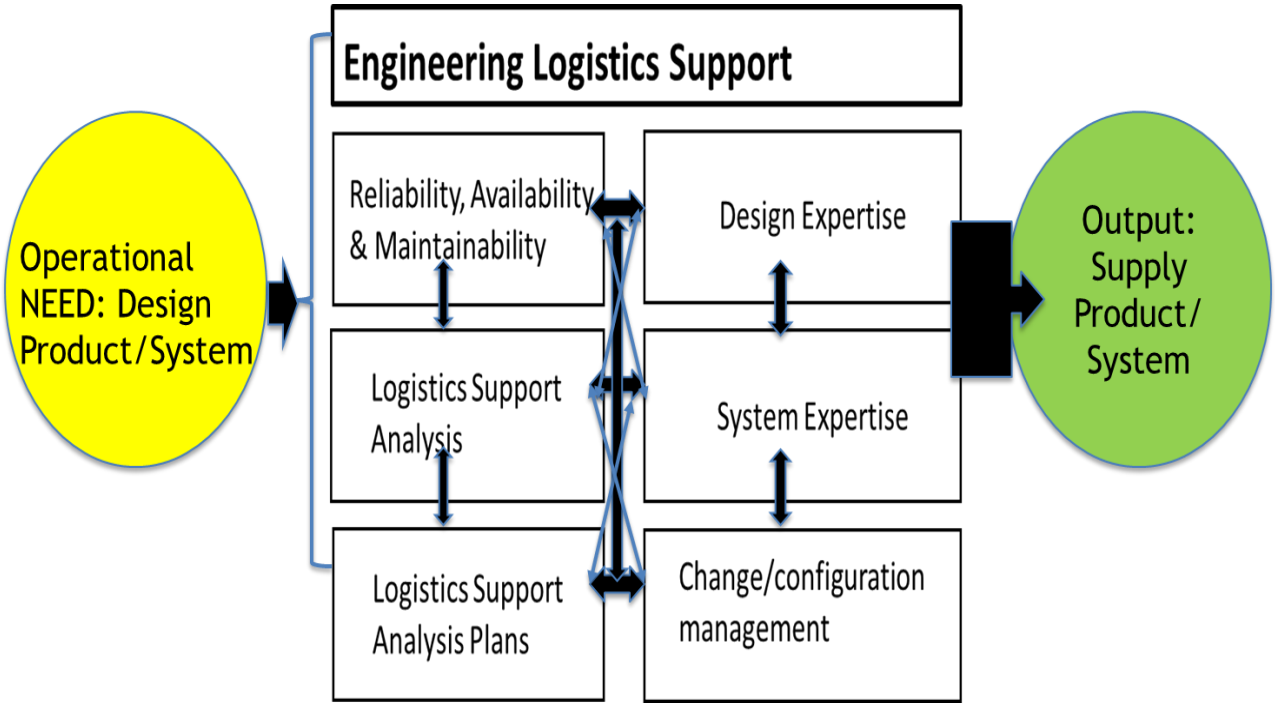
None of the Ops Log elements can or may function in isolation. As the elements all perform towards a single outcome, interdependency is a given. There is also no specific entry point defined but it may be assumed that in operationalising the product or system, skilled HR will be a requirement. Clearly also, technical publications will be influenced by LSAP, performance figures (FMECA, FRACAS, MTBF, MTTR, MTBS) as these will will influence maintenance. In trun Maintenance (predictive - scheduled and corrective - unscheduled) will influence material support and will also have an impact on ICT and skilled staffing required on all accounts with facilities a need in all events even prior to operationalising. Then, materials management will be influenced by lead times & suppliers (Blanchard, 2014: 12-18)



(Source: Meyer 2021)

ENGINEERING LOGISTICS INTEGRATION

In the case of Eng Log, no precedence of other elements is possible. The development project will have some design specification contained within the logistics parameters (scope definition). Design will be around these requirements as per user specification. System expertise might be available or might be contracted in (sometimes developed through R&D). Continuous interaction and exchange of information between RAM, configuration system expertise, updating LSA/LSAP. At baselining for handover (project completion) fixed configuration will be handed to maintenance/operations and materials management.



(Source: Meyer 2021)

ILSM INTEGRATION

Between Operational and engineering logistics integration also exists. The design/development and related information is captured through the technical publications (supported by RAM element). LSA and LSAP requirements are converted into HR, maintenance, facility, materiel's requirements (planned servicing - at various levels, and corrective estimations).

AND THEN

The maintenance performance are measured against the FRACAS/FMECA/MTTR/MTBF/MTBS) for performance conformance. ICT (LMIS) will supply cross functional information datasets to support the ILS Management. Corrective and remedial activities to improve products/system will be performed by Eng Log and again be operationalised. And the loop will continue.

(FRACAS = Fault or Failure Reporting, Anal;ysis and Corrective Action System, FMECA = Failure Mode, Effects and Criticality Analysis)

ILS/SCM INTERFACE EXPLAINED

Considering the design of SCM:

- Inbound Logistics represents inventory/raw material (NOT materials management) but some elements of Ops Log.
- Operations considered to be user of inbound log output, adds value and renders output to outbound log.
- Elements of Ops Log applied in outbound log (W/H, Distr., storage & shipping)

HOWEVER, All elements of ILS M should be applied in In- and Outbound log, AS WELL AS operations. ALSO all elements of ILSM applies to marketing/sales, as maintenance/after sales support/service becomes important in the reverse Logistics process or reverse SCM. Current disposition precludes Eng Log from this process focus is on integration of acquisition (e.g. demand forecasting, REMS, production and manufacturing planning, PHS). Factors such as PHS is actually essential in In- &

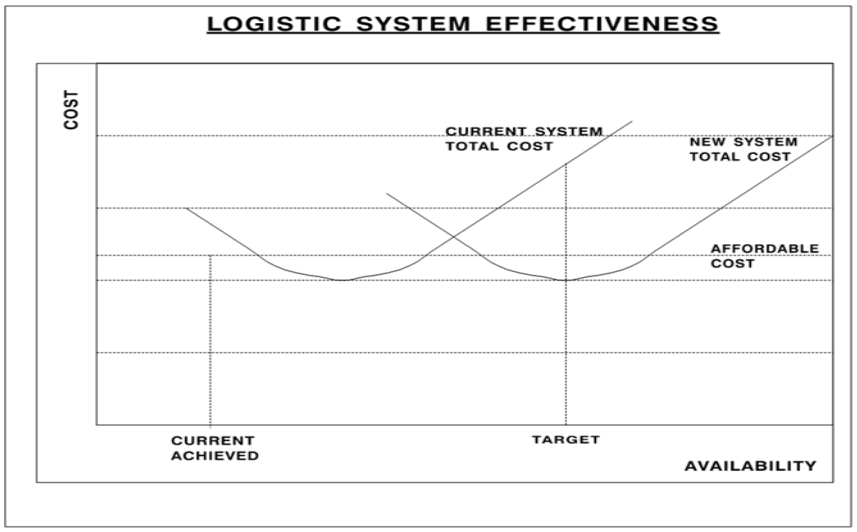
Outbound as well as Operations as well as the transportation/distribution of finished goods. Eng Log MUST be returned in order to control the design and development of baseline requirements and performance parameters of the manufactured product and maintainability is essential.

LOGISTICS IN THE PRODUCT/SYSTEM LIFE CYCLE

Logistics must always be seen in the systems perspective thus having an holistic approach to the supportability. ILS Management process is applicable to Ops and Engineering Log for each element AND on overall ILS model. Monitoring and controlling overarching element to facilitate data/ information/knowledge capture (MIS). Feedback loop on ops log technical aspects is important need. Engineering parameters e.g. FRACAS, FMECA, to improve MTTR↓, MTBF↑, MTBS↑, thus less corrective maintenance (R↑, A↑) wil result in cost reduction. Supplier performance is also needed. Skills development/maintenance on changes and system adaptation requirements remain ongoing and engineering log change management and configuration control needs to be maintained.

LOGISTICS SYSTEM EFFECTIVENESS

The LC and process Groups are to assist in the increase in the system effectiveness. MIS to supply the current or “AS-IS” position and needs or client requirement to determine “TO-BE” position. Improved availability to a targeted figure, can be obtained through investment in the improvement of product reliability and maintainability and optimising complete support/maintenance design features at no higher price than current affordability (e.g. Rm 8 @ 45% availability but targeted 64% availability at same or lower cost). The validity of the systems approach must be considered against actual achievement and deployed on a continuous improvement system obtained through iteration actions (P-D-C-A) (Source: Blanchard 2014)



SUMMARY

The implementation of appropriate ILSM activities across the SCM will enhance the effectiveness of the organisation in terms of the Logistics Support. The implementation will also, when combined with appropriate contracting modes, lead to improved availability at reduced cost. Under all conditions CQM applying TQM principle must be deployed in order to initiate plan, execute, monitor and control a process of continuous improvement. The concept of LEAN and Process Improvement as per the 4th IR MUST be maintained as we move into the 5th IR. Applying AI, Augmented Reality and other ICT modes will be required to continuously improve.

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