ADVANCED LOGISTICS

Prepared by:

The ICT and Logistics Core Team

Facilitated by Dr H Ittmann of the CSIR with inputs from participants acknowledged in Appendix 1

1. Introduction

The effective management of supply chains is a means for organisations, and ultimately countries, to enhance their global competitiveness. This document briefly outlines some general trends both within South Africa and internationally in Information and Communications Technology (ICT), manufacturing, logistics and supply chain management. The emphasis of this document is, however, on logistics and supply chain management. Developments in and the use of ICT in logistics and supply chain management have transformed these disciplines. They have enabled supply chains to become much more efficient, while at the same time ensuring greater integration and collaboration between the various players in a supply chain. Today, brands no longer compete, but supply chains are emphasising the importance of ICT in logistics and supply chain management. For South African companies, it is critical to take note of these developments since it will enable them to become more competitive if they want to operate in the global market.

This document is part of the process of developing a National Advanced Manufacturing and Logistics Technology Strategy. Phase 2 of this process has been completed, and this document contains the outputs thereof.

2. Definition and Scope

The terms “logistics” and “supply chain management” are often used interchangeably, but differ considerably with respect to both scope and impact. In order to create the appropriate context, the concepts of supply chain management and logistics are defined below:

“Supply Chain Management (SCM) is the systemic, strategic coordination of the traditional business functions, and the tactics across these business functions, within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole”. (Current definition of the Council for Logistics Management of the USA.)

“Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods,

services and related information between the point of origin and the point of consumption in order to meet customers' requirements". (Current definition of the Council of Logistics Management of the USA.)

3. Global Trends

The ICT environment is possibly the one technology area where changes and developments are the greatest. It is very closely intertwined with logistics and supply chain management and these two functions cannot be seen in isolation from ICT. Computing power increases at a very rapid rate, while software developments continue to make it easier to use and interact with computers. Communication technology follows the same trend. Communication via satellite, as well as wireless technologies, have created new opportunities that were not possible only a few years ago. The advent of e-commerce, e-collaboration and e-everything falls into the same category. All of these have a direct impact and effect on logistics and supply chain management. They not only create an enabling environment, but also ease the exchange of information between supply chain partners, which, in turn, increases competitiveness. The developments also affect the way in which organisations utilise and operate their supply chains. It is a very dynamic and fast-changing environment. For South Africa, as a developing country, it is critical to take note of and to understand these developments and changes. With a population that is still largely illiterate, this has enormous consequences on how the country endeavours to stay competitive. It also has a direct impact on efforts to enhance and improve the sophistication of logistics and supply chain management in this country.

The efficient management of supply chains progresses naturally from a focus on functional excellence, through a focus on process, integration and channel excellence, to a network-wide excellence focus. As firms progress along these lines, the focus moves from the delivery of products to the delivery of value to the customer. At the same time, firms and channels become more effective in delivering value.

The current focus of supply chain management globally is on process and functional excellence. In order to leverage the opportunities that can be gained from integrating and optimising supply chains, the state of supply chain

management should ideally progress towards excellence in integration and channel performance, and ultimately to the leveraging of network efficiencies.

Given the above discussion, a new set of objectives has evolved for supply chain management [2]:

- Integrated, end-to-end pipeline solutions.
- Improved velocity, flexibility and customer service.
- Network restructuring and streamlining.
- Greater value for the end-user, customer or consumer.

In order to develop strategies and interventions at national level to support competitiveness, we need to consider for a moment the end-state of the progression outlined above, and the meaning of operating in an environment where the goal is to achieve *network excellence*. It means that the focus is on benefiting from collaboration, and the process is technology-enabled rather than technology-driven.

Some of the issues and challenges that face organisations as they make a transition to this level of competitiveness include [1]: collective strategy development, win-win thinking, open communication, coordination and integration, and collaboration.

A move towards logistics excellence and an environment of network excellence will require that firms take an integrated view of all these enabling elements.

As supply chains are becoming more integrated and more complex, greater demands are being placed on solution providers to address needs that reach beyond individual company boundaries in order to satisfy the needs of the network. In addition, greater demands are being placed on the standardisation of technology to allow network integration.

4. Current State of Supply Chain Technology in South Africa

Companies all over the world realise the need to enhance their supply chain management and logistics abilities to remain competitive. The same applies to the South African situation. Although South Africa is geographically far from world markets, its manufacturing industry is dependent on exporting its goods globally. It is therefore essential, and almost an imperative, that South African companies strive towards the same level of supply chain management excellence as elsewhere in the world to gain a competitive advantage. In fact, South African companies need to do this even better because of the fact that geographically we are further away from our main markets in the Triad economies of North America, Europe and Japan.

The major concern about the state of logistics in South Africa is its fragmented nature. Some South African companies competing in the global market are world-class as far as logistics and supply chain management are concerned, while others struggle to get the basics right! After democratisation, South Africa re-entered the free market. Many companies were ignorant, suspicious and confused about operating in this environment. Companies had problems about how to market their products in this new model and, even today, this is still true. South African companies do not trust each other and are therefore very reluctant to share information with others. There is also a lack of clear "channel captains" in many of our industries, together with a lack of physical infrastructure. Companies still tend to think geographically and not globally.

Although no detailed study has been undertaken to assess the current position, the TISA National Supply Chain Strategy Study identified the following challenges:

- Establishing new channels to market:
  - Support to SMMEs
  - Marketing support
  - Use of e-business
- Providing a supportive environment that will stimulate, at the company level, competitiveness improvements and encourage exports:
  - Set of sector-focused incentives that will encourage productivity improvements, investment in capacity upgrading, investment in technology, investment in R&D and skills enhancement
  - Role of TISA and export development

- More aggressive adoption of e-business opportunities:
  - Sales
  - Customer relationship management
  - Collaboration and supply chain optimisation
  - Process optimisation
- Easily accessible information:
  - Foreign market conditions (products, trading cultures, competitors, etc.)
  - Export process
  - Available incentive schemes
- Radical improvement of knowledge and competency in the area of supply chain management:
  - Principles
  - Technologies
  - Improvement opportunities
- Improving key competency areas of the supply chain at the company level for increased competitiveness:
  - Flexibility/responsiveness
  - Cost structure
  - Quality
  - Reliability
  - Lead times.
- Industry collaboration and technology to penetrate foreign markets and improve sector competitiveness.
- Using outsourcing and consolidation to allow optimal use of resources and to be able to focus on core business.
- Upgrading and attracting skills (managerial, technical, marketing and supply chain management).
- Improving service to key logistics service providers:
  - Customs and Excise
  - Air freight
  - Spoornet
  - Ports and shippers
  - Road freight.

Currently:

- There is a lack of trained logisticians.
- The cost of imported logistics software is high.
- There is not enough awareness about logistics generally.
- There is a lack of partnerships and a need for an integrated approach.
- No attempt is made to “measure” logistics components.
- Preference is currently given to road transport ahead of rail transport because of perceived better service, but there are many downsides.
- Opportunities are being missed because some industries are not coordinated and individual firms do not want to share information.
- SMMEs are not supported through proper logistics or supply chain management functions.
- Opportunities are being missed in the service sector with regard to promoting SMMEs and to facilitating delivery in the public sector.
- South Africa has diverse needs regarding logistics and supply chain management in the sense that some companies are global and need to be world-class, others are not getting the basics right, and the needs of SMMEs and people in rural areas have not been addressed.
- There is no comprehensive national strategy for logistics and supply chain management.

Current estimates value the formal logistics and supply chain management business in South Africa at R77 billion annually. It could even be as high as R120 to R150 billion. This could grow with the advent of e-business opportunities. In addition, logistics or supply chain costs are estimated to be 18% of GDP in South Africa, the comparative number in the USA being 9,9%. Even if these numbers are not accurate, the order of magnitude points to huge potential savings.

There is a need, however, to ensure that there is a holistic national plan that is adequately resourced. Currently, resources are being wasted because there is little integration and coordination. This could be resolved by establishing a Logistics Centre of Excellence, or a virtual network of collaborators, to drive and support such a nationally coordinated effort and provide a “one-stop shop” for industry.

5. Recommendations

This document has broadly outlined some trends in logistics and supply chain management, with the aim of initiating a discussion on the enhancement of national competitiveness. A brief overview of research indicates that an integrated, continually updated picture of the state of logistics and supply chain management, indicating South Africa's position relative to that of its global competitors, is not readily available.

During a workshop held on 16 August 2002, most of what appears in this document was discussed with a group of about 30 people from various organisations. There is, in principle, support for what has been suggested here. However, what was presented was at a fairly high conceptual level and more "meat" needs to be included. What is now required is a detailed outline of how to implement these suggestions. Some of the feedback was as follows:

- Specific attention should be given to the needs of SMMEs.
- The concept of rural logistics should be investigated.
- Government departments have large logistics problems and they need to be attended to as well.
- The importance of interacting with, and cooperating with, various sectors such as the craft and culture sector, the automotive sector, the chemical sector, etc. was reaffirmed.
- The involvement of the other technology sectors, in particular the ICT sector, is critical for logistics and supply chain management to succeed.
- Training and HR development must be undertaken in close collaboration with the appropriate SETA.
- It needs to be clear what is to be achieved and what the role of a Centre for Logistics Excellence should be.
- A Centre of Logistics Excellence could also be a "virtual" centre.
- There was huge support for something that will stretch across the country and involve more than one player.

We suggest that the following be considered as mechanisms for promoting a national competitive advantage:

- A comprehensive study of the competitiveness of South African industry, as enabled by logistics and supply chain management, should be the ultimate

aim. This can be done in a phased approach, in which the first step would be to identify the important sectors on which to focus. The rest will then follow over time.

- There is a need to develop a continuously updated picture of the state of logistics (i.e. a supply chain excellence index), which should include multiple perspectives:
  - Users of technology (various sizes of organisations, including SMMEs)
  - Users of products moving through the supply chain (importers and exporters)
  - The use of the above information to identify gaps and opportunities for the development of technology that will enhance national competitiveness and that is relevant to local conditions
  - The development of affordable access to SCM consulting services (expertise, training).

There is a need to ensure that a holistic national plan is set up and adequately resourced. Currently, resources are wasted because there is little integration and coordination. This could be resolved by creating a Logistics Centre of Excellence to drive and support a nationally coordinated effort, provide a “one-stop shop” for industry and from where R&D in this area can be coordinated to the benefit of South African industry, as well as of the whole region.

6. Logistics Centre of Excellence

Any centre of excellence that is to be established must be world-class. What is outlined below will go a long way towards establishing such a world-class facility. From a national perspective, it will fulfil the following role:

- Supporting the improvement of the international competitiveness of South African industry.
- Facilitating the development of national and industry- or sector-specific supply chain strategies and initiatives.
- Establishing an ICT infrastructure to provide support to industry (this will include supply chain and logistics software packages).
- Facilitating and conducting research in the field of logistics and supply chain management that is relevant and that will make an impact in the South African context.
- Providing benchmarking to the industry.
- Facilitating, but also providing, training and development.
- Positioning for strong involvement in NEPAD.
- Participating in the development of integrated policies and strategies.
- Promoting the awareness of logistics and supply chain management as cross-cutting.
- Other priorities as identified by stakeholders in the country.

The Centre will fulfil the following functions:

6.1. Vision of the Centre of Excellence

The vision of the centre will be to act as a catalyst in continuously improving the competitiveness of South African industry via logistics excellence.

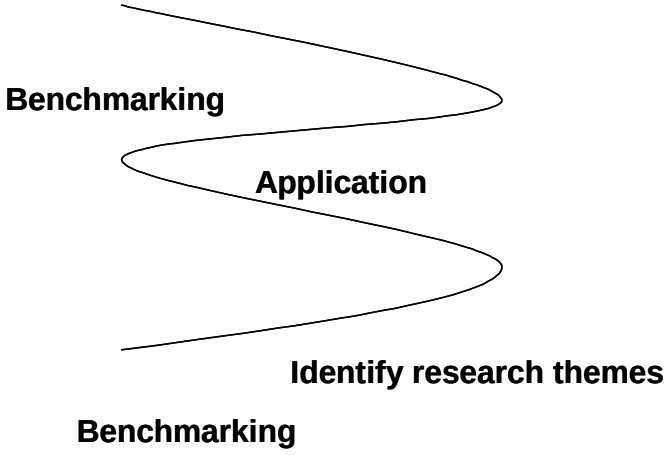


Figure 1: The upward spiral of competitiveness improvement

Proposed names:

- Centre for Supply Chain Competitiveness
- Centre for Logistics Competitiveness

Broadly, it is envisaged that a Logistics Centre of Excellence will have five areas of focus, namely:

- Research and benchmarking
- Training and HR development
- Industry support, solutions and best practices
- Technological availability and demonstration
- International networks, links and partnerships.

Each one of these focus areas can be expanded:

6.2. Research and Benchmarking

- Determine the research needs and issues in logistics/supply chain management.
- Emphasise the African and South African issues, and link these to NEPAD.
- Determine what research has been done, what is currently happening and what is required.
- Develop a research programme.

- Start a continuous process of benchmarking.

6.3. Training and HR Development

- Fulfil the training needs that currently exist, and present higher-level education and training.
- Provide executive sessions by international experts.
- Provide programmes for SMMEs and the public sector.
- Examine logistics education in South African versus the rest of the world.

6.4. Industry Support, Solutions and Best Practices

- Joint initiatives with the **dti**
- An agenda for the improvement of national infrastructure
- An agenda for competitiveness improvement
- Development of blueprints and templates for industry solutions.

6.5. Technological Availability and Demonstrations

- Supply visual demonstration of supply chain concepts.
- Identify and demonstrate software packages available for use by industry in ASP mode.
- Provide integration between training and demonstration.

6.6. International Networks, Links and Partnerships

- Establish strong links with international partners.
- Define joint research projects.
- Interchange researchers and scientists, as well as academics.
- Obtain and define joint projects for clients.

Initially, in order to preserve focus, the Centre will concentrate on the following five industry sectors: automotive, chemical, textiles and clothing, craft and cultural products, and metals. However, the ultimate intention would be to extend the reach progressively to sectors of maximum potential.

The functions and role-players in the network is outlined below:

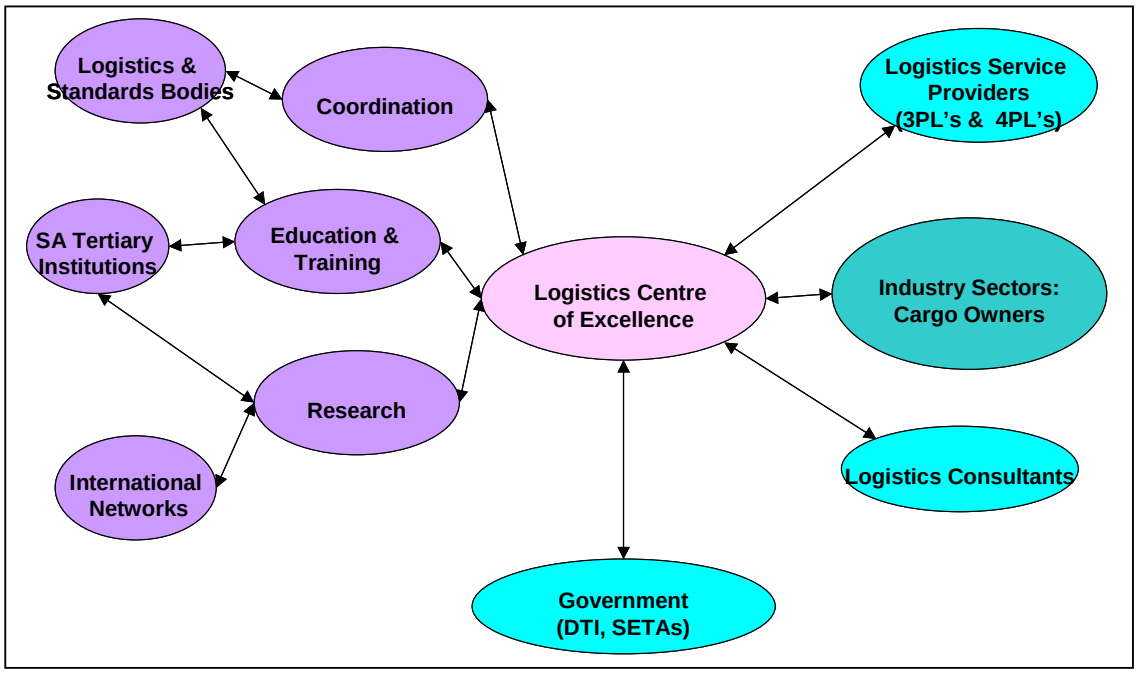


Figure 2: The network and its role-players

6.7. Summary of Roles

Centre Functions	Role-players	Contribution	What would make it work (long term)?	Who benefits?
Research and benchmarking				
State of logistics surveys	Industry sector CSIR, universities, NRF Centre	Data Research capacity Facilitation, coordination	Sector-wide agreement on sharing relevant information The Centre facilitates sector-wide agreement	Industry – identification of areas of improvement

SCOR model Individual sectoral benchmarks Research theme identification	SCOR, UTi		Centre collates industry research needs and facilitates the strategic conversation between research institutes, universities and industry	
Training and HR development				
Categorisation and evaluation of courses	Training of service providers Universities Industry Centre	Course information Trends in education Training needs Evaluation and maintenance of database	The Centre keeps the information continuously updated	Industry – improved skills Industry – informed judgements with respect to investment in training Industry – single point of call
Education standards Mobilise current players to fill the gaps Coordinate establishment of joint training programmes Bursary categorisation and evaluation	SAQA SAPICS			
Industry support, solutions and best practices				
Platform for future **dti** supply chain initiatives	**dti** Centre	Incentives Coordinates administration of initiatives Identifies industry needs	A compelling case for appropriate incentives developed through industry- and sector-wide consultation	Private sector

Logistics Best Practice Award	Logistics associations Research institutions, universities	Underwrite awards Research capacity		
Technological availability and demonstrations	Software providers UP Centre	Software Laboratory Co-ordinates laboratory capacity with industry needs	Decentralised approach in which universities that specialise in different software systems establish a distributed laboratory Centre to understand the match between industry problems and available technology and implementation issues	Industry, through: - Problem identification - Matching appropriate technology with the problem - Understanding hidden costs of implementation
International and local links and partnerships	Cranfield, Georgia Tech, Delft International Logistics Bodies	International research, best practices	Centre creates and maintains network with international partners	Industry and universities
Coordination of: - Research work - Logistics organisations Advise industry on where appropriate solutions can be found	Universities and research institutions	Research capacity	Identify issues of shared concern on a sectoral basis, and facilitate appropriate interventions Centre acts as an objective and independent catalyst across competing forces in industry	Coordination results in increased cooperation between industry players, which in turn raises industry maturity
	Logistics associations	Industry knowledge		
	Industry sectors	Industry needs		
	Service providers	Knowledge of logistics implementations		

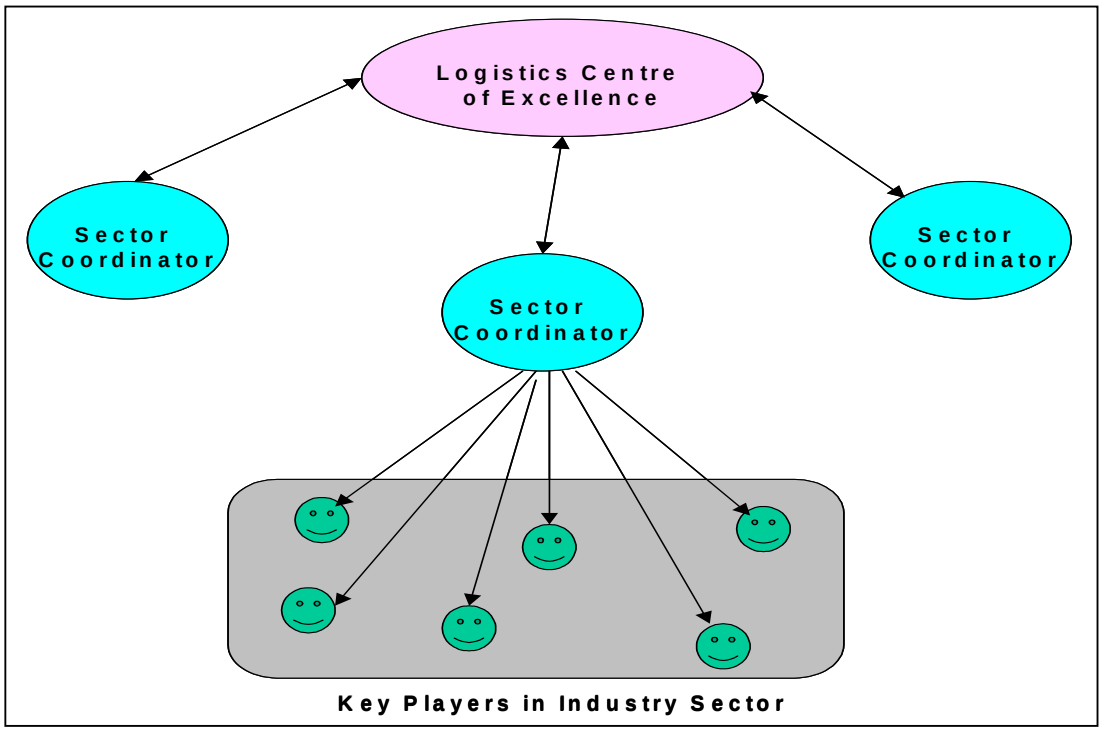
7. Implications for the Design of the Centre

The Centre has a role in facilitating and coordinating the efficient functioning of a network of logistics professionals. As such, it should fulfil a number of roles, which implicitly influences its design. The following roles are of relevance:

- Coordinator.
- Information hub.
- Facilitator.
- Objective and independent catalyst.

In these roles, the Centre needs to have the capacity to continuously perform some core functions, as well as to facilitate work that is to be performed by a network of collaborators. The implication is that the Centre is a physical entity, staffed by a small component of full-time employees, who coordinate the activities of part-time paid and unpaid collaborators. The need for the Centre to be objective has implications for governance structures, funding and host institution(s). For example, an advisory board needs to be representative of industry players, but not dominated by any one particular grouping.

Given the function of the Centre to enhance industry and hence national competitiveness, its funding should at least partly be provided by government. Membership contributions, industry sponsorship and competitive bidding for national and international research funds should constitute the bulk of the funding. In order to protect the objective status of the Centre, over-reliance on sponsorship funding should be avoided. Similarly, training and consulting work should be carefully selected to complement and not compete with existing service providers.



8. High-level Plan

The overall plan assumes that sufficient start-up funding will be provided by the government to plan and launch the Centre, and to support it for a subsequent period of two years. During this period, the Centre will clearly establish its role, demonstrate its value to industry, and establish access to alternative funding streams.

	Activities	Objectives
Year 1	Develop master plan and launch Centre	Launch Centre after six months
	Build sector networks	Develop understanding of each sector and build relationships
	Initiate benchmark in a sector	Develop understanding of appropriate benchmarking approach, identify research themes and apply for funding
	Survey role-players in logistics	Establish first version of information repository
	Initiate distributed technology demonstrator laboratory	
Year 2	Initiate benchmarks in remaining four sectors	Report results
	Initiate research projects	Establish credibility

	Operationalise information repository (training and service providers)	Establish industry resources and source of income
Year 3	Assess impact on sectoral competitiveness	Annual publication of State of Logistics Report
	Re-evaluate and replan	A sustainable logistics support network
	Maintain information repositories	A one-stop shop for industry information needs
	Expand into other sectors	

8.1. Industry-focused Initiatives

Initiatives	For whom
Industry benchmarks	Five industry sectors
Develop partnership with AIDC	Automotive
SCOR model support – information database	Industry
Improvement projects, as identified in benchmarks (e.g. shared infrastructure)	Five industry sectors
Sector-specific projects	
Chemical	See below
Textiles	See below
Automotive	See below
Crafts and Culture	See below
Metals	See below

8.2. Examples of Sector-specific Projects

Chemical

- Optimisation of bulk chemical flows.
- Establishment of regional hubs in West African markets to receive South African exports (potential pilot project).
- Identification of recommendations regarding policy/regulatory and market issues.
- Recommendations regarding incentivesRecommendations regarding firm level improvements.

Automotive

- Pilot project to create motor industry collaboration in Gauteng/Durban.

- Technology assistance centre for suppliers (one-stop shop).
- Establishment of quality-improvement task teams to assist component suppliers with quality accreditation and continuous quality improvements.
- Establishment of collaborative planning forums between OEMs and service providers such as Spoornet.

Textiles and Clothing

- Vertical and horizontal collaboration, focused on AGOA.
- Logistics consolidation for distribution to export markets.
- Identification of recommendations regarding policy/regulatory and market issues.
- Recommendations regarding incentives.
- Recommendations regarding firm level improvements.

Crafts and Culture - SME rural logistics

- Understand cost drivers for rural logistics.
- Impact of corridors on rural logistics.
- Design logistics interventions.

Metals

- Efficiency of shared infrastructure (impact of mix of bulkbreak vs. containerised cargo).
- Coordination of more effective use of shared service providers.

9. Impact and Measures of Success

The South African industry, and specifically those involved in exporting, needs to become more competitive in a global world market. Our geographical location and distance from these markets create an additional challenge for industries to remain competitive. The main objective of the proposed Centre is to enhance the competitiveness of South African industry through the R&D services that it will provide. In addition, the Centre can play a pivotal role in eliminating the inefficiencies that exist in the logistics and supply chain arena within the country.

The impact on the economy of more effective and efficient logistics and supply chain management could be enormous. If the total logistics cost in the country is R150 bn, which is 18% of the GDP, a 1% improvement would constitute a huge "saving". Although it will be difficult to prove that the contribution of the envisaged Centre will effect this, there is no doubt that the contribution could be significant. How then would one measure the impact of such a Centre? The success of the Centre could be measured in the following ways:

- The number of trained logistics professionals within the country on a year-to-year basis will be an indication of success. Of particular relevance here will be qualified graduate students as well as post-graduate students and the number of middle managers and executives who attend the higher-level courses offered by the Centre.
- There will be a substantial increase in the number of trained and well-qualified logisticians from previously disadvantaged communities.
- Benchmarking is going to be critical for measuring the impact of the Centre. Through the benchmarking studies, it will be possible to determine the gaps and areas for improvement in specific sectors and South African industry as a whole. By repeating these on a regular basis, one will be able to determine where improvements are taking place and what effect they are having.
- The SCOR model will be introduced and used as a tool for measuring logistics and supply chain performance in the total supply chain. Firstly, to what extent has SCOR been adopted in the total logistics industry? Secondly, judging from repeat use, how well are companies, sectors and the industry improving?
- Shared infrastructure will be adopted by different players in the same sector.
- There will be improvements in delays on the roads, on the rail lines and at the various harbours.

- There will be an increase in the number of integrated, end-to-end pipeline solutions, and network restructuring and streamlining for different sectors.
- There will be an increase in the number of partnerships to enable more effective and efficient supply chain management, especially through the collaboration of competitors in the different industry sectors.
- The number of coordinated R&D activities in the country, in which all the role-players work together to achieve this, will increase.
- An integrated database/portal will be established, containing all the information about players in the logistics and supply chain management industry and also presenting an opportunity to share information.
- Logistics and supply chain management research in South Africa will receive international recognition, while well-connected international networks will be established with major logistics institutions world-wide.

If such a Centre is not established, the consequences could be as follows:

- There will be an uncoordinated effort to address logistics problems and issues in the country.
- The potential for huge cost savings will be lost or at least there will not be a coordinated drive to address this through R&D efforts.
- Duplication of effort will be a definite possibility.
- In a general sense, South African industry will fall further behind in terms of its competitiveness.
- Benchmarking (if done at all) will be done in an ad hoc fashion, with no guarantee of regular repeats and follow-ups.
- R&D excellence and capacity will not be established.
- Advanced training and education will remain at the current levels, with no concerted effort to introduce substantially more people from previously disadvantaged communities into this discipline.
- Little will be done to establish international networks and collaboration with world experts.
- The opportunity for a focused and dedicated initiative to lift logistics and supply chain management practice in South Africa to a higher level will be lost.
- South African industry will, in general, remain a Third World player in the global market.

10. Conclusions

This document endeavours to put the South African logistics and supply chain management scene into perspective in comparison with the rest of the world. There are many opportunities for assisting in making industry sectors in South Africa world-class, with proper and relevant logistics and supply chain management R&D, best practices and industry-specific solutions. It is suggested that a Logistics Centre of Excellence should be created within South Africa. A great amount of effort will be required to establish such a Centre, but this document provides a proper process and structure for such an initiative.

11. References

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Appendix 1. Acknowledgements

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Philip Esselaar, IT Consultant
Dr Peter Freeman, CSIR
Hans Ittmann, CSIR
Mario Marais, CSIR
Isabel Meyer, CSIR

Appendix 2: Plans