

A Proposal to the GU8 Council of Presidents
on the Establishment of the

JRC Task Force on
Future Supply Chains: Issues, Design, Configurations
(revised 9/10/08)

Submitted by Peter Alfonso, Chair Joint Research Committee, and
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Introduction

The supply chain of the future is a network of all the entities in the extended supply chain, from product design and development to procurement and sourcing, supply and demand matching, logistics and distribution, sales force automation, and customer support. Therefore designing future supply chains requires attention to the dimensions such as configuring the right logistics network, engaging in the right alliances and partnerships, developing contingency plans against uncertainties and selecting the right production, inventory, and distribution strategies. In addition, there are increasing pressures on designing future supply chains that are green (carbon free) and are energy efficient. The increasing level of global trade often implies higher uncertainty including security risks and thus the need to identify underlying causes and strategies to protect against potential disruptions. The consolidation of global supply chains, outsourcing, contract manufacturing, shortened product life cycles, multi-channel distribution, multi-modal transport and the need for adequate return channels have raised awareness on the importance of supply chain design, operations and strategy for the future. The proposed task force aims to set up research projects in the following selected research themes forming essential streams leading to design of future supply chains when integrated.

Research Focus Area One: Issues concerning the greening of supply chains
 Focus Area Team Leader: Dr. Chandra S. Lalwani (University of Hull, England)

For global supply chain network three modes of transport are heavily used. Sea ports and maritime transport have existed for some thousands of years and have developed to support the patterns of international trade which were inherent in shaping the modern world. More than 80% of the world's trade and almost 90% of the European trade with non European countries is by sea. Road transportation provides the door to door service and air transportation is used for the high-value and low-volume goods. Some six billion tons of freight moves by maritime transport each year. These transport modes have assisted in growth of international trade and therefore have economic benefits for the society. However, against these benefits, there are environmental costs borne by community rather than the companies involved in global trade. In the case of road transport these costs include costs associated with emission of air pollutants, greenhouse gases, traffic noise and congestion.

In Europe, it is argued that the polluters are obliged to pay the marginal social cost of their activities and that economic benefits should be given to them to reduce the negative impact of these activities (Piecyk and McKinnon, 2007). This has resulted in a move towards greening the supply chains of the future. This move has resulted in more energy efficient designs of ships, aircrafts and road vehicles. In some countries, Governments through their policies have encouraged the use of rail and inland or coastal water modes of transport for domestic movements but little research is seen in the literature on environment friendly or green international supply chain designs with efficient integration of transport and logistics for global trade. GU8 research in this stream will focus on developing new green supply chain design configurations for international trade and would analyze the environmental impact of findings from other three streams.

Table 1. Critical issues over the next 5 -10 years on greening of supply chains.

Known	Unknown/Speculative
More stringent regulations: - carbon emissions - landfills	Unstable Governments - crisis
Product life cycles - regulations	New types of energy sources
Emerging commercial appeal to green goods/ products	Climate change

Research Focus Area Two: Issues concerning supply chain risks and security
Focus Area Team Leader: Dr. Booi Kam, RMIT, Australia

The importance attached to the focus on supply chain risks and security is underscored by some of the emerging trends that are already visible at this juncture. The move toward a mandatory 100 percent check on containers by US customs, foreshadowed by the launch of the Secure Freight Initiative on December 7, 2006 (US Customs, 2007), is one such issue that would generate far-reaching consequences on global supply chain operations, in particular shipping chains with inbound cargoes destined for US ports. Likewise, unknown, but highly possible megatrends, such as pandemics and technological flaws, would also threaten the uninterrupted flows of goods and information vital for business and socio-economic growth. The critical issues underpinning supply chain risks and security, identified at the Hawaii Logistics Research Workshop, are summarized in Table 2. The operational changes arising from the eventuality of these known and unknown events will necessitate a re-examination of the structure, form and organization of the global supply chain, which is fast becoming institutionalized.

Table 2. Critical issues over the next 5 -10 years on risks and security.

Known	Unknown/Speculative
Move toward 100% check	New pandemics
Rationale for security investment	Emerging forms of Terrorism
Uncertainties (with respect to transport infrastructure development and support)	New technological flaws
Government mandates (security related)	Insurance Mandates
Cyber security	

Reference:

US Customs (2007) Information Quest Linked to Security - CBP Rolls out International Container Security Project to Kick off Secure Freight Initiative (dated 04/23/2007).

Available Online at:

<http://www.customs.gov/xp/cgov/trade/cargo_security/secure_freight_initiative/info_quest_security.xml> (accessed on 29 April 2008).

Research Focus Area Three: Issues related to roles of transport infrastructure (ports, shipping, airports) in supply chain operations

Focus Area Team Leader: Dr. Doug Hales, University of Rhode Island, USA

The fastest growing trade circuits today are those that involve Asia: Asia-Americas, Asia-Europe, and intra-Asia. The expansion in trade among these regions is growing at a faster rate than the planned transportation capacity increases. This is especially true for the major/preferred ports and inter-modal service facilities in Asia, North America, and Europe. This means that a serious imbalance is being created at an alarming rate between the planned capacity (both infrastructure and superstructure) at major ports and inter-modal transfer facilities and the expected demand for the services of such ports and facilities. The expected demand not only includes container and freight volume, but also includes port resources used for tourism. This imbalance has increased the probability for interruptions along the international, national, and regional supply chains that feed the businesses and consumers in these regions - resulting in potentially negative economic, public health, and environmental impacts. To exacerbate the problem, several facilities in the fastest growing regions have aging infrastructures and superstructures. These facilities must not only compete for investment funds to rebuild, but also expand capacity.

Adversities often have silver linings. The capacity-demand imbalances have created an opportunity for other, perhaps smaller, ports in the region to capture the anticipated overflow, and therefore some main line business and new investment. However, it is presently unknown how these ports can best compete for new business or how existing ports can prevent loss of business. This focus area addresses the macro-level competitive factors that transportation facilities – specifically ports - should consider when attracting new business and investment. While the focus is primarily sea-based, secondary land-based logistical links that support merchandise related trade in Asia (and also similar facilities in North America that serve Asia-linked trade) must also be considered.

Table 3. Critical issues over the next 5 -10 years on transport infrastructure

Known	Unknown/Speculative
Transshipment changes	Government mandates on privatization
Water routes	Technology (including materials)
Data access, both historical and real time	Regional impacts of port failures
Land use conflict in port areas (port expansion capacity – limited)	Future port competitiveness (how will ports compete for infrastructure investment with other supply chain infrastructure needs?)
Public health impact	
Tourism	
Freight versus People (route options)	
Aging infrastructure	

Research Focus Area Four: Policies on managing incentives within the
global freight transportation network

Focus Area Team Leaders: Dr. Christopher M. Anderson, University of Rhode Island,
USA and Dr. Young-Tae Chang, Inha University, Korea

While at a broad level the global cargo transportation system efficiently moves cargo from its point of manufacture to consumer markets, the system is made up of nodes and links, each with their own profit-based and politically based incentives. This focus area seeks to model, understand, and develop policy options for managing situations in which the individual incentives of node and link operators may not align to produce desirable outcomes for the operators themselves, or sufficient secure, reliable capacity for system users. Examples include incentives for individual ports to potentially over invest in port infrastructure in pursuit of market share when responding to local incentives for market share; incentives for shippers to avoid ports or handlers who raise their costs in order to support more secure supply chains, in favor of cheaper but less secure ports; and related incentives for ports and liners to invest in costly security. We proceed by developing theoretical models that formalize the conjectured incentives, and validate the models by identifying cases where such incentives appear to be present in the field, and then using the models to predict whether, when and how such incentives are likely to pose risks to profitability or security in the future. With an understanding of how bad outcomes may arise, policy solutions can be devised that assist practitioners to improve the likelihood that the global cargo transportation system continues to meet the needs of its users and constituents into the future.