

**THE INTERNATIONAL MARITIME TRANSPORT & LOGISTICS CONFERENCE  
(MARLOG 4)  
A SUSTAINABLE DEVELOPMENT PERSPECTIVE FOR MEGA PROJECTS  
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**THE ECO-EFFICIENCY AND SUSTAINABLE NATIONAL PROJECTS IN  
EGYPT**

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**ABSTRACT:** As national mega projects, the Suez Canal Area Development Project and New Suez Canal have logistically imposed two main questions. First, how the project can spot the preferred solution for balancing the business and environmental concerns? Second, how the project can enhance the trade-off between those two dimensions. In order to answer these two questions, the efficient frontier between the profitability and the environmental impact needs to be investigated. Three Levels of Thinking has to be applied. In Marlog 2, the Operational Thinking has been discussed using different supply chain approaches including SCOR and Lean Thinking. In Marlog 3, the Tactical Thinking has been explained for global growth opportunities including thinking process and value chain philosophy. This year, the Strategic Thinking approach will be discussed for improving the Eco-efficiency in logistics clusters with the application for the Suez Canal Logistics Corridor project. The main purpose of this paper is to explore the eco-efficiency solution and the concept of eco-topology for the national mega project to transfer the Suez Canal region into a global logistics corridor.

**Keywords:** Eco-efficiency, sustainable logistics network, suez canal logistics area development project, new suez canal project.

## **INTRODUCTION**

In a supply chain context, suppliers, customers and governments have recently increased their attention towards the balance between the profitability of establishing mega national projects and the environmental and societal impacts. Hence, governments have changed the 'end-of-pipe' laws to more comprehensive one, worldwide. The question arises here is which trade-offs occur between the environmental impacts of an activity project such the Suez Canal Area Development Project and New Suez Canal Project and the associated costs? And what are the best solution balancing the ecological and economic concerns of such a project?

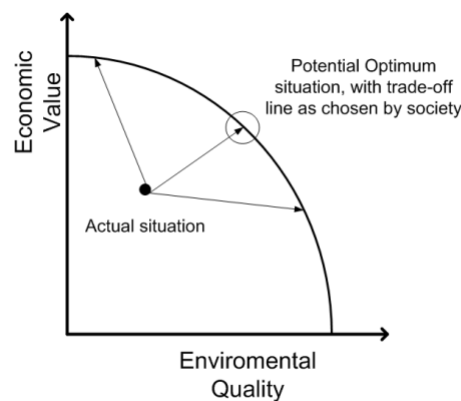
These questions lead to a concept of eco-efficiency as displayed in Figure 1. The axes represent the economic value and the environmental of economic activity expected from establishing a mega project. The eco-efficiency curve provides either decreasing the environmental pressure without decreasing the economic value added, or increase economic

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value without restricting environmental quality. In both way, the right direction is to moving to the efficient frontier.

As each point on the efficient frontier is Pareto optimal, it is up to the decision makers which improvement path is preferable. Often, increasing environmental quality without losing economic value means moving to the right direction in establishing projects. In addition, increasing economic value without losing environmental quality means moving up (Neto et. al., 2007).



**Figure (1) Eco-efficiency of Mega Project  
Source: Huppes and Ishikawa, 2005**

As a management philosophy, the eco-efficiency aims to combine the business excellence with the business excellence that can support sustainable development. Concerning the Strategic Framework for Economic and Social Development plan in Egypt 2022, the economic value can be realized when the investment policies and financial, monetary and commercial policies are directed towards enhancing demand on work in the national mega projects. In addition, institutional and legislative reforms should be added to the policies focusing in developing unorganized labor market. Environmentally, environment that support small and micro projects and young businessmen to improve the chances of having land, loans, and instructional services. In many projects, the quality of environment is affected due to unsustainable use of natural resources, shortage in water resources, and many environmental problems related to different activities in agriculture, industry and drinking water and sanitary sewage sectors and others problems. According to United Nation program definition of environment, “green economy” is seen as a tool that help modifying unsustainable consumption and production attitude and resulted pollution, in addition to the overuse of natural resources, especially energy sources and its emissions. Accordingly, the national mega projects in Egypt such as the Suez Canal Area Development Project should consider this new attitude that leads to more efficient and diverse economy in terms of usage and production of the resources which preserves environment and

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creates proper job opportunities as well as encouraging sustainable trade, limiting poverty and improving social justice.

On the other hand, the Suez Canal Area Development Project objectives include, for example, creating job opportunities and generating investment, increasing exportation and promoting the world trade, ensuring long- term economic growth by integrating the existing activities and attracting foreign investment, using the available opportunities to find out best practices in the field of sustainable development, and upgrading efficiency of Egyptian labor to the international advanced labor standards.

Consequently, the potential optimum can be attained between the economic value and the quality of the environment as displayed in Figure 1. In the following part, the relationship between the eco-efficiency and the logistics network in general and the New Suez Canal Project as an example.

## **METHODOLOGY**

Exploratory approach was conducted in this paper to help understanding the research problem and providing significant insights into a given situation. It relies on secondary research such as reviewing available literature, qualitative approach and projective methods. This approach helps build strength around the linkage between process elements, metrics, best practices and opportunities for eco-efficiency in logistics cluster. In this research, the exploratory approach helps to understand the scientific thinking process for improving the Eco-efficiency in such a project.

## **ECO-EFFICIENCY AND BUSINESS CASE**

Eco-efficiency includes creating economic value and reducing environmental impact and resource use at the same time. This leads the value added becomes more significant in any project. Five aspects of eco-efficiency have been identified that make it an indispensable strategic element in business project. These aspects are:

1. Eco-innovation
2. Optimized processes
3. Networks/virtual organizations
4. New services
5. Waste recycling

Any project includes a set of activities, where eco-efficiency can be implemented along the entire value chain of a product or service. Implementing the eco-efficiency can be achieved through seven key approaches:

1. **Reduce material intensity**

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2. Energy intensity minimized
3. Dispersion of toxic substances is reduced
4. Undertake recycling
5. Capitalize on use of renewables
6. Extend product durability
7. Service intensity is increased.

### **ECO-EFFICIENCY AND LOGISTICS NETWORK**

Increasing importance of sustainable development has lead eco-efficiency to find a specific position in literature. Eco-efficiency means producing goods and delivering services by using lower energy and raw material which together result in lower amount of wastes, pollution and cost. Hence, eco-efficiency considers two aspects: economic and environmental.

As a methodology, using the eco-efficiency concept in assessing the trade-off in logistics networks has received recently attention. Determining the eco-efficient frontier regarding business and the environment for the design of sustainable logistics networks in Suez region requires to use such measures. Three measure can be used to describe the eco-efficiency of any project (Krikke et al., 2003). These measures are cost, energy/resource usage and waste.

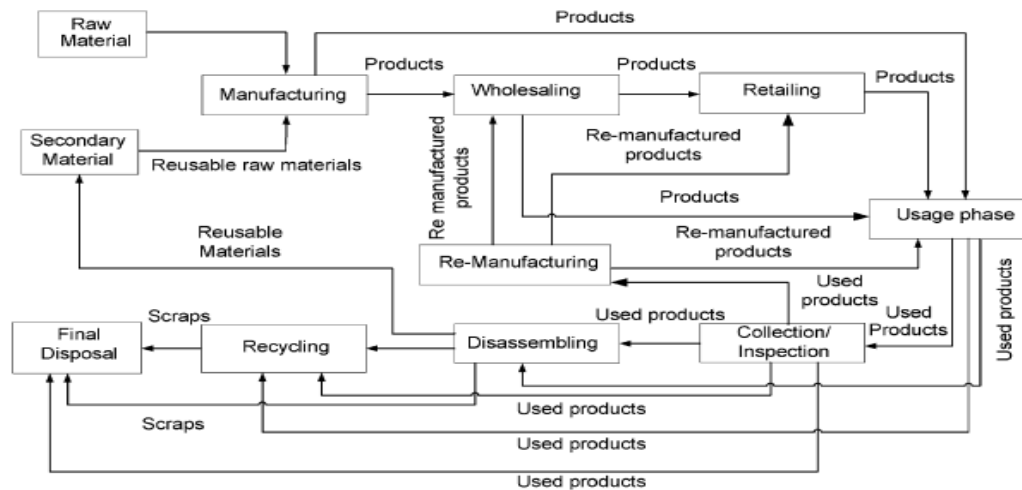
On the other hand, consumers and legislation have pushed companies to re-design their logistics networks in order to mitigate negative environmental impacts. The objective in the design of logistics networks has changed, therefore, from cost minimization only, to cost and environmental impact minimization.

In general, a logistics network has a number of players that influence business costs and corresponding environmental impact. Suppliers, manufactures, consumers, operators, and third parties operating in testing, refurbishing, recycling and energy production for the end-of-life products are the main players (Neto et al., 2008). These players achieve majority of the activities impacting business and the environment.

These activities are related to manufacturing, transportation, usage and end-of-life products' destination as shown in Figure 2. The decisions regarding these activities will, therefore, determine the network costs and environmental impact. These decisions are strategic (e.g. location of proposed projects in the New Suez Canal Area Development Project), tactical (e.g. the destination of products end-of-life), and operational (e.g. the choice of suppliers, third parties, investors, etc.).

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**Figure (2) Framework for a Sustainable Logistics Network**  
Source: Neto et al., 2008

Hence, it is obvious that choosing the right activities in demonstrating definite logistics nets is fundamental. In the available Literature, logistics network design is commonly divided in two approaches: minimizing costs (or maximizing profits) and minimizing environmental impact. However, there is little done integrating these two formulations (Bloemhof-Ruwaard et al., 2004). In other words, there is lack of integration or capturing the trade-offs between the logistics network costs and its respective environmental footprint. Thus, the eco-efficiency is applied in this research for this purpose.

## **ECO-EFFICIENCY AND NEW SUEZ CANAL PROJECT**

The maritime sector is composed of highly competitive businesses. This is because the industry has often faced governmental mandates for achieving regulatory compliance, including safety, security or environmental requirements. Meeting these requirements has been typically perceived as added costs that impede to compete in the sea trade marketplace. With applying the eco-efficiency concept on the New Suez Canal Project and the Suez logistics corridor project in order to make a trade-off between business and environment, a set of attributes can be applied for this purpose (Adams et al., 2009).

### ***Business Approaches***

The Suez logistics corridor and the New Canal projects must comply with their applicable environmental laws and regulations in order to avoid enforcement actions by the responsible government agencies. Targeted investors are looking forward to motivating 'greening' initiatives. Recently, 'green' and 'sustainability' issues have become increasingly part of maritime transport agendas. On the other hand, there are three potential reasons that a business may invest in improving its environmental performance: 1) social licence to operate, 2)

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corporate conscience, and/or 3) competitive advantage. The most important issue for any business will be established in the corridor is to avoid water or air pollution problems or congestion as this will affect the environment as well as the business itself.

***Drivers for Environmental Initiatives***

The drivers for Suez Logistics Corridor investments in environmental performance are many and varied. At the top of the list are regulatory compliance and court-ordered activities where businesses, ports and logistics adding-value activities are forced to make investment to avoid further legal action. There are other drivers, motivations, and considerations as listed in Table 1.

**Table (1) Potential Essential Motives and Drivers**

MOTIVES	DRIVERS	
Regulatory compliance (1)	International Marine and/or environmental legislation	Regional environmental legislation
	Local (e.g. provincial) environmental legislation	Self-regulation
Response to societal pressures (and enjoy resulting direct economics benefits) (2)	Corporate and Social Responsibility	Local communities concerns and public relations
	Environment's protection and/or quality improvement	Assess environmental impact of port's activities
	Economic Incentives (Tax exemption, subsidies, capitalization, revenues)	Insurance premium & liabilities reductions
	Environmental management (e.g. Pollution Prevention)	Profit: Emissions trading market
Development & Planning (3)	Coastal zones planning	Port policy and planning
	Component of port's sustainable development program	
Operational issues (4)	Operational performance	Costs reduction and control
	Health and safety issues	Labor relations
	Processes standardization	Environmental problem-solving and remediation plan
Gain competitive advantage (5)	Competition between regional ports	Corporate strategy
	Short sea shipping promotion	New Markets
	Create/Enhance/Promote "green logistics"	Collaborative logistics
	External business pressure (e.g. Shipping lines, terminal operators)	Strategic alliances
	Commercial and marketing interest	

**Source: Adams et al., 2009**

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*Increasing Pressure and Motivations*

Port, Maritime and shipping industries have become targets for public environmental policy regulations. Proper management of water bodies and sediments, air emissions, waste reception facilities, and modal split of port related hinterland traffic are 'hot button' issues in today's port policy agendas. To a certain extent, ports are being pressured to respond to problems related to environmental harm resulted by shipping activities, whether moved by ships or trucks. Also, the rapid growth of cargo volumes over the years and expanding port infrastructure led to increase both environmental problems and societal pressures.

*Spillover Effects and Timelines*

As an eco-efficiency dynamic, the 'green' practices create spillover effects. Once a business in the Suez region begins to address environmental matters, the interdependent nature of ecological and physical elements inevitably lead towards ever-broader responses. Hence, green suppliers and transporters became a mandatory requirement to any business enterprise and supply chains become greener.

## **CONCLUSIONS**

This research has sought out to address how any project can spot the preferred solution for balancing the business and environmental concerns, and how any project can enhance the trade-off between those two dimensions. Answering these two questions, the efficient frontier between the profitability and the environmental impact needs has been discussed.

Establishing such new national mega projects such as the New Suez Canal and the Suez Canal Area Development Project will certain impact carrier and shipper market practices. Ports, transporters, investors and businesses and other players in these projects should be prepared to proactively address the environmental issues that are emerging, which also have potential to impact costs and carrier market practices.

Making a balance/trade-off between business and the environment has received little attention in the available literature so far. Hence, this research has discussed some attributes that can attain this goal using the eco-efficiency concept. These issues may have even greater impacts on both projects for doing global maritime business, particularly if dealt with reactively. On the other hand, if dealt with from an anticipatory perspective, there may be a possibility of improving a port's competitive position while reducing costs to shippers and carriers. Environmental issues can no longer be considered only as added costs but actively treated as business opportunities.

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