LM-SCM 2014
XII. International Logistics and Supply Chain Congress

30-31 October 2014 - Istanbul, Turkey

“Supply Chains of the Future”
Committees:

Congress Chair
• Murat Baskak, Istanbul Technical University, Turkey

Congress Co-Chair
• Gulcin Buyuozkan, LODER, Turkey

Organizing Committee
• Gulcin Buyuozkan, LODER, Turkey
• Gulgun Kayakutlu, Istanbul Technical University, Turkey
• Mehmet Tanyas, LODER, Turkey
• Murat Baskak, Istanbul Technical University, Turkey
• Seyda SerdarIsan, Istanbul Technical University, Turkey

Local Committee
• Ayca Altay, Istanbul Technical University, Turkey
• Ayse Elvan Bayraktaroglu, Istanbul Technical University, Turkey
• Ecem Basak, Istanbul Technical University, Turkey
• Emre Cevikcan, Istanbul Technical University, Turkey
• Irem Ucal Sari, Istanbul Technical University, Turkey
• Mehmet Karagul, LODER, Turkey
• Mine Isik, Istanbul Technical University, Turkey
• Murat Durucu, Istanbul Technical University, Turkey
• Salih Karadaïyi, Istanbul Technical University, Turkey
• Samet Gursev, LODER, Turkey
• Secil Erçan, Istanbul Technical University, Turkey
• Seda Yanik, Istanbul Technical University, Turkey
• Serdar Baysan, Istanbul Technical University, Turkey
District Planning for Family Healthcare Centers .............................................................................................................. 291

Halil Emre Gonen* (Istanbul Technical University), Seda Yanik (Istanbul Technical University)

Service Supplier Selection with Utility Range Based Interactive Group Decision Method ............................................ 300

Halil Sen* (Hacettepe University's Institute of Science and Technology), Murat Aysal (Salah University)

Surveying Enterprise Resource Planning in the Saudi Private Hospital ........................................................................ 310

Sajed M. Alshaher* (Prince Sultan University)

Supply Chain Intelligence Systems and A Selection Framework Based on Magic Quadrant ........................................ 321

Batuhan Kocaoglu* (Okan University)

The Impact of Upstream Supply Chain Management Practices on Organizational Performance in E-Tailing .......... 333

Gencay Incesu* (Okan University), Mehmet Tanyas (Maltepe University), Baris Asilgil (Mimar Sinan Fine Arts University)

The Effects of Driver Behaviour Over Fuel Economy on Highway Freight Transportation: A Survey in Karaman City .......................................................................................................................... 345

Yasin Ocal* (Maltepe University), Sukru Ari (Maltepe University)

A Supplementary Framework Regarding A Statistical Analysis Using Scorecards in Supply Chain Management ...... 357

Erkut Akkurt* (Yeditepe University), Ali Alper Gokbulut (Yeditepe University)

A Road Map for Improving National Logistics Performance ........................................................................................ 367

Sule Onsel Ecici (Dokuz Eylul University), Ozgur Kabakt* (Istanbul Technical University), Fusun Ulengin (Sabanci University)

The Role of Information Sharing in Supply Chain Demand Planning: The Managerial Perspective ............................ 377

Artur Swierczek* (University of Economics in Katowice)

The Evaluation in Terms of National Competitiveness of Logistics Applications in Turkish Textile – Clothing Industry .......................................................................................................................... 387

Ozlem Kaya* (Hitit University), Serdar Kilickaplan (Gazi University)

Sustainable Logistics at Fedex: A Case Study .................................................................................................................... 395

Cigdem Sofyalioglu (Celal Bayar University), Ebru Surucu* (Celal Bayar University)

A Multi-Objective Optimization Model for Sustainable Distribution Planning Under Economic and Ecological Constraints ...................................................................................................................... 405

Sezgin Teoman* (Maltepe University), Nagehan Uca (Istanbul Commerce University)

Green Port Management Concept and Applications: A Preliminary Qualitative Study with Port Managers in the Mediterranean Region of Turkey ........................................................................ 416

Erdem Alkan* (Mersin University), Soner Esmer (Dogus University)

International Scope of Operations and the Nature of Supply Chain Members’ CSR Policy ........................................ 423

Danuta Rispenska-Morini (University of Economics in Katowice), Edyta Klosa* (University of Economics in Katowice)

What is the Current State of Sustainable Initiatives in Transportation and Logistics Industry? ................................. 433

Juliana Campos* (Berlin University of Technology), Chiranth Hulgur (Berlin University of Technology), Rohan Prasad (Berlin University of Technology), Ananth Revankar (Berlin University of Technology)

Distributions Logistics for Biogas By-Product Digestate ............................................................................................... 443

Paz Vilanova Plana* (University of Duisburg-Essen), Aydin Karakaya (University of Duisburg-Essen), Bernd Koche (University of Duisburg-Essen)

An Integrated Methodology for Order Dispatching to Distributors .............................................................................. 451

Sule Itir Satoglu* (Istanbul Technical University), Tugce Aslanoglu (Istanbul Technical University)
GREEN PORT MANAGEMENT CONCEPT AND APPLICATIONS: A PRELIMINARY QUALITATIVE STUDY WITH PORT MANAGERS IN THE MEDITERRANEAN REGION OF TURKEY

Erdem Akkan¹, Soner Esmer²

Abstract – Green approaches have become widespread in many industries including shipping. About ninety percent of the world trade has been done via shipping. From supply chain management perspective shipping reduces the costs and extends the distances from suppliers to customers. Although shipping is accepted as the most environmental transportation type, recent studies have explored the environmental impacts of it. These studies also focus on ports’ environmental effects. A green port is considered as an environmental friendly facility which considers every potential impact of a port facility on the environment. In this study, the effects of transportation, more specifically shipping on the environment, and the green port concept in the literature has been explored, additionally in-depth interviews based on the study of Lirn et al. (2013) have been conducted and some implications have been made.

Keywords – Green logistics, green port management, shipping, environment

INTRODUCTION

Due to some negative evidence on environmental destruction by the unprecedented economic expansion, there has been an increasing demand for “green” products in the marketplace by more concerned citizens worldwide. As a result, more stringent pollution regulations set forth by many governments and more environmentally responsible business management [1]. Green supply chain management, which is defined as ‘integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life’, is gaining increasing interest among researchers and practitioners of operations and supply chain management [2]. The growing importance of it is driven mainly by the escalating deterioration of the environment, e.g. diminishing raw material resources, overflowing waste sites and increasing levels of pollution [2].

EFFECTS OF TRANSPORTATION ON THE ENVIRONMENT

Similar to supply chain management concept, green supply chain management includes many activities such as purchasing, design, manufacturing and physical distribution. The only difference is that all these activities must be environmentally friendly in green supply chain management. In the logistics system, transportation is the single largest source of environmental hazards [1]. Thus, when it comes to the effects of logistics activities on the environment, transportation always gets the biggest slice. For instance in the U.S., transportation industry represents 25 percent of recycling costs. The impact of transportation on the environment comes primarily from three sources: construction of transportation networks, operation of transportation vehicles, and disposal of transportation vehicles and parts [1]. It is estimated that freight transportation accounts for roughly 8 percent of energy-related CO₂ emissions [3] and 13 percent of global greenhouse gases (GHG) [4] worldwide.

¹ Erdem Akkan, Mersin University, Vocational School of Social Sciences, Department of Logistics, Mersin, Turkey, eakkan@mersin.edu.tr
² Soner Esmer, Dokuz Eylul University, Faculty of Maritime, Department of Logistics Management, Izmir, Turkey, soneresmer@gmail.com
ENVIRONMENTAL EFFECTS OF SHIPPING

Shipping has many effects on the environment. International maritime shipping is the second\(^3\) biggest CO\(_2\) emissions contributor among all transportation modes with 11.8 percent ratio [5]. In the maritime shipping sector, ton-kilometers and the carrying capacity of the world’s merchant fleet nearly tripled from 1970 to 2005 [4]. Global CO\(_2\) emissions from transportation, which has grown 45% from 1990 to 2007, accounts for a significant share of the global fossil fuel combustion-related CO\(_2\). Emissions are led by the road sector in terms of volume and by shipping and aviation in terms of the highest growth rates [6].

Ship emissions can have considerable impact on atmospheric concentrations of several important pollutants especially in coastal areas [7]. The International Maritime Organization (IMO) calculated that ocean-going vessels released 1.12 billion metric tons of carbon dioxide in 2007. This is equivalent to the annual greenhouse gas emissions from over 205 million cars. More than three percent of global carbon dioxide emissions may be attributed to ocean-going ships. In fact, if global shipping were a country, it would be the sixth largest producer of greenhouse gas emissions. Nevertheless, carbon dioxide emissions from ocean-going vessels are currently unregulated [8]. Sera gas emissions to the atmosphere might have a significant increase in global temperatures which will almost certainly result in a series of catastrophic changes across the globe, including worse droughts, stronger storms, flooding of low-lying areas by rising sea levels, extinction of many species and a major disruption in the global production of food [8].

Humankind is one of the most coastally dependent species in the biosphere. By the middle of 21th century, 5.5 billion people live in the coastal zone, clustered into “mega cities” of a 8 billion people or more, on only about \(\%11\) of the earth’s land surface [9]. Furthermore, Without doubt, this forecasts show that port related activities will affect human health much than the past. Corbett et al. (2009) indicate that reducing ships’ speed to reduce CO\(_2\) emissions could save 8300 lives and relieve the respiratory symptoms of three million people in the U.S. each year [as cited in 10].

Transportation-related air pollution\(^4\) affects a number of health outcomes, such as mortality, non allergic respiratory morbidity, allergic illness and symptoms (such as asthma), cardiovascular morbidity, cancer, pregnancy, birth outcomes and male fertility. Transportation-related air pollution also increases the risk of death, particularly from cardiopulmonary causes, and of non-allergic respiratory symptoms a disease [11]. Maritime transportation has also significant effects on human health. Shipping-related PM (Particulate Matter) emissions might have caused between 20,000 and 104,000 premature mortalities annually from cardiopulmonary disease and lung cancer in 2000, with a best estimate of 60,000 [12]. These health impacts are particularly concentrated in areas of Southeast Asia and Europe and might have increased by 40% in 2012 [12].

GREEN PORT MANAGEMENT

At present, as the transportation is an integral part of the entire supply chain, ports play an important role in the management and co-ordination of materials and information flows [13]. As the environmental impacts of logistics and transportation have gained recognition, ports have initiated to develop environmental strategies. An essential tool for executing these strategies is the differentiation of port dues related to environmental impact [14]. Increased environmental awareness and regulations emphasize the importance of identifying and implementing more sustainable transportation systems [14]. As Martinsen & Björklund (2012, p.565) indicate, the demands of shippers for environmentally responsible transportations are rising [30]. Port management studies have focused mainly on port’s competitiveness and efficiency [15]. However, in recent years, there has been a growing literature about green port management [10,15,16,17,18]. At present, both domestic and foreign ports have respectively proposed the notions of “eco-port”, “green port”, “environment-friendly ports” and other concepts of green ports, and actively conduct green port construction, which have aroused public concern [19].

\(^3\)The biggest contributor is road transport with 72.6 per cent ratio, other transportation modes are 11.2 percent ratio with aviation, and 2 percent ratio with rail.

\(^4\)Major pollutants produced by human activity include many substances such as Sulphur oxides(SO\(_x\)), Nitrogen oxides (NO\(_x\)), Carbon monoxide (CO), Carbon dioxide (CO\(_2\)) and Particulate matter(PM).
Serious concerns over environmental disasters, such as the Exxon Valdez oil leak, also discourage firms from overlooking environmental management. The legal and financial consequences of environmental mismanagement, coupled with bad publicity, offer another incentive for firms to act green [1]. In the maritime activity, port operations have a dramatic environmental impact because of logistics, energy supply, traffic congestion, etc. [17]

As Lirn et al. indicates, many port authorities (e.g. Shangai, Hong Kong and Singapore) and international organizations (PPCAC5, IAPH6) have come up with six green port performance indicators: speed reduction after landfall, cold ironing, using electrically powered equipment, encouraging the use of low-sulphur fuel, a willingness to reuse recyclable resource, and encouraging public transportation mode development [15].

Port administrations might have significant effects. For instance ship maneuvering in harbors contributes about 6% of NOX and 10% of SO2 to total shipping emissions [12]. Cold ironing, which can be simply defined as the practice of providing shore power to a ship so the ship may shut down primary and secondary combustion engines while in port [20] could be useful to reduce these emissions. Chang &Weng (2012, 189) found that by using cold ironing, Kaohshiung Harbor could provide significant emissions reduction of NOX(49.2%), SO2(63.2%), PM(39.4%) and CO2(57.2%)[10].

GREEN PORT PROJECT

In 2012, The Ministry of Transport, Maritime Affairs and Communications (UDHB) Directorate General of Merchant Marine initiated green port project in Turkey. Under the scope of this project, “Green Port” award will be given to the port facilities which comply with the standard that have been stipulated by UDHB. The application for the awarding is based on volunteer scheme. Whenever any port claims that it is fully compliant with the standard, a survey is being carried out. Finally, the port is awarded a certificate [21]. Green port certificated facilities should have ISO 9001 Quality Management, OHSAS 18001 Health and Safety, and ISO 14001 Environmental Management System certificates. They should sustain the necessities of these quality certificates. Furthermore they should operate with harmony to every legal regulation related with the environment [22].

However, any port facility hasn’t been given the green port award. It is temporarily suspended, but expected to proceed in the late of 2014. It is also expected to make a protocol with Turkish Standards Institute (TSE) in the certification process [23].

IN-DEPTH STUDY

In this section subject and method of the study will be given. Afterwards some findings will be presented and discussed based on the findings and recent literature.

Subject of the Study

The subject of the study is to determine green port management activities in three major ports in the Mediterranean Region of Turkey. As there is little research conducted in this area [22], it is decided to conduct in-depth interviews with the managers.

Method of the Study

In-depth interviews were adopted as the method of the study. With in-depth interviews, interviewers can probe each respondent in much greater detail. Also, one respondent’s viewpoints do not influence others [24]. In-depth studies were carried out with four managers separately. Three of them are the executive managers of three major ports7 in the Mediterranean Region of Turkey and the other one is a director from the local unit of

---

5The Pacific Ports Clean Air Collaborative
6International Association of Ports and Harbors
7Due to private port company rules, interviewed managers kindly request us not to mention neither their nor companys’ names in this study.
the Ministry of Environment and Urbanization who/which is responsible for legal auditing of Turkish ports’ environmental effects. From here to the end of the paper, the three ports are named as Port A, Port B, Port C.

Data collection tool of the study is a semi structured questionnaire format, which includes 5 constructs and 20 items, was adapted from Lirn et al. (2013)-[15]. Respondents were asked as how they do those activities in their ports. For instance about air pollution management, they were asked as “Do you have any tool/practice to reduce speed after landfall and how?”

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution management</td>
<td>Reducing speed after landfall</td>
</tr>
<tr>
<td></td>
<td>Using substitute energy</td>
</tr>
<tr>
<td></td>
<td>Using energy saving device</td>
</tr>
<tr>
<td></td>
<td>Encouraging use of low-sulphur fuel</td>
</tr>
<tr>
<td></td>
<td>Using electrically powered equipment</td>
</tr>
<tr>
<td></td>
<td>Air pollution avoidance</td>
</tr>
<tr>
<td>Aesthetic and noise pollution</td>
<td>Aesthetic interference/visual impact/improving city scenery</td>
</tr>
<tr>
<td>management</td>
<td>Noise control</td>
</tr>
<tr>
<td>Solid waste pollution management</td>
<td>Solid waste dumping management</td>
</tr>
<tr>
<td></td>
<td>Avoiding pollutants during port maintenance and cargo handling</td>
</tr>
<tr>
<td></td>
<td>Using recyclable resources</td>
</tr>
<tr>
<td></td>
<td>Reducing energy consumption</td>
</tr>
<tr>
<td>Liquid pollution management</td>
<td>Fuel spilling contingency plan</td>
</tr>
<tr>
<td></td>
<td>Ballast water pollutant control</td>
</tr>
<tr>
<td></td>
<td>Cargo spilling control and prevention</td>
</tr>
<tr>
<td></td>
<td>Sewage treatment</td>
</tr>
<tr>
<td>Marine biology preservation</td>
<td>Wetland and marine habitat preservation</td>
</tr>
<tr>
<td></td>
<td>Ecological preservation and environmental protection training</td>
</tr>
<tr>
<td></td>
<td>Port entrance sediment control</td>
</tr>
<tr>
<td></td>
<td>Coastal erosion control</td>
</tr>
</tbody>
</table>

Source: Lirn et al. (2013)-[15]

**Findings**

In this section some qualitative findings based on the interviews will be given with five structures shown in Table 1.

**Air pollution management**

Port A is one of the biggest ports in Turkey in terms of cargo handling. It also located in the transition from Middle East to Europe. This situation makes the risk high in terms of air and water pollution. After Turkish government signing MARPOL 73/78 Annex VI in 2012, port authorities finally have the enforcement power to interfere any air pollution cases in the port areas. Before that date, they have no legal authority on any ships. The shipping industry is under strong pressure to reduce sulphur emissions, while the use of ultra-low-sulphur fuels is now the norm in the trucking systems of developed countries [3]. But in Turkey, port authorities don’t encourage use of low-sulphur fuel because they don’t need to. According to EPDK (Republic of Turkey Energy Market Regulatory Authority) directive, sulphur in maritime diesel fuels which will be launched to the market, cannot exceed the %0.1 and %1.5 ratios [25].

Electrically driven trucks and machines not only can reduce green gas emissions effectively, but also they can largely reduce the level of noise generated by traditional diesel engines [15]. Hartman and Clott (2012) indicated that diesel container trucks are large sources of NOx and PM [15]. In Port A, by using about 25 electrical powered Rubber Tired Gantry Cranes, the port facility saves money and reduces the emissions.

**Aesthetic and noise pollution management**
Port A is located in the center of the city. It seems a disadvantage. Because of this, the potential to extend the port is limited. In the future plans it is expected to extend the port to the south through land reclamation. Noise pollution of the port might also disturb the residents. Fortunately the surrounding area is mostly business centers. Port B and C are located outside the city center and there is no resident nearby. All three port managers mentioned that they have never heard a complaint from the surrounding area about noise pollution.

Solid waste pollution management

In Port A, every ship berthed to dock has to pay with or without the solid waste. This system mostly prevents the ships to leave their solid waste to open water. Even if any ship informs that there is no solid water, port authority then asks where they leave their solid waste and request the legal paper afterwards. By chasing the waste, the port authority helps to prevent from leaving solid waste to open water. In Port B, every solid waste management activity is done according to the certain regulations [26].

Dust pollutants are mainly related with cargo and handling type. For instance in container handling, dust pollutant amount would be low, in contrast in bulk cargo such as coal handling dust pollutant amount comparably high. In Port A, in the last ten years port authority have both renewed the handling equipments and educated the handling personnel. Thus, amount of dust pollutants seem low.

Liquid pollution management

According to recent legal obligations, port authorities should make emergency plans and financial liability insurance. Potential pollutions in port areas are evaluated in three levels. Level 1: Can be treated with port’s own emergency response teams. In all three sample ports, port authorities choose to use third party companies for such services. Level 2: Regional pollution. Needs more sources than the port’s own facilities to treat. Level 3: National pollution. Needs nationwide treatment.

Every port has typical risk factors, therefore typical plans. For instance, Port A is mainly concerned with bulk and container cargo, but Port B is concerned with oil. Thus it has more strict plans. In Port B there are minimum recyclable resources. Sometimes there is waste fuel, but the government doesn’t let to recycle them in order to minimize custom fraud risk. These waste fuels are sending to licensed recycling plants such as cement factories.

The spread of invasive species resulting from ballast water is now recognized as one of the greatest threats to the ecological and the economic well being of the planet [27]. Fernandez (2007) indicated that these species could have negative impacts on human health, marine ecosystem health, and economic production from marine resources [as cited in 15]. Ballast water pollution has also significant effects on Turkish seas. For instance in 2005, the number of foreign species in Turkish seas was 263, but in 2011 it jumped to 422 and it is still increasing [28]. In Turkey, port authorities have no enforcement power to affect the ships’ ballast water. Furthermore there is no legal regulation by UDHB specifically related with ballast water.

Marine biology preservation

Developing ports without an adequate environmental and ecological preservation policy could hurt both the residents and fauna/flora close to the port [15]. In our case, there is no wetland around of both Port A, B and C. In Port B, fishing has banned with the port authority’s decision. It is now a fish nest. All three ports have no coastal erosion risk.

CONCLUSION AND RECOMMENDATIONS

Implementing continuous environmental monitoring implies dedicated specialist personnel, typically unaffordable in smaller ports [29]. Unless it is mandatory, there is central/local government’s or city hall’s support, or economic benefit exists; the motivation level of port authorities’ green approaches seems low. According to a recent research conducted on 35 Turkish port executives, the highest average attitude related
with green port applications is “To make green port transformation attractive, tax advantages, preferential loans and suchlike promoting practices has to be done.” with 4.23 arithmetic mean score\(^8\) [22]

Ports are 7/24 open facilities. But customs and trade headships open on only business days from 8 a.m. to 5 p.m. This situation makes an intensive traffic flow and noise between 3 to 5 p.m. in the Port A main area. Relocating buildings, entrances, exists and/or reorganizing bureaucratic processes might reduce this kind of pollution.

Ballast water problem in Turkish seas becomes much greater as times goes by, whereas port authorities has no legal enforcement power. A regulation related with ballast water seems urgent.

Until the late of 2014, it is expected that the blue card system, which enables UDHB to pursue all the waste of the ships in Marinas, will be completed. With expanding this innovative practice to all kind of ports, it is possible to minimize the waste pollution related with ships. Another recommendation is that, in any emergent situation such as “Ulla” case, bureaucracy seems very slow. Quickly liquidation of such ships without waiting for the outcome of the litigation might be a solution for minimizing the environmental impact.

REFERENCES


\(^8\) The measurement scale of the statement is defined as 1 Completely disagree to 5 Completely agree.

© XII. International Logistics and Supply Chain Congress
October 30-31, 2014, Istanbul, TURKIYE


