**PROMOTING WATERBORNE TRANSPORTATION FOR BETTER SUSTAINABLE FREIGHT MOVEMENTS IN THE SOUTH WEST UK**

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**Introduction**

The importance of water freight as a sustainable mode of transport is growing continuously. As world trade depends on maritime transport, water transportation has a special place in the logistics industry. Water transportation is a sustainable mode of transport in a supply chain. The integration of water freight in to intermodal transportation and logistics will increase the efficiency and competitiveness of the freight transport industry while maintaining an environmental balance (Tailor, 1993). Water freight offers many environmental and financial advantages to society (Yassin et al, 2010). At present within the UK road transport is mostly used for domestic transportation of goods (Sea and Water, 2008). This study analyses the potential for water freight in the South West UK especially in Devon and Cornwall.

**Research background**

UK has 11,072 miles of coastline and 300 ports. At present 1000km of water ways are in regular use in the UK for larger scale freight traffic (DFT, 2010). The recent statistics from the Department for Transport UK revealed that waterborne transport has become a substantially underutilized mode (DFT, 2016). Today, rising environmental concerns and a government grant system to encourage business to seek alternatives from road transport renewed the interest in waterborne transport. The government of the UK is aiming to transfer 3.5 per cent of road freight movements to water. If used properly water transportation could perform an important role in eliminating freight from the road and rail networks (North West Freight Advisory Group, 2003). In this situation this research analyses the nature of water freight in the South West UK. There are 41 ports in Devon and Cornwall, all small but commercially active (Kuznetsov, 2014). A number of European Union countries such as France, Ireland, Portugal and Spain are geographically well placed to trade with this region. By developing coastal shipping links between regional ports, seaborne trade links can be developed with these European countries, which will in turn, result in substantial economic activity for the region and maximise local and regional economic development (Chang, 2011).

The literature review on the potential for water freight in the South West UK revealed few prior academic studies. The published list of the quantity of goods transported from each port provides little information about the potential of these ports in conducting different kinds of water transportation. Hence this study attempts to fill the gap in the literature by analysing general attitudes towards water freight transport in Devon and Cornwall, current practices in water freight, the importance of water as a sustainable mode of transport in the supply chain, the potential of water freight from a business point of view, and barriers to achieve this potential. At the same time an attempt has been made to identify whether the use of water freight as a sustainable mode of transportation is worthwhile to the logistics industry in Devon and Cornwall and its socio-economic impact in society.

**Conceptual model**

A conceptual model links the objectives of the research, literature review and issues which should arise from the literature review and brings out interrelationships among them, which inevitably leads to the formation of the most suitable methodology for making solutions for the issues (Miles et al, 2014). The formation of a conceptual model revealed the key factors and the assumed interrelationships that are important for the research problem. These factors have different levels of influence on the potential for water freight in CAD. The key factors are arranged at the top of the display with normal arrows and factors with moderate influence listed at the bottom of the display, and dashed arrows towards the major boxes. The formation of a conceptual model revealed that the key factors and the assumed interrelationships are important for finding solutions for the research problem. Since the use of water freight is more limited in the SW compared to other regions, seeking experts’ opinions and suggestions on the existing and future use of water freight in CAD was instructive. The best way to canvas experts’ opinions on the topic of study as per the conceptual model was the Delphi method. It is a method of inquiry, a useful communication tool to achieve consensus in a given area of uncertainty and provides more accurate assessment obtained either by individuals or by interacting groups (Delbecq et al, 1975). The experts’ opinions on the key factors and their interrelationships helped to analyse the situation without any predetermined views.

**Research Methods**

This study is exploratory. Consequently, it used a qualitative technique known as the Delphi method and secondary research for data collection. Secondary research is mainly the review of literature. Since water freight in Devon and Cornwall has been less studied than many other parts of the UK, the opinions and suggestions from the experts in the shipping and logistics field is very important to achieve the objectives of the study. Thus, the Delphi method was used for primary data collection. The consensus level is fixed at 75% and three rounds of the Delphi survey were conducted. The experts’ panel was comprised of professionals from the shipping and logistics industry, government officials dealing with transportation, academics especially from shipping and logistics, journalists (Lloyds’ list, Plymouth Evening Herald etc.), officials from ports, and politicians. A total of 24 experts’ panel members participated in the first round Delphi survey. The second and third Delphi surveys were attended by a total of 23 and 22 expert panel members respectively and in each round one respondent dropped the survey due to lack of knowledge on the local ports and personal reasons.

Following this a focus group with the members of the Maritime and Waterborne Innovation Group in the South West UK was conducted to measure the trustworthiness of the Delphi findings. Participants were asked to discuss the results of the Delphi study. The significance and trustworthiness of the findings were debated. Their discussion extended the initial findings of the Delphi study with detailed explanations of the current practises, issues and challenges water freight is facing in the region.

**Findings**

The Delphi study achieved a total of eight statement consensuses among the expert panel members. The consensuses revealed that presence of extensive coast line and accessibility to a number of ports along the coast of the South West UK are supportive for water freight movements in the region. Water freight is a sustainable green alternative to road and rail which is more labour, energy and fuel efficient than road transport. As an efficient and sustainable mode of transport, water freight will reduce the cost of transportation of bulk products over long distances, overland congestion, negative impacts on the environment, and external costs. It provides competitive cost, integration across all regions, economic progress and sustainability compared to road transport. At present ports in Devon and Cornwall lack investments in infrastructure and poor hinterland connectivity blocks the development of water freight in the region. As a result, the integration of water freight in the logistics chain is difficult.

**Figure 1** **Conceptual framework showing the potential for water freight in Devon and Cornwall and major influences on it**

 Source: authors

Market Demand

Tax incentives and subsidies

Stakeholders

Policy, support and promotion from the government, EU and DFT

Professionals in the shipping and logistics industry

Weather and tidal constraints

Environmental benefits

Local authority

Speed, frequency and reliability of water freight service

Public opinion

Economic benefits

Attitude towards water freight

Population density

Public investment

Regulations on marine traffic

Overland congestion

Marketing of water freight

Meanwhile the focus group participants collectively upheld the significance of the Delphi results. According to them the results of the study could apply and assist almost to anywhere especially places where there are regional hiccups and areas with complicated issues. They opined that professionals related to the industry need more information about the possibilities of water freight and they have to work for the betterment of water freight in Devon and Cornwall. With the help of improved resources, water freight in the region can support transfer of road freight movements to water and will be beneficial to the economy of Devon and Cornwall. As per the findings and suggestions of the Delphi study and the focus group, the conceptual model formed in the beginning of the study showing the potential for water freight in Devon and Cornwall is modified into two new conceptual models. Figure 2 presents current water freight in CAD in accordance with the findings of the Delphi study and focus group. Figure 3 represents future water freight in CAD based on the suggestions and findings of the Delphi study and focus group, once they are accepted and implemented by the industry and respective governing bodies.

**Discussion and conclusion**

The three rounds of Delphi surveys and the focus group together brought a large amount of information on water freight in the South West UK especially in Devon and Cornwall. Water freight is best suited to transport non-time critical bulk cargoes. Small and medium ports in the region can be used for small quantities of single bulk cargo movements. With the integration of local water freight into intermodal transportation, links between the existing port facilities, better hinterland connections, infrastructure and operational systems, and the door to door delivery of goods will improve and be more reliable to conduct. Water freight in an intermodal transportation will be profitable to the entire logistics chain if the overall multimodal cost is lower than road transport and frequency and the reliability of water transport is competitive. With improved port infrastructure, subsidies and investment for essential facilities and a reduction in duty/taxes water freight in the region can support transfer of road freight movements to water. Better water freight movements will reduce road congestion, increase port employment, and local jobs and local distribution opportunities which could be beneficial to industry and society. The use of water freight will produce a better environment, congestion free roads, integration of remote locations, less price for goods, and a better economy.

The information collected during the Delphi study helped to realize the importance of using water freight and possibilities of it in South West UK. It was identified that water transportation is a sustainable mode of transport and offers many benefits to industry, society and environment. However the usage of water freight in the South West UK is low due to low usage is the lack of infrastructure at the ports and hinterland connectivity. The findings of the study will be useful for the government departments working for freight transportation, shipping and logistics industry and any groups working for the development of waterborne freight.

The focus group discussion presented a very good interpretation of the Delphi results. The focus group participants’ experiences, knowledge, expectations, visions and concerns about water freight in the South West UK have contributed to the justification of the Delphi results. Their suggestions for policy formulation for the development of water freight in the region, barriers to policy formulation and implementation, and issues need further investigation for the development of water freight in the region were clearly identified in the focus group. They pointed out many issues in the progression of water freight, factors favorable for water freight development, opportunities available in the region and role of local, regional and national authorities in promoting water freight in the South West UK. Proper marketing of the benefits of water freight compared to other modes of transport and a strategic approach to educate professionals in the industry are prerequisites to increase the use of waterborne transport. DFT has a key role in promoting water freight. DFT can develop innovative ideas through funding mechanisms. An effective policy to overcome cost and significant investments requirements can only be achieved at government level. DFT has the responsibility to provide substantial support in the form of policies, grants, tax reductions, subsidies and incentives to promote and develop waterborne transportation in the country.

 A discussion on the policies for the development of water freight recognized that there is a little bit open attitude from the government side in the promotion of maritime activities. At the same time stereo thinking and inertia from local authorities create problems in the increased usage of water freight. An analysis of the barriers to policy implementation in promoting water freight in the region recognized the lack of understanding of the sector at the regional level, lack of entrepreneurial activities in the South West UK and limited commercial knowledge about exactly how much money the freight could be generated, prevent proper implementation of policies. As a result of an in-depth focus group discussion generated new insights on the early findings of the Delphi study and helped to strengthen the Delphi results generalizability and transferability.

The results of this research also have many implications to the rest of the world where water freight is in the developing stage or aiming to increase the usage of it. The suggestions, observations and information collected during the Delphi study and from the focus group participants could be used for forming better management strategies to improve the efficiency and effectiveness of water transportation in a region or country. Consequently, the economic and environmental benefits of using water freight would be more real in the shipping and logistics industry and society.

**Figure 2 Conceptual framework showing current water freight in CAD Source: authors own**

Vague tax incentives and subsidies

Known market Demand

Unenlightened Stakeholders

Vague policy, support and promotion from the government, DFT and EU

Indifferent professionals in the shipping and logistics industry

Lack of deep water, tidal and weather constraints

Vague environmental benefits

Unfavourable attitude towards water freight

Scope for Economic benefits

Indifferent public opinion

Excessive overland congestion

Lack of Public investment

No marketing of water freight

Insufficient population density

Unpredictable speed, frequency and reliability of water freight service

Inertia of the local authority

Over regulation of marine traffic

**Figure 3 Conceptual framework showing projected water freight in CAD Source: authors own**

Proven Market Demand

Defined tax incentives and subsidies

Educated Stakeholders

Focused policy, support and promotion from the government, DFT and EU

Determined professionals in the shipping and logistics industry

Effective tidal access and ports with adequate depth

Well-known environmental benefits

Reliable speed, frequency of water freight service

Presence of maritime professionals in the local authority

Clear understanding of marine traffic regulation

Positive attitude towards water freight

Focused marketing of water freight

Grouping service for low population density

Reduced overland congestion

Proven economic benefits

Supportive public opinion

Strategic public investment

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