Low Carbon and Green Supply Chain

Feasibility Study of WiLCO

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SEAMS-WiLCO

The European Centre for Total Quality Management, School of Management University of Bradford

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Executive Summary

The proposed project is a joint collaboration between Logistics and Supply Chain Management (LSCM) Research Group, Management School University of Sheffield and SEAMS to explore how WiLCO software can be modeled for 'Low Carbon and Green Supply Chains". LSCM also has a strategic partnership with the European Centre for Total Quality Management (ECTQM), at Bradford University School of Management, where expertise on CSR, modelling and decision support are drawn into this project. Through the feasibility study, SEAMS will benefit through establishing a new market for the application of WiLCO, and further enhancing the WiLCO brand in delivering innovative solutions to all modelling problems. On the other hand, SUMS can utilise WiLCO's modelling capabilities to support a number of research opportunities, understanding the data and skillsets required to go forward. The modelling framework within WiLCO provides an ideal structure to model a product's full life cycle. It provides a framework to capture the key performance aspects of supply chains; the costs incurred; accounting for the energy used and carbon footprint. Furthermore, WiLCO can be used to explore the alternative strategies. Ultimately, these strategies can be optimised to identify the least cost strategy to meet defined performance and environmental standards.

Supply chain intervention has been used successfully by companies for decades to improve their financial bottom line. Successful companies have expanded their field of vision to look at the processes and operations of the companies that they buy from and companies that they sell to. This has allowed them to make better, more informed decisions about how to run their own operations. Many benefits have been seen: improved productivity, increased efficiency, reduced waste, lower capital requirements and enhanced product development. However, extensive content analysis in this feasibility study has identified that majority of the traditional energy efficiency and carbon management methodologies have analysed the operations of single companies (or even single sites). Therefore, carbon savings typically come from efficiencies within each company's operations only and will not impact on the rest of the supply chain network. The proposed carbon management model extends this feasibility to cover specific processes from multiple sites and multiple companies operating in a single supply chain. This allows the full carbon footprint for each product to be created. The advantage of implementing such an approach is that companies will engage collaboratively up and down the supply chain. Carbon savings will therefore come from both internal efficiencies, and from external process change and reorganization.

The scope of the project is to explore how the capabilities of this modelling framework can be employed by SUMS and SEAMS in carbon footprint management. Benefits identified for SEAMS and SUMS include the opportunity to reduce emissions in the total supply chain network (by performing intervention analysis) because the boundary is wider (involvement of other supply chain entity) than in traditional carbon analysis (single entity). Results demonstrated in the working prototype in the WiLCO model also enable decision-makers to map the current emissions sources, and the ability to create awareness of potential trade-offs. For example, improving lead time within supply chain in order to maximize the truck load capacity, hence the reduction of additional mileage to reduce CO2 emissions. Lastly, there is

potential benefit to create awareness among supply chain entities in regard to carbon emission sources along the supply chain. With the awareness among customers who demand more environmentally friendly products, companies will have the opportunity to develop new low carbon products, or change their current business processes to capture new markets and retain existing customers. Furthermore, WiLCO can be used to explore alternative strategies. Ultimately, these strategies can be optimised to identify the least cost strategy to meet defined performance and environmental standards.

New functionally added in WiLCO also enables informed decision making for managers of companies in the supply chain. Results obtained from the analysis will assist optimisation of decision making on ways in which energy inefficiency could be addressed through proper investment. The impact of these informed decisions will help many companies, especially SMEs to prioritise their investment effort in order to reduce carbon footprint, CO2 emissions and energy consumption. As a result, this will inspire new innovation of products and services, leading to new sales, new jobs and increased job security.

In order to demonstrate the applicability of Carbon Footprint assessment into the existing WiLCO software, a pilot model had been developed to map the CO2 emissions. In this pilot model, only Transportation CF assessment had been taken into consideration because it is assumed if the transportation model works in WiLCO, the rest should work based on the same principle. Results show that WiLCO has successfully integrated the Transport Carbon Footprint assessment into the existing software. Recommendations have been proposed in order to enhance the functionality of WiLCO to perform a more integrated Carbon Footprint analysis include integration of a "Case Based Reasoning" decision support system, designing of new graphic user interface due to the complexity of supply chain network, and inclusion of reverse Carbon Footprint supply chain into the proposed model