Supporting tools for better implementation of sustainability strategies in transport sector

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Abstract

Transport industry today is facing an increasing pressure to improve its sustainability performance. Aviation industry, for example, will be included in European Union Emission Trading Scheme from 2012, therefore effective strategies to reduce their carbon footprint is urgently required. Policies and strategies are set in response to such a growing demand from various stakeholders, yet the progress seems to be slow. This paper uses aircraft manufacturers as an illustrating example to demonstrate why more systematic approaches are urgently needed. Aircraft manufacturers indeed realise the importance of focusing their efforts to incorporate sustainable development policies into their core business strategies. However, this study addresses the scarcity of supporting tools that could be applied in order to implement sustainability strategies more effectively.

The main objective of this paper is to demonstrate how aircraft manufacturers can formulate and implement sustainable development strategies in a systematic and traceable manner. The paper emphasises the importance of having a structure in developing sustainable development strategies. Today, the importance of stakeholder analysis, dialogue and engagement is widely recognised in the aviation sector. This paper suggests such stakeholder analyses to be conducted in a more structured and integrated way in view of offering improved support to the ever globalised aircraft manufacturing system in order to effectively define and implement sustainable development strategies. Under the rapidly changing business environment that aviation industry is operating in, the need of a holistic approach to develop sustainable development strategies, such as a systems approach, seems to be well justified. Opportunities created by such an integrated and holistic conceptual framework can enable aircraft manufacturers to strategically manage their business and deal with increasingly demanding business challenges are discussed.

1. Introduction

Transport sector is currently facing a challenging task of incorporating sustainable development strategies into its core strategy. Climate change is especially a key topic on the sustainable development agenda for the transport sector in the 21st century. Some transport modes show significant negative contributions to climate change. Thus, executing an effective climate strategy is becoming extremely important. As depicted in Figure 1, light duty passenger vehicles dominate CO_2 emissions in the transport sector. However, as often concerned, the growth rate of the CO_2 emission from air transport is far more than any other transport mode. The European Union has decided to include the aviation sector in the currently running European Emission Trading Scheme (ETS) from the year 2012, in order to attempt to reduce carbon emissions from the aviation industry. New initiatives, such as voluntary carbon offsetting schemes are increasingly adapted, while taxes are other options to reduce emissions using economic measures. The aviation industry also invests their efforts to reduce their environmental impacts by enhancing R&D (research & development) for improved technology and more efficient operational procedures.

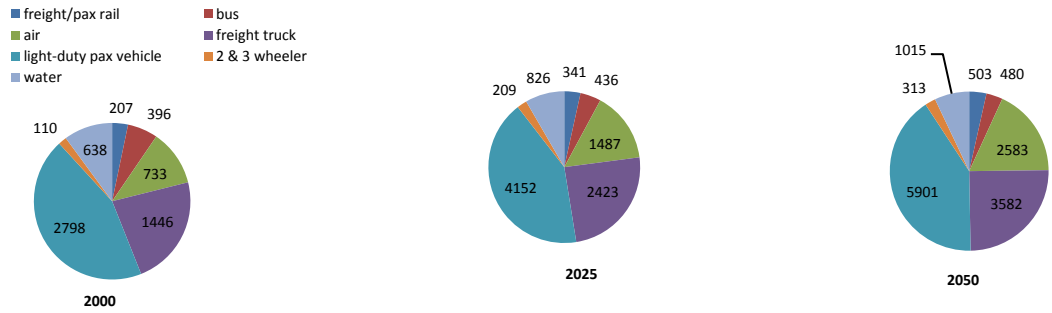

Figure 1World transport CO_2 emissions by mode (mega tonnes); Source; IEA/SMP

Climate change is not the only concern for sustainability strategies in transport sector. There are numerous other issues, such as noise, local air pollution, congestion, alternative fuels, waste management, to name a few. Both demand and supply side management are required to be carefully studied in order to design an effective sustainable transport planning. Due to the nature of the industry, environmental issues tend to draw much attention, however recent trends shows a gradual shift in the industry's attitude from environmental focus to more holistic views of the overall industry performance including economic (e.g., regional/local development) and social (e.g., safety & security) aspects. Figure 2 depicts the economics, environmental and social issues surrounding sustainable development for aviation industry. Recent disruption due to the Icelandic volcanic eruption called much attention of

sustainability in the aviation industry and its supply chains when such unexpected events happen. Due to the disruption in their logistic system, many fresh flowers, fruits and vegetables flying into Europe by air cargo from Africa were stranded for six days. These sudden events reinforce the argument on the importance of applying more broader and innovative integrated multi-mode transport strategies to reduce the risks on depending on one transport mode. Given such a painful lesson to the air cargo business, moving into the integrated transport model seems to be a key for the transport sector to develop in a more sustainable manner. The effectiveness of integration can be easily seen in a case of growing numbers of so-called 'airport city' around the world that airports grew as a part of their surrounding community and are connected strategically by various public transport systems to the city centres and other regions.

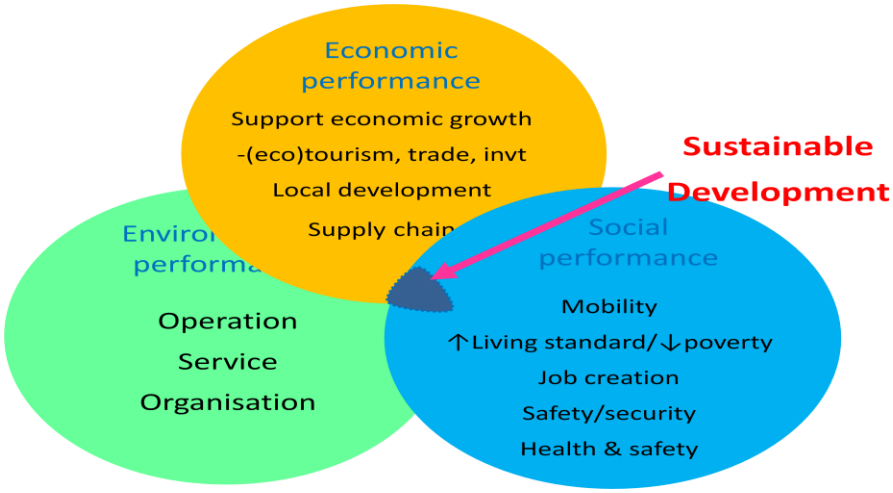

Figure 2 Sustainable development in aviation industry

When faced with the growing environmental uncertainty triggered by globalisation and regulatory pressures, existing business processes employed by organisations may prove to be inadequate in order to remain competitive (Mykityshyn & Rouse 2006). This argument could well apply to the aviation industry, which operates in a competitive market and faces a continuously rapidly changing business environment including constant regulatory changes.

At present, there appears to be a gap between setting and meeting sustainability targets in transport sector. Lack of implementation tools seems to show the difficulties in effectively formulating and executing their sustainability strategy. Hence, we call urgent needs of coordinating within and among different transport modes. The paper therefore asks a research question: what are the tools that the transport sector could apply in order to improve their implementation process more effectively? The study explores different approaches and

examines the consequences of applying the proposed approaches. This paper comprises of three sections. The next section will illustrate how we can improve the implementation process of sustainability strategies in transport sector using aircraft manufacturing industry as a case study. Section 3 explains why the suggested approaches in this paper are useful. Final section concludes the study and explores the area of future research interests.

2. How can we improve the implementation process?

According to Ashuri et al. (2007), the performance of organisations highly depends on the collective efforts of stakeholders involved in managing the organisation. They claim that identifying how different stakeholders perceive business processes facilitates in solving specific business problems and infusing innovation to the existing processes. Stakeholder analysis, dialogue and engagement have been widely recognised as significant activities in the aviation industry (e.g. see the *Airbus economic, environmental and social report* 2008). Alexander Ter Kuile, the CANSO (Civil Air Navigation Services Organisation) Secretary General, has emphasised the importance of stakeholder engagement for the aviation industry at *Aviation and the Environment Summit* in Geneva, 22 April 2008. He has claimed that the balance and trade-offs between diverse interests of many different players in the aviation sector is a key and can be achieved by effective stakeholder engagement. He believes that minimising the environmental impacts of the aviation industry requires both active involvement of all key stakeholders and clear accountability of each party. Alexander Ter Kuile calls for the need of optimising the performance of the entire aviation system, as one system with united leadership and actions, instead of the current system of operating independently in many places of the aviation sector.

According to Clarkson (1995), corporate social performance can be effectively analysed and evaluated based on strategic relationships with key stakeholders. One of the most widely quoted definitions of stakeholder is "*any group or individual who can affect or is affected by the achievement of the firm's objective*" (Freeman 1984). Stakeholder analysis provides a new way to explain the relationship between an organisation and its environment by challenging the dominant economic model of firms (Simmons & Lovegrove, 2005). Stakeholder analysis provides an opportunity to link stakeholder perspectives to system thinking (e.g. Checkland 1998), as such perspectives could be identified and expressed based on the purposes, processes, and outcomes of organisational systems (Lewis et al. 2007).

Justifications for undertaking a stakeholder approach can be given by considering stakeholder engagement in terms of strategic economic management or otherwise in terms of legitimate moral relationship (Goodpaster 1991; Kaler 2003). The former justification approach promotes enhanced stakeholder cooperation and performance resulting inincreased profitability for organisations. However, empirical studies do not always support on such profitability increment due to the stakeholder approach (e.g., Coombs & Gilley 2005; Orlitzky et al., 2003). The latter justification approach promotes fulfilling a moral obligation or duty of stakeholders to the firm to establish a good relationship (Greenwood & Uhlenbruch 2007). Stakeholder analysis that provides a balanced approach including environmental and social considerations during a decision-making process is becoming significantly important in the airport sector (e.g., Graham & Guyer 1999; Hensher & Brewer 2001; Gago & Antolin 2004; Kaszewski & Sheate 2004). Amaeshi and Crane (2006) provide a stakeholder engagement framework to support airport companies in formulating and implementing strategies for sustainable airport development and suggest a practice guide to operationalise the framework.

A lifecycle approach is a widely recognised global approach (Blanchard & Fabrycky, 2005) that is becoming increasingly popular for aircraft manufacturers. A lifecycle approach enables aircraft manufacturers to assess and control not only their environmental impacts but also costs in a systematic way over the whole lifecycle from R&D to aircraft retirement. Thus, such an approach is the key in establishing sustainable development practices. The integrated approach implied from a lifecycle approach is aligned with ACARE's (Advisory Council for Aeronautics Research in Europe) vision that supports integrated design and product development to increase efficiency and competitiveness of European aircraft manufacturers. An extended ISO14001, a certification system for environmental management, covers all the company's production sites and products throughout their lifecycle. According to Stackpole (2007), a lifecycle approach enables aircraft manufacturers to most efficiently design and manufacture a product with the highest quality, as well as reduced amount of data translations and manual processes, thus potentially reduce transactions costs. One such example is the lifecycle approach for Boeing Dreamliner 787 that established a common development environment and set design processes for all the global partners.

Khurana and Rosenthal (1998) found that the greatest success comes to enterprises that take a holistic approach to effectively linking business strategy, product strategy and product-specific decisions. It has to be noted that the findings of their research were based on a number of in-depth case studies concerning the front-end practices of US (United States) and Japanese enterprises. These research findings are further enhanced by the work of Karkkainen and Elfvengren (2002) and Cagan and Vogel (2002) who emphasised the fact that the systematic articulation of issues in the front-end is a critical success factor in the development of new products. Manufacturing enterprises have been long pursuing to achieve high performance by aiming to improve key business performance indicators and benchmarks; for example, by targeting right first time (RFT) and reducing cycle time and increasing overall equipment effectiveness (OEE). Benson (2005) proposed the use of new product efficiency (NPE) as a benchmark equivalent to OEE for research and development of new products. RFT is a central factor in NPE and is affected by the degree to which the defined design requirements are aligned with stakeholder needs. Systems engineering processes and methods aim to support the systematic and traceable derivation of design requirements from stakeholder needs (e.g. Agouridas et al 2008, 2006). As such these processes can contribute to improving NPE by effectively linking business strategy, product strategy and product-specific decisions; such a linkage is a key enabler for downstream integration management. There is an urgent need for the aviation industry to learn and, most importantly, operationalise system development methods so that it can capitalise on the promising benefits arising from such methods.

3. Why the suggested approaches are useful

This section discusses why the proposed holistic approaches, namely stakeholder analysis, life cycle approach and systems analysis, are important to effectively design and implement sustainability strategies in transport sector. As Figure 3 illustrates, the life cycle model enables the industry to operate in a more efficient way throughout value-chains in a closed-loop design, while the stakeholder analysis provides a tool for effectively responding to stakeholder demands in a globalised market. The systems analysis then offers the systematic as well as traceable process via top-down and bottom-up approaches. Such an integrated approach, compared to the current fragmented approach, is expected to support the industry to reduce risks, time and costs as a result of improved efficiency and better coordination, such as risk-sharing with suppliers at an early stage as shown in Figure 4. Early identification of opportunities, threats or risks would be a key success factor for the industry which is

operating in an increasingly globalised environment with huge future uncertainty including sudden events (e.g., economic, political, natural or seasonal).

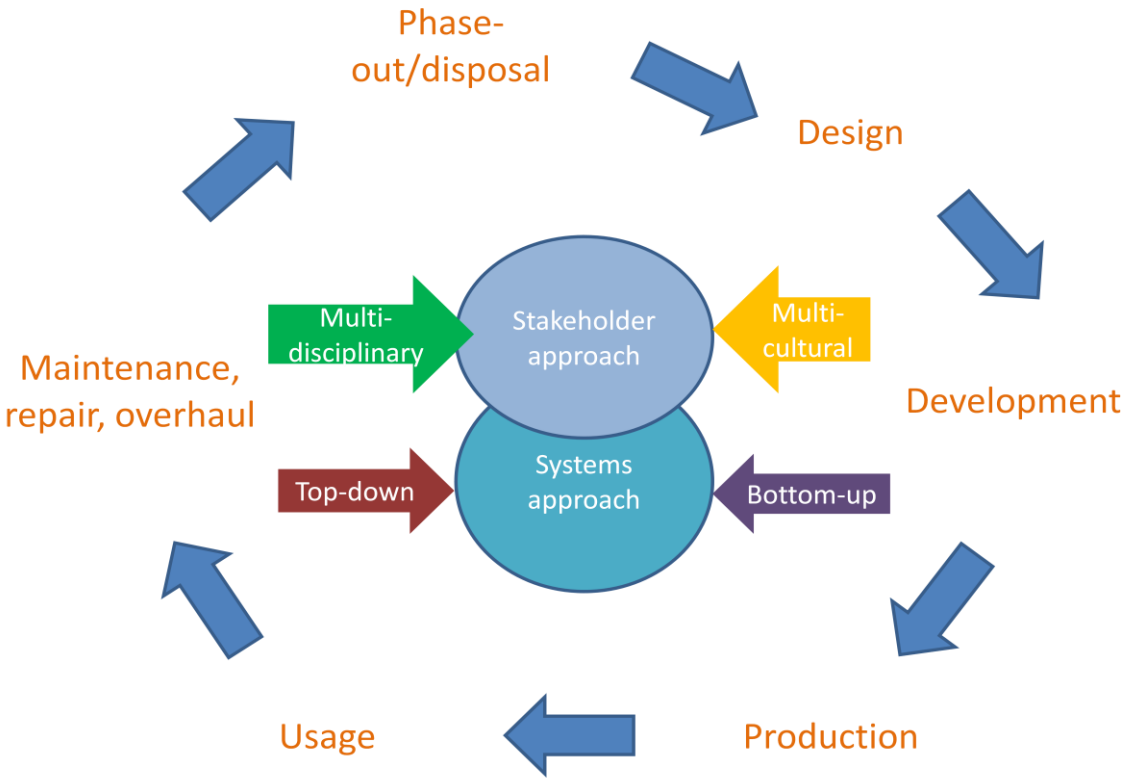

Figure 3 Holistic approach to sustainable transport development

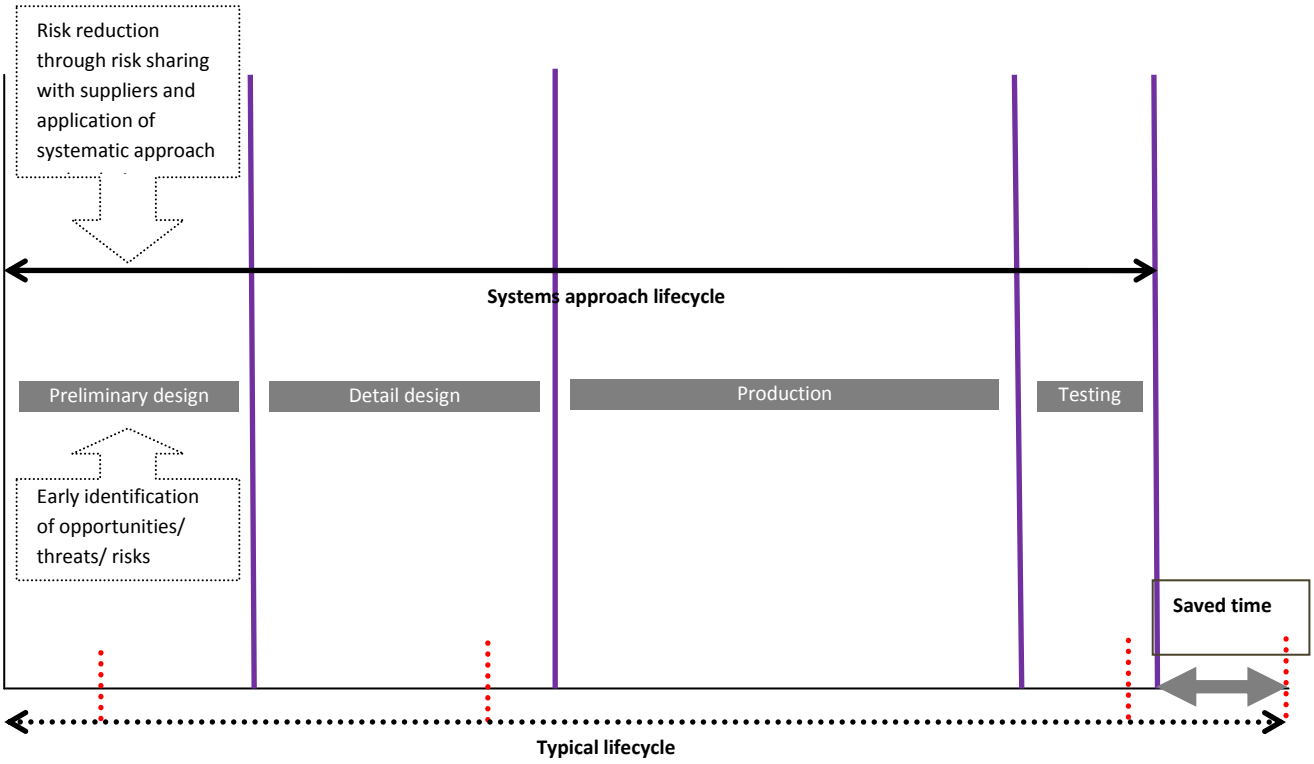

Figure 4 Benefits of applying the stakeholder and systems approach

In the past decade, many business investments, such as ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management), resulted in improved operational efficiency and customer retention (Slack et al, 2007; SaaFilippo, 2007). Those investments still continue today with an expanded focus on using product definition information more effectively in both production and operation of a product, or plant, in service. Effectively leveraging supply chain partners for both design and production efficiency continues to grow its importance in achieving operational excellence (Slack et al, 2007; Anon, 2002). Achieving product leadership focuses on revenue generation from a steady stream of innovative, new products. To this end, enterprises are challenging to bring innovative products to market more effectively and more quickly to maximise customer interests and sales. The pressures to reduce time, improve product quality, and lower costs have not gone away; they are being reaffirmed and folded into programs that focus on delivering not just the 'right' product, or service, but products and services of the 'right value'. In order to continue to expand, product leadership companies should continue to enter new markets with innovative products. This requires leveraging and reusing the product-related intellectual capital created by business partners working together across the extended enterprise value chain (Slack et al, 2007; Subrahmanian et al, 2005; McMahon et al, 2005; Chen et al, 2008, Anon, 2002). Globalisation is an overarching reality that spans each of these business drivers. To be successful in the global markets, organisations must develop and apply a diverse set of skills and business processes.

4. Conclusion

This paper has investigated the tools which could be applied by the transport sector in order to effectively design and implement sustainability strategies. The life cycle model enables the industry to operate in a more efficient way throughout value-chains in a closed-loop design, while the stakeholder analysis provides a tool for effectively responding to stakeholder demands in a globalised market. The systems analysis then offers the systematic as well as traceable process via top-down and bottom-up approaches. Such an integrated approach, compared to the current fragmented approach, is expected to support the industry to reduce risks, time and costs as a result of improved efficiency and better coordination, such as risk-sharing with suppliers at an early stage. The key emphasis of this paper is the importance of the 'design stage' in a life cycle as to modify/change strategies or physical structure (e.g.,

airport design, connectivity of air transport to other transport mode) would be much more costly, time consuming and less efficient.

The paper has mainly discussed the theoretical development of a holistic approach for improving current practices of sustainability strategies. The author therefore proposes further research on conducting an empirical analysis in order to confirm the robustness of the suggested approaches and measure the impacts and possible challenges associated with. The proposed tools are not only limited to be applicable to aircraft manufactures, but also bringing a huge potential to be extended for further applications to other industries in the whole transport mode.

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