



A Review of Key Issues and Challenges for Sustainable Food Logistics Management

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요 약 : The need to further improve food quality and reduce food waste leads to increased attention for the development of Food Supply Chain Management (FSCM) which considers intrinsic characteristics of food supply chains besides traditional supply chain management (SCM) objectives such as cost and responsiveness. Growing consciousness of society towards sustainable development brings additional objectives to the food supply chains and the fast evolution of sustainable development results in the development of a new fast-growing concept: Sustainable Food Supply Chain Management (SFSCM). In response to these developments, researchers have developed various decision support tools that can be used for handling progressively increasing complexity along the alteration process from SCM to FSCM and now to SFSCM. This study reviewed literature on sustainable food logistics management to identify logistical key issues and relevant challenges. The evaluation of the reviewed papers shows that towards obtaining sustainability together with considering intrinsic characteristics of food supply chains, there is a gap between the needs of the practice and the current available method.

핵심용어 : Food logistics management, Sustainability, Key performance indicators

<p>CONTENTS</p> <ul style="list-style-type: none">○ Introduction○ Literature Review○ Issues and Challenges○ Case study and Helps○ Conclusion	<p>INTRODUCTION</p> <p>Food chain logistics is a significant component within logistics system as a whole. The food sector plays a significant role in economy being one of the main contributors to the GNP of many countries, particularly in developing countries.</p> <p>Due to differences in goals and scopes, methodological approaches, setting of boundaries and assumptions as well as data quality and availability it is often not possible to compare the environmental impact of food products within the same product category and even less so between different product groups.</p>  
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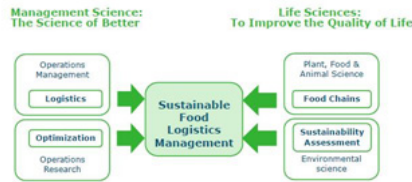
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INTRODUCTION

Sustainable Food Logistics Management



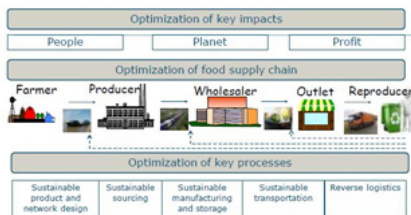
INTRODUCTION

- o The current trend in food value chain is characterized by three overriding features:
 - a. greater concentration of farms, food industries, and wholesalers into smaller number with large sizes;
 - b. the evolution of integrated supply chains linking producers and other stakeholders;
 - c. ever increasing consumers demand for food quality and safety (food that is fresh, palatable, nutritious and safe) and animal welfare.

However, to date, the linkage between logistics systems of the stakeholders in the agriculture and food supply chains is rather loose and fragmented. Even within individual firms, the vertical and internal integration as related to freight and logistics is loose, and therefore they are both economically and environmentally inefficient and not sustainable. In this regard, effective and efficient logistics will be a critical success factor for both producers and retailers.

INTRODUCTION

Framework Sustainable Food Logistics Management



INTRODUCTION

Sustainability & SCM

Sustainability: *Sustinere (Latin): to maintain, endure*

Triple Bottom Line: *Responsible management of environment, economy and society*

Supply Chains/Networks: *Planning and management of all activities involved in sourcing, procurement, conversion and all logistics management activities (plan, implement and control efficient and effective forward and reverse flow and storage of goods, services and information between point of origin and point of consumption)*



LITERATURE REVIEW

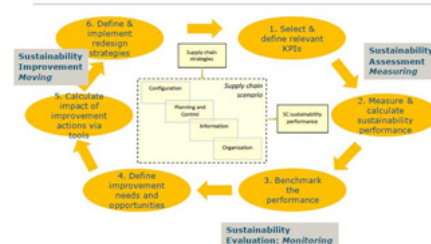
Lessons learned from literature:
Soysal et al. (2012): Review on QM for SFLM

- FSC systems: complex
 - wide diversity products
 - many quality requirements
- Key logistic aims:
 - Cost reduction and improved responsiveness
 - Improved food quality and reduction of food waste
 - Improved sustainability and traceability
- Quantitative modelling challenges:
 - Variabilities, continuous quality degradation, multi indicators, multi objectives, system boundary



LITERATURE REVIEW

Stepwise approach for sustainable supply chain management



LITERATURE REVIEW

Indicators for People, Planet and Profit (3P) (adapted from United Nations)

Social	Environment	Economic
Employment	Food Miles	Material use
Quality of life	Water use	Percentage of food lost
Food Safety	Carbon intensity of energy	Transport efficiency
Nutritional value of food	Land usage	Output growth
Fair trade	Use of fertilisers	Added value
Share of food in consumption	Generated waste	Waste recycling/reuse

ISSUES & CHALLENGES

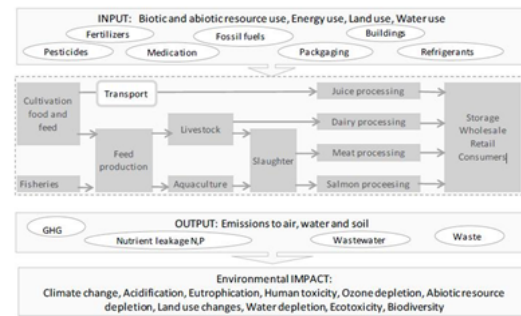


Figure 1. A simplified overview of the common steps in three food supply chain systems (orange juice, meat/dairy and aquaculture) and examples of input resources and output emissions causing environmental impacts.

ISSUES & CHALLENGES

- In general supply chain of food products share similarities where food moves from producer to consumer via the processes of production, processing, distribution, retailing and consumption. Each step of the supply chain results in an environmental impact on local, regional or global level (Figure 1 and Table 1). If the environmental hot spots or a key environmental challenge for each step in the chain is known, efforts can be used to focus on these problems and effectively minimize the environmental impact.

ISSUES & CHALLENGES

- The environmental challenges of food supply chain systems are typically caused by the use of fossil fuels, water, fertilizers, pesticides and land in the primary production as well as the accumulation of discards from the farm animals i.e. manure and excessive feed in aquaculture. Other challenges in farming are related to the use of feed, medication, the occurrence of escapees and the impacts of the farming on the wild flora and fauna. In the processing steps of food the use of resources, energy, water, packaging and refrigerants, waste and wastewater generation, and the type of facilities like buildings and infrastructure will influence the overall environmental impacts. The choice of technologies is often a key influential factor and the yield, full utilization of resources including the use of by-products is of importance in the overall estimation of the environmental load both in production and processing. In the transport phase the use of diesel is a challenge where the mode of transport can influence the severity of environmental impacts.

TABLE 1. IDENTIFIED KEY ENVIRONMENTAL CATEGORIES FOR THE FOOD CHAIN, RELEVANT PRODUCTION STEPS AND CHALLENGES.

Impact category	Production step	Challenges
Climate change	Cultivation of biomass, Fishing (feed fish), Feed industry, Animal rearing, Food industry, Transport	Nitrogen fertilizer production, Use of N fertilizer and manure, Enteric fermentation, Manure handling, Use of fossil fuel, Refrigerant leakage
Acidification	Cultivation of biomass, Fishing (feed fish), Feed industry, Animal rearing, Food industry, Transport	Use of N fertilizer and manure, Use of fossil fuels
Eutrophication	Cultivation of biomass, Fishing (feed fish), Feed industry, Animal rearing, Food industry, Transport	Use of N and P fertilizer and manure, Manure handling, Nutrient release from aquaculture, Waste water
Human toxicity	Cultivation of biomass	Use of pesticides
Ecotoxicity	Cultivation of biomass, Feed industry (fishing), Animal rearing, Aquaculture	Heavy metals from fertilizers, Use of pesticides, Use of medicines, Use of antifouling paint
Land use	Cultivation of biomass, Animal rearing (Aquaculture sea surface/floor use)	Land use efficiency
Abiotic resource depletion	Cultivation of biomass, Fishing (feed fish), Feed industry, Food industry, Transport	Use of fossil fuels, Use of P fertilizer
Water depletion	Feed industry, Food industry, Transport	Irrigation, water use
Biodiversity	Cultivation of biomass, Animal rearing	Land use, Use of pesticides, Escapes and diseases in aquaculture

CONCLUSION

From effective logistics management point of view, an integrated approach from farm to table is required for effective control of food hazards which is a shared responsibility of producers, packers, processors, distributors, retailers, food service operators and consumers. Therefore, tracking slaughter animals from birth to finished products and tracking food shipments are becoming area of focus recently. Studies indicated that, in the food and agriculture supply chains, there are potential area of logistics related improvements in terms of reducing transport routes, distance and time; reducing emission from vehicles; improving the packaging of food products and improving transport services. This can be implemented in collecting, storing and transporting slaughter animals, meat products, milk and dairy products, grain and related products. These logistics related improvements are possible in developed and developing countries. In case of local food systems, an integrated logistics network that embraced producers, customers (delivery points), collection centers and distribution centers in the local food supply chain is very important, because the logistics services in such local systems are fragmented and inefficient, compromising competence of local food producers. Introducing and implementing logistics related coordination and integration in the local food systems greatly improve the sustainability of local food systems. In general, studying and identifying the constraints and developing and implementing more effective and efficient concepts of logistics services in the agriculture and food supply chains is very essential for overall economic growth of a country and for environmental benefits.