

# **Information Services for Agri-Food Supply Chains – A Framework for Development –**

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**Abstract:** Several global developments such as the growing demand for bio-energy, limits in the availability of water and diminishing production resources as well as sector-wide crises (e.g. BSE, swine fever, dioxin) have led to a changing attitude of society towards the consequences of the food system's activities for social, economic and environmental issues, captured in the term of sustainability. As a consequence, consumers show increasing interest in the characteristics of food, and in turn, on the availability of related information and guarantees. Enterprises in agri-food supply chains are facing new expectations and are seeking to communicate social, economic and environmental performance of their business to customers within the supply chain and consumers as the final customers. Information services, since they are mainly building on existing systems, could provide flexible solutions for enterprises to measure and evaluate sustainability of products throughout a food supply chain. Gained information on product characteristics might be used for decision support within enterprises as well as for communication of sustainable practices to customers and consumers, resulting in increased competitiveness of enterprises, supply chains and the sector by satisfying customers' and consumers' need for information on the sustainability of a product. This paper will introduce a framework for developing information services for agri-food supply chains by identifying and defining different types of information models and gaps, which need to be considered when developing an information service.

## **1 Introduction**

The most well-adopted and most often quoted definition of the term sustainability is that of the Brundtland Commission, generally known as the Brundtland Report. It refers to sustainability as “development that meets the needs of the present without compromising the ability of future generations to meet their needs” [WCED87]. However, because the definition of sustainability is so far reaching, enterprises often find it difficult to

determine their individual roles within this broad perspective [Sh95]. Enterprises have problems to identify future versus present needs, to determine technologies and resources required to meet those needs and to understand how to effectively balance organisational responsibilities to multiple stakeholders such as employees or other enterprises in the supply chain and broader stakeholders including society [SR95, GPM04]. In a competitive environment, in which integrated responsibilities for people, planet and profit are becoming a prerequisite for good entrepreneurship [KM03, SW06], consideration of these integrated views is one of the critical success factors for the food sector's long-term success [Wo10]. New solutions for determination of sustainability, either in a broader sense, covering social, economic and environmental issues, or more narrowly, covering only single aspects of sustainability, are needed for agri-food supply chains to support decision makers within enterprises as well as for communication of sustainable practices to customers and consumers [TM04, VBV05].

## **2 Framework for Developing Agri-Food Information Services**

An information service for agri-food supply chains provides information on product characteristics to enterprises within a supply chain and to consumers. Such product characteristics might involve product information, such as quality parameters, and/or process information, which might be more difficult to quantify and might not be measurable at the final product, such as animal welfare information [Sc02]. Hence, it can be described as a service that (1) measures and evaluates social, economical and/or environmental product characteristics, (2) might be used for decision support and (3) enables communication of product characteristics to customers and consumers. By building information services upon the existing supply chain information infrastructure (defined as available intra-enterprise and chain/sector focused information systems [Le10]), information services could provide cost- and time-saving solutions for enterprises to meet their increasing information demands, therewith improving the competitiveness of enterprises, supply chains and the sector by satisfying customers' and consumers' need for information on the sustainability of a product. Moreover, such services would provide a flexible solution for also meeting future information demands.

Figure 1 illustrates the general steps of an information service, involving the four major parts information demands, information service, information sources and information provision (meeting the information demands). These steps are similar for a multitude of technological solutions, for example, the service might be approached by a person through any web-enabled device such as a personal computer, smart phone or personal digital assistant (PDA), or the service might also run fully automated, e.g. for every product passing a RFID-gate. The service user approaches the service with one or more information demands which first need to be specified. This specification of information demands determines the type and number of queries (request and reply loops) the information service needs for providing the information.

After demands have been specified, an event, such as the product identification (e.g. scanning a barcode, reading a RFID-tag, typing in the product's ID) or a predefined time, starts the service. The first step of the service is usually a traceability query,

identifying which actors were involved in the production process and may have the needed information, followed by further queries to the involved actors, which are depending on the specified information demands and the received traceability information. Thereby all information queries might alternatively or complementarily make use of intra-enterprise information systems, chain/sector focused information systems and/or external applications, which may contain redundant, processed and/or additional information. As a next step, in some cases received information needs to be further processed (e.g. if results first need aggregation or due to different metrics) before it is prepared in a report and provided to the service user.

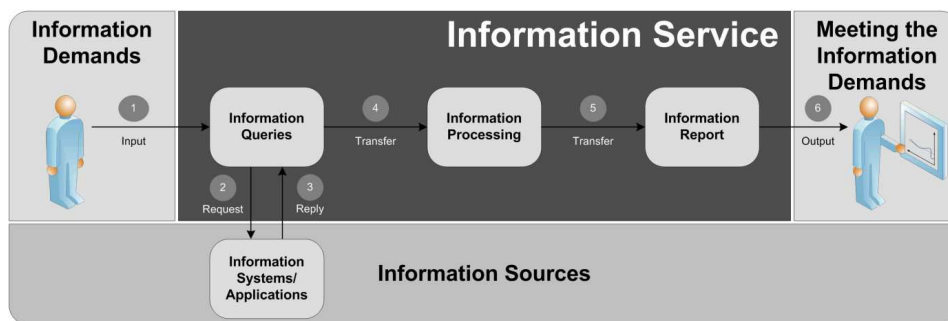


Figure 1: Steps of an information service

The identified steps of an information service allow for deriving a framework for developing information services. Any development of an information service should build upon (1) information supply models (determining available information sources), (2) information demand models (determining information demands of a service user) and (3) gap models (determining information which is not available without additional efforts). However, analysis of information supply and related gaps is a difficult task in the agri-food sector because of its multitude of small and medium-sized enterprises (SMEs) and the resulting widely-spread heterogeneous information sources. Gaps are identified by contrasting the information demand models with the information supply models and they indicate where additional efforts need to be considered when developing an information service. Thereby three types of gaps can be distinguished: (1) information gaps (information is not yet available in the information infrastructure), (2) preparation gaps (available information is not sufficiently complying with actual demands) and (3) communication gaps (information is available in the information infrastructure but is not communicated). Solutions for information and preparation gaps might be very different as they might include various problems in information provision and processing. Communication gaps primarily call for agreements among involved chain actors.

### 3 Summary and conclusion

The present paper has introduced a framework for developing information services for agri-food supply chains by identifying and defining different types of information models and gaps, which need to be considered when developing an information service. Such information services could provide flexible, cost- and time-saving solutions for enterprises to measure and evaluate sustainability of products throughout a supply chain. Gained information on product characteristics might be used for decision support within enterprises as well as for communication of sustainable practices to customers and consumers, resulting in increased competitiveness of enterprises, supply chains and the sector by satisfying customers' and consumers' need for information on the sustainability of a product. Further research is needed to operationalise this framework for specific agri-food supply chains.

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