

Motivation gives better traceability

Motivation for implementing traceability is strongly linked to the costs and benefits of using traceability. If companies do not see the benefits, they will not make the necessary investments and changes to implement it.

The requirements for

documenting food products are ever increasing. Extensive national and international legislation has been passed to ensure food safety, and both the industry and the consumers are also becoming more interested in additional knowledge about the origin, processes, and other properties concerning the product.

The food scandals of the 1990s put traceability of food on the agenda because of an increased concern regarding food safety and quality. Traceability is defined by the International Organization of Standardization as the '...ability to trace the history, application or location of an entity by means of recorded



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identifications'. The outcome of the food scandals was that traceability was included in the European Food Law regulation EC-178/2002.

This law requires companies to document their suppliers and customers. Traceability systems may be used to document various properties and processes in the production of food, such as quality and optimising of production. If seafood companies only want to fulfill the legislation in the Food Law, they do not have to do anything as several companies already fulfill this legislation. However, if they use the information to optimise the production internally in the company, they should trace more of the processes.

In this research, mapping the loss of information in three different supply chains (clip fish, fresh fish and farmed salmon) was carried out. It is clear that information loss occurs within and between companies in

these three supply chains. This knowledge was necessary information when implementing traceability for seafood. The next step in this study was to study critical criteria in the implementation of traceability for fresh fish.

Critical criteria

An implementation of electronic chain traceability in a fresh fish supply chain was carried out. A whole supply chain was chosen, and the companies in the chain had a supplier-customer relationship. Fishing vessels, a production plant, a distribution company, and a supermarket with a manned fish and meat counter were included in the study. In addition, a sales organisation was involved. This organisation was responsible for organising the trade between the fishers and production plant, which was documented through a landing note. The

landing note was the starting point, because this document contained relevant information about the origin of the wild-caught fish (catch area, catch data, gear type, etc), and the end point was the consumer packaging at the supermarket.

Experience gained from this study showed that implementation is complex and involves many different aspects that affect each other. This study clearly demonstrated that internal traceability must be present before it is possible to achieve chain traceability. In addition, the development of optimal practical solutions to prevent information loss can be a challenge.

A number of critical success criteria were identified as a result of this implementation. The ability to identify benefits to be gained from implementation of electronic chain traceability was identified as one of these. If a company cannot identify any benefits in carrying out an implementation, this will affect the motivation. The willingness of the companies to co-operate and their motivation to implement traceability had enormous impact on the implementation process.

The motivation varied significantly between the different links of the studied supply chain.

The sales organisation was motivated by new legislation, which required better documentation of the fish (ie catch certificate). The supermarket was motivated by a desire to be able to trace fresh fish, because they wanted more information about this product (eg catch area, catch date, processing method, gear type). The supermarket also pointed out that better documentation throughout the cooling chain would help the parties involved identify who was responsible if the fresh fish was of poor quality. Efficient information exchanges could also be used to achieve shorter storage times at the production plant and distributing company, which would result in a longer shelf-life of the fresh fish at the supermarket. The supermarket was an important customer of the distribution company, so the motivation for the distribution company was mainly related to satisfying customer needs. The production plant was unsure of the benefits they could derive from a traceability solution, and the distribution company did not put pressure on the production plant for improved documentation, so motivation for the production plant to implement traceability was rather low.

Motivation

Motivation for implementing traceability is strongly linked to the costs and benefits. There are several benefits of using traceability in the food industry. Traceability can be used to fulfil legislation, and to document food safety issues, quality, sustainability, and welfare. In addition, traceability can be useful to meet requirements in certification schemes, to gain competitive advantages, to improve chain communication, used as a response to the threat of bioterrorism, and to optimise production.

The identified drivers of traceability for the studied companies were legislation, food safety, quality, competitive advantages, chain communication, and production optimisation. The most important driver of traceability was production optimisation, followed by competitive advantages and quality, legislation, and food safety and chain communication.

One finding in this research was that the investments necessary for successful traceability are dependent on several factors. These investments were affected by which software solutions and electronic recording equipment were available in the company. Other factors affecting investments were the degree of integration required in the software systems for successful internal traceability (simple or full integration), investments in new IT solutions, and necessary re-engineering of current IT systems. Another finding was that the companies would not make the investments necessary for better product documentation if they could not identify the benefits they stood to gain by making these investments.

Communicating and understanding the benefits of a traceability system is important for successful implementation of traceability. If a company cannot identify any benefits in carrying out an implementation, the motivation will soon wane. This will affect the willingness to invest in any technology needed to achieve better documentation of products. Take, for instance, the following scenario: a production plant distributes its fish to a wholesaler who, in turn, distributes the fish to a supermarket. The supermarket is extremely keen to offer its customers more detailed information about the



Implementation of traceability at the line level is challenging for wild-caught fish as there is less control over quantity of fish landed, variation in quality etc.

fish, such as its origin, and asks the wholesaler to arrange this. The wholesaler then needs to convince the production plant that it needs to send more information about its fish, after which the manager of the production plant asks himself "What do we get in return for doing this?"

Not complicated

Implementing traceability does not need to be complicated. It depends on what information you require and whether the system will contain little or a lot of information. The extent of the information to be traced depends on what the information will be used for.

Not all companies need to trace every last detail of the process, but can manage with the statutory requirements. In other places it is sensible to trace much of what happens, for example, to be able to increase the efficiency

of the company and achieve better control of production.

Based on the experiences, it was clear that knowledge of costs and benefits associated with traceability must be increased, as this can help seafood companies determine preferable traceability levels before the implementation process begins: what can the traceable information be used for, and what information is relevant for whom? The key is to develop a traceability system based on the user's needs, and at a price that is acceptable. Thus, different levels of traceability were studied.

Different levels

A traceability system can be simple (one-up-one-down traceability), when costs would be low and implementation would be easy. Traceability can also be complex. The chosen level will determine the complexity of

the traceability system, and can affect the practical solutions and specification of the IT systems in the implementation of traceability.

Application of information for quality and process optimisation purposes may demand finer traceability level. Coarser traceability level can be used when the risk of contamination is low, or when the requirements for controlling production processes are less stringent. Thus the level is dependent on a company's internal and external need for traceable information.

At the fine level, the complexity of the traceability system will increase, and it will entail higher costs, because there is more information to record, a higher number of transactions, and new systems and procedures would possibly have to be introduced. Consequently, the costs and potential benefits associated with implementing traceability at different levels should be identified. Which level to use, is dependent on

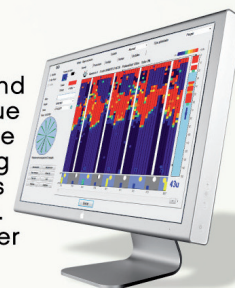
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the stakeholders' need for traceable information.

It is clear that the implementation of seafood traceability is affected by the level of the traceability system, but how will the randomness of fish supply affect traceability of wild-caught fish and farmed fish?

Wild-caught vs farmed fish traceability

The implementation of traceability at the fine level for wild-caught fish is probably more challenging than for farmed fish because of the differences between these two production concepts. In aquaculture, producers have much more control over the raw materials they receive; the fish size and quality of the farmed fish is quite stable, and different species are not mixed together. This makes it easier to coordinate and plan the time of production of farmed fish. The slaughter plant can coordinate with the fish farms when they have capacity to receive and produce the farmed fish.


The capture industry has much less control over the quantity of wild-caught fish delivered, and the variation in fish size, quality, and number of species is great, especially in the Norwegian conventional fisheries. In these fisheries, the sizes of fishing vessels and gear types vary greatly, and the volume of wild-caught fish delivered, for

example, from a vessel using a Danish seine can be very big compared to a delivery from a smaller vessel using a jig. The studied production plant received landings from the conventional fisheries ranging from 23 kg to 100 381 kg in 2007, for example, and the studied wet salted fish producer received landings ranging from 9 kg to 28 586 kg. If a company wants to trace deliveries back to each fishing vessel, the volume is important, because separating smaller landings of wild-caught fish will affect the efficiency of production and practices. This illustrates how the context can impact implementation of traceability in seafood supply chains at different traceability levels.

For both the production plant and wet salted fish producer, landing frequencies vary over the year, and large quantities of wild-caught fish are landed in a short period of time. This makes it difficult to trace at the fine traceability level, such as for each fishing vessel or each gear type. Mixing several catches together is a practical adjustment for achieving an efficient production, because separating all the small catches would be very time-consuming. Thus, using the fine traceability level can present big challenges due to the randomness of landings of wild-caught fish. Consequently, an important factor to include in a discussion of preferable traceability level in the capture industry is finding practical solutions for traceability.

Further work

Identifying applications for traceability and benefits of traceable information in seafood supply chains is a clear area for further studies. To be able to design a traceability system at the right level, there is a need to increase knowledge of preferable traceability levels for different seafood companies. When discussing preferable traceability levels it is important to include how this will affect practical solutions.

There is also a need to increase knowledge of who bears the cost and who reaps the benefits of using traceability in seafood supply chains. As documented in this study, motivation is a critical factor when implementing traceability, and is closely connected to identification of benefits of using traceability. 

Kine Mari Karlsen, is a scientist at Nofima, where she is working on various issues attached to traceability. This article is based on the author's doctoral thesis entitled "Granularity and its importance for traceability in seafood supply chains", financed by the Fishery and Aquaculture Industry Research Fund (FHF) and Innovation Norway.

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