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# 1 Towards a Decision Support Framework for Technologies 2 used in Cold Supply Chain Traceability

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## 7 **ABSTRACT**

8 In recent years, a need for product traceability in the cold supply chain has emerged. The purpose of this study  
9 was to identify and map out different kinds of identification technologies and techniques used for cold supply  
10 chain traceability. This was done by looking into what traceability solutions are available right now through  
11 literature review. The results from this review were then further analyzed to obtain a basis for the current state  
12 of knowledge, technical solutions and to identify possible traceability structures in the cold chain. A Decision  
13 Support Framework (DSF) was constructed for choosing a suitable technical solution. It consists of a table  
14 listing different functions and attributes of technologies and a decision-tree. The DSF created from this work  
15 will help the user to identify what kind of traceability technology and structure best suits his products. This is  
16 important, as it can often be difficult for the user to decide which technology is most beneficial for his company.  
17 That is why this decision support framework will enable him to decide what is technologically feasible,  
18 practical, economical, can sustain reputation, quality and safety of the products.

19 **Keywords:** Food traceability, Decision support framework, Cold supply chain, Quality, Traceability  
20 technologies, Supply chain management

## 21 **1. Introduction**

22 In global food trade, it is important to be able to ensure quality and safety of the products.  
23 This is not a simple task as food production consists of many different steps and after  
24 production the final products have to be shipped to different markets that can be regional,  
25 national and international depending on the customer. Therefore, it is important to be able  
26 to track and trace the products through these different steps along the supply chain (SC).  
27 *Traceability* is defined as “The ability to access any or all information relating to that which  
28 is under consideration, throughout its entire life cycle, by means of recorded identification”  
29 (Olsen & Borit, 2013). Two key terms in traceability literatures are tracking and tracing.  
30 *Tracking* is defined as “The ability to follow the movement of food through specified stages  
31 of production, processing and distribution”. Whereas *tracing* is defined as “The ability to  
32 trace the history, application or location of an entity by means of recorded identifications”  
33 (Bosona & Gebresenbet, 2013; Dandage, Badia-Melis, & Ruiz-Garcia, 2017; Storoy,  
34 Thakur, & Olsen, 2013). Storoy et al. (2013) say that a good traceability system should have  
35 the capability of performing both functions efficiently.

36 As perishable food products in cold supply chains are much more sensitive than non-  
37 perishable food products a special care must be taken. The *cold supply chain* is defined as  
38 “the transportation of temperature sensitive products along a SC through thermal and  
39 refrigerated packaging methods and the logistical planning to protect the integrity of these  
40 shipments” (Luo et al., 2016). Temperature is therefore the most important factor to monitor  
41 during the life time of perishable food products in order to prolong the shelf life and ensure  
42 quality and safety. This, requires decisions to be made quickly based on accurate information  
43 as problems need to be detected as soon as possible (Ruiz-Garcia, Lunadei, Barreiro, &  
44 Robla, 2009). There are not many traceability technologies available right now on the market

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