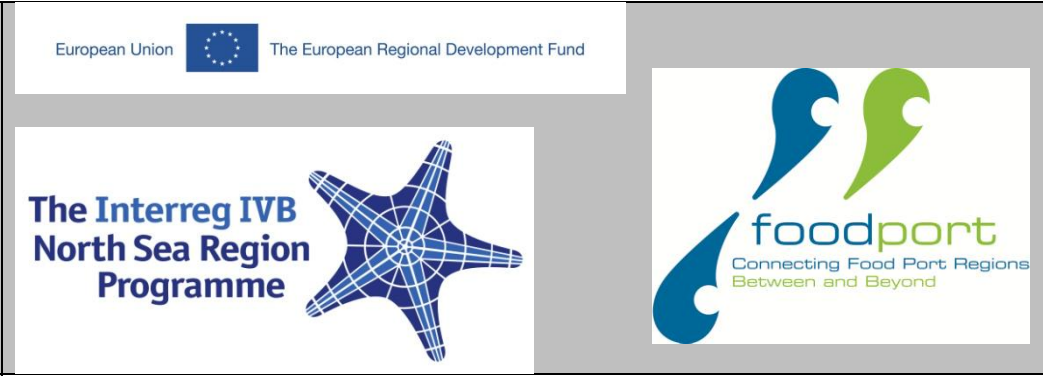


<p>WP 4.2</p> <p>Case Study 1</p>	 <p>The image contains four logos: the European Union flag and 'The European Regional Development Fund' text; the 'The Interreg IVB North Sea Region Programme' logo with a star-shaped grid; and the 'foodport' logo with the tagline 'Connecting Food Port Regions Between and Beyond'.</p>
<p>Project</p>	<p>The potential of adopting returnable transport packing systems in food transport</p>
<p>Project</p>	<p>FOOD PORT - <i>Connecting food port regions - Between and beyond</i></p>
<p>Project team and organisation</p>	<p>Port of Odense University of Southern Denmark</p>
<p>Domain/Context</p>	<p>The current practices in the transportation of fresh, chilled and frozen food differ from each other. For fresh food, many losses during the transport are direct result of inappropriate packaging, too high temperatures or frequent reloading or manipulation. The chilled and frozen food flows also face problems in temperature control and inefficient product reloading. Thus, it is highly important to elaborate an efficient solution for food transport. To achieve this, food transportation equipment is a key factor to consider. The success of transport equipment demands a smart design, an efficient utilization of space and time, and an effective management of each step in the food transportation process.</p>
<p>Description</p>	<p>In this project, a transport equipment pooling system is proposed as a solution for food transport. The pooling system refers to the shared use of standard pallets and containers by multiple customers who collectively benefit from the network scale of the pool, versus trying to manage reusable equipment individually. The key of this system is the shared standard pallets and containers, which can also be called returnable transport items (RTI). The system has been successfully utilized in transporting horticulture products, which normally have a short life cycle and requires fast-and-efficient transport solutions. RTI also has a great potential to be implemented in transporting food products.</p> <p>The RTIs are issued from a depot to food suppliers or shippers, who load food for transporting through the supply chain (Figure 1). At the end of the supply chain, the distributors unload the food and return the RTIs to the depot. The collection centre will prepare the RTIs and make them ready for use by the next shipper.</p>

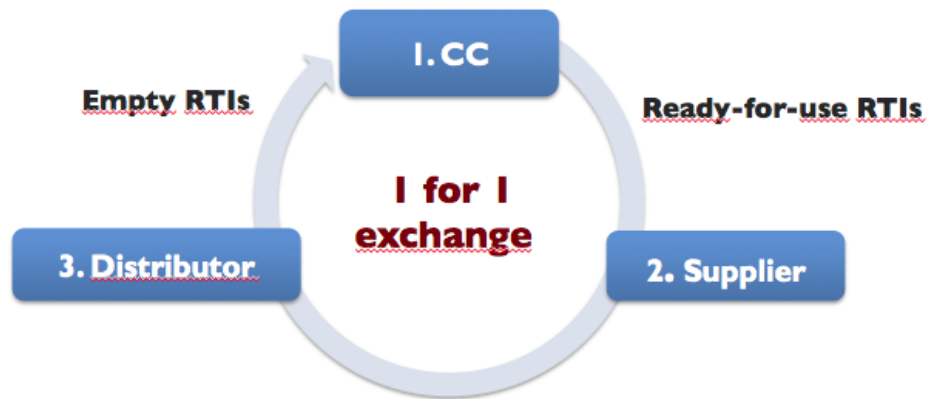


Figure 1. The basic elements of RTI flow

With the extended network of depots, it is also possible to pick up the RTI at one centre and return the RTI at another depot (may even located in another country) by paying a small amount of transfer fee. In this way, the returned RTI can be exchanged all over the depot network and is not necessarily to be transported back to the pick-up depot, see Figure 2. This will greatly facilitate the handling of transport equipment and thus save costs of returning empty equipment. It is particularly important for the food suppliers that are dealing with international activities.

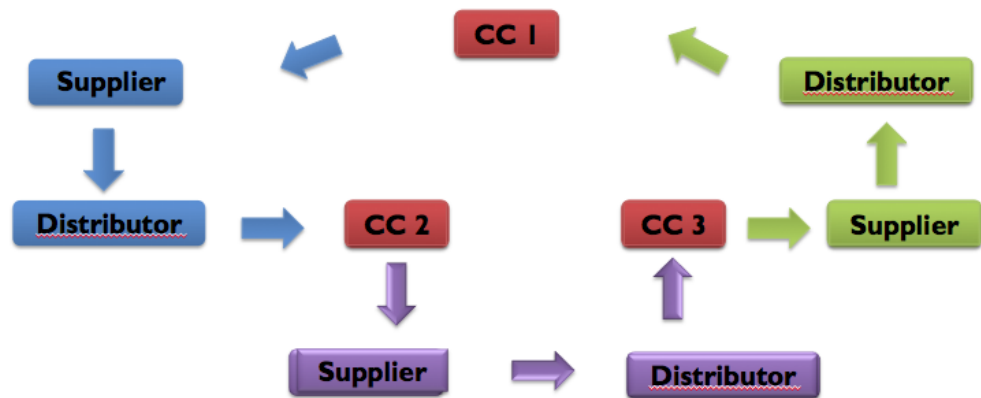


Figure 2. RTI flows within depot network

The transport system equipped with RTI has a few significant benefits for business. First of all, it ensures a cost-efficient supply chain by eliminating the fixed costs of procuring and maintaining transport equipment. Operating costs of transport equipment for every single shipper are also reduced by sharing RTIs among shippers in the supply chain. Similarly, there will be less administration work for and costs of transportation equipment. More important, the RTI enables shippers to cope with seasonal or unexpected capacity peaks through access to additional RTIs. Therefore, the quick reaction to volatile market demand and less risk of the food supplier can be expected.

<p>Target(s)</p>	<p>The target is to propose an efficient system for food transport based on the concept of a transportation equipment pooling system. Experiences and critical success factors from the plant and flower industry will be intensively studied and be the point of departure for our analysis. We look closely into the special requirements of transport equipment for food transport. Against this background, we put forward the potential RTI solutions in the food industry. Moreover, the transport equipment for three different food types, namely fresh, chilled and frozen food, will also be discussed.</p>
<p>Process and time line</p>	<p>STEPS ALREADY UNDERTAKEN</p> <p>Step 1: Study of transportation equipment pooling system utilized in plant and flower industries.</p> <p>Step 2: Summary of inspirations and experiences learnt from other industry cases.</p> <ul style="list-style-type: none"> • Utilization of transport pooling system; • Efficient design of RTIs. <p>Step 3: Proposal of possible RTI solutions for the food transport</p> <ul style="list-style-type: none"> • Reusable plastic crates; • Rollcontainer; • Rolly; • Minitainer. <p>Step 4: Identification of the equipment needs for transporting fresh, chilled and frozen food.</p>
<p>Actors + roles</p>	<p>Shippers, food suppliers generating demand for food transport, and collectively use RTIs as food transportation equipment. An individual shipper has the possibility to return empty RTIs and exchange for the new and ready-to-use RTIs. Food considered in this project can be generally categorized into three types: fresh, chilled and frozen food. Therefore, shippers engaged in different food types may have specific transportation needs in terms of volume, quality, time and costs.</p> <p>Logistics providers are the providers of the transportation equipment pooling system. They can manage and offer a wide range of RTIs and services that make transport and logistics simpler, cheaper and cost-efficient. Their major roles are 1) design of RTIs and transport system based on customer's requirements; 2) forecast the need for RTIs and transport of RTI within the depot network; 3) maintain the returned RTIs and prepare them ready for use.</p> <p>Research Institutes are expected to investigate the potential need for RTIs in the food industry. Additionally, research focuses on the special requirements of transportation equipment for food transport and propose possible solutions in this regard.</p>

<p>Critical Success Factors</p>	<p>One of the critical success factors is the pooling system that can exchange returnable transport items freely. It results in a smoothly running supply chain and customers don't have to worry about the management and maintenance of RTIs. A depot network would make sure that a RTI collected from one end of the supply chain can be returned to the other depot, and thus the total RTIs can be efficiently managed as a whole.</p> <p>The second successful factor is the efficient design of RTIs. There are four aspects that particularly matter. First, the RTI should have adjustable shelves. It will enable the maximum carrying capacity and suitable for the different product sizes. Second, each type of RTI should have a standard dimension so that food products from different shippers can fit into standard pallets or containers and be transported together. Next, some RTIs can be designed as perfect retail displays. Thus, the RTI can be rolled from suppliers and directly into the store. Products only need to be loaded once. One person alone can handle it, even without lifting equipment. It will lead to higher efficiency, reduced handling costs, and less product damage. Last, the RTI should be decomposable. For return logistics of RTI, it can be separated into several parts and condensed to a fraction of its loaded volume.</p>
<p>Pitfalls</p>	<p>There is no real case study of RTI in the food transport. In the future study, it would be interesting to interview a real food supplier who utilizes the RTI for food transportation. The absence of case study also makes it difficult to make precise estimation in terms of cost-saving, time reduction and efficiency improvement.</p>
<p>Project/test results</p>	<p>A transportation equipment pooling system is proposed based on experience learnt from other industries, e.g. horticulture and flower transport. Two essential factors are important for the success, which are the utilization of RTI and the efficient design of RTI. Based on the above discussion, several RTIs are proposed for transporting food, including reusable plastic crates, rollcontainer, roly and minitainer.</p> <ul style="list-style-type: none"> • A reusable plastic crate is in standard pallet size, so they can be stacked together and can also be used for retail display. Crates can also be made into collapsible type. • A rollcontainer is a two-side roll cage, which is more efficient when used together with the plastic crates. • A roly is a pallet with rubber wheels and a plastic base. • A minitainer is a roll cage for the handling and transportation of heavy products. <p>Furthermore, the RTI specifically for fresh, chilled and frozen food are investigated respectively in terms of retail display, product mix and innovation needs. There is a great research need for RTI in frozen food transport, particularly for the fish transport.</p>
<p>Lessons learned</p>	<p>Returnable transport items (RTIs) have been successfully and widely implemented in many other industries, such as plant and flower transport industry. The successful factors have been summarized (see 'Critical Success Factor' Section) and can be used for the food transport. However, the special characteristics of food product should also be taken into account when designing the equipment and systems.</p> <p>In many cases, fresh vegetables and fruits are transported together. In such mixed</p>

loads, it is very important to combine only those food types that are compatible. For instance, foods such as apples and bananas produce ethylene which induce ripening of many other fruits and vegetables. Thus, these commodities should not be mixed with others and need to be stored at a certain temperature in the refrigerated transport. When fresh foods are mixed properly, several RTIs are available for its transportation, including reusable plastic crate, rollcontainer, roll and minitainer. In particular, the reusable plastic crate can also be utilized for retail-display, which will significantly smooth the logistics process and improve the transport efficiency. Some plastic crates can also be folded to minimize the size of transport equipment when they are returned. At present, fresh foods have the least innovation needs for transport equipment.

Chilled foods are also designed to be stored at refrigeration temperatures and need to be kept chilled during transportation and storage. There is no specific requirement on transport equipment to avoid inappropriate product mix. However, chilled food products vary greatly in term of size and thus may pose challenges in loading capacity. For example, the packed chilled foods can vary from bottles of milk to cubes of butter, from boxes of meat to dozens of egg. Therefore, it requires an innovative design of transport equipment which can maximize the utilization of transport capacity. In most cases, medium-sized transport equipment for chilled foods can be reused as retail display, such as crates for loading milk and yogurt. But small-sized products, e.g. butter or big-sized products, e.g. meat and chilled seafood, still require reloading efforts.

With respect to the frozen products, they are more flexible in term of product mix because of low temperature. However, due to the temperature requirement, it may need special design for the air circulation in the transport equipment or in the closed box. Additionally, frozen products also require extra loading and unloading work, which needs innovation efforts to improve the efficiency in this regard.