

# **DAVINCI: VIRTUALISATION SCENARIOS FOR FLORICULTURAL TRADE NETWORKS**

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# DAVINC3I: VIRTUALISATION SCENARIOS FOR FLORICULTURAL TRADE NETWORKS

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## Abstract

The Dutch floricultural industry is generally appreciated for its world leadership; the Netherlands is the trading hub for the European market. There are two trends affecting this position. First, virtualisation of trade and logistics control enabled by technological progress. Second, internationalisation of markets and production reshapes the market in size and distance. To maintain leadership, the Dutch floricultural industry has initiated the Dinalog DaVinc<sup>3</sup>i project. In this paper we outline the activities we are currently undertaking and some of the outcomes achieved so far. These include 12 commercial scenarios for the future of the industry and specific challenges related to ICT as an enabler of virtualisation in floricultural logistics and trade. Alongside the discussion of these activities and outcomes, we present some thoughts on how to address the challenges based on an (inter)national benchmark carried out as part of the project.

*Keywords: floriculture, distribution hub-networks, virtualisation, scenarios*

## Introduction

The Dutch floricultural industry is generally considered a global market leader. The five clusters, or *greenports* clubbed together as Greenport Holland, are home to the high concentrations of horticultural businesses, from growers and traders to breeders and logistics service providers. The floricultural industry as a whole makes a significant contribution to the Dutch economy in terms of value added and employment (Van der Vorst et al., 2011a). Apart from production, trade and logistics are important generators of this contribution as well. Products from around the world are transported to the Netherlands. Here these products are traded, value is added and break/bulk activities take place. For flowers, still some 70% is being auctioned in contrast to plants, where it is only a quarter. Figure 1 depicts the current value and supply chain. However, the position of the Netherlands as centre for logistics and trade is not guaranteed. This position is challenged due to two main trends: virtualisation and internationalisation. New technologies are enabling new ways of doing business and controlling logistics processes. These reduce the need for the physical product to follow the same route as the information and transactions related to it. Internationalisation is exemplified by growing production centres in e.g. Africa, as well as new, expanding markets in Central and Eastern Europe. A more detailed description is available in Van der Vorst et al. (2011a).

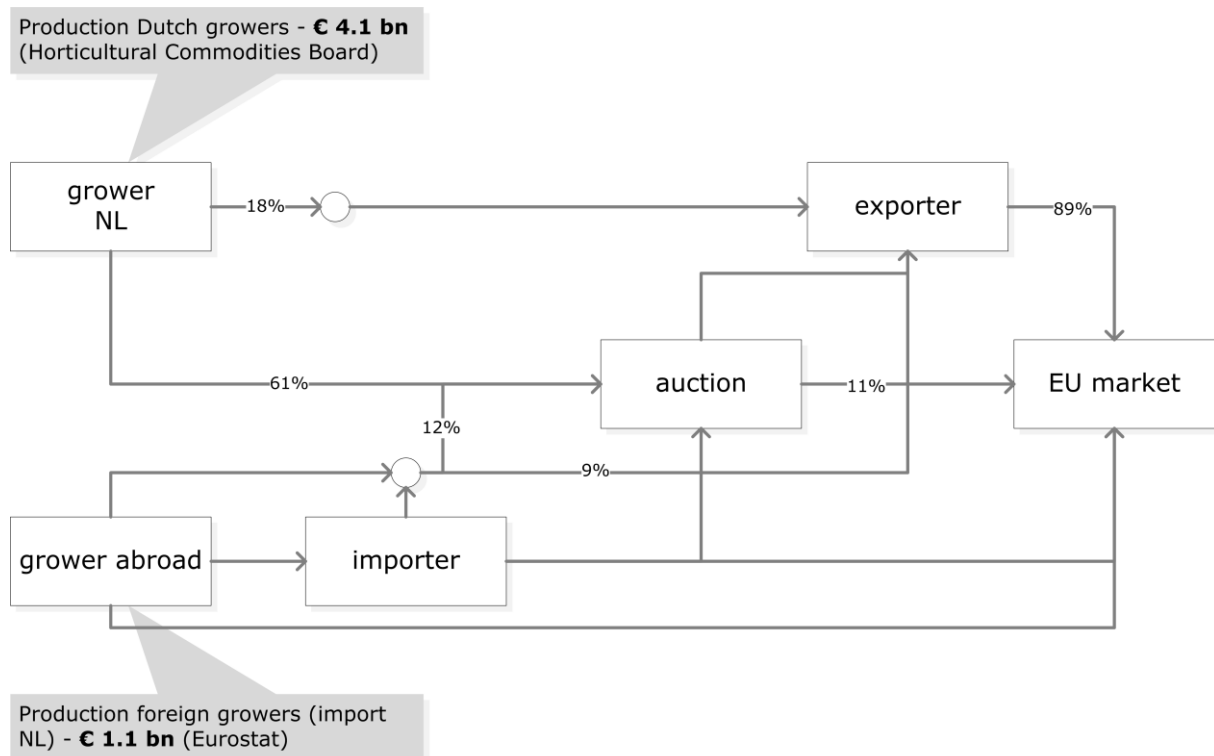


Figure 1 The floricultural supply chain network

As the Dutch floricultural sector wants to (continue to) be the (virtual) horticultural trading hub of Europe, it has started a 4-year Dialog project called DaVinc<sup>3</sup>i (Van der Vorst et al., 2010). DaVinc<sup>3</sup>i is the acronym of Dutch Agricultural Virtualized International Network with Coordination, Consolidation, Collaboration and Information availability. The project started in 2011 and has as objective to strengthen the international leading competitive position of the Dutch horticulture sector in a global, virtualized trade network by researching:

1. the opportunities for new logistics coordination, consolidation and collaboration concepts in extended international hub networks using the concept of Quality Controlled Logistics (Van der Vorst, 2011b)
2. the possibilities for making chain information directly and real-time available and usable to support decision making of all partners in the horticultural network.

The DaVinc<sup>3</sup>i project aims to provide useful insights to the industry on how the Netherlands could maintain its world leadership in the industry. Therefore we are working along multiple lines of research. As a fundament, we defined the most relevant virtualisation scenarios for the different types of supply chains (e.g. retail, detail and e-tail and flowers vs. plants). Furthermore, we are researching:

- the functional specifications for potential coordination, consolidation and collaboration concepts within these scenarios. Focus is on the design of value-added logistics services, comprising flexible and robust prediction, planning and control models and algorithms for inventory, packing and

sychromodal transportation management, considering the increased complexity, uncertainty and dynamics;

- opportunities for advanced information exchanges and architectures of knowledge bases to facilitate the advanced planning and control concepts developed in the project;
- relevant business models that work for specific settings in open collaboration networks. Nice to have advanced tools and decision support models for planning and control, but if the actors in the chain are not keen on using them and are unwilling to collaborate, no gains are taken.

In our view, insights and initiatives in these areas will support strengthening the role of the Netherlands as trading and logistics centre for plants and flowers. The research is foremost done by two PhDs, and two Postdocs, in close cooperation with the business partners and researchers from Wageningen University, VU and TU/e. A number of MSc students complement the researchers on specific research questions in collaboration with business partners.

The subsequent sections of this paper describe the scenarios for the future of the floricultural industry, and we will elaborate the specific challenges related to information technology as an enabler of virtualisation in floricultural logistics and trade. Several text boxes provide encouraging examples from other countries and industries that offer useful lessons learned for the floricultural industry. These findings originate from an international benchmark study conducted in Brazil, China, India and Turkey; and the automotive, food and stimulants, publishing, retail, telecommunication and tourism sectors.

**Example 1. Develop marketing concepts for specific markets from A-Z and include logistics**

Increasingly, consumers are sensitive to buying an experience rather than a product. This applies to European consumers, but also consumers in upcoming markets. For example, the richest 1% of Chinese families possess 41% of the accumulated wealth in China. These people are willing and able to spend significant amounts on products which they experience as contributing to their status, like Louis Vuitton bags. Dutch flowers could be such an experience. However, the logistics need to fit the exclusivity expressed by the marketing concept. Likewise, the logistics concepts applied in either of the scenarios, should fit the marketing concept of the channel of sales.

**Virtualisation scenarios for the future**

The trends affecting the floricultural industry not only affect the logistics and trade processes and possibilities, but also affect the supply chain in another way: organisations need to reinvent the role they have. An on-going trend is the decrease in the number of links between production and consumer (VGB, 2010). The organisations cooperating and competing to satisfy demand will therefore change. As to have a common understanding of what the supply chain may look like in the future, the project team developed 12 commercial scenarios; that is, the scenarios focus on the commercial

relationships in the chain, not on the product flows as such. Our reasoning started at the (international) consumer; her purchasing motives and consumption patterns drive the way the supply chain is shaped. As consumer behaviour is changing, for example driven by the possibilities of the internet, the floricultural supply chain evolves to accommodate this development. Three dimensions typify the scenarios:

1. **The product.** We distinguish between plants and flowers. As explained in our previous contribution, the physical characteristics of the product impose different requirements on logistics (Van der Vorst et al., 2011);
2. **The dominant channel of sales.** We distinguish between three channels of sales: retail, detail and e-tail. Whereas retail and detail consist of physical stores, possibly with an affiliated webshop, the e-tail channel is a new online channel of sales where consumers buy their plants and flowers online via a webshop. As such, the e-tail channel is not connected to any of the current players. Table 1 presents some of the supply chain characteristics for each dominant channel of sales. The table highlights significant differences between the three channels of sales, the supply chain will need to adapt to serving different types of customers. This is a development taking place as increasingly organisations are focussing on a particular market and/or channel of sales (VGB, 2010).
3. **The degree to which the supply chain develops.** On the one hand there are "evolution" scenarios, where the supply chain gradually evolves from the current state to the future state. In these scenarios there remains at least one link between producers and channel of sales. On the other hand, there are "revolution" scenarios. In these scenarios the number of links in the value chain decreases even further and direct trade between producers and channel of sales occurs. In the revolution scenarios, businesses are challenged more intensively and will need to develop new capabilities.

*Table 1 Supply chain characteristics for different channels of sales (adapted from De Keizer et al., 2012)*

	<b>Detail</b>	<b>Retail</b>	<b>E-tail</b>
Number of shops	Large	Small	Very small, online
Product variety	Large	Limited	Large
Type of product	Specialized	Mass-customized	Currently mass-customised, potential for specialised
Order size	Small	Large	Large
Order lead time <sup>1</sup>	Day	Week(s)	Day
Quality	High	Guaranteed	Guaranteed
Type of trade	Daily trade	Long term contracts	Long term contracts
Network type	Supply driven	Demand driven	Demand driven

<sup>1</sup> Time between placing an order and receiving the order

With these three dimensions in mind, we designed a new chain configuration for each commercial scenario. The general idea is that in each scenario the shortest possible value chain is able to satisfy consumer demand. This means that in a scenario with many small detail shops, there is a need for a physical or virtual market where demand and supply meet. Whether or not an intermediary party, a flora provider, is active in the sourcing for or on behalf of detail shops depends on how much the industry actually changes. In most of our scenarios there is at least one intermediary party active in the value chain, the exceptions being the "revolution" scenarios for retail and e-tail. The logistics concepts associated with each value chain are currently subject of research. Figure 2 graphically presents the scenarios. Logistics service providers are not depicted as they will not own a product at any stage. However, their services will be relevant at various points in the supply chain.

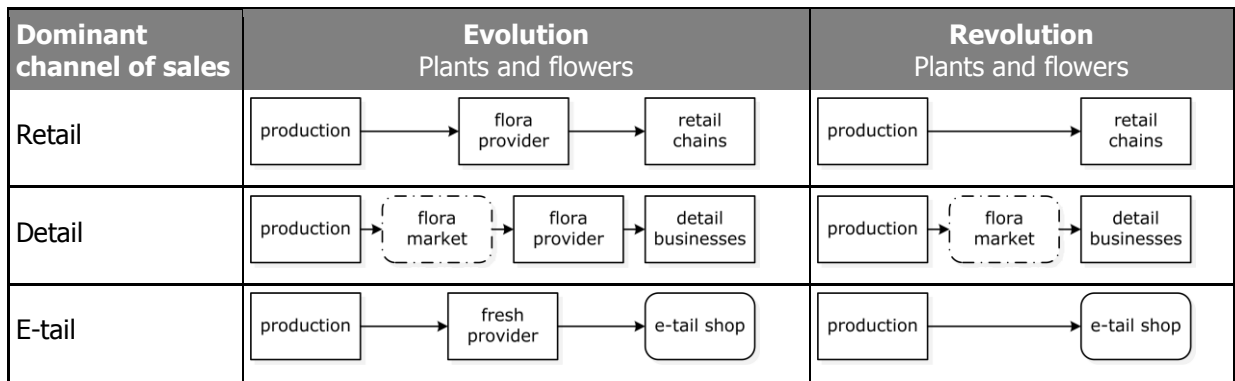


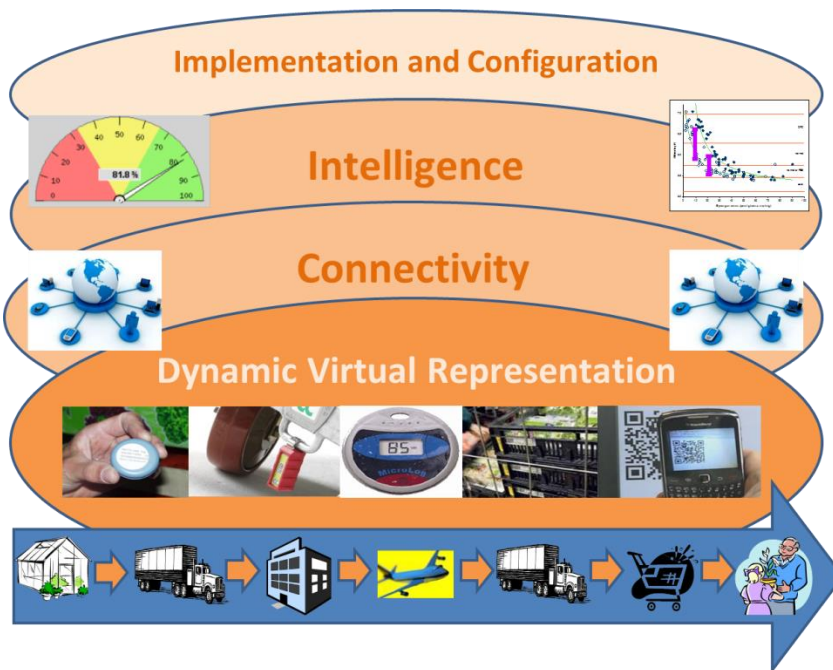
Figure 2 Simplified commercial scenarios for the future of the floricultural industry

**Example 2. Tourism – focus on the consumer**

The tourism industry is characterised by a consumer centric approach. All related organizations focus on the value of the tourism product and related services for the final customer. The customer satisfaction prior to the consumption highly depends on the accuracy and comprehensiveness of tourism information and the ability of organisations to provide tools for customization, which comprises an automated personal approach. Nearly all the sales and marketing activities are more efficiently and effectively done with the use of virtual applications such as individual webpages and personalized advertisement and special offers. The derived lesson learned is that the focus of every related party of an organization in the tourism supply chains must lie on the needs of the final customer and these needs are best served by virtual customization.

**Challenges related to ICT**

For the Dutch floricultural industry to be able to be at the centre of a global virtualised network for plants and flowers, it is crucial to have modern information systems available. Such systems are generally considered a key enabler. For this reason, the DaVinc<sup>3</sup>i is actively researching what such systems, in general terms, should facilitate and be capable of. Looking at the current state of ICT in



the industry, the focus has been predominantly technical and oriented towards addressing short term bottlenecks (Verdouw & Beulens, 2012b). These bottlenecks mainly concerned data exchange: standardisation of messages and (product/service) characteristics. The use of such data for intelligent decision support is, however, a fairly unsubstantiated topic in the industry despite its potential benefits. Such benefits may include supply chain process improvements as researched in the other work streams. In doing so, virtualisation should not only be to virtualise existing processes, but also to contribute to designing future supply chain processes (see figure 3). This requires the floricultural industry to focus on the end user and the value she attributes to the product. However, at present there is a strong focus on costs and cost reduction. In addition, virtualisation is often considered to be a technical IT problem, rather than a new approach able to contribute to a renewed focus on the end user. These are challenges related to logistics intelligence.

*Figure 3 Future Challenges in the Virtualisation of Trade Networks (Verdouw et al., 2012b)*

### **Example 3. HubWays**

The HubWays project is a cooperation between businesses in the floricultural industry that intends to provide an ICT platform that facilitates collaboration in transport between the different trade parks in the Netherlands. The development of the platform is rooted in two primary motives. First, the growth of traffic will reduce the reliability and efficiency of intra-hub transport (which is needed to deliver plants and flowers bought at one hub to the buyer at another). Moreover, society is increasingly concerned with ecological sustainability. An excess of truck movements contradicts with this concern. By taking an industry-based initiative it has become possible to achieve improvements beyond the reach of individual companies. (c.f. Van der Veen and Van der Vorst, 2011)

In addition to the logistics intelligence challenges above, there are more practical challenges at the level of logistics connectivity. These are the following:

- the ability to use data, which depends on the extent to which people are able to understand and use data – standardisation is crucial in this respect. Though various standards are available in floriculture, there is still significant scope for further standards;
- design of chain information systems: existing models are often based on a data warehouse concept. This brings about questions on business models often needed to support the system. Companies are availing data that is, to some extent, private and need to be assured data is not used adversely;
- interoperability with enterprise management systems: integration between the chain information systems and enterprise management systems needs to be smooth (without human interference or additional actions) as to ensure sharing is easy and benefits are easily generated and experienced. As in other industries, companies often use multiple systems, where interoperability is also needed;
- data security and access authorisation, which are also recurring topics for intercompany systems.

In this respect the structure of the industry, with many small and medium-sized companies and only a few bigger ones needs to be borne in mind.

**Example 4. KPN – network as source of revenue**

In the Netherlands, KPN has always had a competitive advantage with an existing network. When new companies entered the telecom market, it was decided that other telecom providers could use the existing network at cost price. The logic was that building a second network would be inefficient. So now, various companies compete while using the same network. Under set conditions, however, there is a commonality

With respect to the implementation of ICTs, it is not so much the technological basis that is lacking strength. Rather, the open network structure of the industry and diversity in existing supply/value chains creates issues for implementation. Though one solution can be found in ICT systems able to be implemented, integrated and disconnected fairly easily. Such flexibility will allow ICTs to remain relevant in different circumstances and scenarios. Having said that, however, the crucial link in implementation is the user. And while the generic and joint benefits are often clear, the business case for individual parties in the industry are often less evident.



**Example 5. Sanoma – extent of the impact of virtualisation**

As a result of virtualisation, the production process at Sanoma has been overhauled. Initially, the extent to which this was done, was fairly limited and the preparations for a magazine were done in a more traditional way with pen and paper. Now, the preparations are made using a virtual noticeboard. Journalists are informed of what to contribute, when and how much. Photographers and designers receive similar information. Though it may appear a simple and easy transition, but involves a fundamental overhaul of the way of working. It turned out to be crucial for the uptake of the new way of working to involve the users in designing the virtualised way of working. The success of Sanoma with several magazines and websites, such as nu.nl, is attributed to its approach to virtualisation: both from a consumer perspective, as well as a production perspective.

**Conclusion**

The Dutch floricultural industry is facing two trends affecting its standing as a world leader and trading hub for Europe. DaVinc<sup>3</sup>i is developing insights on how to address these challenges. Three perspectives are used in developing these insights: logistics, IT and business models. To provide a common basis for discussions, we have developed 12 commercial scenarios that describe which actors cooperate to deliver a product to the end user. Though we will not allocate activities to actors, it highlights what needs to be done to satisfy demand. Subsequently, we highlighted the specific challenges faced in the industry in enhancing its IT capabilities to reap the benefits of logistics intelligence and logistics connectivity. These are many, but the perception of IT is a primary one. Moreover, there are issues related to standardisation and the use of data. Organisational aspects also impose a barrier on furthering virtualisation of the supply chain. Last, but not least there is a need to incorporate the user more actively in virtualisation efforts. The DaVinc<sup>3</sup>i project is conducting research in both theory and practice to develop insights that will contribute to the overall goal of maintaining the Dutch world leadership in floriculture.

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