



Agrologistics sector study Netherlands

Describing the ecosystem and the international ambitions of Dutch agrologistics companies

Dr. R.B. (Bob) Castelein, M.G. (Melanie) Kok MSc and drs. ing. J.C.M.A. (Joost) Snels

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Abbreviations

DHI	Demonstration projects, Feasibility studies and Investment preparation projects (Original: Demonstratieprojecten, Haalbaarheidsstudies en Investeringsvoorbereidingsprojecten) (RVO tool)
DLO	Agricultural Research Institute (Original: Dienst Landbouwkundig Onderzoek)
FTE	Fulltime-equivalent
IenW	Ministry of Infrastructure and Water Management (Original: Ministerie van Infrastructuur en Milieu)
KVK	Chamber of Commerce (Original: Kamer van Koophandel)
LCA	Life Cycle Assessment
LIOF	Dutch Regional Development Agency Limburg (Original: Regionale Ontwikkeling Maatschappij voor Limburg)
LNv	Ministry of Agriculture, Nature and Food Quality (Original: Ministerie van Landbouw, Natuur en Voedselkwaliteit)
NBSO	Netherlands Business Support Office
PPP	Public Private Partnership
PSI	Private Sector Investment (RVO tool)
PSOM	Cooperation with emerging markets (RVO tool)
R&D	Research & Development
ROM	Dutch Regional Development Agencies (Original: Regionale Ontwikkelingsmaatschappijen)
RVO	Netherlands Enterprise Agency (Original: Rijksdienst voor Ondernemend Nederland)
SME	Small and Medium Enterprise (Original: Midden- en kleinbedrijf)
STV	Food Waste Free United Foundation (Original: Stichting Samen Tegen Voedselverspilling)
USP	Unique Selling Point
WFBR	Wageningen Food & Biobased Research
WUR	Wageningen University & Research

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Summary

This sector study report provides insight into the agrologistics ecosystem in the Netherlands and the international ambitions of Dutch agrologistics companies. The main focus is on companies within the Dutch agrologistics ecosystem that provide technology, products, and services to customers active in the operational parts of agro chains. This study elaborates how Dutch agrologistics entrepreneurs are active abroad, what successes and barriers they experience, and what support they may need to improve their international potential. Furthermore, this study focuses on the aspects of sustainability in the (international) strategies of Dutch agrologistics companies.

In this study, over 200 organizations active in the agrologistics domain were identified. This list includes companies active in the provision of different types of agrologistics technologies and services. First, representatives of 23 Dutch companies – established companies as well as startups – with some degree of international activities, were interviewed. To incorporate the full diversity of companies in this domain, companies were selected from eight different segments; 1) Sorting and packaging technology, 2) Transportation and storage technology, 3) Air conditioning and refrigeration technology, 4) Product processing and handling technology, 5) Quality control, 6) Training and advice, 7) Packaging materials, and 8) IT and data solutions for infrastructure and connectivity. Secondly, interviews were conducted with 10 representatives of ecosystem actors; organizations that are not directly involved in providing agrologistics products and services, but through their systemic function are nevertheless relevant for agrologistics. This includes representatives from industry organizations, auctions, port authorities, financiers and agrologistics cluster organizations.

Agrologistics is defined as the collection of all post-harvest logistics functions in the agro chain (of food and related products), including transportation, handling, storage, climate control and management, and the organization of coherent interplay between these activities, from harvest up to the end consumer, as well as the supply of technologies, products, and services that enable these functions and that have a direct relevance for the agro chain, agro products, and product quality. These functions should be seen as part of an *agrologistics ecosystem*, which comprises 1) all parts of the agrologistics system, and 2) organizations and institutions (further removed from the chain and products) that create the general conditions necessary for agrologistics functions and suppliers to function and perform well.

Nowadays, the Netherlands is the second-largest exporter of agricultural and agriculture-related products worldwide. For a large part these exports consist of agricultural and food products, but also includes a growing share of enabling technology, products and services. This illustrates not only the significance of the Dutch agricultural sector, but also the significance of the Netherlands as a hub for trade in agricultural and agriculture-related products and an innovator in enabling technology, products, and services. Factors that can explain the international agrologistics performance of the Netherlands include a) that the market size in the Netherlands for agrologistics-related technology, products, and services is conducive to the development of companies that supply them, b) the degree of development of the logistics sector in the Netherlands, and c) the particularly Dutch approach to innovation policy.

The findings from the interviews conducted provide further context to the question how Dutch agrologistics positions itself internationally. The international success of Dutch agrologistics companies is found to be at least in part supported by government organizations (including embassies, RVO, ROMs) promoting their interests abroad. However, entering these foreign markets was also for a large part the result of the companies' own effort, reputation, network and market research. The main reasons for Dutch agrologistics companies to select a specific foreign market included product relevance (companies that specialize in technology or services for specific product types are specifically active in major producer countries) and client connections (for some agrologistics suppliers, their main foreign markets were determined by the presence of one or more major clients in that country), but also more generic opportunities – Dutch agrologistics suppliers do not always necessarily need specific niches or relationships to find markets abroad, even though the majority of them internationalizes through a specialization in solutions for certain products or product categories.

A common thread in agrologistics companies' views on the support of government organizations is their need for embassies to have extensive knowledge of the local market, and legislation and administrative aspects of the foreign market. Besides, companies voice a need for a higher visibility of what support can be offered to easier access the support instruments they want to make use of. The main international barrier the respondents encounter when operating abroad was the administrative barrier related to differences in laws, regulations, standards and other types of bureaucracy.

Although many respondents stated that they were satisfied with their current international presence, attractive new markets to focus upon included emerging markets, countries going from low- to high tech in the future, countries with a large and developing agriculture/horticulture sector, and specific product-related opportunities.

To conclude, the Netherlands has a long history of productive, innovative and export-oriented agriculture, and – with support through government policy – over time developed an innovative ecosystem of interacting companies, knowledge institutes, and government organizations (the 'triple helix'). The Dutch approach to innovation policy strengthens this dynamic, with a high degree of institutionalized cooperation between the triple helix domains (industry, government, and knowledge organizations) – as well as relevant civil society organizations. An example of this Dutch innovation policy is the Topsector approach, which is currently organized in 9 different 'Topsectors', including 3 (Agri & Food, Horticulture & Starting Materials, and Logistics) directly related to agrologistics. Simultaneously, the geographical location, orientation on trade, infrastructure quality, and international connectedness stimulated the development of a high-performing logistics sector. These two strengths combined over time established the Netherlands as a major player in agrologistics.

An important note regarding efforts to promote and support the overall agrologistics 'sector' abroad is the current unfamiliarity and ambiguity of the term agrologistics. For promotion and support efforts internationally, it is important to reach out to companies proactively to emphasize their added value as a technology or service provider for specific agro chains, as it is more beneficial for a Dutch supplier of technology for a specific crop to share their product portfolio internationally in the perspective of the agrologistics supply chain than promoting itself as a producer of – for example – packaging in general.

Secondly, the companies that are part of the definition of agrologistics should be organised around production chains instead of the type of technology they offer. For the effectiveness of Dutch companies abroad, it may be better to group for one specific product-market combination instead of approaching potential foreign regions or countries generically with agrologistics technology, products, and services. By organising the companies per product-market chain, the synergetic power of agrologistics is preserved and it will ensure a more efficient market approach.

1 Introduction

In this sector study report – commissioned by Netherlands Enterprise Agency (RVO¹) – we provide insight into the agrologistics² ecosystem in the Netherlands (including its strengths and weaknesses), the international activities and ambitions of Dutch agrologistics companies, and the enablers and barriers they face when operating abroad. The study is intended by RVO to serve as a basis for programming public-private activities in different countries, related to trade, innovation, and investments.

Extending from a definition and description of the Dutch agrologistics ecosystem, we examine how Dutch agrologistics entrepreneurs are active abroad, what successes and barriers they experience, and what support (from RVO, the ROMs (Dutch regional development agencies³), and other relevant organizations) they may need to improve their international potential. Within this broader question, we further focus on the aspect of sustainability in the (international) strategies of Dutch agrologistics companies.

1.1 Scope of this study

This study focusses primarily on Dutch suppliers of innovative technologies, products, and services that enable the activities conducted by agro trading companies, and that have a direct relevance for the agro chain, agro products, and product quality. Companies that only conduct *operational* agrologistics activities such as trading, transportation, storage and processing are out-of-scope for this study – i.e., we do not focus on the companies that perform operational functions in the agro chain (handle the product itself), but we do focus specifically on *suppliers* of agrologistics technology, products, and services, as this is where most agrologistics innovation takes place. Also, out of scope are companies that provide enabling technology, products, and services that do not have (product- or process-specific) relevance for agrologistics. This group of suppliers and functions is relevant for agrologistics, but for which the nature of agrologistics, agro chains, and agricultural products is not relevant – this includes generic technologies and materials, government policy, financial services, and general infrastructure. This, however, is all part of the agrologistics ecosystem, which is described in Chapter 3.

1.2 Methodology

In this study, over 200 companies (including startups) active in the agrologistics domain were identified. This list includes companies active in the provision of different type of agrologistics technologies and services.

To further understand and illustrate the current (international) position of Dutch agrologistics, we have conducted interviews with representatives of 23 Dutch agrologistics companies. The full list of interview questions is attached to this report as Annex 2. From the list of 200, these companies were selected to be interviewed due to a) them having international activities, and b) to obtain a balanced representation of companies from the different agrologistics segments we identified. These segments, and the number of respondents interviewed from companies in those segments, are included below:

- Sorting and packaging technology (3)
- Transportation and storage technology (2)
- Air conditioning and refrigeration technology (3)
- Product processing and handling technology (5)
- Quality control (3)

¹ <https://english.rvo.nl/>

² In the English (scientific) literature there are 3 ways to write agrologistics; agro logistics, agro-logistics and agrologistics. The choice for any way of writing depends only on the author's preferences. For this report we have opted for the notation of agrologistics because it not only corresponds to the Dutch spelling, but it also emphasizes the synergy which arises from connecting agro and logistics.

³ <https://www.rom-nederland.nl/en/>

-
- Training and advice (1)
 - Packaging materials (4)
 - IT and data solutions for infrastructure and connectivity (2)

The companies that were interviewed ranged from 1 (a one-person training and advice business) to some 9000 (a manufacturer of product processing and handling equipment) people, as measured in FTEs (Fulltime equivalents) employed. The majority (17) consisted of fewer than 100 FTE, with 4 more consisting of between 100 and 1000 FTE, and 3 of over 1000 FTE. Among the smaller companies, there were 2 companies that self-identified as startups – both small companies built around an innovative product with considerable international growth ambitions.

In addition, 10 interviews were conducted with representatives of organizations with specific relevance for the agrologistics ecosystem, such as industry associations, auctions, port authorities, agrologistics cluster organizations and financiers. We label these organizations 'ecosystem actors'. The full lists of interview questions and list of organizations are attached to this report (Annex 3).

These structured interviews covered topics related to:

- Products and services offered
- The Dutch agrologistics ecosystem
- International activities and ambitions
- Success factors and barriers to internationalization
- Support from Dutch institutional actors (such as government organizations, industry associations)
- Sustainability

With this approach, we aim to incorporate the full diversity of companies and organizations in this domain, to understand the considerations relevant to the question of this study. As such, the interview data is not quantitatively representative of the viewpoints of the sector, but does give us the broadest possible inventory of viewpoints and observations from companies in the sector. We did not 'fact check' the respondents' statements, and thus report these at face value. Therefore, the findings from the interviews should be seen as evidence of companies holding a certain viewpoint, regardless of whether their statements can be verified to be true. Accordingly, the interview findings will be reported in a qualitative, narrative form, highlighting common experiences and perspectives. To ensure confidentiality, we will refer to these companies and respondents only in general terms in this report.

1.3 Structure

This sector study report is structured as follows. Section 2 defines agrologistics and its relevant sub-segments. Section 3 focuses specifically on the Dutch agrologistics ecosystem, including its history, institutional context, and current strengths and weaknesses. Section 4 outlines the findings from abovementioned interviews on the international ambitions and activities of Dutch agrologistics companies, including current activities, barriers and enablers of internationalization, and support from Dutch (semi)-public sector organizations. Last, section 5 discusses the sector study findings in a broader perspective and concludes.

2 Defining agrologistics

Agrologistics is a term frequently used with slightly differing definitions (either implicit or explicit). For the purpose of this study, it is desirable to formulate a clear and well-founded definition of agrologistics itself, and specify which aspects of agrologistics are in scope for this study.

There is no official definition of what agrologistics is; therefore, we aggregate perspectives on how it should be defined from actors that consider themselves to be active in agrologistics, combined with definitions from earlier WUR-research on the agrologistics domain (Van der Vorst & Snels, 2014). In the 10 interviews with agrologistics ecosystem actors (list included in Annex 3), a range of aspects was mentioned to be part of agrologistics, with the most important points of consensus among the respondents being that:

- Agrologistics is directly related to the agro sector
- At the core of agrologistics is the (post-harvest) logistics chain for agro products, including:
 - Technology for activities in this logistics chain: temperature control, processing, transportation, storage, packaging, handling etc.
 - Products and materials required for logistics of agro products, such as packaging materials.
 - Services related to logistics and logistics management, transportation, quality control, quality management, transaction facilitation (e.g., auctions), information technology and -management, and financing.

Agrologistics is the set of functions that ensure that the right product is delivered at the right time and under the right conditions to the customer, while minimizing costs (Van der Vorst & Snels 2014). So, agrologistics is part of the logistics field, relying on logistics-related functions, methods, and equipment, but is also part of the agricultural complex⁴ due to the central role of agricultural products and their characteristics and requirements. For companies to arrange efficient and effective agrologistics operations, capabilities are required that are related to the agricultural products (including understanding of product physiology and quality), as well as logistics capabilities (including handling, transportation, storage and processing). Figure 1 visualizes the positioning of agrologistics, at the interface of logistics functions and the agricultural complex.

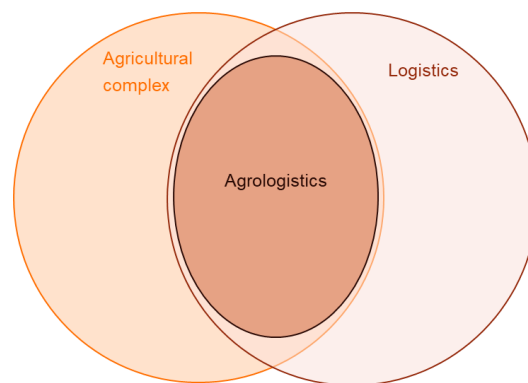


Figure 1 **Positioning of agrologistics (authors' elaboration)**

⁴ Agricultural complex or agro complex = defined by Statistics Netherlands (CBS, 2020), 'the coherent chain of activities that are directly and indirectly related to agriculture is often referred to as the agro complex, with a central position for primary agricultural production and the food and beverage processing industry.

Agrologistics functions are the logistics-related functions in the agro chain. The part of the agro chain included in agrologistics is the part of the chain after harvest until the point of sale towards the final consumer (See Figure 2).

The agrologistics functions in this post-harvest agro chain (of food and related products) include:

- Sorting, grading, (re-)packaging, labelling, pricing
- (Re-)processing
- Transportation (distribution, transshipment)
- Storage
- Climate control (conditioning and ripening)
- Management, coordination and organization of coherent interplay between these activities, from harvest up to the end consumer.

Not only the functions themselves, but also the providers of (innovative) technology, products and services that enable these functions are part of agrologistics.



Figure 2 Agrologistics functions in the agro chain (authors' elaboration)

While there was broad consensus among ecosystem actors about the definition of agrologistics including the post-harvest chain and necessary technology and services, there were also differences in perspective on two important aspects. First the question whether agricultural/horticultural production itself and the supply of technology, supply, and materials to this primary sector are part of agrologistics; and secondly the question whether functions such as financing should be considered as part of agrologistics itself, or only part of the environment in which agrologistics companies operate.

Taking into account these definitions and points of consensus and contention, we describe agrologistics as follows: Agrologistics includes all post-harvest logistics functions in the agro chain (of food and related products), including transportation, handling, storage, climate control and management, and the organization of coherent interplay between these activities, from harvest up to the end consumer, as well as the supply of technologies, products, and services that enable these functions and that have a direct relevance for the agro chain, agro products, and product quality.

As described above, for the purpose of this study we focus specifically on the companies that provide these enabling agrologistics technologies, products, and services, rather than the operational post-harvest logistics functions in the agro chain. This distinction is also visualized in Figure 3, showing all functions encompassed in the definition of agrologistics, and the further distinction between the operational post-harvest logistics functions in the agro chain, and the supply of enabling technologies, products and services.

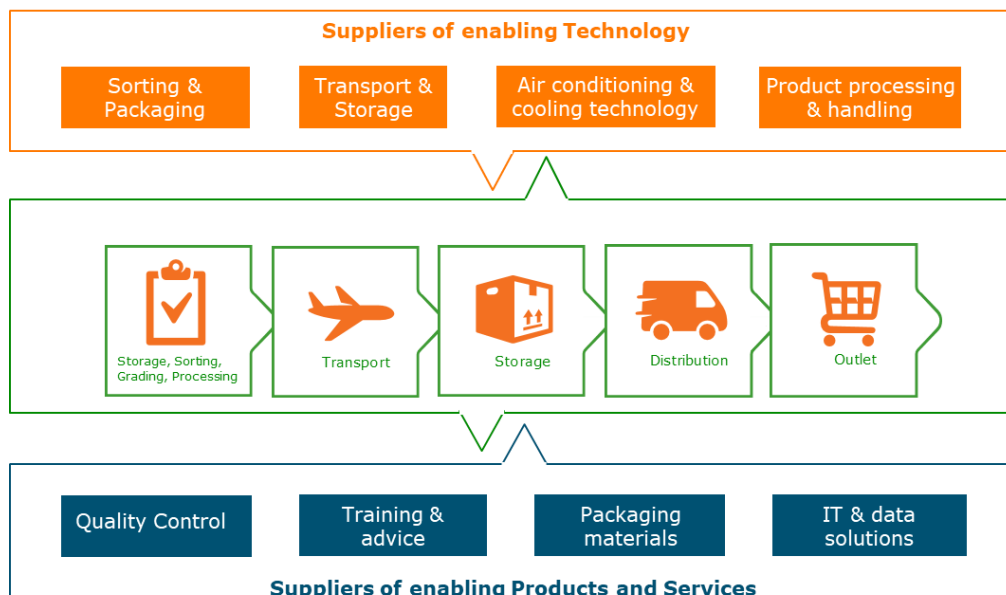


Figure 3 *Agrologistics - Agrologistics activities and their enabling technologies, products, and services (authors' elaboration)*

2.1 Suppliers of enabling technologies, products and services

Companies that provide technologies, products and services relevant for agrologistics do not fall within a predefined category or set of categories: although agrologistics is often referred to as a sector in itself, it is not a coherent sector as defined by official statistical classifications. For example, suppliers of agrologistics technologies, products, and services may be classified under sectors such as agriculture, manufacturing, trade, transportation and storage, ICT, and business services. As a working demarcation, the relevant companies all have in common that they provide products and services that have a direct relevance for agro chains and agricultural products and their quality. Moreover, their innovative potential in the development and implementation of these products and services is based on knowledge of agro chains and agricultural products.

Aside from the operational activities (the managed system) in the agro chains themselves, we define the two main domains of agrologistics and agrologistics innovation.

First, we distinguish the enabling technology for agro chains, including:

- **Sorting and packaging technology:** The development of sorting and packing machines, specifically for agro products, designed to work with the product in such a way that product quality is ensured. For example, suppliers of generic packaging machines do not have a specific agrologistics functions (definitely a logistics function, but not with specific relevance for agro chains), but suppliers of packaging machines specifically designed for packaging that extends the shelf life of agro products fall within this category (e.g., modified atmosphere packaging equipment).

Example: Sorting and packaging technology

Crux Agribotics develops robotica for the end-to-end harvesting, sorting and packaging of vegetables and fruits. The robotica includes adaptive robotics, with vision and machine learning capabilities to gently handle products like tomatoes and chicory.^{a,b}



Figure 4 Crux Agribotics SortiPack® chicory^b

a <https://www.groentennieuws.nl/article/9421428/crux-agribotics-en-koat-samen-aan-de-slag-in-de-ontwikkeling-van-robots/>, publication date 25-04-2022

b <https://cruxagribotics.com/>

- Transportation and storage technology: Transport and storage solutions for agro products, that are based on knowledge of specific products and their transportation and storage requirements. For example, producers of generic trucks and transportation equipment do not have a specific agrologistics function, but producers of trailers for the transportation of specific agro products are relevant (e.g., cooling tanks for dairy).

Example: Transportation and storage technology

The Praxas cargo covers reduce the risk of food losses due to temperature fluctuations in the cold chain. The TLX2 cargo cover is recyclable, breathable and waterproof, allowing airflow and water vapor to ensure that the humidity inside the cargo covers cannot reach harmful levels. Furthermore, the cover consists of a white outer surface to ensure radiation reflection and minimize temperature fluctuations during transport.^{c,d}



Figure 5 Praxas cargo covers^d

c <https://www.freshplaza.com/article/9431562/you-can-prevent-air-freight-soft-fruit-losses/>, publication date: 31-05-2022

d <https://www.praxas.com/en-gb/Solutions/Cargo-Covers>

- Air conditioning and refrigeration technology: Technology that offers specific solutions for preserving agro products (based on the product's requirements), and/or suppliers that specialize in supplying this equipment to agro chain actors. Suppliers of generic refrigeration equipment are not within scope, but suppliers of specialized refrigeration equipment for agro products are within scope.

Example: Air conditioning and refrigeration technology

Weber Cooling produces the widest range of vacuum coolers for food and fresh produce with the shortest cooling times due to hydronic cooling. Advantages include a reduction in required refrigerants with a minimal risk of leakage, high cooling speeds with reduced cooling capacity and energy saving for warm applications using freecooling.^{e,f}



Figure 6 Weber Cooling^f

e <https://www.freshplaza.com/article/9421773/the-temperature-goes-from-25-to-4degc-in-20-minutes/>, publication data 26-04-2022
f <https://webercooling.com/en/homeen>

- Product processing and handling technology: Technology for the processing or handling of agro products in (added value) agrologistics. As above, suppliers of generic processing or handling equipment are out of this scope, but suppliers of specialized technology for agro products are within scope.

Example: Product processing and handling technology

Interko designs, manufactures and installs systems for high quality fresh fruit ripening. The ethylene ripening rooms are designed for various types of fruits like bananas, mangoes, avocados and other exotic fruits, and allows the operator to ripen with precision. Its containerized ripening room is able to being transported easily by truck or ship to anywhere in the world, including being constructed inside a standard insulated refrigeration container.^{g,h}



Figure 7 Interko OPTIMO ripening room^h

g <https://www.freshplaza.com/article/9415477/interko-announces-brand-name-for-new-ripening-room-mobilo/>, Publication date: 01-04-2022
h <https://www.interko.com/products>

In addition to technology – which primarily includes the physical ‘hardware’ for logistics activities in agro chains – we distinguish enabling products and services, which are complementary in facilitating logistics activities in agro chains. In this category we see a mix of ‘hardware’ (e.g., packaging materials and the physical components of IT solutions) as well as complementary ‘software’ (e.g., knowledge, management, and information systems) for agrologistics functions. We distinguish the following types:

- Quality control: Services related to quality control and quality management (such as audits), specifically for agro products.

Example: Quality control

Wageningen University & Research (WUR) developed a High-Speed 3D Scanner that can help multiple stakeholders in the agri- and food production chain like growers, traders, packers, transporters to objectively assess the quality of their products as far as size and shape is concerned. Due to its 360-degrees ring-scan it can handle a complete batch of products in a short period of time.^{i,j}



Figure 8 WUR High Speed 3D scannerⁱ

ⁱ <https://www.agf.nl/article/9303725/kwaliteitscontrole-instrument-voor-agf-de-hogesnelheids-3d-scanner/>, publication date: 18-03-2021
^j <https://www.wur.nl/en/project/high-speed-3d-scanner.htm>

- Training and advice: Training and advisory services aimed at companies active in agro chains, for which the services require expertise on agro products or agro chains. For example, a management consultant advising a food distributor on its HR policy is not within the scope, but an advisor specializing in Life Cycle Assessments (LCAs) of food products is within scope.

Example: Training and advice

Wageningen Food & Biobased Research (WFBR) has developed a Storage Advice Tool that helps growers, custodians and wage coolers to set storage conditions for Dutch hard fruits, specifically for apples and pears. The tool advises conditions for different situational conditions to support ready knowledge. The best storage conditions depend on, among other things, the variety, the picking period and the storage installation.^{k,l}

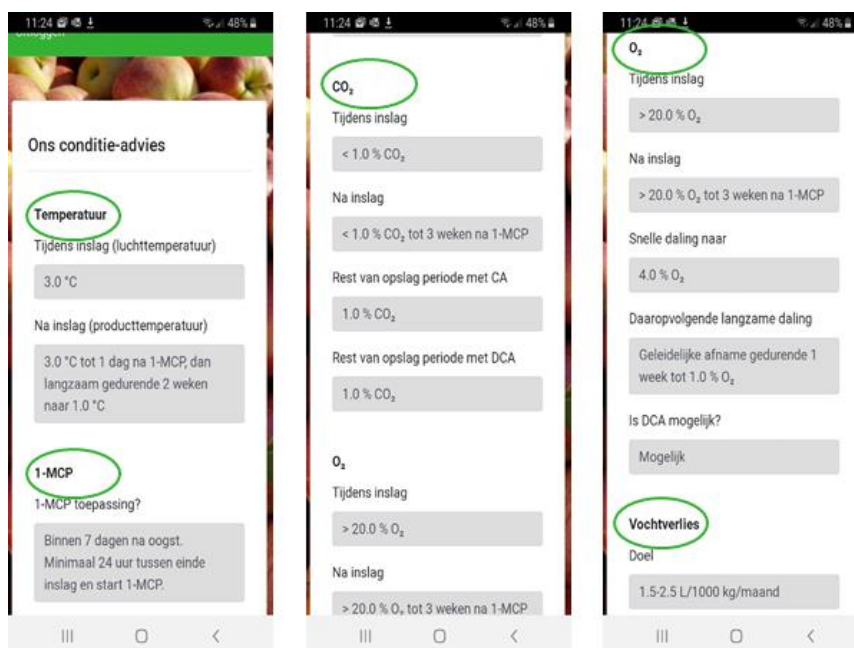


Figure 9 WFBR Storage Advice Tool for apples and pears^l

^k <https://www.nieuweoogst.nl/nieuws/2020/11/04/bewaaradvies-tool-voor-appels-en-peren-helpt-telers>, publication date: 04-11-2020
^l <https://www.wur.nl/nl/product/Bewaaradvies-Tool.htm>

- Packaging materials: Suppliers of packaging material specifically developed (or marketed) for agro products. For example, suppliers of generic shipping cartons are not within scope, but suppliers of packaging materials that optimize the shelf life of agro products are within scope. Also interlinked with packaging technology.

Example: Packaging materials

Remmert Dekker Packaging creates and produces custom printed cardboard packaging for fresh produce, food, snacks and beverages. In collaboration with Driscoll's they designed a new, fully recyclable blueberry cardboard packaging to replace the plastic bucket.^{m,n}



Figure 10 Remmert Dekker Packaging's fully recyclable blueberry packaging for Driscoll's^m

m <https://www.freshplaza.com/article/9432727/we-wanted-a-distinctive-sustainable-blueberry-packaging/>, publication date: 03-06-2022

n <https://www.remmertdekker.nl/site/en/thema/vegetable-and-fruit-packaging>

- IT and data solutions for infrastructure and connectivity: information and communication technology for companies working with agro products, and that have functionalities specifically relevant for agro products and product quality. For example, suppliers of generic ERP software are not within scope, but suppliers of inventory management software for food products are within scope.

Example: IT and data solutions

Infitiv is developing a sensor and decision support software to provide an early warning system to prevent quality degradation and spoilage of fresh produce in storage. The sensor can measure the quality parameters which indicate the ripening, rot and fungus problem of fresh produce during storage. The decision support software will offer early warning of quality changes to enable the company to take action to reduce further loss and optimize the sales strategy.^{o,p}



Figure 11 Infitiv terahertz sensor and decision support software^p

o <https://www.agriholland.nl/nieuws/bericht.php?id=240049>, publication date: 25-05-2022

p <https://infitiv.com/about-us>

3 The Dutch agrologistics ecosystem

3.1 Characteristics of the Dutch agrologistics ecosystem

As discussed above, 10 agrologistics ecosystem actors interviewed were asked to define this ecosystem in their own words, highlighting the following elements:

- The agrologistics ecosystem is part of the Dutch agro complex;
- Beyond agricultural/horticultural production and logistics functions, also knowledge, cooperation, innovation, and education are important components underpinning competitiveness of Dutch agrologistics;
- The ecosystem benefits from spatial concentration of organizations and functions – in the Netherlands as a small country overall, but also in production (e.g., Greenport's, Food Valley) and logistics (e.g., around the Port of Rotterdam and Schiphol Airport) clusters;
- National and regional government organizations (e.g., national and local government, funding, support and network agencies (RVO), infrastructure managers, as well as networked innovation policy through the Topsector approach⁵) fulfil an important role;
- The 'triple helix' of private sector, knowledge institutes and government organizations supporting innovation.

All elements mentioned relate to elements constituting a successful agrologistics ecosystem reflecting the consensus among the respondents that the Dutch agrologistics ecosystem is a globally leading example. The few negative aspects mentioned relate to the need to get more out of cooperation, expand expertise on exotic products, valorize innovations better, address logistics bottlenecks, and mitigate the environmental impact of the agro complex. Several respondents mentioned foreign investment in companies in the Dutch agro complex as a threat, that would lead to less cooperation and knowledge and innovation benefiting foreign owners rather than the Dutch agro complex as a whole.

The respondents describe the Dutch agrologistics ecosystem mostly in terms of aspects that explain its success. As reflected in the discussion above, the performance of agrologistics sectors in an international context is a complex and multi-faceted question. Also, in earlier research, the position of the Netherlands in agrologistics is often referred to as an example of successful development of these functions at the country level (Holland International distribution Council n.d.; Nederland Distributieland et al. 2009a, 2009b; RLI 2013). Proposed – and often interrelated – elements that explain this well-functioning agrologistics ecosystem and well-performing agro chains are:

- A large agro sector with a strong export focus, and a well-developed ecosystem of customers and suppliers (the 'agro complex');
- A well-developed logistics sector and international trade and transport connections;
- The Dutch network approach to innovation policy;
- High-quality education at all levels, with intensive exchange with industry.

3.2 Past and present of Dutch agrologistics

The Dutch agro sector has since long been the focus of policymakers, for a variety of reasons ranging from food security to competitiveness to sustainability (De Haas, 2013). In a long-term historical overview however, farmers in the Netherlands were already specialized, export-oriented and competitive before the state took an active interest in the sector. During most of the 19th century, state involvement remained limited, but the agro sector did organize itself strongly through trade unions and cooperatives. In the late 1800s and early 1900s state involvement increased due to threats to the competitiveness of the sector.

⁵ <https://www.topsectoren.nl/>

This involvement followed the example of input policies already existing abroad (focusing on knowledge infrastructure, credit availability, and high-quality inputs to boost export competitiveness) but doing relatively little in regulating markets and prices. Only after the second world war, the state directly intervened in the agro sector, successfully pushing for consolidation and mechanization of the sector, still with a focus on productivity and (international) competitiveness. The development since of the Dutch agricultural sector is illustrative of the success of this policy (see Figure 12): Farms grew significantly in size, with steadily increasing output per hectare, all without requiring more farm labour. This trend of scaling-up and labour-saving created domestic demand for mechanized and automated equipment, stimulating innovation in the development of technologies and complementary products and services that could efficiently harvest, handle, and process large volumes of agri-food products.

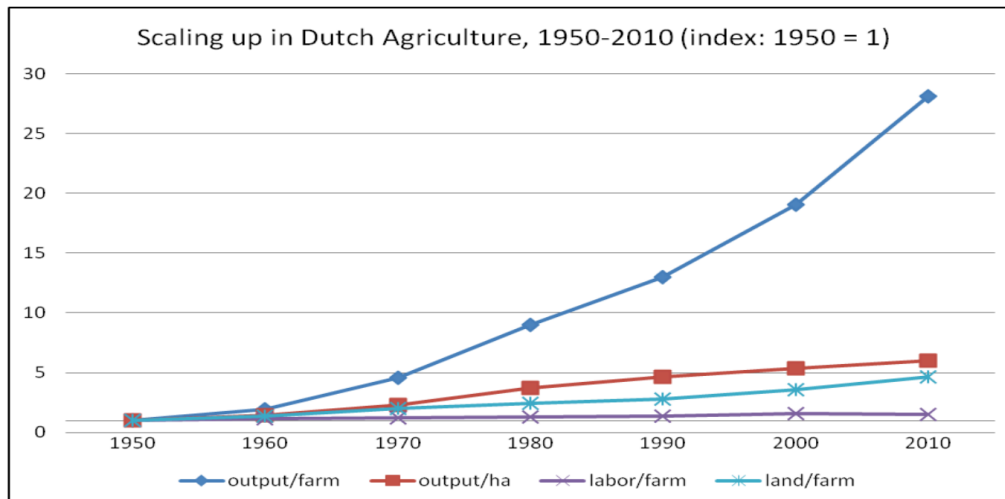


Figure 12 Development of the Dutch agricultural sector, 1950-2010 (De Haas, 2013)

This was the period in which Dutch agriculture grew to a major global exporter. Fairly recently – from the end of the 20th century – has the singular policy focus on productivity, scale and competitiveness shifted to include more attention for sustainability and innovation, with also a departure from the previous directive approach to a more hands-off type of support emphasizing initiative from the sector in ‘triple helix’ cooperation with knowledge institutes and government organizations.

Nowadays, the Netherlands is the second-largest exporter of agricultural and agriculture-related products worldwide (the US being the largest). In 2020, Dutch agricultural exports amounted to a total value of 95,6 bln euros (Jukema et al. 2021). Figure 13 shows how this has grown steadily over the past years, and how re-exports of imported products constitute a significant share of Dutch exports. This illustrates not only the significance of the Dutch agricultural sector (Dutch exports), but also the significance of the Netherlands as a (European) hub for trade in agricultural and agriculture-related products.

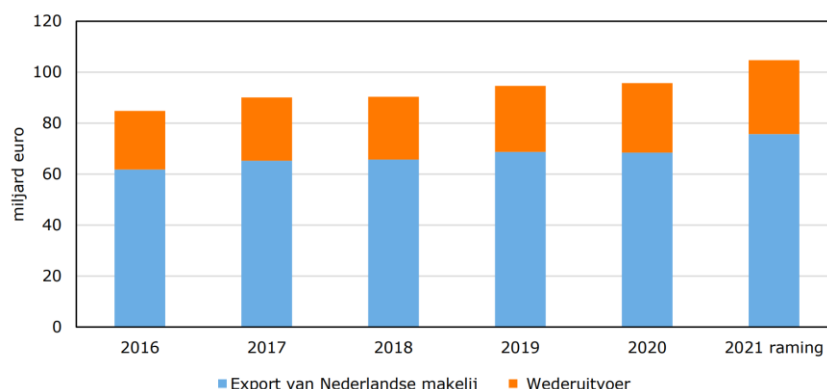


Figure 13 Dutch exports of agricultural and agriculture-related products, distinguishing Dutch-made (blue) and re-exports of imported (and sometimes processed) goods (orange) (Jukema et al. 2021)

For a large part this consisted of agricultural and food products, but also includes a growing share of enabling technology, products, and services (Smaling 2018). The agro complex, of which this is a part, contains agricultural producers as well as processors and suppliers. Likely, the market size in the Netherlands for agrologistics-related technology, products, and services is conducive to the development of companies that supply them. Dutch providers of these have a large 'home market' for their products and services, and the possibility to work closely (in terms of geographical as well as cultural proximity) together with their customers in the agro chain. In working together with high-performing, internationally competitive clients, agrologistics suppliers are able to acquire knowledge of agro and food products and their requirements and further develop their products to meet high standards. Over time, this relationship becomes mutually beneficial, where agrologistics providers can perform at a high level due to their home market advantages, and in turn the Dutch agro and food sector can maintain and enhance its (international) competitiveness by making use of well-developed enabling technology, products, and services of agrologistics providers – often developed specifically for their own needs in the home market.

The (international) performance of the Dutch agro complex and agrologistics can also partly be explained by the degree of development of the logistics sector in the Netherlands. Agrologistics is a domain spanning both the logistics sector and the agro sector, and conditions that favour logistics activities in general (e.g., location, connectivity, infrastructure) are also conducive to agrologistics performance. For the Netherlands, these conditions are definitely present, with high quality infrastructure, well-developed mainports in the Port of Rotterdam and Schiphol Airport that connect the Netherlands to agri and food trade worldwide, as well as good connections to major production and consumer clusters in Europe. Historically, these conditions allowed a strong logistics sector and related ecosystem to develop, with capabilities that are easily leveraged to support logistics functions in agro chains as well. At present, the international competitiveness of the Dutch agro sector depends on the Netherlands' role as a major logistics hub, and vice versa, the Dutch transportation and logistics sector is strongly dependent on the transportation demand from agro chains. Figure 14 (in Dutch) below illustrates this symbiosis: Around one-third of all cargo transported by road in the Netherlands is related to agricultural and food products (Landbouwproducten (light blue) and Voedingsproducten (orange)).

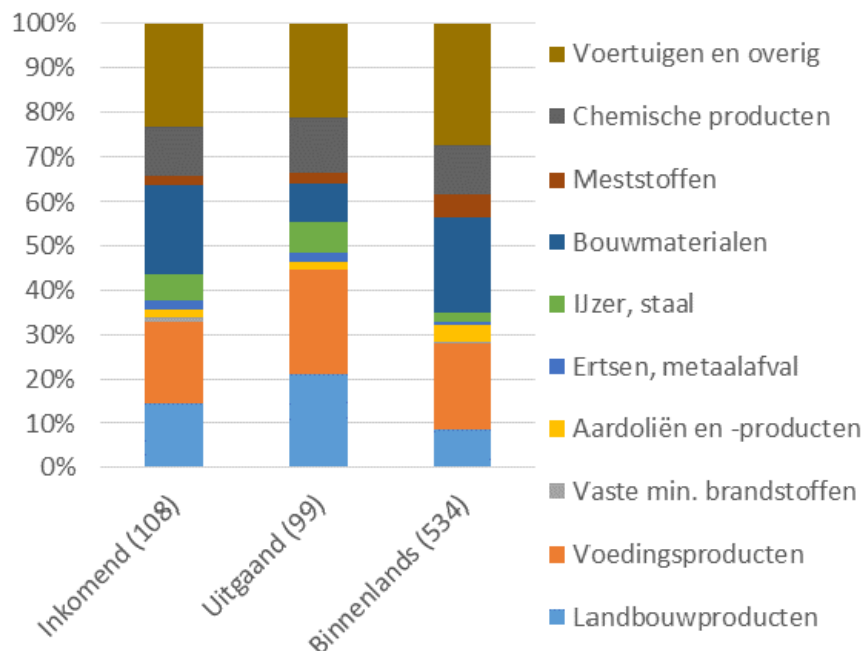


Figure 14 Composition of cargo in Dutch road transportation (Agricultural products (light blue) and Food products (orange)) (Kindt et al. 2020)

A third factor that can explain part of the agrologistics performance of the Netherlands is the Dutch approach to innovation policy. Agrologistics functions require companies in different domains and sectors to not only do transactions but also cooperate and learn from each other to develop product- and chain-specific technologies, products, and services, ideally with support from government organizations and knowledge institutions.

The Dutch approach to innovation policy strengthens this dynamic, with a high degree of institutionalized cooperation between industry, government, and knowledge organizations (triple helix) – as well as relevant civil society organizations. Since 2010 this has been developed further into the still-relevant Topsector approach, in which this tripartite cooperation is specifically stimulated for nine predetermined focus sectors or 'Topsectoren'. The Topsector approach is a strategic choice to support 'triple helix' cooperation (or 'Dutch diamond' when also including civil society organizations) in specific sectors, with financial instruments and the development of a vision and strategic agenda for research and development (R&D), education, and the labour market. Agrologistics broadly defined can benefit from support from at least three different Topsectors – Horticulture & Starting Materials⁶, Agri & Food⁷, and Logistics⁸. This does bring the risk that agrologistics may receive too limited attention in these individual Topsectors (e.g., decision-makers in the Topsector Agri & Food considering it to be a logistics topic, and decision-makers in the Topsector Logistics considering it to be a Agri & Food topic). A similar risk lies in the fact that agrologistics – as relating to agriculture and food – is relevant for both the Ministry of Agriculture, Nature and Food Quality (LNV) and – as related to transport and logistics – the Ministry of Infrastructure and Water Management (IenW). Currently however, agrologistics is addressed consistently within (e.g., attention within Topsectors Agri & Food and Horticulture & Starting Materials for efficient and sustainable agro chains (mission D in the KIA LWV (2021)) and between (e.g., attention for crossovers between Topsectors Agri & Food and Logistics) the Topsectors, suggesting that the risk of it being a neglected topic is limited.

A specific part of the Topsector approach is strong linkages between research and education institutions on the one hand, and industry on the other hand. However, research and education for (and in cooperation with) specific sectors has a longer tradition in the Netherlands ("Ontwikkelagenda groen onderwijs 2016-2025", 2016; ABDTOPconsult, 2015), with the basis of the current knowledge infrastructure supporting the agro sector having been established over a century ago (De Haas, 2013). This is reflected in the history and current position of established institutions. The higher agricultural education in the Netherlands is offered at Wageningen University & Research (formerly State Agricultural University which has since merged with the agricultural research institute (DLO) of the Dutch Ministry of Agriculture) and several higher professional education institutions (vocational university with a strong agricultural focus). There are four universities of applied sciences: Aeres⁹, HAS¹⁰, Inholland¹¹ and Van Hall Larenstein. In addition to the classic courses such as horticulture, animal husbandry and arable farming, various schools also offer courses such as Food design and innovation, environmental science, animal management and water management. This research and education infrastructure with a strong focus on the agro complex (and related domains) contributes to R&D relevant for agrologistics, as well as high-quality human capital.

Agrologistics is part of the agrologistics ecosystem that is a combination of several sectors and the collaboration between the actors in these sectors.

Figure 15 visualizes the Dutch agrologistics ecosystem synergies, including the elements that explain this well-functioning agrologistics ecosystems and well-performing agro chains. See also Annex 1.

⁶ <https://topsectortu.nl/en/>

⁷ <https://topsectoragrifood.nl/en/>

⁸ <https://topsectorlogistiek.nl/> and <https://www.dinalog.nl/en/>

⁹ <https://www.aeres.eu/>

¹⁰ <https://www.hasuniversity.nl/>

¹¹ <https://www.inholland.nl/inhollandcom/>

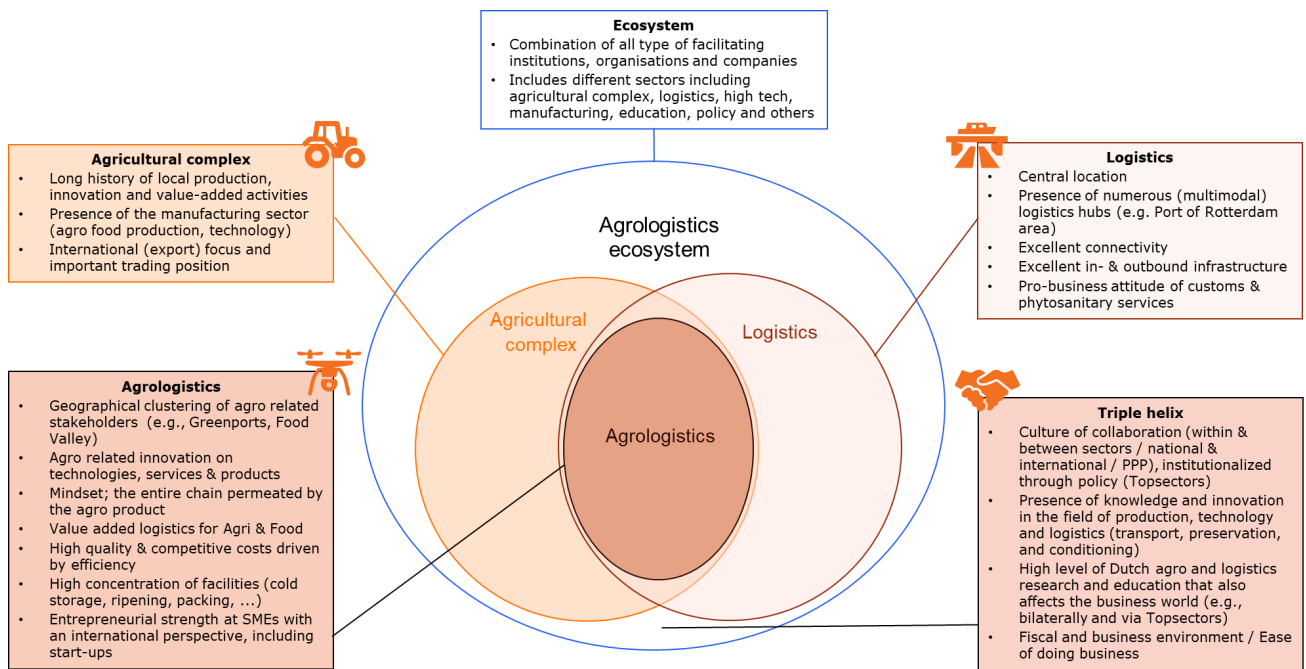


Figure 15 Agrologistics ecosystem synergies (authors' elaboration)

To summarize, the success factors of the Dutch agrologistics ecosystem can be identified in four broad domains: 1) the 'Triple Helix' collaboration, 2) logistics, 3) agrologistics and 4) agricultural complex.

International use of Dutch technology

Dutch technology, focussing on improving the agrologistics sector, does not always fit the context of low- and middle-income countries (LMIC). LMIC are characterized by:

- a) A large share of the rural areas and limited infrastructure, decreasing the accessibility of markets for farmers;
- b) supply driven markets, that still play a major role in the food system of these countries;
- c) linkages in these supply driven markets tend to be weak and vary per day, so monitoring is difficult and intervention efforts are not easy to allocate; and
- d) the sizes of the farmers production areas are small, whereas their practices and performances are diverse, and their numbers are huge.

Due to the limited size of the farms and of the production, the value chains are long and complex, efficiency is low, and food losses are high. This can lead to relatively low prices being paid at the production part of the chain, often resulting in minimal investments in production- or quality improvement, efficiency, or loss reduction (Soethoudt et al. 2021). Availability of affordable solutions in primary production, and in post-harvest handling, storage and processing, is key to develop the local food system. The availability of cheap labour and the limited willingness of consumers to pay additional prices for improved quality limit the possibilities to invest in high-tech solutions. Furthermore, high-tech investments require a minimal scale to apply successfully (Verschoor et al. 2020).

Most interview respondents (25 representatives of companies that provided agrologistics enabling technology, products, and services) mentioned they do not develop specific products for certain countries, but rather focus on entering specific markets (such as greenhouse producers, retail, restaurants, etcetera), on a specific type of crop, or on optimizing its existing developed products. Generally, products are initially developed for the Dutch market and, when successful, are sold to foreign markets as well. New potential countries are sourced based on individual customers located in a specific country or due to collaborations with a third local party (agent). So, their network, or individual contacts, is their main reasons to go to a new country with their products. For example, machines for sorting apples can only be sold in countries where they also produce apples. On the other hand, companies can be specialised in developing products for specific crops that are not produced in the Netherlands, like kiwi or banana. In that case Dutch companies initially develop their products for one or two main production countries.

Overall, a strong group of medium-sized enterprises is needed in a country to strengthening post-harvest knowledge and technologies. It is important to recognize the development level of a specific country or region and pay attention to the entire value chain. All links in the value chain need to match each other in terms of development level to ensure success for improving food security. This may include hardware, software and orgware, adapted to each other and adapted to the appropriate level of development of the country (Verschoor et al. 2020).

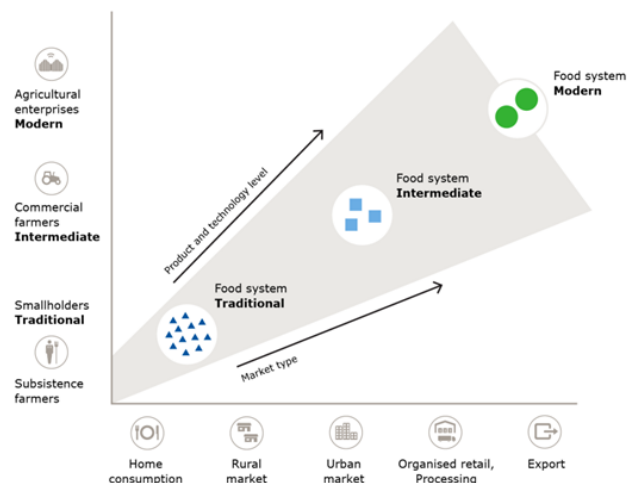


Figure 16

Food system level development related to market and technology development (Verschoor et al. 2020)

3.3 Agrologistics ecosystem: Strength and Weakness

The interview respondents (10 from what we labelled 'ecosystem actors' and 23 representatives of companies that provide agrologistics enabling technology, products, and services) were also asked their view on the main drivers of the competitiveness of Dutch agrologistics, as well as what they saw as the main weaknesses and threats in an international context.

The elements discussed in Section 3.2 above were consistently affirmed by respondents. In addition, they raised the following elements that were – according to them – also crucial for the (sustained) success of Dutch agrologistics:

- The link with high-tech and manufacturing industries. To develop high-quality enabling technology, agrologistics companies benefit from collaboration with other industries with innovative and productive capacity.
- The strong position of SMEs (Small and Medium Enterprises) in the Dutch agrologistics ecosystem. SMEs are described as innovative players that establish themselves as market leaders in specific niches.
- Strong relationships between companies. Parties in agrologistics generally know each other and work together – whether structurally or on an ad-hoc basis. Some respondents attribute this to a specifically Dutch culture of cooperation.
- The combination of domestic production and significant import of agri-food products. This allows companies to develop expertise on a wider range of products, and helps their international competitiveness.

These mechanisms can all be reasoned to contribute to the development of strong agrologistics capabilities in the Netherlands. They are not mutually exclusive, but rather interdependent. Due to this interdependency, it is hard to indicate which is the main driver or was the first catalyst of the development of a strong agro complex and agrologistics functions. Nevertheless, this development should be considered first and foremost in the Dutch context.

In the interviews, trends (abroad) that may constitute threats to the 'frontrunner' position of Dutch agrologistics were discussed. Summarizing shared experiences of respondents across the interviews, the following common threads in respondents' perspectives can be identified:

- As discussed above, the strength of Dutch agrologistics is attributed at least in part to strong linkages with well-developed agriculture, manufacturing, and high-tech sectors. If these sectors would decline in the Netherlands, this affects the capabilities underpinning the competitiveness of Dutch agrologistics. Trends such as offshoring of manufacturing and discussions of curtailing (intensive) agricultural production to mitigate its externalities are examples of this being a real threat.
- There are several challenges that require strategic direction (such as the energy transition and nitrogen problem). When there is uncertainty – for example about the scale and characteristics of future agricultural production, or the incorporation of renewables in the energy system – coordination within and between sectors proves to be challenging. Several respondents attribute this to the predominance of SMEs in agrologistics, but also lack of direction from the government in terms of long-term vision, clear standard setting, and consistent policy are mentioned by respondents.
- Several respondents share the perception that the 'triple helix' model of inter- and intra-sectoral cooperation is under pressure. They observe growing individualism and competitiveness, and a decline in the cooperation and exchange necessary to innovate and invest collectively.
- Foreign companies investing in Dutch agriculture and agrologistics businesses is also mentioned to weaken the competitiveness of the sector in general: Foreign-owned companies are stated to be less focused on cooperation within the Dutch ecosystem and to invest less in R&D in the Netherlands than Dutch-owned companies.

Several respondents from organizations we labelled 'ecosystem actors' also put into perspective the perceived 'uniqueness' of the Dutch agrologistics ecosystem. In other countries – either at a national or regional level – comparable dynamics exist that underpin the competitiveness of certain sectors or sub-segments.

Examples include:

- Innovation in the agricultural sector in **Israel** - with effective cooperation between companies, government, and research institutes, as well as a strong international network.
- Rapid development of smaller-scale innovation ecosystems for agriculture and agrologistics in **Singapore** and the area around **San Francisco**.
- Larger countries (the **United States, Germany, Japan, and China**) are - with their sheer market size - also described as countries with similar ecosystem dynamics.
- Other countries (**Belgium, Italy, Spain**) with a significant agricultural and food sector also show (elements of) the dynamics that characterize the Dutch agrologistics ecosystem.
- Also, foreign examples exist of how cooperation can be effectively organized at the sector level, for example the **Cold Chain Federation**¹² in the United Kingdom, and the **Global Cold Chain Alliance**¹³ (based in the United States of America, where government organizations (USAID, USDA, USTDA) also provide considerable funding, almost exclusive for American companies).

So, while the Dutch agrologistics ecosystem seems to perform well - for reasons discussed above - its dynamics (or at least elements thereof) are not necessarily unique in the world. For every sub-segment and market there are companies from other countries with which Dutch business compete. Nevertheless, Dutch agrologistics companies have consistent success with their technology, products, and services around the world, due to several aspects of the Dutch agrologistics ecosystem that respondents and experts consider to be unique:

- Research institutes and facilities for R&D are of a level that is not readily found elsewhere (e.g., Phenomea at Wageningen University & Research¹⁴); Agrologistics innovation are developed in close cooperation with the agricultural sector to an extent that is not seen elsewhere.
- The stringent demands of clients in the Netherlands, in combination with European standards, incentivize Dutch agrologistics companies to adhere to the highest quality and sustainability standards.
- Dutch agrologistics companies excel at offering integrated solutions that provide the best fit for the product, process, sector and/or supply chain.
- Providers of agrologistics technologies, products, and services as well as agricultural producers cooperate within the context of the Dutch agrologistics ecosystem, but all have a strong international (export) focus.

The Dutch agrologistics ecosystem consists of established companies as well as newer companies and startups that focus on bringing (scalable) innovative technology to the market. Startups in the food and agriculture domain can benefit from dedicated support. An example is startup accelerator StartLife¹⁵ (StartLife, 2020), which has since 2010 supported over 400 food and agriculture technology ('agrifoodtech') startups. StartLife is situated at the Wageningen University & Research campus, and was founded by Wageningen University & Research, as well as regional investment organization OostNL¹⁶ and regional collaboration FoodValley¹⁷, to build successful businesses around 'agrifoodtech' innovations. This domain is broader than agrologistics, but includes numerous startups that develop new agrologistics technologies, products and services. Examples include technology for quality monitoring in food supply chains, laser-based labelling technology, new sensor technology and applications for quick and easy quality control, and blockchain technology for food supply chains. Among this diverse group of agrologistics startups, there is a predominance of startups providing enabling products and services, particularly in the 'quality control' and 'IT & data solutions' segments, that bring complete, standalone products to markets. A smaller group of startups is centered around technology that is to be supplied to other manufacturers of enabling technology (e.g., for integration in sorting or packaging lines or use in cold storage).

¹² <https://www.coldchainfederation.org.uk/>

¹³ <https://www.gcca.org/>

¹⁴ <https://www.wur.nl/en/Research-Results/Research-Institutes/food-biobased-research/Facilities/Research-facility-for-postharvest-technology-and-robotics-2/A-research-facility-brimming-with-innovation.htm>

¹⁵ <https://start-life.nl/>

¹⁶ <https://oostnl.com/en>

¹⁷ <https://www.regiofoodvalley.nl/en/home>

A recent report (Startup Genome, 2022) comparing startup ecosystems ranks the Netherlands (labeled Amsterdam-Delta) 14th worldwide, specifically referring to its strengths in the agri tech and new food startups domain. The report attributes this particularly to the government's vision on circular agriculture, and the strong position of Wageningen University & Research in research, education and spin-offs. The highest-ranked startup ecosystems are Silicon Valley, New York City, and London, and The Netherlands is the highest-ranked ecosystem with a specific attribution to the agri tech and new food domain. So, while the startup ecosystem of the Netherlands may not be unique, the ecosystem's strength in agri-food (based in part on triple-helix cooperation) makes it a major player in this domain worldwide.

In sum, these are the aspects of the Dutch agrologistics ecosystem that constitute and/or underpin the unique selling points (USPs) of Dutch agrologistics abroad. Their international activities are the subject of the next section.

4 International activities and ambitions of Dutch agrologistics businesses

This section focuses on how Dutch agrologistics companies operate abroad, and what they see as barriers and enablers for international success. The previous section closed with a discussion of unique aspects of the Dutch agrologistics ecosystem that underpin companies' competitiveness. To illustrate how these companies view their own international competitiveness, throughout this chapter we include text boxes with examples of what respondents considered to be the 'unique selling points' of their specific product offering. While these USPs are subjective and company-specific, they tend to reflect the overall strengths of the Dutch agrologistics ecosystem that underpin their USPs, notably cooperation, innovation, integrative solutions, and an international orientation.

The 23 respondents from agrologistics companies were asked about their main activity, which in all cases matched with the subsegment we expected them to be in beforehand. Also, we asked about any other activities – beside their main activity – which for most companies was either very limited, or closely connected to their main activity. For example, a manufacturer of refrigeration systems also does installation and maintenance, a company specializing in quality control also incidentally does surveys for insurance claims, and a company that mostly does sorting and packaging also has some sales activities of packaged products they market under their own label.

4.1 Sustainability ambitions

Although not specifically related to internationalization, an important topic of conversation was to what extent (and how) sustainability is reflected in the firm's operations and activities. We observed several dimensions of sustainability that were highlighted by respondents. Most respondents included more than one in their answers.

- Internal sustainability – This entails that companies' own facilities and processes are designed or adapted to mitigate their environmental footprint. Companies that emphasized this dimension would for example invest in renewable energy systems (e.g., solar panels) for their own building(s), switch to LED lighting and/or implement other energy-saving measures. Furthermore, they would stress separated waste collection, have electric company vehicles, and/or include miscellaneous sustainability metrics in their (annual) reporting. Last, they improve the environmental performance of their own production processes, for example through heat recovery or using recycled raw materials.
- Sustainable product offer – Companies that emphasize this dimension design and produce their products with attention for sustainability in their application, allowing their clients to mitigate the footprint of their processes. This entails producing recyclable or biodegradable products, and/or developing products (durables) that are more energy-efficient when operated by the client. The latter is a very diverse category, ranging from machinery with electrically driven components instead of hydraulics, wastewater capture and cleaning solutions and energy saving solutions in general.

Examples of USPs - Product processing and handling technology providers

- Offering equipment as well as servicing – "Offering the equipment and servicing, maintenance, builds long-term client relations and provides a steady income [...] We can help clients optimize and reduce waste."
- Designing equipment with improved sustainability performance and savings for clients – "We found a niche in helping clients save water cleaning their equipment [...] and continue to innovate our cleaning technology."

- Food loss prevention and valorization – Along this dimension of sustainability, companies consider how their product or service offer helps to reduce food loss or make better use of side streams that arise (in circular economy applications). Producers of packaging and refrigeration technology, as well as packaging materials, often highlight that their products lengthen the shelf life of perishable products, and thereby prevent food loss. The companies that we interviewed that provide quality control services both mention that their services help verify quality, detect contamination of food as well as residual streams, thus contributing to reducing food loss and enabling residual streams valorization.
- Sustainability as value proposition – Most companies highlight that improving their sustainability performance (and helping their clients to improve theirs) produces a double benefit. Not only is it described as “the right thing to do” or “a must nowadays”, but it also helps to realize savings in terms of time (efficiency), money (energy), and reduced food losses and waste.

Several respondents note that clients with specific demands regarding sustainability are predominantly from the Netherlands, Europe, or other developed countries. In Africa, and Asia there is limited awareness, although high energy costs do motivate clients to value energy-efficient technology.

Examples of USPs - Sorting and packaging technology providers

- Work with the most innovative clients – “The Dutch market is seen globally as the driver of innovation [...] if it’s developed for the Dutch market, we can automatically take it abroad.”
- Cooperating with seed companies to fine-tune packaging – “We continue to diversify to offer solutions for other products as well, explore different routes for improved preservation”

4.2 Current international activities

Eight of the companies interviewed were active worldwide, with activities and/or sales agents on all or most continents. These companies did indicate that the focus of their international business would shift frequently, depending on where new orders would come from. For companies working with agents in multiple countries, they did observe that good agents are hard to find, but that a good agent could make one country an important market for them with multiple clients and projects ongoing.

Examples of USPs - Packaging materials providers

- Developing products tailored to retail/foodservice/household customers’ requirements, which vary by country – “We make the conscious choice to adapt our offering for different countries, but in the Netherlands, we are furthest with rolling out fully recycled packaging”
- Control the full production process and offer the widest range of products and services – “We have our own recipes for specific foils [...] print packaging materials ourselves [...] These specialty products are our main success worldwide.”

Still, around half of the respondents indicated that most of their business took place in the Netherlands or nearby in Europe (Benelux, Germany, UK). Some indicated that this was due to convenience and the easy accessibility of nearby markets. Others also explained that these are also the markets where their big clients are, for example large potato processors in the Netherlands and fruit producers in the Netherlands, Belgium, and Germany, and that they don’t need to look further to find a big market for their offering. Moreover, some respondents focused their activities specifically on the main European ports (Antwerp, Rotterdam, Bremen and Hamburg) and the (food-related) trade flows through them, for example quality control services, surveys, equipment for refrigerated warehouses. They indicate that their main clients are clustered around these major ports.

Other respondents indicated specific foreign markets where they are active. Among these responses, we distinguish three main reasons for this, which are – again – not mutually exclusive:

- Product connection – Companies that specialize in technology or services for specific product types are specifically active in major producer countries. For example, a big foreign market for a producer of refrigerated warehouse technology is Kenya, as this company specializes in warehouse solutions for the horticulture and floriculture sectors and has major clients among rose producers in Kenya. Similarly, several companies indicate that they provide technology and services specifically for avocado's (e.g., packaging) and focus accordingly on countries such as Peru, Mexico, Chile, South Africa, and India.

Examples of USPs - IT and data solutions for infrastructure and connectivity

- Broaden product-specific solutions to products with similar characteristics – “First we focus on [two markets], but are looking for other applications in agri food and other markets”
- Developing capabilities to easily export equipment abroad – “The challenge is the exporting of our equipment [...] and paperwork [...] we have staff who is very good at taking care of this.”

- Client connection – For some agrologistics suppliers, their main foreign markets were determined by the presence of one or more major clients in that country. Sometimes this is through a Dutch client with whom they do business at home in the Netherlands that sets up a foreign subsidiary and requires the same technology or services abroad. In other cases – mostly by coincidence – a relationship with a foreign client has grown to the extent that the client in which this country is operating becomes a major market. As discussed above, having a good partner or agent in a country that helps to contact lucrative clients can also make a foreign country over time develop into a major market.
- Generic opportunities – Dutch agrologistics suppliers do not necessarily need specific niches or relationships to find markets abroad. Several companies indicated that a large agricultural sector in general is enough for them to consider focusing on a country. For example, one producer of processing and handling equipment stated that Eastern Europe was particularly interesting for them as they significantly subsidize the agricultural and food processing sectors, leading to an accordingly significant growth in the demand for processing equipment. A similar awareness of the growth of the food processing sector is relevant for other emerging economies, such as in Latin America and Southeast Asia. As another illustration, one provider of transportation and storage technology explained that when these economies grow, the middle class grows, as does demand for more diverse food and processed food products, in which they see a major general opportunity.

The products and services with which they had most success abroad were generally the products and services they considered to be their main activity.

Examples of USPs - Transportation and storage technology providers

- Combine offering technology and control tower services – “Our clients can focus on production; we take care of the logistics.”
- Conduct own – excellent – R&D - “Our competition cannot offer this type of equipment and cannot offer storage this long.”

We also asked respondents about how foreign markets were approached initially. Also, here, we could distinguish several main types of responses, with most respondents indicating that a number of these is relevant for them:

- Grown over time – multiple respondents could not recall how or when the decision was first made to internationalize, and indicated that it has historically grown and/or the company has been active internationally for a very long time.
- Trade shows - The great majority of respondents indicated that they frequently visit trade shows to meet potential foreign clients and to showcase their offering. In an illustrative elaboration on this topic, a representative from a product processing and handling technology provider shared that previously they used to find and approach potential clients via Chambers of Commerce (KVK) or trade associations, but that with new privacy regulations this has become more challenging, and they considered trade shows a good alternative.

- Own network and reputation – For some companies, foreign endeavors have been instigated by an existing (Dutch or foreign) client or partner inviting or recommending them for activities in new markets. Most respondents (realistically or not) considered their company to have a good reputation in the industry – either across the board or in specific market segments. A few respondents simply described it as potential clients who “know how to find them”.
- Start small – For agrologistics companies, the barrier to start activities in a foreign market is quite low. Several companies report that they start small by contracting an agent, establishing a foreign subsidiary or establishing first tentative contacts with a foreign partner. To illustrate: one provider of refrigeration technology stated that this does not always work, and you need some luck in finding a first client, but in order to be successful you need to take a risk and try. Along the same lines, a manufacturer of processing and handling technology remarked that agents in foreign countries are a “hit or miss,” and that they find it challenging to find a good agent who connects them to the right potential clients. Nevertheless, they maintain a network of agents (even those who don’t perform well) just in case one of these small risks yields a result.
- Institutional support – Multiple companies interviewed indicated that they had support (broadly defined) from Dutch government organizations, such as RVO or embassies. This ranged from subsidies to participation in trade missions and help from the embassy to give country-specific support and advice. This is discussed in more depth below.
- Market research and marketing – Surprisingly, only a few companies reported that they did elaborate market research or undertook dedicated marketing efforts before starting activities abroad (and only one hired a specialized party to do this research for them). More often – as described above – they rely on existing knowledge of developments in their sector or their own network or reputation.

Examples of USPs - Training and advice providers

- Offer highly specific knowledge and advice. “We work in a specific field and entered markets where there was no competition yet.”

None of the respondents reported that their company undertakes country-specific R&D activities for international markets. For most, the agro product or process for which they develop technology or services is the main driver of any R&D activities, regardless of the (potential) country. In practice, this may mean that this product focus leads them to develop and market their technology or services for the main producer markets (such as developing refrigeration technology specifically for kiwifruit in New Zealand and China), but nevertheless the product and product characteristics are the main driver for R&D. If anything, respondents indicate that any new product development for a specific market is for their Dutch clients – for example, as one provider of IT and data solutions stated, “there has to be a market for it in the Netherlands, otherwise we won’t develop it.”

4.3 Support for internationalization

Above it was discussed briefly already that some – but not all – Dutch agrologistics companies experienced support from government or other public sector institutions in setting up their activities abroad. In this section, we will go into further detail about this support for international expansion, and specifically the role Dutch institutions play in this.

Examples of USPs - Quality control providers

- Anticipating changes in regulation – “We follow regulation closely, also internationally, and already start looking at markets where regulation is lagging.”
- Digitization – “We develop software for quality control ourselves and are still looking for the right model to market it.”

One of the questions posed to the respondents was what type of problems or barriers they encounter when operating abroad. The great majority of respondents mentioned administrative barriers related to differences in laws, regulations, standards, and other types of red tape. Also, in the EU, this is not always well aligned, for example product certifications, which are accepted worldwide when coming from any European country, but which differs between European countries, as described by a quality control service provider. Other problems reported were:

- Bureaucracy ("red tape") – In addition to the administrative barriers above, respondents observe that working through bureaucracy (for example for obtaining visa or certifications) takes inordinate amounts of time and effort.
- Difficulty of finding staff and partners – Respondents note that having a good local partner and/or staff can help navigate any administrative barriers. However, this often proves hard to find.
- Product quality at the farmgate – Dutch agrologistics companies that work with producers, logistics service providers, or processors in developing countries find that the product quality at the beginning of the chain is unpredictable and often sub-standard. This is a problem they rarely must deal with in the Netherlands or in Europe, but in other countries is ubiquitous and a considerable challenge to companies, especially those with more high-tech offering and ways of working.
- Language, culture and (business) customs – Quite predictable barriers that are not unique to agrologistics, but nevertheless are indicated by respondents as an important problem they encounter abroad. Especially the way of doing business in a foreign country is experienced as unfamiliar, unpredictable and cumbersome. Establishing good relations with local partners (see above) proves challenging, and things that are common in a European business context (financial disclosure, payments on time) are not common practice elsewhere and may be hard to align with the way the company is run by the Dutch headquarters.
- (Unfair) competition – Several respondents observe that they face competition from businesses and individuals that – from their perspective – do not necessarily offer something better but are subsidized or otherwise supported by governments.
- Financial barriers – When operating outside of Europe (e.g., Africa), financial transactions often do not go as smoothly as close to home, and exchange rates may fluctuate strongly, introducing some uncertainty in foreign transactions.
- Logistics and infrastructure deficiencies – Coming from the Netherlands, respondents described logistics systems and infrastructure in foreign (developing) countries as something they had to get used to.
- Safety – One respondent mentions safety of personnel as a major barrier in the context of their activities in Mexico.

The respondents' elaborations highlight the subjective nature of these issues: factors that are described as major problems by some respondents, are described as not much more than a nuisance by others. The latter attribute this to having the right partners or advisors in the foreign market, having experience in this market or operating internationally in general, or finding creative ways to overcome the problems described.

As a follow-up to these questions regarding the companies' international expansion and problems they face, we asked them about the support they received from Dutch (government) institutions when operating abroad. The respondents' answers were on a wide spectrum between "not aware of who can support at all" to "received support and very satisfied with it." 15 companies did not receive any support that the respondents were aware of (to which most added that they did quite well themselves); 10 did receive support in some form.

Most frequently mentioned were embassies, with support activities ranging from general trade missions to specific advice, support, and matchmaking by agricultural counsels. Secondly, support from RVO was mentioned.

Individual respondents acknowledge specific support such as the (former) PSI (Private Sector Investment) and PSOM (Cooperation with emerging markets) programs¹⁸, DHI (Demonstration projects, Feasibility studies and Investment preparation projects¹⁹) subsidies, subsidies for market research, or support from the Netherlands Business Support Offices (NBSO network²⁰). Apart from RVO, multiple individual support institutions were mentioned such as support in the form of a loan from a regional development and investment company (LIOF²¹), cooperation with Dutch universities (research university and university of applied sciences) for their international offering, mentioning PPP (Public-Private Partnership) projects and bilateral projects, support received from LNV (Ministry of Agriculture, Nature and Food Quality) (not further specified), and support through STV (Food Waste Free United foundation²²) vouchers. Here it should be emphasized that individual instruments were named by only one or a small number of respondents; most respondents did not indicate specific instruments, programs, or subsidies they made use of.

In addition to questions regarding the support they already received (currently or formerly), we also asked respondents how Dutch (government) organizations can be more helpful supporting Dutch agrolistics companies abroad. For Dutch government organizations in general, the following needs were found:

- Overview of offered support – Companies want to have a clear overview from Dutch government organizations of what support can be offered (what support is available, and how can companies benefit from this?).
- Promote the Dutch business abroad – Companies have a need to be promoted as Dutch business abroad (what can Dutch companies do for potential clients abroad?).
- Focus on sustainability – Companies have a need to translate adherence to sustainability standards into a competitive advantage abroad (how can Dutch government organizations support this?). To illustrate, one respondent noted that sustainability requirements attached to any form of support were too non-committal to be effective.

For **embassies** specifically, the following needs were elaborated:

- In-depth knowledge – There is a high need for in-depth knowledge of local markets, legal requirements and administrative aspects of the foreign market. In this way embassies can effectively support the companies in their international expansion.
- Matchmaking – Some companies appreciated and emphasized support from embassies in the form of matchmaking and setting up meetings with potential local partners, representatives and/or clients, while other companies mentioned that they can find partners on their own.
- Trade missions – Companies that participated in trade missions reported their need to organize more specific trade missions. Often trade missions are too generic, which result in minimal follow-up. On the contrary however, other interviewees mentioned they were very satisfied with the amount and quality of the trade missions.
- Country specific information – Need for knowledge provision on specific potential countries or regions. This can for example start from a specific problem or need from these countries and advice on how to start in a specific country/region. These type of presentations/workshops/meetings are already in place, and these are very much appreciated.

For **RVO** specifically, interview respondents voiced the following needs:

- Improve accessibility of funding – Companies have a need for a clear, simple structure to improve the accessibility of funding. Multiple companies that considered applying for funding indicated that the application process is experienced as bureaucratic and time-consuming for companies, requiring more effort than the result is worth to them.

¹⁸ <https://english.rvo.nl/subsidies-programmes/psi#> (closed)

¹⁹ <https://english.rvo.nl/subsidies-programmes/dhi#>

²⁰ <https://english.rvo.nl/partners-network/international-economic-network/netherlands-business-support-offices>

²¹ <https://liof.nl/en>

²² <https://samentegenvoedselverspilling.nl/>

- Clear rules and procedures – Companies prefer clear and simple rules and procedures for support (implemented in different contexts). Examples include (1) that support for product development stops when the product is considered mature enough, but companies would also benefit from support in marketing the product (abroad), and (2) that subsidies for SMEs (Small and Medium Enterprises), have strict constraints (for example a small company within a large holding cannot participate). One concrete suggestion was to broaden DHI beyond strictly SMEs.
- In-depth knowledge – Respondents indicated a need for support in requiring in-depth knowledge of foreign markets and potential clients. For example, there is a need to receive more information on foreign markets into who exactly makes decisions in foreign potential client organizations, which would make it easier for Dutch companies to know who they need to approach – like the ‘match-making’ by certain embassies.

4.4 International barriers and ambitions

Last, we asked respondents in which countries and/or with which products they see their main opportunities for the future. Seven respondents indicated explicitly that they were satisfied with their current international presence and that they were not looking to expand this any time soon. The potential markets mentioned by others were very diverse, and more frequently attractive regions (or groups of countries with properties in common that made them attractive) rather than countries were identified. The main factors (not mutually exclusive) that respondents considered to make for attractive markets were:

- Emerging economies – When a country develops and moves from low-tech to mid- or high-tech agri-food supply systems, more opportunities arise for (Dutch) technology providers to market this technology to industry there. In this context, respondents specifically mentioned emerging markets in Latin America, Asia and (North) Africa.
- Countries with large and developing agriculture/horticulture sector – Agrologistics firms find clients for their technology and services in the agro sector, making countries where this sector is large and/or growing fast attractive markets. In this context, respondents mention countries and regions nearby with well-developed agro sectors (Western Europe, Southern Europe), as well as emerging markets (examples mentioned in Eastern Europe, Latin America, and Asia).
- Countries with large agriculture and horticulture sector and shortages of workers – This specific type of market was identified as an opportunity for automated technology (in sorting, packaging, processing, handling, storage and transportation). Respondents who mentioned this saw these opportunities mainly in developed countries in Europe and North America.
- Opportunities related to specific products – Agrologistics companies that offer technology or services aimed at specific products or product categories generally look for opportunities in major producer markets of these products, either established producers (in more developed regions) or upcoming producers (in emerging regions). Examples of these types of opportunities include avocado producing countries in Latin America, and dairy producers in Africa.

All respondents saw the main opportunities with their current offering or with products and services closely related to their current offering. Interestingly, all future opportunities they described in terms of their product offering were within three main areas:

- Automation and digitization – Multiple respondents explicitly discussed how they plan to make more use of automation and IT in the technologies and services they offer to their customers. Examples include software development for quality control, digitization and use of data to make technology more adaptable to clients’ demands, use of IT to provide “control tower services” (as described by one storage and transportation technology provider), and standardizing and providing information chains to clients.
- Related diversification – Some respondents mentioned that they intend to expand their current technology and service offer to other agro products and also insects. They describe this as a relatively small adaptation of their current products that allows them to access other promising markets as well.
- Sustainable products – A few respondents were planning to expand their current product offering with more sustainable technology and products, expecting that their customers would increasingly come to value this.

5 Discussion and conclusions

In this report we outlined the characteristics and development of the (Dutch) agrologistics domain and investigated how Dutch agrologistics companies operate internationally. We provided a working definition of agrologistics and a breakdown in eight main segments related to technologies, products, and services that enable logistics processes in agro chains.

The Netherlands has a long history of productive, innovative and export-oriented agriculture, and – with support through government policy – over time developed an innovative ecosystem of interacting producers, suppliers, knowledge institutes, and government organizations. The Dutch approach to innovation policy strengthens this dynamic, with a high degree of institutionalized cooperation between industry, government, and knowledge organizations – as well as relevant civil society organizations. An example of this Dutch innovation policy is the Topsector approach, which is currently organized along 9 different Topsectors, including 3 (Agri & Food, Horticulture & Starting Materials, and Logistics) directly related to agrologistics. Simultaneously, the geographical location, orientation on trade, infrastructure quality, and international connectedness stimulated the development of a high-performing logistics sector. These two strengths combined over time established the Netherlands as a major player in agrologistics.

The international success of Dutch agrologistics companies is found to be at least in part supported by governmental organizations (embassies, RVO, ROMs) promoting their interests abroad. A common thread in agrologistics' companies views on this support is their need for support in terms of knowledge of the local market, and legislation and administrative aspects of the foreign market. Besides, companies would like to have a higher visibility of what support can be offered to the companies and to get easier access to support instruments they want to make use of.

The companies interviewed were primarily engaged in business-to-business transactions abroad, supplier private sector clients with technology, products and services. This suggests that there are opportunities to be explored to work more with institutional funding organizations (such as the World Bank and Asian Development Bank) to reach international markets they may not reach doing business-as-usual – for example small farmers.

An important note regarding efforts to promote and support the 'agrologistics sector' as such is that the term might be considered unfamiliar and ambiguous to some. Even the ecosystem actors who were interviewed – organizations that frequently refer to 'agrologistics' as a specific sector – do not always agree on a common definition. For the purpose of this study, a – narrow – definition of agrologistics was proposed that most if not all actors would agree on. However, two important related domains should be considered. First agricultural production itself, while not part of our definition of agrologistics, production practices and product characteristics remain an important factor for agrologistics. Secondly, in the Dutch landscape of 'agrifoodtech' startups, we observed a considerable number of startups focusing on the collection and valorization of agro and food side streams. While this 'reverse logistics' of agro products was not part of our definition of agrologistics, it is an interesting (but as of now quite separate) development that in the future may become more intertwined with agrologistics. Even defined in the most basic way possible, 'agrologistics' as a term may not resonate with all actors, we consider to be involved in agrologistics. Among the companies interviewed for this study, providers of agrologistics technology do not always consider themselves to be active in 'agrologistics', but rather as providers of, for instance, refrigeration technology or packaging materials (for particular agriproducts). They may, however, consider themselves to be suppliers to the agrologistics sector. For promotion and support efforts internationally, it is important to reach out to companies proactively to emphasize their added value as a technology provider as part of the agrologistics sector, as it is more beneficial for a Dutch supplier of technology for a specific crop to share their product portfolio internationally in the perspective of the agrologistics supply chain than promoting itself as a producer of packaging in general.

Moreover, it is recommended that the companies that are part of the definition of agrologistics are organised around production chains instead of the type of technology they offer. For the effectiveness of Dutch companies abroad, it may be better to group for specific product-market combinations instead of approaching potential foreign regions or countries as the agrologistics sector as a whole. Individual technologies, such as cooling, packaging and sorting, are often product- or product group-specific. For example, companies that focus on agrologistics-related technologies can approach a market together, but the cooling technology needed for potatoes differs from that for dairy, and cannot always be provided by the same supplier. At the same time, companies that produce sorting, packaging, processing or storage technology for potatoes can benefit from (horizontal) collaboration and joint efforts in marketing and production. By organising the companies per product-market chain, the synergetic power of agrologistics is preserved and it will ensure a more targeted market approach.

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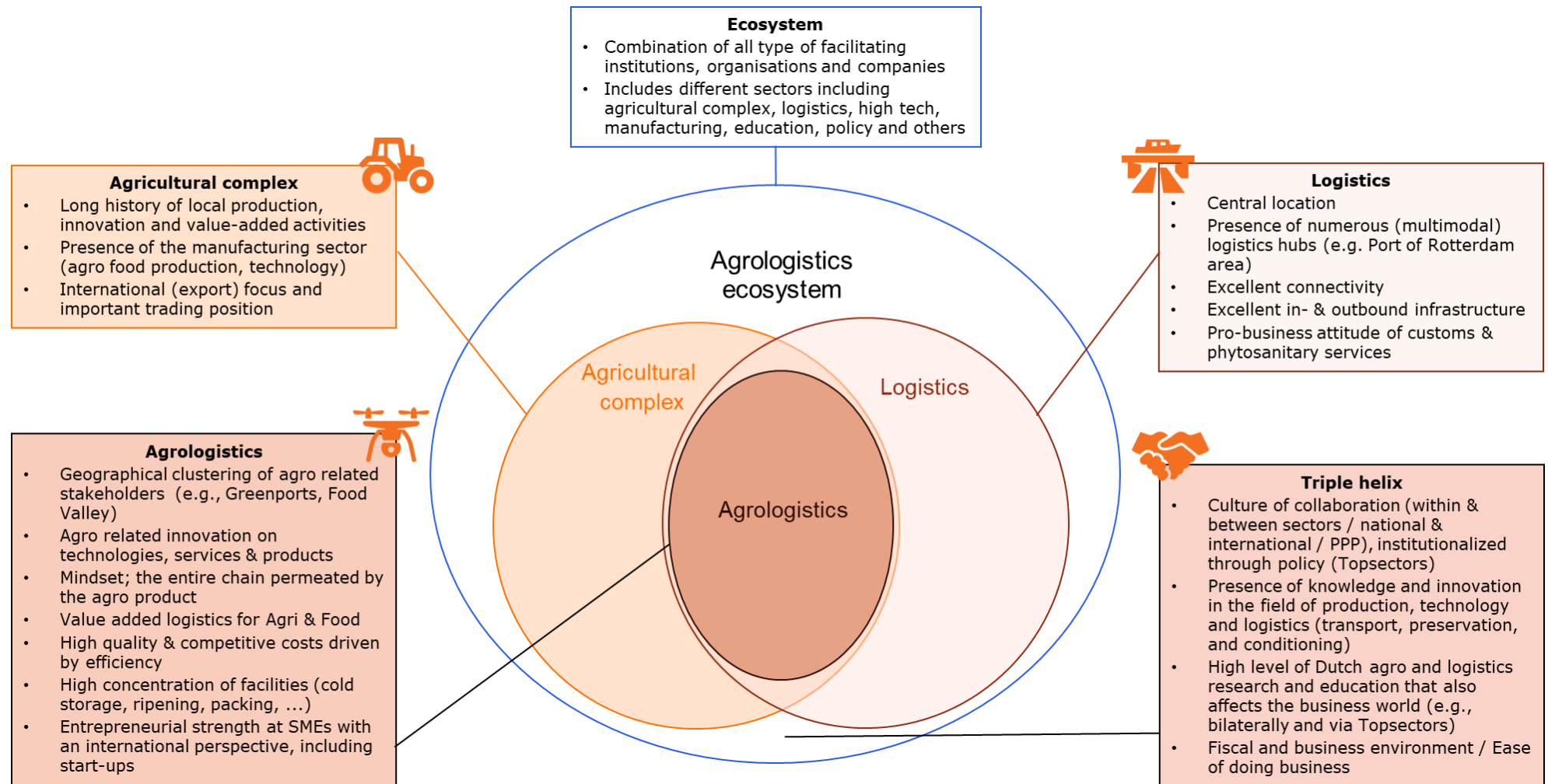
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Annex 1 Agrologistics ecosystem synergies



Authors' elaboration

Annex 2 Interview questions companies

A. Algemene informatie m.b.t. het bedrijf, inclusief verduurzaming:

- 1 Hoeveel werknemers (in aantal FTE) heeft het bedrijf?
- 2 Wat is jullie hoofdactiviteit?
- 3 In welke nevenactiviteiten, die te maken hebben met agrologistiek, zijn jullie betrokken?
- 4 Hoe ziet jullie markt eruit qua type klanten/sectoren die jullie bedienen? En in welke landen actief?
- 5 Met welke producten/diensten gaan jullie momenteel naar welke landen?
- 6 In welke landen waren jullie al eerder actief, maar nu niet meer? En zo ja, waarom?
- 7 Hebben jullie R&D activiteiten voor de ontwikkeling van producten en diensten voor specifieke landen?
- 8 In hoeverre speelt duurzaamheid en verduurzaming een rol zowel binnen jullie bedrijf, richting klanten en (internationale) markten?

B. Internationaliseringsambities:

Als er al wordt geëxporteerd:

- 9 Waarom richten jullie je op m.b.t. deze landen (uit vraag 4 & vraag 5)?
- 10 In welke van deze landen en met welke producten boeken jullie de grootste successen en waarom?
- 11 Welke stappen hebben jullie doorlopen om tot internationalisering te komen? (bijv. intern besluit, bezoek beurzen, marktverkenning, ...)
- 12 Hebben (overheids)organisaties in Nederland daarin bijgedragen? Zo ja, hoe? (denk aan RVO / ambassade / Top Sector / Regionale Ontwikkelingsmaatschappijen, branche organisaties)
- 13 In welke landen zien jullie kans voor (verdere) internationalisering in de toekomst en zouden jullie je op willen gaan richten in de toekomst? En waarom?
- 14 Met welke producten/diensten zien jullie kansen m.b.t. internationalisering in de toekomst?

Als er nog niet of niet meer geëxporteerd wordt:

- 15 Hebben jullie je in het verleden gericht op andere landen?
- 16 Zo ja, in welke landen waren jullie actief of hebben jullie je op gericht en waarom nu niet meer?
- 17 In welke landen zien jullie kans voor internationalisering in de toekomst en zouden jullie je willen gaan richten in de toekomst? En waarom?
- 18 Met welke producten/diensten zien jullie kansen m.b.t. internationalisering in de toekomst?

C. Mogelijke belemmeringen en ondersteuning:

- 19 Tegen welke problemen liepen / lopen jullie aan tijdens jullie internationale expansie?
- 20 Hebben of hadden jullie bij jullie internationale activiteiten advies of ondersteuning vanuit de Nederlandse overheid (bijv. via RVO, Topsector, Ontwikkelingsmaatschappijen, Ambassades)?
- 21 Hoe zou de Nederlandse overheid (bijv. RVO, Topsectoren, Ontwikkelingsmaatschappijen) jullie beter bij jullie internationalisering kunnen ondersteunen? Denk aan beurzen, handelsmissies, communicatie/branding, stimuleringsregelingen (seed-money) of anders.
- 22 Hoe zouden brancheorganisaties nog beter bij jullie internationalisering kunnen ondersteunen?

Annex 3 Interview questions ecosystem actors

A. Definiëring agrologistiek en agrologistieke sector

- 1 Hoe zou u agrologistiek definiëren of omschrijven / wat is volgens u agrologistiek?
- 2 Wat ziet u als agrologistieke sector? Of welk type bedrijven vallen volgens u binnen de agrologistieke sector?
- 3 Wat zijn in uw beleving typische agrologistieke technologieën, producten en diensten?
- 4 Hoe schat u de Nederlandse agrologistieke technologische ontwikkeling in t.o.v. die in het buitenland?
- 5

B. Agrologistieke activiteiten en ontwikkelingen vanuit de organisatie

- 5 Hoe wordt agrologistiek binnen uw organisatie opgepakt? / welke activiteiten richten zich specifiek op agrologistiek?
- 6 Speelt verduurzaming volgens u een rol? En zo ja, hoe vertaalt zich dat?
- 7 En welke internationale ambities zijn er daarbij vanuit uw organisatie (beleid / strategie)?
- 8 Welke obstakels moeten weggenomen worden om dit te 'versoepelen'?
- 9 Welke rol ziet u hierbij voor de Nederlandse overheid en RVO in het bijzonder?
- 10 Hoe zou de BV Nederland volgens u dit de agrologistieke sector internationaal kunnen verwaarden?

C. Definiëring agrologistieke ecosysteem in Nederland

- 11 Wat ziet u als het agrologistieke ecosysteem van Nederland? Of waar is het agrologistieke ecosysteem van Nederland uit opgebouwd?
- 12 Zijn er landen met een vergelijkbaar ecosysteem?
- 13 Is het Nederlandse ecosysteem succesvol? En zo ja, wat is dat succes en wat maakt het tot een succes/waar zit de kracht van het ecosysteem?
- 14 Hoe sluit ons ecosysteem aan bij die in het buitenland, kijkend naar grensoverschrijdende activiteiten / agrologistiek?

Table 1: Ecosystem actors interviewed

Organization Name	Website
AVAG Greenhouse Technology Center	https://www.avag.nl/en/
Flying Swans	https://www.flyingswans.org/our-organisation/
Greenports Nederland	https://www.greenports-nederland.nl/
GroentenFruit Huis	https://freshproducecentre.com/
NFIA (Netherlands Foreign Investment Agency)	https://investinholland.com/
NVKL (Netherlands association for companies in refrigeration technology and climate control)	https://www.nvkl.nl/
Port of Rotterdam	https://www.portofrotterdam.com/en
Royal FloraHolland	https://www.royalfloraholland.com/en
TLN(Transport & Logistics Netherlands) / Transfrigoroute Holland	https://www.tln.nl/ and https://www.transfrigorouteholland.nl/
Topsector Logistiek / Dinalog	https://topsectorlogistiek.nl/ and https://www.dinalog.nl/en/

To explore
the potential
of nature to
improve the
quality of life



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Report 2323

The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 6,800 employees (6,000 fte) and 12,900 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.

