



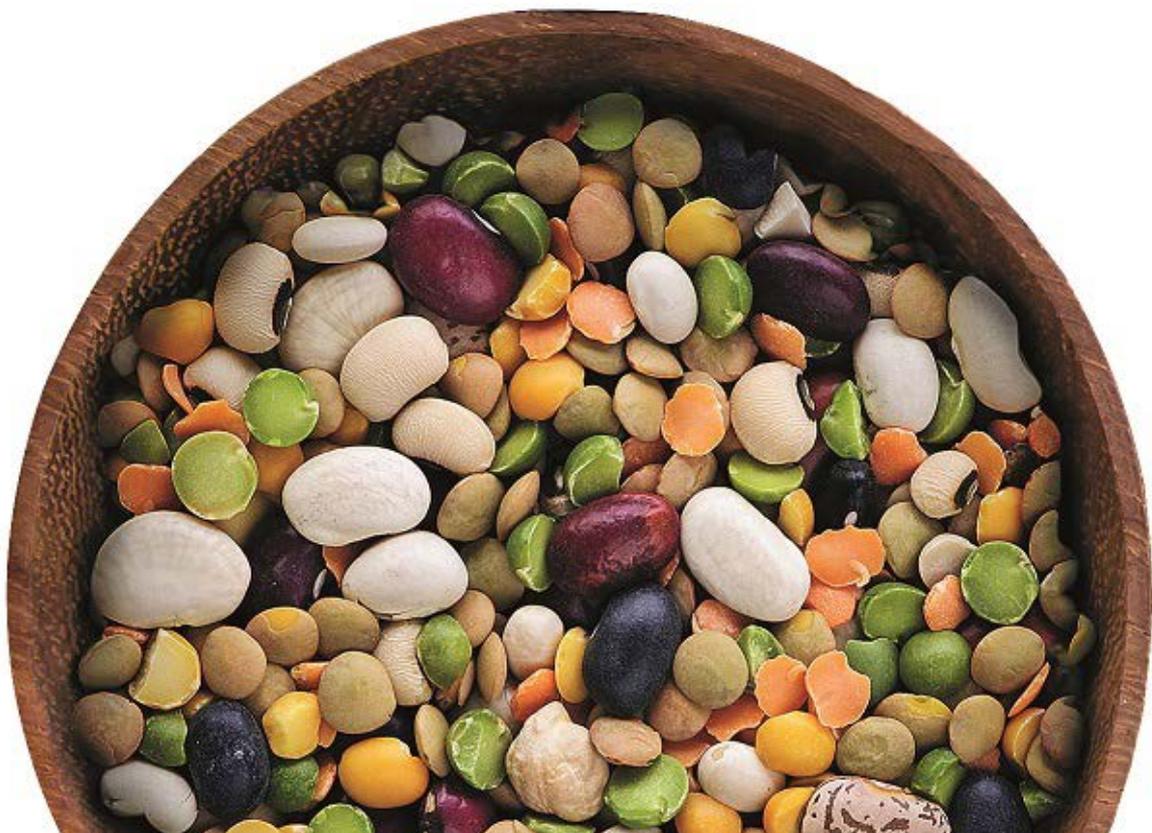
TRansition paths to sUustainable
legume-based systems in Europe

Best practices for the commercialisation of legumes

Deliverable: D4.6 (D28)

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1. Deliverable Description & Contributors

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The Deliverable refers to Task 4.4: Characterise sustainable food and feed production and quality chains. Deliverable description: Through five roundtable discussions organised at the Regional Cluster (Legume Innovation Network (LIN)) workshops to validate project findings against a list of market-related sustainability indicators by consulting value network and markets and the ISAB. The results are compiled in a Guidance Document on commercialisation of legumes destined for business actors and policy makers (D4.6).

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3. Executive summary

The scope of this report is to provide examples of best practices for commercialising grain legumes, including pulses and extending to forage legumes in the food- and feed- (including industrial feedstock) sectors, and ingredient- and processed-product markets. Commercialisation is defined here as, *'making the crop or grain legume-based product available for purchase, thus linking the agricultural production with a market and so consumer'*. The report explores examples from all commercial scales, and from several European countries. Findings from North America are included to illustrate the market-pull and its importance for commercialisation of legume crops. The examples have been provided by TRUE project partners, and from consultations with stakeholders of grain legume-based value networks¹ at the TRUE project Legume Innovation Network (LIN) workshops. The main challenge for a farmer or business is to define the optimal route to market by identifying the value network structure, collaborative partners and via a deep understanding of the market drivers and barriers which are defined by the specific contexts for operation. This report highlights **four parameters that together characterise a Best Practice to market routes**.

- 1) When businesses take a crop or product to market, the intention is to sell it and make a profit. Once a link with the market has been established, the business will be looking for options to both maintain and expand the business and this requires **links to the upstream and downstream value network, or 'value network'**. The basis of a Best Practice is to have well-established **connectivity or partnership** to all the essential (and robust) network components.
- 2) A strategic approach should be adopted to identify the **most promising routes to market**, and they may be based on already successful strategies. Hence, the most successful commercialisation strategies or routes may be defined as one which allows 'repeat sales' or **replicability**.
- 3) A successful commercialisation strategy should also allow for 'scaling up' (or 'scaling out'), which means that the strategy must also consider the value network capacities, for example, of production or processing to accommodate larger volumes, more markets and/or marketing channels. Thus, **scalability is also a defining feature of a best practice route to market**.
- 4) As sales increase and the markets develop competition will intensify, and successful practice will also need a diversification strategy to accommodate new, or adapted USPs (unique selling points). Thus, best practice routes would normally present **potential for diversification**, and may extend to a myriad of factors such as: product types, ingredients, supply networks chains and marketing strategies.

¹ Note that the term value network is used throughout this report in preference to the term supply chain, and as described by Vasconcelos et al., (2019), and described fully in 'Annex 1 – value networks (not food- or feed-chains)'.



4. Background to the TRUE project

4.1 TRUE project executive summary (abbreviated)

TRUE's perspective is that the scientific knowledge, capacities and societal desire for legume supported systems exist, but that practical co-innovation to realise transition paths have yet to be achieved. TRUE presents 9 Work Packages (WPs), supported by an *Intercontinental Scientific Advisory Board*. Collectively, these elements present a strategic and gender balanced work-plan through which the role of legumes in determining 'three pillars of sustainability' – 'environment', 'economics' and 'society' - may be best resolved.

TRUE realises a genuine multi-actor approach, the basis for which are three *Regional Clusters* managed by WP1 ('*Knowledge Exchange and Communication*', University of Hohenheim, Germany), that span the main pedo-climatic regions of Europe, designated here as: *Continental*, *Mediterranean* and *Atlantic*, and facilitate the alignment of stakeholders' knowledge across a suite of 24 Case Studies. The Case Studies are managed by partners within WPs 2-4 comprising '*Case Studies*' (incorporating the project database and *Data Management Plan*), '*Nutrition and Product Development*', and '*Markets and Consumers*'. These are led by the Agricultural University of Athens (Greece), Universidade Catolica Portuguesa (Portugal) and the Institute for Food Studies & Agro Industrial Development (Denmark), respectively. This combination of reflective dialogue (WP1), and novel legume-based approaches (WP2-4) will supply hitherto unparalleled datasets for the '*sustainability WPs*', WPs 5-7 for '*Environment*', '*Economics*' and '*Policy and Governance*'. These are led by greenhouse gas specialists at Trinity College Dublin (Ireland; in close partnership with Life Cycle Analysis specialists at Bangor University, UK), Scotland's Rural College (in close partnership with University of Hohenheim), and the Environmental and Social Science Research Group (Hungary), in association with Coventry University, UK), respectively. These *Pillar WPs* use progressive statistical, mathematical and policy modelling approaches to characterise current legume supported systems and identify those management strategies which may achieve sustainable states. A *key feature* is that TRUE will identify key *Sustainable Development Indicators* (SDIs) for legume-supported systems, and thresholds (or goals) to which each SDI should aim. Data from the *foundation WPs* (1-4), to and between the *Pillar WPs* (5-7), will be resolved by WP8, '*Transition Design*', using machine-learning approaches (e.g. *Knowledge Discovery in Databases*), allied with *DEX* (*Decision Expert*) methodology to enable the mapping of existing knowledge and experiences. Co-ordination is managed by a team of highly experienced senior staff and project managers based in The Agroecology Group, a Sub-group of Ecological Sciences within The James Hutton Institute.



4.2 Purpose and structure of the deliverable

The purpose of the Deliverable is to provide a collection of, ‘*best practices for commercialisation of legumes*’; examples of the diverse strategies which have been adopted for taking a crop or product to the market. It has been a priority to select commercialisation practices that implicitly promote volumes and scalability, *and* which have a defined structure for other actors to replicate (if grain legume production in Europe is to be upscaled). It is also perceived that start-ups and small-scale business actors should also be inspired to engage in the value networks and markets for grain legumes. In addition, the success of any one commercialisation approach may also be determined the implementation of governance (or policies) which may be adopted at various levels from local/public to global. This Deliverable D4.6 report provides a set of recommendations of how to support the development of a ‘market-pull approach’ which is geared to having more grain legumes cultivated and processed in the European agri-food- and -feed-systems. Furthermore, the content presented here is produced in the context of other Deliverables for this work package and includes the following.

- **D4.1: Map of processing infrastructure for legumes.** This report demonstrated the diversity of businesses in the European food industry including value networks and processing infrastructure.
- **D4.2: Ten example business cases on the successful marketing of legumes as food.** This report analysed the value networks (or networks), and marketing positioning of legume-based food products and provided findings about entrepreneurial companies and established food businesses.
- **D4.3: Legumes for feed.** Insights into the European market for feed with special emphasis on value networks and market opportunities for legumes crops.
- **D4.4: Public and private procurement.** This report analysed the drivers and barriers for having more pulses and legume-based products in the food service market. The report provided insights to product demand and value networks targeted at fast food chains, canteens, restaurants, and public food service.
- **D4.5: Sustainable Development Indicators (SDIs) for legume-based value networks.** Identifies a range of critical factors which may hampering or facilitate the uptake of more legumes in food- and feed-value networks, and with special emphasis on network longevity and resilience – which is ability to adapt and survive in the face of stochasticity.

Therefore, in the following chapters diverse routes to market are demonstrated using real-life examples of legume-grain based value networks and markets that span: food service; feed; and food ingredients. For each of the routes to market, strategies are defined with respect to the four key parameters already highlighted in the executive summary: partnership (or/and connectivity), replicability; scalability; and diversification potential (see Section 1.3.2). The best practices are summarised in Chapter 8, and both References and Methodologies are provided in Annexes.



4.3 Approach and key concepts

4.3.1 Introducing commercialisation

When products, or crops, leaving the site of production and enter the market, the first step of commercialisation has just been taken, and the best situation is entering markets that best suit the product and that are within reach of the seller. That is, which align the product and spatial reach of the seller with the buyer (or consumers') expectations. Finally, the seller (preferably together with the buyer) must consider how to make this effort most commercially viable, i.e. sustain the routes of trade. Only if a route of trade, or commercialisation praxis, shows potential for growth and diversification that benefit the buyer *and* seller can the praxis be realised as viable in the long-term (D.4.5) (Searcy, 2015). Therefore, in this report **commercialisation is regarded as the process of taking a crop or product to the market with the aim of buyer and seller collaborating for sustaining and developing the route of trade and for mutual growth.**

Additionally, when bringing a product into a market context there are more questions to consider:

- What market should be targeted, and how is that market defined? Is the market local or international? Is the market the supermarket sector, specialty stores or B2B (Business to Business)?
- What is the product, and does it meet the requirements and demands of the intended customer?
- What makes the product unique and stand out as an interesting product for the customer?
- What would be the right price for the product, and in what market can the product obtain the best price?
- Would it be an option to consider collaboration for the commercialisation?
- What are the opportunities for developing the business?
- How is the product brought to the market, and what distribution channel to choose to work with?

Commercialisation is the process of bringing new products (crop commodity or processed product) or services into the market. Based on this definition, commercialisation takes product or service from a non-commercial context (as for example a laboratory or from field trials), and into an economic or commercial context. Commercialisation is also referenced with respect to new technologies and the terms under which their use is licensed or sold, such as for patents; or, by establishing spin-out companies from academic research institutions.

4.3.2 Defining best practices

Market-pull, -push and -facilitating approaches have been identified by TRUE project to achieve the overall aim of realising transition paths to having more legumes cultivated, processed and consumed in the European agri-food- and feed-value networks. This implies that target markets should demonstrate a growing demand for legumes whether these are legume-grains (oleaginous or pulse) and extending to forage legumes. The EU is an 'open economy' and, local and international



trade is an important feature for Europe. Therefore, **trade is also a central factor** to consider when the possibilities for having more legume grain-based products in the European market.

Bringing crops or products to the market requires the **collaboration in a value network structure** hence the trading partners and scale of trade are important factors to consider. The scale of trade refers to the volumes thus, the aspects of global value networks and large volumes on the one hand, and the small-scale local approach on the other hand. Similarly, the trading partners who could be the multinational food processing companies, supermarket chains, restaurant chains, or local buyers of small crops, local farmers trading with consumers in farmers' markets or with local feed companies. These non-exhaustive examples only show the diversities of trade, value networks and markets for legumes. If a commercialisation strategy proves successful, *i.e.* the product generates sales in the market, the next question would be: *can more sales be generated?* This calls for consideration of **scalability of the commercialisation strategy**, where scalability refers to potential for increasing volumes or increasing the number of market segments addressed, thus increasing the activities.

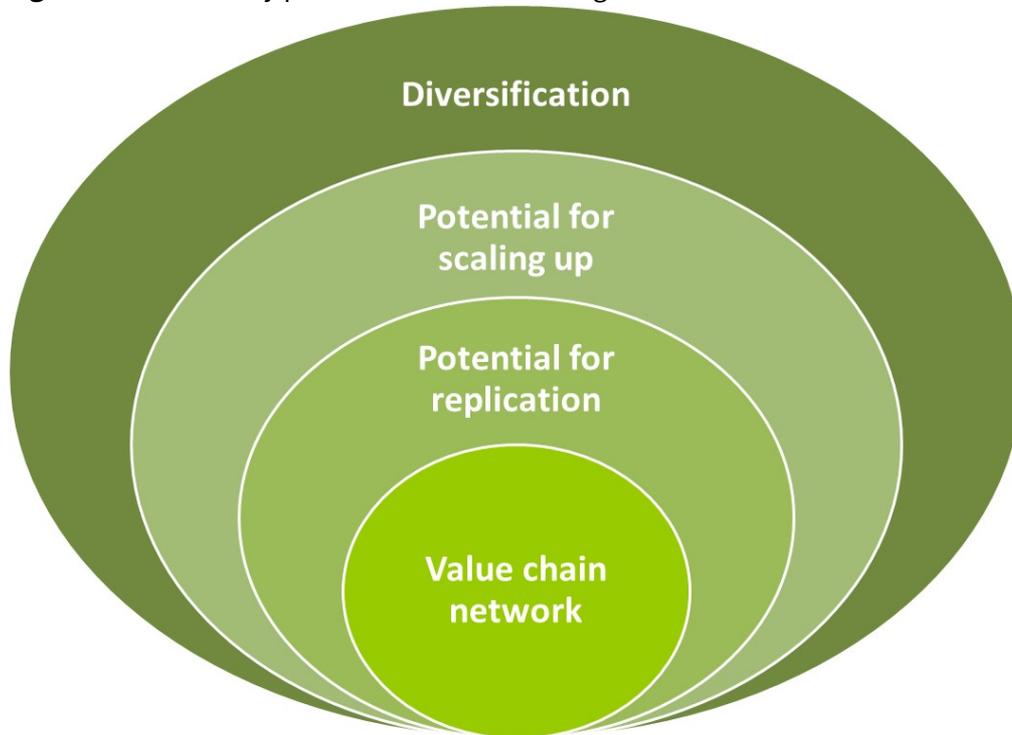
There are always “the good news stories” of how new products were successfully brought to market, and of how such new products were developed to achieve this. Such examples are interesting and insightful to study in order to learn more about the success factors. In this report, the examples provided are intended to illustrate how different strategies can be used for to take legume grains, including pulses, to the market with the aim of listing those factors that were important for achieving their successful commercialisation. If such factors could be identified, then other businesses could exploit these and so **replicate good commercialisation practice**.

Characterising business will also highlight that many have started off with the commercialisation of a single crop or product in mind, and subsequently enlarged efforts by bringing other crops or products to the market. This is **diversification**. To meet the market-pull approach **diversification is a key strategy** as it allows businesses to engage in the market by providing a wider range of products, targeting more marketing channels, or using more types of legume commodities – all with the aim of meeting market demand.

To be **acknowledged as a ‘Best Practice Strategy’**, for market penetration four key parameters are considered: 1, links to value networks; 2, potential for replication; 3, potential for scaling up; and 4, potential for diversification.

As illustrated in Figure 1, the four key parameters are interlinked. The essential basis for taking a product to market is to have a supply, thus the value network presence and **connectivity** is a fundamental requirement. As the business develops, the choice of strategy for going to market becomes important, here denominated as replicability, with reference to the possibility for implementing already existing strategies. Then, scaling up is the next level for expanding the commercialisation efforts, which can be developed further by diversifying activities.

Figure 1. The four key parameters characterising Best Commercialisation Practices



4.3.3 More Definitions

Innovation: the processes of translating an idea into goods or services that somebody will pay for. Innovation brings something new into a commercial context (*i.e.* a unique selling point, or USP) in contrast to R&D (research and development) effort that is not yet ready for the market.

Private labels: brands that are owned by retailers, in contrast to brands owned by food processing companies. Private labels appear for low cost products, as well as for premium products.

Value network: the connectivity between two or more parties that have a shared motivation to improving their financial prospects by linking with one another, *i.e.* in an economic context to benefit from business opportunities – buying and selling goods and services for profit. Hence, a continuous sequence of buying and selling transactions forms a value network.

5. Partnerships for mutual profit and growth

5.1 Characteristics of partnerships

Partnerships, as defined here, involve at least two businesses and aim to work together for mutual benefit *i.e.* a strategic agreement where two parties coordinate their activities for profit of some description, though most commonly financially. Partnerships involve a producer (for example a farmer or food processing company), and a trader (perhaps food retailer or other type food service operative). Partnerships tend to be long-term agreements and are most often used by larger businesses in the retail and/or food service markets. These long-term agreements cover topics such as definitions (recipes and appearance) of products, pricing strategies, marketing channels, spatial outreach (*i.e.* geographic coverage), branding and issues related to logistics and warehousing, or storage.

The benefits of such long-term agreements (several years) are wider market coverage and larger volume handling for the producer and trader. Other benefits include the exclusiveness of the products (*i.e.* products only available in via specific marketing channels can increase demand and social value placed upon it). This also presents potential for use of a trader's own brand or private label, as well as access to production facilities and option to adapt the product and or product range according to market demands. The challenges of partnerships are inequality in the balance of power, as many retailers and food service chains exercise strong buying power and negotiation strength in comparison to food producers and processors.

5.2 Partnerships in the food service market

Big brands and food service companies are answering growing consumer demand for vegetarian and vegan (and demitarian or flexitarian) options, as more consumers are seeking alternatives to meat and dairy products. Major companies in the restaurant and food service markets do not have food processing facilities of their own but work together with food processors. Below, you will find examples of how food service companies have satisfied the significant market-pull by having new meat-alternative products available in restaurants.

In April 2019, McDonald's-Germany launched a vegan burger for the first time, and it was made with Nestlé's plant-based 'Incredible Burger' which is soy- and wheat-protein based. At the same time in the USA, Burger King revealed plans to roll out its plant-based 'Impossible Whopper' more-widely following a successful trial of the burger across 59 stores in St. Louis earlier that year. Burger King's plan was to make the Impossible Whopper available in more US regions during 2019, if the product is well received (World of Food Ingredients, 2019). Consequently, Burger King announced in May 2019, that it would roll out the Impossible Burger in its restaurants in Sweden (Foodwatch, May 2019). This demanded the readiness of all the operatives in this large-scale value networks involved to ensure that products of consistent quality are available consistently and at volumes which can more than satisfy demand in all locations simultaneously.



Example 1: How IKEA brings pulses into menus

The Swedish retail giant, IKEA, is known as a major player in the food service industry. Globally, more than 1 billion people visit the IKEA stores per year and 680 million people visit the IKEA restaurants in 430 restaurants in 52 markets. IKEA has announced a target of achieving 20 % plant-based menus in its restaurants by 2022. Today, Swedish meat balls make up a significant proportion of the meals sold, but IKEA will take the meat balls into the plant-based agenda by developing a vegetarian alternative to be launched in Europe during 2019 and in Asia and North America shortly after. The recipe for the new “meat balls” will include ingredients with connection to Swedish cuisine such as pea protein, oats, potato and apple. IKEA has revealed that the development of the new “meat balls” will be from a price point in order to be appealing for as many customers as possible. So, the new “meat balls” will be developed from a starting point of a set consumer price and from there, the recipe will be formulated. The fact that 20 % of IKEA’s customers visit the stores just for the food underlines the importance of offering the new vegetarian “meat balls” at the right price. In 2018, IKEA introduced a veggie hotdog, and today sales of the veggie hotdog exceed 110 million pieces yearly at a price of 0.50 EUR. When the veggie hotdog was introduced, it sold 10 million pieces in the first year at 0.50 EUR (Foodnavigator.com Sept. 2019). The example of IKEA clearly demonstrates the importance of an appealing price for consumers and the scalability of the business case.

Example 2: Max Hamburgers in Sweden

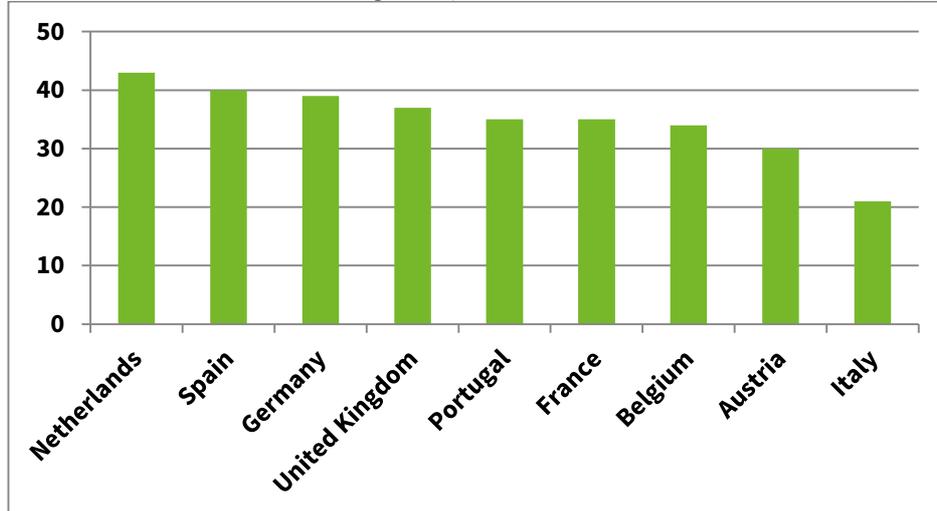
Max Hamburgers is the second largest Swedish burger chain (McDonald’s being the first). Max Hamburgers collaborated with the Nordic food processing company Orkla Foods to have a vegetarian burger for the restaurant chains’ 100 outlets in 2016. At that time, Max Hamburgers introduced the concept “Green Family” consisting of one vegan and four vegetarian burgers. During 2016 sales of the green alternatives quadrupled. The aim of this launch was to have one in five orders to be no-meat by 2020. However, this was revised in 2017 with Max Hamburgers now aiming at one in three orders by 2020. Also, in 2017, Max Hamburgers launched the “BBQ Burger” campaign with three new burgers including one vegetarian Halloumi option (Hamann et al, 2018).

5.3 Partnerships in the retail market

Retailers offer food products in their stores under companies’ brands (such as Heinz, Kraft or Bonduelle) or, as retailers’ own labels (the so-called private labels). Across the EU countries, private labels account for more than one third of the grocery sales, with the highest shares in the Netherlands (Fig. 2). Frozen foods account for the majority of private label-based sales in Europe (42 %) followed by fresh and chilled food (40 %) and canned and ambient² products (39 %) (IPLC, 2015).

² Ambient products: Shelf-stable foods products that do not need cooling or freezing to stay edible.

Figure 2. Private labels' share of grocery sales in selected EU countries (IPLC, 2015).



(Ref: https://trademaster.ua/im/food_privat_2015/7_Presentation_IPLC_Kiev_31042015.pdf)

The main motives of retailers for marketing products as private labels are (IPLC, 2015) as follows:

- Offering consumers standard products which are sold at lower prices than branded products, as for example canned vegetables or dried pasta. This motive is the oldest and most widespread approach to private labels, and it is used extensively across numerous foods, drinks and personal-care products.
- Offering an exclusive selection of products which are defined as special since that are only available in a single retail chain. For example, high quality chilled soups or ready meals. The scope of this motive is for the retailer to capture market shares in the premium segments, and to attract customers that are looking for, and willing to pay extra for, specialties.
- Entering a category where branded products are already available, so in principle to engage in a developing or developed market. Current examples are strongly linked to the plant-based arena such as dairy and meat alternatives – and which now compete.

Retailers work together with food manufacturers to produce private label products. From the retailer's perspective, a good producer of privately labelled products is a company which is:

- certified with an internationally recognised food safety system such as IFS or BRC;
- has an environmental-sustainability program in place that offers safe, good quality and environmentally friendly products;
- demonstrates and a robust traceability system; and,
- reactive, innovative and transparent to customers.

Contracts for collaboration between retailer and producer are negotiated every year as a 'call-for-tender' procedure, and the bidding for contracts is a competitive process in an international environment (IPLC, 2015). The above-listed criteria seem obvious as the retailer is dependent on high levels of food or non-food-product safety, and a supplier's system of traceability in case of a

withdrawal of products from the market. As retailers are interested in new products, and good stories (USPs) that can be communicated to consumers regarding that product, the sustainability practices of a producer must be compatible with those of the retailer. The current practices show that communication in the retail market is from the retailer to the consumer and, producers of private label products are not mentioned in this line of communication. Despite this communication praxis, the retailer is dependent on the procedures and praxis of the producers of private labels. Suppliers of private label products can thus use their sustainability efforts to promote themselves to the retailers.

In the case that a food producer is a 'category leader', the company is also expected to lead the development of the category (for example ready meals or dairy alternatives) by the provision of innovative products and consistency in sales. The benefit for the food producer is the potential for long-term collaboration with the retailer in the domestic or more markets and, that the costs of marketing and branding of the products lie with the retailer. Below you will find a few examples of how retailers' private labels have contributed to satisfying the increased a market-pull for pulse-based products.

Example 3: Schouten Food and collaboration with retailers for private label production

The Dutch company Schouten Food is an example of a food processing company that has expanded their business through collaboration to help retailers realise successful private labels. The company is considered as one of the European top-producers of plant-based products. Schouten Food produces a wide range of plant-based meat alternatives and works together with leading retailers in the Netherlands and abroad. Among their customers are European retailers such as Carrefour, Ahold, Jumbo Supermarket and Lidl. The company also works together with small food businesses. The production facilities are certified according to BRC, IFS and/or FSSC 22000³. Schouten delivers its products to 50 markets in Europe, North America and Africa.

The vegetarian products are made with beans, peas, soy, chickpeas, lentils, nuts and seeds. Schouten has a high sustainability profile (<https://www.schoutenfood.com/sustainability/>) which fulfils the following requirements.

- Only use of sustainably certified ingredients (sustainable soya and sustainable palm oil).
- Only use eggs from free-range chicken.
- Be a member of the Green Protein Alliance (Dutch alliance promoting green proteins).
- Be a member of MVO Nederland (Dutch business network promoting economic *and* social sustainability).
- Only use plastic trays for retail products that are made from recycled RPET plastic.
- Transport is outsourced to partners committed to limit CO₂ emissions and reduce waste.

In 2017, Schouten Food was approached by the Dutch retailer Jumbo Supermarket who requested a range of vegetarian products. This resulted in a series of nine new vegetarian products ready for

³ BRC, IFS and FSSC 22000 are internationally recognised food safety standards and required by retailers.

the supermarket. Product development, packing and logistics was also carried out by Schouten Food. The products are marketed under the private label, ‘Jumbo Veggie Chef’ (Fig. 3).

Figure 3. The product range produced by Schouten Food for Jumbo Supermarket.



(<https://www.schoutenfood.com/nl/nieuws/klantencase-jumbo-veggie-chef/>)

Example 4: Tesco introduces hybrid meat products under private label

In the UK, the leading retailer Tesco introduced a mixed product in April 2019 that was made with half meat and half vegetables; this is called a ‘hybrid product’. The product was launched in the Tesco supermarkets under a newly created private label: “Meat and Veg”. This product range has been developed for the retailer by the professional chefs in Tesco’s own product development department, but the production is undertaken by a contracted food processor. The product range is formulated so it can be positioned in the market as contributing to one of the suggested five-a-day servings of vegetables as 35 % of the product is vegetable. Market research shows that two thirds of Britain’s 22 million flexitarian (or demitarian) consumers are actively looking to cut down on meat consumption (Tesco, 2019). The ‘Meat & Veg’ product range is available in 250, 500 and 750 g portions to cater to solo-diners, couples and families (World of Food Ingredients, 2019).

Example 5: Launching a new private label for plant-based products in Denmark

In 2019, the Danish retail chain Netto introduced a plant-based range under a new private label “Spir” (Brandt, 2019). The Spir series includes 19 different products of which eight are organically certified. The scope of introducing the new Spir private label series was to make it easier for Danish consumers to find the plant-based products. In Denmark, plant-based products have attracted much consumer attention, and for the first time in 2016 Statistics Denmark tracked the market for plant-based drinks. Since then, the market for plant-based drinks has increased by 25-30 % per year. The retailer Netto claims that the consumers’ main purchasing motives for plant-based foods are to reduce climate change, help ensure clean ground water and support organic food production (i.e. avoid man made pesticide use). Furthermore, in 2018 28 % of Danish consumers claimed to have one meat-free day *per* week, indicating a growing demand for plant-based products. This strong interest was the basis for developing the new Spir series. The Spir products are sold at prices 25 % *below* the prices for similar branded products. Examples of Spir products made with pulses include spreads made with beans; a bean and quinoa paté; and meat alternative made with chickpeas. The Spir private label is also used for dairy-alternatives like soymilk and soy-based yogurt (Fig. 4).

Figure 4: The Spir series from Danish retailer Netto.



(<https://nyheder.okologi.dk/mad-og-marked/netto-gor-det-nemmere-at-spise-klimavenligt>, 2019)

5.4 Partnerships as routes for commercialisation

Partnerships are often agreements between larger businesses and, therefore, the volumes contracted in such agreements may be very large. It is the responsibility of the food processor to organise the value network, but requirements from the retailer or food service chain can influence the selection of products and, therefore, the use of ingredients. For retailers and food service companies it is a fundamental demand that suppliers comply with internationally recognised food safety standards such as BRC, IFS or FSSC22000.

Given the growing consumer demand for vegetarian options in the supermarket sector as well as in restaurants, partnerships in these marketing channels have the potential to stimulate a very large demand for vegetable protein of various kinds: soy, pea and wheat being the most used types of proteins. For a food manufacturer, a partnership with a retailer or food service chain can be an appealing route for commercialisation as the volumes involved call for the organisation of a value network and for production method that can be scaled-up. The added value of partnerships materialises in the form of combined knowledge. This is, the knowledge of the food processor regarding the production system and how to produce the products, and that of the retailer or restaurant chain with respect to the volumes and price-points. This can generate a win-win situation where new products create significant demand for legumes and legume-based ingredients.

The agreements formed between chain (retail and food service) and food producer are replicable as the agreements cover business terms and product specifications and, for both parties there are options to expanding their business. The provided examples demonstrate potential pathways for diversification through development of more products, reformulation of recipes and new (private) labels.

6. Establishing value networks as contracted production

6.1 About value networks for crops

The establishment of value networks which span from field to market is the basis for commercialisation of any crop, and such connectivity/partnership bridges the gap between agricultural production and consumer. The value network could in principle only include two actors: seller and buyer. For legume grain crops, the farmer is the seller and the buyer may take several forms, whether trader (also known as ‘grain aggregator’) who often contract growers to produce specific commodities for processors. However, processors may also contract growers to deliver commodities directly, so they may limit commodity costs and so sell the (now processed) crop to the end-user for optimal profitability – this approach may also allow the processor greater control and guarantee of product qualities too. Finally, the end-user may be another farmer, for example purchasing grain for feed, a company processing grains, the consumer and may even include trading and storage specialists who will buy grain for storage when prices are low and selling when prices are high. The essence of such value networks is that sellers relate to buyers, and that the actors which comprise the network span a diverse range of types. ‘Short value networks’ are defined by the fact that they span only few actors and are attractive since they may return more profit to producers (farmers) and improve the connection of farmers with consumers. In contrast, the more prevalent value networks of current conventional business networks are elongate involving multiple actors. Here, profitability for those at the base (production end) of the network is usually least (Kneafsey, 2018).

Value networks can be organised as ‘contracted production’. In this case, a farmer undertakes the obligation to produce a certain crop following a set of specifications from the buyer and, the buyer agrees to pay an agreed price for the crop (regardless of market price fluctuation). For the buyer, contracted production is a way to ensure access to a certain volume of a crop with a defined quality and at a known price. The defined quality may relate to specifications regarding the use of fertilisers, protein content or when the crop should be harvested. For the farmer, contracted production is a way to secure an income for a crop and to maintain a production capacity at a certain scale. Contracted production is appealing to the farmer in cases of specialty crops and for crops that require high capital investments for farm machinery. The following examples of value networks for pulse crops show how contracted production can be a route to commercialisation (and limit risk).

Example 6: The vining pea industry in the UK

The UK arable farmed area cropped for fresh frozen peas in the UK is estimated at 32,000-35,000 ha *per year*. This leads to production of around 150,000 tonnes of pea annually for freezing as a ‘fresh’ commodity. The industry uses seven freezing factories and is concentrated to the South and North Eastern parts of the UK (in the centre of Scottish and English arable heartlands). To maintain the freshness and nutritional values it is important that crop production takes place in field which are less than 100 km from the freezing factories (Fig. 5). Farmers produce these peas based on contracts which are negotiated with the freezing plant executives annually. Farm gate prices are (currently) around £300 *per tonne*, and their retail value (for the consumer) is approximately ten times that of farm gate prices. Retailers must also assume a margin of at least minimum 50 %. This example

illustrates the mutual dependency of the contractor and the grower. For the grower, contracted production is a route to ensure that costs for producing the crop, and investments made in farm machinery, are more than compensated for. For the freezing company, the contracted production ensures a known flow of vegetables for processing, and with this knowledge will negotiate its sale prices with clients in food retailing and wholesaling (Vickers 2019, personal communication). Quality of the frozen peas is a key issue, and rigorous quality assurance checks are carried out by the freezing company staff. Here, contracted production connects the value network as a simple and relatively short chain from farmer to consumer and it built on estimated knowledge regarding projected demand, securing sufficient crop area and production and quality, and balancing this with prices (including prices of key inputs which differ for actors across the chain, though energy costs are usually significance and common to all actors).

Figure 5. The frozen pea production chain in the UK.



<https://britishgrowers.org/uk-vining-pea-and-bean-industry-conference-2019-press-release/>

Example 7: Organic peas in Denmark

The Belgian Company Ardo is the largest player in the European frozen vegetable industry with an annual turnover of more than € 800m and 20 processing plants across Europe. In Denmark, Ardo has a factory for freezing (and storing) peas. In 2014, Ardo's Danish factory was operating at a financial loss. However, in 2015 2,000 hectares of the southern Danish islands were cultivated with peas for the fresh freezing market and this yielded almost 9,000 tonnes of peas. By 2018, (three years later) the cultivation had increased to 3,000 ha and yields up to 30,000 tonnes of peas (only 30% more area but three times greater production). While approximately 25 % of the crop was cultivated organically by contracts with Ardo, farmers also considered peas as an attractive crop to produce as management demands are limited, and the added benefits synthetic nitrogen fertiliser-use offset (pea need no nitrogenous fertiliser), and for non-legumes cultivated in the following season, plus soil functional benefits (improve soil carbon content and water holding capacities). In Denmark, farm-gate prices for organic peas are 20 % above prices for conventional peas, the latter being priced at around € 200 EUR *per tonne* (2014). As part of the agreement regarding the farm-gate price, Ardo has taken over the costs for purchasing, sowing and harvesting the peas (Smitt, 2015). This helps ensure the necessary product qualities too. The peas from Ardo are then marketed in the Danish retail market under the brand *Frigodan*. In 2013, organic food accounted for 8 % of the Danish food market, and by 2018 this market share had increased to 13 %. A consumer survey from 2018⁴ showed that 20 % of the Danish consumers appreciated that organic frozen peas were available in the retail market and, that frozen peas accounted for 77 % of purchase of peas in contrast to 17 % for fresh peas. Ardo's Danish plant is now a profitable cornerstone for organic frozen peas, and the plant also

⁴ Consumer survey based on +1000 respondents among Danish consumers.

boasts exports of up to 700 tonnes of organic frozen peas to the US market *per year* (Vincent, 2018). This example illustrates how consumer demand for organic food has contributed to maintaining and increasing the cultivation and processing of organic frozen peas in Denmark, and the importance of having a well-connected value network for bringing an organically certified crop to market.

Example 8: Canned peas and beans in Croatia

Podravka is a leading Croatian food company and the biggest producer of canned and frozen fruit and vegetables in the country. Podravka obtains the peas and beans from contracted growers and the company is regarded as the largest buyer of locally produced fruits and vegetables for processing. It is estimated that the company purchases approximately 20 % of the Croatian pea crop and has plans for increasing this share, although imports of peas and beans from neighbouring countries are challenging this ambition. Podravka's product range includes a variety of frozen and canned products made with peas or beans (Fig. 6). Podravka mainly supplies the domestic market with exports to Austria and neighbouring countries. The company's main trading partners are wholesalers targeting the retail and food service distribution channels (Blazon, 2019, personal communication). This example illustrates the important role that a major processing company holds for stimulating the production of a certain crop, and how this is instigated through contracted production with farmers.

Figure 6. Products from Croatian company Podravka.



(Pictures provided by TRUE partner PIREĐ, 2019)

Example 9: Organising the value network for a new crop: the “Alp Leisa” organic green lentils

In Baden-Württemberg in the southwest of Germany, a pioneer has introduced a new crop and developed the adjacent value network and several different routes to market. In 2001, an organic farmer started to grow a cultivar of green lentils that originated from this area of the Schwabian Alps. The seeds were discovered in the Seed Bank in St. Petersburg and carefully multiplied by the farmer. As more seeds became available, more local organic farmers became involved in growing the green lentils and by 2018, more than 200 hectares were cultivated. The organic green lentils were harvested, cleaned and packed by a cooperative organized by the pioneer. Furthermore, the pioneer started a farm shop and introduced the brand Alp Leisa for the green lentils. The farm shop was marketed locally and through a website <https://lauteracher.de/>. The routes to market were



strengthened when the pioneer engaged with a local restaurant which agreed to have a vegetarian meal on the menu made with the organic green lentils, and with local health food stores. The example shows how important it is to engage in the development of routes for commercialisation of a specialty crop (Hamann et al., 2019).

6.2 Contracted production as route to commercialisation

The examples provided in this section show that production under contracts can be a route to help commercialise crops as the agreement connects the farmer with the market for mutual benefit. The approach also demonstrates how the added value of contracted production can be leveraged to secure supply of a (specialty) crop for a defined market segment (the case of organic peas in Denmark) or for establishing a new crop in a market (the case of Alp Leisa). Furthermore, it has been shown in these examples how food companies in the canning and freezing industries in particular build on production via contract to further increase cultivation of pulses (the cases of Denmark and Croatia).

The markets for frozen vegetables and canned vegetables are especially large when measured in tonnes, but the growth rates of these markets (*ca.* 1-3 % per year) do not match up with the growth rates of segments like meat alternatives (*ca.* 6-7 % per year). Furthermore, the canning and freezing industries may be regarded as traditional industries in comparison to the emerging plant-based foods industry. However, the volumes represented by the freezing and canning industries are large and these industries present important buyers of legume grain crops across European countries hence, for helping to ensure the large-scale cultivation and commercialisation of these crops such operators might be specifically encouraged.

Establishing a value network by building on production via contract can be instigated at large scales, as illustrated by the example from the British vining pea industry, as well as small and pioneering scales such as the German case shows. The common feature is that the principles of contracted production are applied between two value network actors (*e.g.* farmer and trader; farmer and processor; or processor and distributor). Typically, contracts specify how the crop should be cultivated, the quality criteria (*e.g.* use of pesticides or time of harvest), the contractual obligations of the buyer and seller, and pricing. Contracted production can be scaled-up as more easily, as more hectares may be easily included in a contract, and the contract may also allow for diversification measures such as for organic production of planting additional or alternative crop types.

7. Diversification as strategy

7.1 Diversification and the meat industries

Diversification is a strategic approach used by companies to expand operations. Diversification forms range from simply entering a new market to providing a new product, or even entering a new industry or commercial arena. Diversification can be a large and high-risk step for a business, for example, when a meat company enters into the plant-based food market. Or a less intense approach could be to provide a new demitarian product to the existing meat-market segment.

Diversification is a commonly used strategy in the food industry to bring new products to the market, including those which contain pulses. It is known that from 2006-2016, ca. 5,000 new food and drink products made with pulse ingredients were launched in the North American market, and that in 2016, more than 900 new products with pulse ingredients were introduced into the USA, and 300 in Canada. Overall, 44 % of the new products were totally new products, and 33 % were variations of existing products⁵ or line extension⁶ (Agriculture and Agri-Food Canada, 2017).

Most companies in the food and feed sectors are specialised in processing specific types of raw materials to realise certain range of products. With a diversification approach, companies must organise their value networks and marketing efforts accordingly. From findings derived in the TRUE project (refer to Deliverables from WP4) it has become clear that many food and drink companies have diversified their product portfolio to include products made with pulses. Following a diversification strategy targeted at a specific product range, and with the marketing channels remaining unchanged, the food manufacturer is able to offer its customers something new. This is attractive for the customer and gives the food producer a competitive advantage. For the processor there is also a new value network that demands greater use of more pulses. This will be demonstrated in the following examples.

Example 10: Companies offering meat alternatives

Meat companies⁷ like Vion (The Netherlands), Tyson Foods (USA), Hormel Foods (USA) and Maple Leaf Foods (Canada) are companies that are rooted in the slaughtering and meat processing industry. These companies are major players in the international meat industry. Yet, a common trend seems to appear in the international meat industry: the major players are turning towards the plant-based products and have introduced alternatives to traditionally meat-based products. The arguments for engaging in the plant-based agenda include the following narratives.

- The market demands from flexitarian consumers keep on growing.
- The retailers want meat alternatives in their stores.

⁵ Variations of existing product range: a new product where product specific parameters are changed, for example flavour, size or sugar/sugar-free

⁶ Line extension: a new product added to an existing range of products (for example a new yogurt added to a range of dairy products)

⁷ Red meat company is a packer or processor of beef, pork or lamb



- The distribution systems and logistics to reach the market are already available.
- The technology for producing meat alternatives is in place in the meat processing factories.
- The necessary ingredients are available.
- The consumers like the meat alternatives.
- There are many untapped market opportunities for meat alternatives in Western countries and in emerging markets in Asia.

The US Company Tyson Foods began its own venture into plant-based protein with the introduction of their, “*Raised and Rooted*” brand in June 2019 and more recently, Tyson’s corporate venture arm, Tyson Ventures, announced its investment in the American start-up ‘*New Wave Foods*’, a manufacturer of plant-based seafood. Tyson has positioned itself to be part of a plan to roll out a product which tastes of shrimp but is made from seaweed and plant protein. This product is targeted at the food service market (Meat and Poultry, Oct. 2019).

Example 11: Vion takes on arable farmers as suppliers

Vion, a red meat company headquartered in the Netherlands, has entered the plant-based market after forming a start-up called, ‘*ME-AT*’. The start-up concentrates on developing plant-based meat alternatives, and these 100% vegan products are targeted at the international retail and food service markets. The first products are expected in the market early 2020. The meat product production facility in Leeuwarden (the Netherlands), will be converted to produce only plant-based products. This was originally built in only 2017 as a beef-processing facility. The site can be scaled-up to add more production lines, freezing facilities and a larger storage capacity. The Company states: “*With this new division we are exploiting our knowledge and expertise to take the next step in providing the world with alternative sources of protein with products that are meat-like in their appearance and flavour. We look forward to welcome arable farmers as new suppliers in our plant-based chain*”. (Foodingredientsfirst.com, Nov. 2019)

A common denominator of the meat companies and their diversification strategies is to build on existing distribution channels and use processing technologies already in place. To produce the plant-based meat alternatives, the companies use plant proteins such as soy-, pea- and wheat-protein. The plant proteins are purchased from specialised distributors or processors of ingredients to the food processing industry. Therefore, an important factor for leveraging the growing market for meat alternatives is the availability of functional plant protein ingredients. In addition, better functionality (e.g. flavour, texture, or solubility) that plant proteins ingredients offer are also attractive since they generate improved more appealing products including better texture, taste and reduced allergen risk, especially where pulse grains such as (yellow) pea are used. This sequence of actions is already materialising as numerous companies are presently increasing plant-protein processing capacities.

7.2 Diversification and the fish feed industry

Fish feed for use in aquaculture production is usually made with a high content of fishmeal and -oil. Due to the risk of overexploiting wild fish stocks used for producing the oil and meal, the fish feed manufacturers are in search for alternative sources of protein (and oil) to replace the wild fish. More than 50 % of the fish consumed globally comes from aquaculture production, and this provision is set to increase globally too. Today, soybean meal is the most widely used plant-protein ingredient used by the fish feed industry. An increasing trend in the formulation of diets for aquaculture is to include alternative plant-protein sources to reduce the dependence upon soya, and among other legume grain types, faba bean is regarded as a feasible alternative, which also provides functional advantages.

Example 12: Faba beans for the fish feed industry – the case of Biomar

One of the largest producers of fish feed, Biomar, has already gained vast experience of working with faba beans. Biomar produces approx. 1.2 million tonnes of feed for 45 different fish and seafood species from factories across Europe, Chile, China and Australia. About 1:5 farmed fish globally are fed with feed from Biomar. At the Biomar factories in Denmark, faba beans have been used in the formulation of fish feed since 2015, when approximately 2000 tonnes went into the feed. By 2017, the volumes had increased to 3,500 tonnes, and the company transitioned the nature of its raw material from using whole faba beans to using dehulled beans. The estimated demand for dehulled faba beans is more than 10,000 tonnes by 2019 and this is expected to increase, and this is only the figures for the factories in Denmark. The faba beans are produced by Danish farmers and they are also imported *via* traders from farmers in Germany and other EU countries. The use of faba beans in the formulation of fish feed appears to be challenged by the: content of anti-nutritional factors (such as vicine and convicine) that inhibit the digestibility of the feed; uncertainties regarding the available volumes of faba beans; and, price competition from other protein sources (Vestergaard, 2019). This example demonstrates how reformulation of a feed-diet can include the use of alternative protein sources and, that this can have a significant impact on market demand for a pulse crop. Given the fact that demands for digestible protein in the international aqua-feed industry will be increasing, the importance of the aquaculture feed industry as route to commercialisation of faba beans is anticipated to be emphasised significantly in the near future – if the prices of faba bean digestible protein can compete commercially with alternative protein sources.

7.3 Diversification strategies and market pull for legumes

From the example provided in the section (above) regarding the meat industry, and related feed industries, it is evident that once major producers change recipes or enter into new markets, the demand for pulses increase. Existing food and feed manufacturers have already established production facilities and their recipes will be formulated to optimise the products to their existing food- and/or feed-markets. The interesting aspect from a commercialisation perspective is that the food and feed companies are targeting markets with good prospects for growth in the coming years and minimise their risks by building on existing production infrastructure and market access routes.



Feed companies may purchase pulse crops directly from farmers or traders and sell the manufactured feed to livestock or fish farmers. In this context, the value networks to absorb more pulses already exist, and the challenging aspect is to motivate the inclusion of legume grains other than (imported) soya into the feed formulations. For food companies, the value networks which may accommodate large volumes of pulses are specialised distributors of ingredients for processed products (e.g. pea protein and starches too). Therefore, having more pulses in the value network for feed and food can build on existing trade infrastructure. This makes strategies of such diversification replicable by other companies, and the increased scale follows from increasing volumes from existing or new processing facilities. The examples provided highlight that diversification can be linked to changes in the formulation, so enabling entry to new markets or industries. Furthermore, diversification can also be linked to the adoption of new processing technologies.

8. Quality standards and certifications

8.1 Quality schemes paving the way to market

Quality standards and certification schemes are fundamental elements for trading commodities, produce, or processed products. The purpose of quality standards and certification schemes is to ensure that products of a specific standard are marketed. In this sense, quality standards and certification schemes function as market entry barriers for those actors who offer products not fulfilling the standards. On the other hand, quality standards and certification schemes can be used to encourage marketing of products of a specific standard. For food and feed, hygiene standards are the most fundamental requirements for marketing of products. For example, these standards can be fulfilled for food products by compliance with food safety standards such as IFS, BRC or FSSC 22000. The following examples demonstrate how compliance with quality standards and certification schemes shapes the route to market for fresh legume grain and legume grain-based products.

Example 13: Sourcing of dried mung beans for spring rolls

As a leading producer of ready meals including vegetarian meals and spring rolls, *Good Life Foods* need to ensure a constant quality and availability of its products to fulfil contracts with its customers in the retail market. Sprouted mung beans are an important ingredient in these ready meals and especially for spring rolls. As the company undertakes the sprouting process at one of the factories, the supply of beans needs to be constant in flow and quality, and with a special focus on microbiological quality. The company has identified mung beans from Myanmar as delivering the highest qualities for their purpose. Farmers in Myanmar produce the beans according to the company's specifications, this extends to agronomic practices such as pesticide applications and harvest time. In addition, the grain aggregator and exporter based in Myanmar ensures compliance with the company's requirements and EU's General Food Law. The dried mung beans are traded via intermediaries to arrive at the factory in Scandinavia. There, the beans undergo a sprouting process and are used in the ready meals. Since 2013, imports to the EU of dried mung beans have increased from 21,000 tonnes to 27,000 tonnes in 2017 (CBI, 2019) and the main markets are the UK, the



Netherlands and Germany. The leading suppliers of dried mung beans to the EU are China and Myanmar. In 2018, the European Commission gave a positive evaluation of the food control system in Myanmar with regards to microbiological contamination of mung beans for sprouting. This example demonstrates how a value network can link a food company in Europe with farmers in Asia, and the importance of a proper food control system.

Example 14: Exporting fresh French beans in Kenya for the European retail market

Kenya is the second largest exporter of fresh French beans to Europe. Beans are cash crops for farmers of all sizes (Odee, 2019, personal communication). Kenya's success as an exporter of French beans is built on several factors including: good climatic conditions for growing high-quality beans; investment in certification schemes; value-addition *via* efficient sorting and packaging; and, a fast-moving and adaptable logistics, since once the beans are packed they must rapidly enter the European market. In 2017, Kenya exported 34,000 tonnes of French beans, and mainly to the UK, Netherlands and France. Since 2012, imports of fresh green beans to France have increased by 6 % (*i.e.* more than 16,000 tonnes) to 62,000 tonnes in 2017. The main exporters to France are Morocco, Egypt, Kenya and Senegal in that order. Kenya holds only few per cent of the bean exports to France, yet the country's exports are increasing (GTI and EDA, 2018).

More than 60 % of the crop is produced by small-holder farms and 40 % from larger contracted farms. The French bean crop from small holders in Kenya reaches the market through brokers, or as contracted production with packers and exporting companies. For large-scale farms and contacted small-holders the production of French beans seems to be profitable, whereas scattered non-contracted small-holders are struggling to be profitable. Overall, engaging in the production of French beans generates an income and cash flow for small-holders and farmers, and the French bean sector is important for foreign exchange earnings of Kenya. Figures from 2017 indicate that cultivation of French beans in Kenya contributes to keeping 52,000 small holders out of poverty and provides employment to more than 150 brokers, 350 wholesale traders, and 2700 retailers (VCA4D, 2018). As the European market for fresh produce is experiencing growth, and trading relations with Kenya for French beans is well established, it is perceived that the European and Kenyan value networks for French beans will be strengthened leading to increased imports of fresh beans to the European market.

8.2 Certification scheme promotes pulses on the menu in food service

On average, food services account for 15-25 % of the meals provided to citizens across the Europe (Hamann et al., 2018). Food services comprise the meals provided in the public sector such as schools, hospitals, the elderly and the meals provided by private operators such as from restaurants, fast food outlets and canteens.

In public food service, the procurement of food is based on centralised agreements with suppliers and the ordering of the specific items for purchase is decided by the operators themselves. Public food services are closely linked with government policies and budgets. For example, public food services may be subject to policies that target certain impact areas like improved nutrition, sustainability or which encourage the use of organic products (Madsen, 2019). In this perspective,

policies can play a significant role for driving demand for food products and the composition of menus (Degiorgis, 2019).

Example 15: Organic Eating Label promotes the use of organic food in Danish food services

The voluntary label was created in 2009 by the Danish food authorities with the aim of rewarding food service outlets (restaurants, hospitals, schools, cafés etc.) according to their procurement of organic products. The background for introducing the ‘Organic Eating’ label was a government strategy of achieving a 60 % share for organic food in public procurement of food, and this has been achieved today. Outlets where organic products accounted for at least 90 % of the food and drinks procured were rewarded with a ‘Gold Label’ (Fig. 7). When the label was introduced, approximately 350-400 outlets were rewarded, and by October 2019 more than 3000 outlets have been rewarded including large hospitals, workplace canteens, hotels and restaurants. This illustrates how the label has proved compatible for use in many different businesses. The *Organic Eating* label is now recognised by more than 75 % of the Danish consumers and it is used to promote (or certify) outlets using organic products in the menus. The label has been important to increase the use of vegetables and legume grains (pulses) in the menus offered, and for improving the cooking skills of kitchen staffs. In recent years, the use of the label has also spread to Germany, Norway and Estonia (www.okologisk-spisemaerke.dk).

Figure 7: The Organic Eating label (from Denmark).



(www.okologisk-spisemaerke.dk).

8.3 The importance of standards and certifications for commercialisation

In the examples provided we demonstrate that trade also forms the link between the European market on the demand side and farmers in USA, Africa and Asia on the supply side. Establishing international trading relations for legume grains and fresh produce is a process that still demands a consistent and reliable value network. Once the trade relations are established, and the value network organised, the basis for scaling-up the initiative is there. For example, if the import of mung beans for the ready meal production complies with quality standards and supplies can be extended, the trade can be expanded.

The example of exporting beans from Kenya to the EU shows the importance of fulfilling food safety and quality standards, and ability to comply with the standards is a key competitive parameter for the Kenyan bean value network. Countries that export fresh produce to EU or for intra-EU trade must also comply with these standards hence, controlling the value network and compliance is the essential elements in a route to commercialisation. When producers or exporters have

demonstrated compliance with the relevant standards, the cultivation and trading praxis can be scaled-up and applied for other crops. In this sense, quality standards can promote replicability, scalability and encourage diversification, and standards facilitate local and international trade.

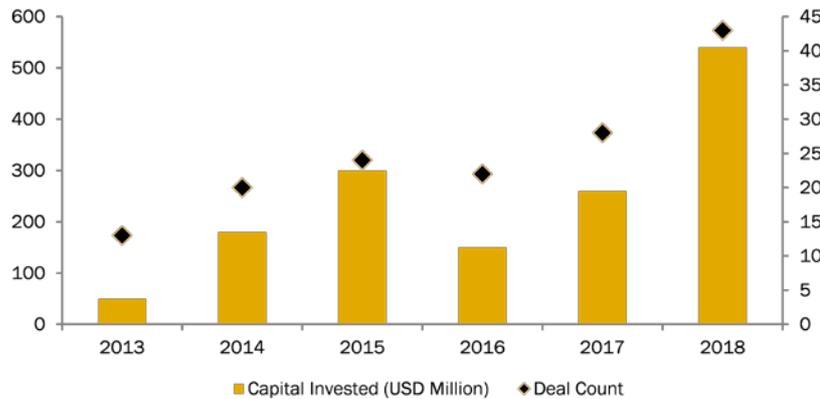
Certification schemes that stimulate demand for a certain category of products, for example organic or Fair Trade products, can be used to promote items to consumers seeking particular attributes (functional qualities or/and ethical values). The example of the *Organic Eating* label from Denmark demonstrates how powerful this kind of market tool can be. A certification scheme that is motivating for more actors across the value network, and meets the demand criteria of the end-users, can be used to promote the development of a new market segment, as for example organic food in the food service market. In this way, a certification scheme can motivate producers and market actors to scale-up activities and diversify the range of products or menus offered. Communication activities and strategies should therefore also be considered as relevant for diversification.

9. Meeting demands for ingredients in new market segments

9.1 The plant-based food agenda

The European market for plant-based products is valued at € 970m (2018) with an average 7 % annual growth rate, according to data from Euromonitor International. Following the increasing consumer awareness of the need for more sustainable consumption and the tied ‘plant-based’ approach in that, the growing demand for plant-based ingredients in the food and drink sectors means producers are looking for the best ingredients. These ingredients are essential for manufacturing such products as plant-based burgers or balls, “dairy” products (e.g. milks, yoghurts, cheese or spreads), and other plant-based alternatives to conventional (or organic products) made from milk, meat or eggs. The increasing market demands for plant-based products, including pulse-based products, are reflected in investors’ interests in plant-based food manufacturing companies (Vegconomist.com, 2019). Data from the USA shows that companies in the meat-alternative industry have received massive investor interest with major deals of millions of dollars being signed (Fig. 8). Strong interest from investors is projecting an increased market demand that calls for expansion of pulse cultivation and processing. Several of the large American companies are active in the European market, for example *Beyond Meat* and *Impossible Burger* are sold through fast food chains and in supermarkets.

Figure 8. Trends in investments in plant-based food companies USA, 2013-2018 (US € m).

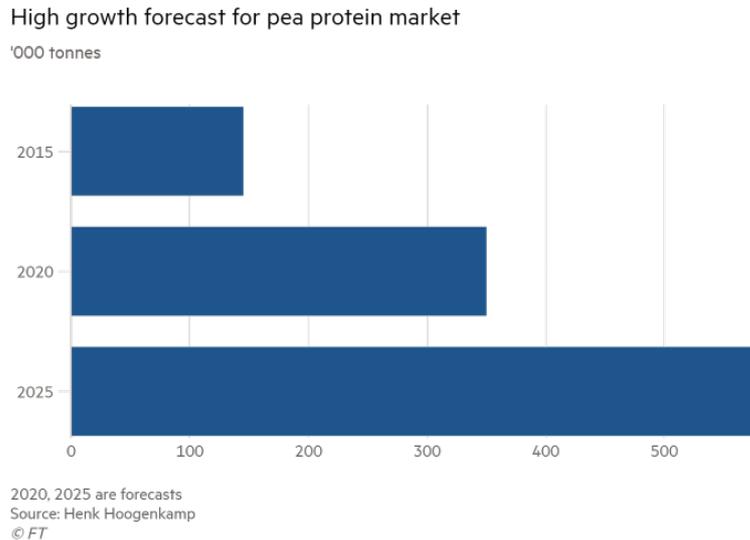


<https://vegconomist.com/market-and-trends/growing-consumer-preferences-toward-vegetarian-and-flexitarian-foods-to-drive-the-demand-for-vegetarian-and-vegan-products/>

9.2 Pulse-based ingredients and product development

The most important factor for consumers, if they are to buy a product again, is their appreciation of the products taste. This highlights taste and mouthfeel as key criteria to meet consumer expectations. To accommodate this, food and drink producers are currently looking for key ingredients, formulations and processing methods to deliver those expectations, whilst also rising above the competition. Such market-pull has significantly increased demand for ingredients made from plant protein, such as texturised protein and protein isolates. Pea protein has attracted special attention from the food industry as peas are non-allergenic and non-GMO in comparison to most (if not all) other protein and starch sources. These attributes are provided in addition to other desirable functional properties, such as extrusion potential. The global market for pea protein stands at approximately 500,000 tonnes (2019) and is expected to continue increasing strongly (Fig. 9).

Figure 9. The global market for pea protein and growth rates, in tonnes.



(Terazono, 2019)

Pea protein ingredients are most often made from yellow peas (also sometimes referred to as ‘white peas’). The companies processing the largest volumes of pea protein are Roquette Freres (France); Cosucra (Belgium); Puris (Cargill, USA) and, Emsland Stärke (Germany). Collectively, these companies hold more than 80 % of the global market for pea protein (market share estimated by author). Data from Innova Market Insights show that the launch of new pea-protein-based food and beverage products grew by 19 % globally from 2016 to 2018. As the global demand for pea-based ingredients is forecasted to show continuous growth in the coming years, several companies have invested to expand production capacity and tap into the growing market demand and this in turn leads to a growing demand for more yellow peas for processing.

Example 16: Increasing production capacity for pea protein to meet demand from the food industry

Cargill is a global leader in agribusiness including processing of soybeans for vegetable oils, feed and food proteins. In 2018, Cargill acquired the American company Puris and invested \$(US) 75 m to double the processing of peas into pea protein, starch and fibre. Puris processes yellow peas supplied by a network of 400 contracted farmers in Minnesota and the company is the largest supplier of pea protein to Beyond Meat (foodingredientsfirst.com, 2019). The French company Roquette Freres has invested € 300 m to build the world’s largest yellow pea processing facility in Manitoba, Canada, and this facility was inaugurated just this year (2019). The pea protein will be marketed in North America and around the world. With the new factory and an existing processing plant in France, Roquette has a processing capacity of more than 250,000 tonnes of peas. Supplies of peas for the factories in France and Canada are secured *via* contracted farmers. Other major players in pea protein like Verdient Foods in Saskatchewan (Canada), Cosucra (Belgium), Emsland Stärke (Germany) and Vestkorn (Norway) also report of growing sales.

The growing sales from the pea protein industry are based on European and international value networks for yellow peas, where the pea crop is provided by contracted farmers. Even though some



of the value networks span across continents, the global demand for yellow peas is increasing and will continue to rise as market demand (and competition) for such plant-based foods intensifies. This significant market-pull is regarded as a major motivating factor increasing the pea crop cultivation across European agricultural systems.

The market for pulse-based protein ingredients is increasing and diversifying with new ingredients being introduced in the market. In 2017, chickpea proteins were commercialised from an Israeli start-up and Roquette plans to introduce textured faba bean protein in 2020 (foodnavigator.com).

Example 17: Israeli start-up ChickP introduces chickpea protein isolates

The ‘patent pending’ technology for extracting protein from chickpeas was developed at the Hebrew University in Jerusalem several years ago. Using this technology, the company can produce chickpea protein isolates (90 % protein) and concentrates (70-85 % protein). The unique selling points of the chickpea isolates are their non-GMO status, neutral taste, high solubility and protein content. Together, these aspects make the ingredients suitable for a wide range of applications. In addition, chickpeas are (also) non-allergenic in contrast to soybeans and nuts that are currently the most used proteins for dairy alternatives. In 2016, ChickP was founded as a start-up to commercialise new protein ingredients, firstly in pilot-scale, and then in 2017 tested at large fully commercial and industrial scales for a range of applications and products. In 2019, the company began scaling-up production and today is set to market chickpea-based ingredients to customers in the dairy and meat alternative industries for products spanning pastries, snacks and cereals (www.chickpea-protein.com, and www.foodnavigator.com).

9.3 Ingredients and market-pull for yellow peas

Currently, the provision of pea protein ingredients for the food processing industry is expanding significantly both in terms of a wider assortment of pea-based ingredients and the larger volume handled. The companies in the ingredients industry are highly innovative and work to develop products that can fulfil the needs of the food and beverage processing companies. Such a situation is pointing towards a highly competitive ingredients industry where the key competitive parameters are technological innovation and ability to provide customer (i.e. food processor and consumer) satisfaction.

The examples provided show that the global demand for pea-based ingredients in particular will be growing significantly in the coming years, and globally. Major players are investing heavily in more production capacity and securing supplies by contracting farmers. This approach emphasises the contracted production and international value networks are key routes to market for the (yellow) pea crop. Processing companies (of pea) are the key players in satisfying the pea-based ingredients market and for developing new ingredients. Progressing new markets also requires deep knowledge about the functional properties, and with respect to customer requirements and expectations. The pea protein industry is a global yet consolidated industry where diversification is connected to new varieties of ingredients, new applications or new market segments.



10. New ways to valorise legume crops

10.1 Innovating with legume crops

Innovation is the process of translating an idea into goods or services that somebody will pay for. With this definition in mind, innovation differs from research and development work (R&D) as the outcome of R&D is usually not in a market-ready format. Innovations may appear as “radical” in the sense that the innovation is absolutely new, maybe even a “game-changer”, however this relates to market potential. The introduction of a new technology could be a radical- or incremental-innovation, and while both may be transformative, the length of time required for implementation needs considered, and with respect to the need to process and sell ever-increasing volumes that period. Immediate implementation at large scales may be easier to implement with incremental innovation and could be represented by product re-formulation for example. Furthermore, innovation can be related to a process, product, material or organisational structure of a business (case).

Legume crops are used for a wide range of applications in the food and feed markets today, but technology and entrepreneurship can promote the use legume crops in new applications. In many cases the success is achieved because a new technology or process has been developed. Taking technology-enabled innovations to market may require new ways of organising the value networks as well as thinking about collaboration with partners in the market. This approach will support the entrepreneur to understand the market requirements and build relations to potential customers.

Furthermore, commercial developments are more commonly realised by large players in the value network, and examples of small companies remain to be expounded and this may well reflect the lack of affordable and small-scale processing technologies for deployment in local or regional markets (only).

Example 18: Using faba beans for making beer

Scotland is home to several craft breweries including Barney’s Beer in Edinburgh. Barney’s Beer has been recognised as among Top-5 craft breweries in Scotland (2013) (www.barneysbeer.co.uk). In 2016, the new Bean Beer was introduced as a beer made with 40 % whole faba beans and 60 % malted barley. The beer was developed in collaboration with the James Hutton Institute, Abertay University and Arbikie Distillery (by Montrose, Scotland UK). The Bean Beer is distributed through stockists in the Edinburgh area and marketed as a gluten free and vegan beer. The beer is marketed as a sustainable drink made as it is made from a crop that contributes to more sustainable farming practices (Iannetta P. 2016). The brewing process uses the sugars and starches of the beans and leaves the protein and fibre fraction in the spent grain. Work is now undergoing to find way to valorise the utility of the high protein spent grain for chicken feed, and an associated Life Cycle Analysis to compare the environmental impact of the bean-based beer against that of its barley-only counterpart. This example illustrates how new ideas can be turned into new products by improving the process, and how new opportunities for working with a circular-economic approach appear.

Example 19: Processing of clover grass to make feed protein for pigs and poultry

Protein from clover grass can be extracted to produce a high-quality feed protein for livestock. This process has been developed in Denmark as a collaboration involving farmers, universities, technology providers, and end-users in the feed industry. The aim of developing the protein flakes from organic clover grass is to increase the self-sufficiency of Danish organic pig and poultry producers with feed protein. After having developed the production process for making the protein flakes, a major company in the feed industry has been contracted to test the protein flakes in compound feed, and the feed pellets have been submitted for feeding trials with organic pigs and poultry. The results were very promising, showing that the protein flakes could be produced and would function in industrial pellet production. It was also demonstrated that the animals liked the new feed and thrived on it. The preliminary conclusion was that the production process needed further refining to increase feasibility if the protein flakes should be competitive to organic soybean concentrate (Hamann and Gylling, 2019). During the development work, organic farmers have been consulted to understand the requirements for making cultivation of organic clover grass attractive for them. The point is, that if the organic farmers did not identify a promising business case, then the cultivation of organic clover grass for making protein flakes would not be realised. Therefore, efforts were made to identify factors that created value for the farmers, include the:

- value of the N-fixation from growing clover grass;
- value of reducing the leaking of N and P into waters;
- value of receiving the fibre fraction from the juice pressing and use it for cattle feed or bioenergy;
- potential organisation of the harvesting and how to expand the season;
- potential price for the grass;
- minimising of distance (i.e. cost) in delivering clover-grass to processors; and,
- other whole and long-term system-level benefits that translate as resilience factors.

The example of the protein flakes demonstrates that the business case valorisation may be more complex than merely the price of the crop. It is very important to identify factors that constitute the embedded value the crop and/or crop components. Furthermore, it is essential to communicate and discuss these factors with stakeholders from producers to consumers. It is still too early to draw conclusions regarding the resilience of the new value networks for making protein flakes as this venture is moving towards scaling-up to process 100,000 tonnes *per* year during 2020. However, an important point to learn is that the product can be made, and the necessary value-network realised.



10.2 The entrepreneurial route to commercialisation

In this section it has been shown that innovations can be launched to the market following a diverse array of transition paths. A core issue for taking innovations to market is identifying the best route to market. Critically, developing the market access for new products should be undertaken while the product is still in development, and this is relevant for new foods and drinks, and for technology-enabled innovations. The benefits of such pre-emptive activity allow the product to be adapted according to responses. Additionally, in scoping this, attention should also be paid to identification of marketing channel which are suitable to accommodate scaling-up.

The food and drinks market welcome innovative products and consumers are always interested in trying new tastes (ingredients) and textures, and especially those with proven environmental (and ethical) credentials. Placing innovative foods and drinks in the retail market (supermarket sector) may be very challenging for entrepreneurs and it is not always the optimal route to market. In some cases, a better choice would be other types of stores or alternative routes such as ‘box schemes’, ‘web-shops’ or farm-gate sales and may extend to food service sectors in place of the retail markets.

Despite the diversity of these examples, it has been demonstrated that the organisation of the value network needs to be in place before taking an innovation to market. This is especially clear in the case of the protein flakes. Furthermore, the examples have shown how, once organised, the potential for scaling-up the value network can be undertaken without changing the business model.

For entrepreneurial ventures to become a success in the sense of “being realised”, it is important for all actors involved to identify and align themselves with the values (monetary and non-monetary) that can be brought forward by the new venture. In the example of the organic protein flakes, the non-monetary values are important for the overall context of the business idea, such as the farmer’s contribution to reduce synthetic nitrogen use and improved self-sufficiency. This way, non-monetary values can be those factors that push an emerging venture into a business context on the way to become economically viable. The challenge is that some ventures need to have front-runners or early adopters, who can manage significant risks to realise products’ new and better markets *i.e.* that are multi-functional and serve in a sustainable fashion, commercial, environmental *and* societal needs.



11. Characterising best practices

11.1 What are best practices?

This report provides examples of best practice for commercialising legumes in the food and feed sectors. Commercialisation is defined as putting the crop, or crop-derived product up for sale, thus linking the agricultural production with a market. This report explores examples of all scales and from several European countries. The examples have been provided by the Partnership of the TRUE project and from consultation of external stakeholders in legume-based value networks.

A central finding of the report is that a best practice is dependent on the actors and the socio-economic contexts and therefore is not uniform and cannot be prescribed. That is, there are numerous routes for commercialisation of legumes as the go-to market and it is essential to consider the context of the commercialisation. For example, is it a new product for an established market segment? Or is it a diversified product in a new market segment? Is the value network new? Is the product for commercialisation based on an innovative technology? Or, is the partnership the essential feature? And, is the commercialisation undertaken by an established value network actor, a start-up, collaborative-partnership or other business structure? This sequence of issues is pointing to a range of considerations before a best practice for a route to market should be decided upon and includes the following foundations.

- Building on a robust value network is fundamental for a successful commercialisation.
- Consider including partners for cultivation, processing and/or marketing when establishing new value networks – that is, it may not be wise to venture too far out from your own area of expertise.
- Collaboration in partnerships can strengthen a value network as well as shape the route to market for new products.
- Contracts for production can lead to long-term partnerships, and contracts are not limited by distance.
- Technology improvements offer new opportunities for valorisation of legume crops and this may well mean new routes to markets.
- Establish a route to market that allows for scaling-up in the future.
- Certification schemes and standards are important for building value networks and market positions, and such schemes can be a market-entry barrier as well as a market enhancer.
- Food and feed markets offer many routes for commercialisation of legumes crops, so consider diversification as a range of opportunities.

Overall, there are numerous options for commercialisation of legumes crops and processed products thereof, and this report has provided examples of such options. The challenge for any business wishing to commercialise legumes is to identify which options could be relevant for their value network structure, collaborative partners and to understand fully the potential drivers and barriers given the given context for their operation(s). For a route to market to be recognised as a ‘best practice’, the report highlights to **four parameters that together characterise a Best Practice:**



- 1) When businesses take a crop or product to market, the intention is to sell it and make a profit. Once a link with the market has been established, the business will be looking for options to both maintain and expand the business and this requires **links to the upstream and downstream value network, or 'value network'**. The basis of a Best Practice is to have well-established **connectivity** or **partnership** to all the essential (and robust) network components.
- 2) A strategic approach should be adopted to identify the **most promising routes to market**, and they may be based on already successful strategies. Hence, the most successful commercialisation strategies or routes may be defined as one which allows 'repeat sales' or **replicability**.
- 3) A successful commercialisation strategy should also allow for 'scaling up' (or 'scaling out'), which means that the strategy must also consider the value network capacities for example of production of processing to accommodate larger volumes, more markets and/or marketing channels. Thus, **scalability is also a defining feature of a best practice route to market**.
- 4) As a sales increase and the markets develop competition will intensify, and successful practice will also a diversification strategy to accommodate new, or adapted USPs (unique selling points). Thus, best practice routes would normally present **potential for diversification**, and may extend a myriad of factors such as: product types, ingredients, supply networks chains, marketing strategies.

In Table 1 (below), examples provided in the report are summarised to show how they meet the four key parameters at an aggregated and conceptual level.

Table 1. Summarising how the examples match the four key parameters of best practices.

Example	Link to value network	Replicability	Scalability	Diversification
Private label plant-based products	Contracts between retailer and food manufacturer	Replicable for more products or for more food manufacturers	Volumes can be increased to supply more stores	Products can be diversified
Partnerships for food service	Partnership between restaurant chain and food producer	Partnership model to be copied by other restaurant chains; products supplied can be replicated by other food producers	Having agreed to sell one product, the option to sell more is presented; restaurant chains have many outlets	Marketing strategies, products and new outlets hold potential for diversification
Establishing value networks	Contract production for establishing or securing a supply	Contracts for other crops	The number of contracts can be expanded	Contracts for diversified crops e.g. organic varieties
Quality and certification	Certifications required by value network actors; no certification is an entry barrier; appropriate certification is a market enhancer	Other suppliers can apply for same certifications and standards	Once approved, the product range can be enlarged; once the certificate is recognised demand increases	More certifications can be acquired and combined; Fair Trade, Organic, BRC, IFS etc.
Diversification as strategy	Securing supply / input is fundamental	Other businesses can follow the example	Once established, a new strategy can be expanded	Products, ingredients, marketing channels and more can be diversified
Valorising crops in new ways	Access to the crop is essential for developing a new value network	Principles of the value network can be replicated; replication of technologies can be hampered by confidentiality	Once established the valorisation can be targeted at larger volumes or more markets.	Modification of technologies provides options for new products; new marketing channels means a diversified marketing strategy



11.2 Concluding remarks

The main conclusions to be drawn are that there are many opportunities for commercialisation of legumes crops and legume-based products whether for food-, feed- or -industrial uses. What especially **characterises the best practices in comparison with other buyer-seller relations, is that parameters of replicability, scalability and diversification in their specific socio-economic contexts are considered.** From a pulse-based perspective, diversification is a key driver for market development as demand for pulse-based products is forecasted to grow significantly in the coming years. This market-pull effect will benefit both the food and feed (the latter including industrial) markets. Strong current trends are pointing to markets that will show clear signs of diversification as new market segments develop, volumes will increase, customers will demand for a wider selection of innovative products, and new routes to market for legumes will be organised.

As the European Union claims it is heading towards implement the ‘food systems approach’, including a role where legumes are foreseen to play a larger role than currently afforded (EU Protein Plan, 2018; Achterbosch et al., 2019). In these contexts, it is essential to stress that best practices should promote the good examples through their replicability and scalability, because of anticipated larger volumes and expanding markets for legumes crops. In this context, the replicability and scalability of best practices for (large scale) commercialisation of legumes will capture the opportunities following from a market-pull that is foreseen to further strengthen demand for legumes.



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15. Annex 1 – ‘Value networks’, a definition

The definition and justification for adoption of the term ‘value networks’ is provided below as originally described by Vasconcelos et al., (2019), who argues that there is a need to reappraise the commonly used term “supply chain”.

“First, food and feed supply are not usually the function of a simple “chain”, but rather several interconnected chains or “networks.” Furthermore, these networks do not simply deliver food, they also deliver feed and a range of industrial products including fibers, oils, and biomass for energy. So, production systems which are often stereotyped as food networks produce a diversity of outputs that influence many aspects of environmental, societal, and economic status of society. It is these impacts, and particularly the negative impacts, that have come to determine a shift in society’s “values” with respect to agriculture and food. That is, these values determine the impacts society will tolerate or wish to achieve, and expose what society really considers to be most beneficial and important. Respecting the diversity of values among various stakeholders will be key to progressing dialogues, and especially those targeted toward more effective policies, with greater potential to help harmonise currently dominant values, such as those driven by largely economic considerations, with those which are neglected, such as societal and environmental wellbeing.”

This embodies the "triple bottom line" of Elkington (2018), and more modern “true-cost accounting” approaches which aim to quantify the consequences for and of key ecosystem services, such as food- and feed-provisioning.

16. Annex 2 - References

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Newsletters

Various issues of newsletters for the period 2017-2019 have provided insights to the development of companies, markets and product innovations. The most important newsletters are from the sources listed below.

www.foodnavigator.com

www.foedevarewatch.dk (Foodwatch in English)

www.foodingredientsfirst.com

www.globalmeat.com

www.meatandpoultry.com

17. Annex 3 - Methodology

The report has been elaborated with an explorative and qualitative approach. Research has been carried out during the period May 2017 to October 2019. The report compiles key findings of WP4 about markets and consumers in the TRUE project. Prior deliverables on which this report builds are reports about processing infrastructure for pulses in food and feed (D4.1); report of 19 innovative business cases and their value networks (D4.2); report about the EU market for legumes in feed (D4.3); report about public and private procurement in food service (D4.4); and report about sustainability indicators for markets and value networks (D4.5).

This report builds on desk research combined with stakeholder consultations. **Desk research** has comprised of reviewing empirical and academic literature for the period of 2016 to present. Main sources are industry and market reports; European and global newsletters⁸ about the food, feed and food ingredients business and markets; EU policy plans; statistics; and, other sources as listed under References. The aim of desk research has been to identify common patterns of successful routes to market for legumes crops and processed products thereof.

To identify common patterns for successful routes to markets, **numerous company cases** have been monitored during the period 2017-2019. The monitoring has included reading about the companies in newsletters, following market trends in market reports, and looking into new products and technologies being launched in the market – locally or globally. Monitoring the extensive range of company examples from European countries, North America, Israel, Australia and some countries in Asia have made it possible to **identify some key parameters that the successful companies show. These parameters are being linked to value network; replicability; scalability; and, diversification.**

Field research has been performed to investigate the selection of brands and private labels offered in many supermarkets across Europe to learn about the assortment, pulses processed and branding strategies of the retailers. These findings are compiled in a database for the TRUE project. The main **learnings about retailers' strategies for private labels** for processed pulse-based products are confronted with literature about the penetration rate of private labels and the growth rates in the market share of private labels. Conclusions about private labels have been drawn out based on these research activities.

To **validate the findings about common patterns for successful routes to markets** and about branding strategies, **consultations with stakeholders** have been undertaken at the Legume Innovation Network (LIN) workshops hosted as part of the TRUE project in the UK, Hungary, Portugal, Germany and Denmark during 2017-2019. At the LINs, market and value network sessions have been organised as roundtable-discussions to identify opportunities and barriers for having more legumes in the market, to validate identified sustainability indicators for markets and value networks (D4.5) and, to discuss good practices for commercialisation of legumes. The market sessions and roundtables were organised as active dialogues involving the stakeholders and encouraging them

⁸ See 'Appendix 2 – References' for a full list of the newsletter sources.



to bring forward their views and experiences. The **outcome** has provided first-hand insights to challenges and opportunities for marketing of food products, feed and food ingredients, the most important sustainability indicators for food and feed chains, as well as international trading relations. To **enhance the international approach**, the TRUE International Scientific Advisory Board (ISAB) has also been consulted.

Based on the above-mentioned research activities, a collection of illustrative examples was chosen by the authors for publishing in this report. The collection comprises of **highly diverse examples that clearly demonstrate how the four key parameters of the best practices are instigated.**