D.T2.2.2 Regional good practice case reports

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Deliverable D.T2.2.2

Regional good practice case reports

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1. Table of content

2. Introduction

The objective of Task 2 of the I-CON project is to develop tools and techniques to improve competences and skills of food related SMEs through cross-sector related tools and techniques.

In the first sub-task of the I-CON project, advanced tools, techniquies and methods were identified and analysed in the disciplines of food safety, quality and labelling (FS); mechatronics (M) and food design (D) in order to provide support to SMEs.

Then, these tools and techniques were used to find solutions for the collected regional needs provided by the Regional Partners of I-CON.

Aim of D. T2.2.2- Regional Good Parctice case reports was to identify relevant technologies or techniques that can be used under sustainable principles where significant savings or quality improvments were made in regions of I-CON Partners.

3. Method of collection of regional good practice cases

3.1. What is a good practice?

Good practice cases can be defined as description of cases where such lessons learned are identified, which can be useful, adaptable and applicable for others as concepts, approaches, methods, procedures, systems, business models for developing and implementing solutions for other cases.

A template was developed by CBHU in order to identify the relevant regional good practice cases. The template was circulated among Partners for feedback, and they were asked to send at least 3 good practices from their own regions.

This template was also used to collect infromation for D.T2.2.3- Handbook tool report.

These good practices can present the successful use of the tools identified in *D.T2.1.1- Analysis report of existing advanced tools and techniques* or other cases from the experience of the I-CON Partners.

In the previous, in Deliverable D.T2.2.1- Global/European good practice guideline, European and worlsdwide good practices were presented aiming to be an extension of the Regional good practice case reports.

The template covered the following aspects:

- Location
- Short description of the case
    - Describe the specific need or problem being addressed by the case
    - Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)
    - Describe the method, procedure, solution implemented
    - Describe the specific constraints of the business related to the implementation of the method and/or related to the region
    - Describe the results, achievements and typical failures

- Summarize what makes the case to a good practice
- Lessons learned (this is used for the Handbook tool only (DT.2.2.3))
- Aspects, methods, transfer of methods, lessons learned (this is used for the Handbook tool only (DT.2.2.3)
- Aspects for sustainable use (maintaining implementation, this is used for the Handbook tool (DT.2.2.3)
- Recommendations for other applications

4. Collected regional good practices

4.1. Food safety, quality and labelling

4.1.1. Detection of foreign bodies

1. **Title of the case description**

Food radar system for the detection of foreign objects with low density in foods

Author: UHOH

2. **Indicate the region:** Bad Schwartau, Germany
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x	x		x	x	
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

5. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

The detection of foreign bodies is one of the main issues of food safety, because they can present a health risk for the consumer. Detection methods have been optimized over the years, but it is still difficult to detect small foreign bodies of low density. In contrast to X-Ray or metal detectors, the new detection method is able to detect even small plastic pieces or fruit stone fragments.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Schwartauer Werke is based in Bad Schwartau, Germany. 800 people work in Bad Schwartau, where all kinds of jams, fruit preparations, dessert dressings, cereal bars and syrups are produced.

For the new food radar system they worked together with the Swedish company Food Radar Systems AB, which was founded in 2003 and is based in Göteborg. Their microwave food radar system was first only applicable in homogeneous products. Together with Schwartauer Werke, they further developed the technique to be able to use it also for chunky products like jams containing fruit pieces.

- *Describe the method, procedure, solution implemented*

This new food radar system works with microwaves to detect a broad level of contaminants (wood splinters, fruit stones, hard and soft plastic, shells, rubber, seeds, and paper). The contrast, as experienced by electromagnetic waves, between these foreign bodies and the surrounding bulk material is physically described by the different electromagnetic permittivity (the dielectric constant between the two materials). The permittivity is very complex and is frequency and temperature dependent, and of course depends on the physical shape of the foreign object.

The company was able to include all the mentioned differences between bulks and foreign body from an electromagnetic point of view. By penetrating microwaves through a pipe and creating a microwave field covering the pipe, a noise pattern is obtained. With a foreign body in the bulk material having different dielectric properties, the noise level is changed. The noise level of the food is the norm, anything differing from that is detected. With an algorithm a signal is sent to a valve at the right time to open and reject the foreign object.

When a product changeover happens, the system calibrates what is being produced at the time. This then becomes the base without telling the system what is being produced.

The whole systems makes up one meter of pipe length and consists of an operator panel, a rejection unit, a buffer pipe and a sensor unit. The installation is quick and easy.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The method is patented by Food Radar Systems AB. The location is of no restriction, as they are shipping worldwide. The implementation again is simple.

- *Describe the results, achievements and typical failures*

The results are promising, Schwartau Werke stated they have implemented the system in fruit processing after proving its ability to detect foreign bodies like pits and plastic. The company stated they were really impressed with the systems ability to detect low density foreign bodies.

6. Summarize what makes the case to a good practice

The strategic alliance of two companies to further develop Food Radar Systems method proved to be very successful. The successful detection of pits and plastic pieces shows that the case is a good practice, as many companies struggle with the detection of those low density foreign bodies. The food radar system improves the food safety rapidly and also reduces the waste of food if such a foreign body is detected in the end product. In this case, the whole batch has to be thrown out. Additionally product recalls can be minimized and thus again food waste. This also helps with the companies' image, as bad press is always more remembered than good press.

4.1.2. Food safety consultation

1. **Title of the case description**

Food safety

Author: CCIS-CAFE

2. **Indicate the region: Slovenia**
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x	x	x	x	x	x
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

Around 180 members of CCIS-CAFE – small, medium and big companies are facing a problem regarding food safety on daily basis. CCIS-CAFE which is an independent, voluntary, non-profit, interest group of legal entities that carry out lucrative business activities in the agricultural or food sector or related activities on the market can make a big contribution to these issues.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

CCIS-CAFE represents the interest of around 180 agricultural and food companies, registered in Slovenia. CCIS-CAFE offers consulting to small, medium and big companies, most members are SMEs. Every company has an option to contact CCIS-CAFE and pose a question about food safety.

   - *Describe the method, procedure, solution implemented*

CCIS-CAFE provides direct professional help in the form of consulting and providing information and also indirect through organization of professional seminars, conferences. CCIS-CAFE can also organize education about introducing ISO standards and HACCP in the specific company and can even provide an assessment of the company on the field.

   - *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

Some companies do not see the advantages that these services can give them. The biggest constraints they have to become a member are financial.

- *Describe the results, achievements and typical failures*

Results are better functioning of the company as a whole and in compliance to food safety standards. Typical failures are that if the company doesn't take into account the expert advice given they may face problems and also almost always face higher expenses.

5. Summarize what makes the case to a good practice

For a company to gain a consult about food safety and an assessment of the company (if it is working in accordance to food standard) means an important cost reduction. Otherwise there may be a scenario where, due to the lack of understanding of food standards and consequently wrong implementation of food plant can lead to higher costs.

4.1.3. Bát-Grill Poultry Processing Ltd.: Food safety and quality assurance system

1. **Title of the case description**
   Food safety and quality assurance system in operation at Bát-Grill Poultry Processing Ltd.
   Author: STRIA
2. **Indicate the region:** South Transdanubia, Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label		x	x	x	x	x	x	x	
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

The main activity of Bát-Grill Ltd. is processing poultry meat, which is not possible without operating food safety and quality assurance systems. The company aims at "preparing a food with consistent quality, a food which is reliable in food safety, and satisfying customer needs."

Nowadays, the compliance to the mandatory EU standards and consumer needs have become a major goal for food industry SMEs. Consumer's demand for information in the enterprise's production process and the product's place of origin continued to increase. Therefore food companies have to apply techniques and tools, whereby they can ensure the long-term confidence what consumers put in their products. In order to grow a company's goodwill and develop customer's confidence in the product, it is essential to comply with product quality and traceability requirements.

In Hungary, the introduction of the HACCP food safety system is compulsory for all food companies, however, the system itself is not certifiable. It would be important for the companies to objectively ensure a guaranteed quality and traceability of products within one system.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Bát-Grill Ltd. was established in 1995, its main activity is slaughtering broiler chickens and performing their primary process. The owners of the company are Hungarian citizens and companies with Hungarian ownership. The structure of owners has only slightly changed since the foundation of the company.

Although the majority of its 135 employees are from the town of Bátaszék, there are quite a lot of people from the neighboring settlements who have the ability and willingness to work. They have managed to find employment at the company to earn their livings and to make their ends meet.

The members of the management, who are also shareholders in the company, have been managing the company since the very beginning. Due to their efforts the processing plant has been continuously growing and expanding (quantity of poultry slaughtered was 4319 thousand pieces in 2014, resulting in 8268 tons of poultry sold generating an income of 3915 million HUF [12,8 million EUR]), offering perpetual challenges for them, while making profit for the owners and providing safe living for the employees. This common objective drives all three decisive groups of interest at Bát-Grill; the workers, the management and the owners.

The related businesses of Bát-Grill Ltd. are Agro-Cikó Ltd. and Bát-Hund Ltd.

Agro-Cikó Ltd. was established in 2002 by Bát-Grill Poultry-processing Ltd. being its exclusive owner (Cikó is a village in Tolna County where Bátaszék is located). The main activity of this business is growing broiler chickens. By today this small enterprise employing four people grows some 300,000db chickens per year, and can satisfy 10% of the needs of the parent company.

Bát-Hund Ltd. was also established in 2002 at the farm in Cikó, Tolna County, Hungary. The founders of the company are Bát-Grill Ltd. and Tibor Renner both having 50% share in the company. Mr Renner is the managing director of the company at the same time. The main activity of the firm is production and wholesale distribution pet food – partly utilizing the by-products of Bát-Grill Ltd.

For more information available on the website of Bát-Grill (http://batgrill.hu/).

- *Describe the method, procedure, solution implemented*

This good practice case deals with ISO 22000 standard. This system is intended to ensure traceability and quality to customers. The standard determines integrated requirements for the HACCP system too, thereby ensuring the compliance with all regulations. The ISO 22000 standard is used throughout the factory area, in order to organize the activities, define the rules and locate the control/check points (eg. critical points, deterioration in quality).

The standard helps customers to feel safe when they consume the products and if a problem arises they can follow its origin back, thereby the system is strengthening customer satisfaction and trust too. Food processing SMEs (as Bat-Grill) use a lot of tools and techniques and ISO 22000 helps them to integrate these things in a system, and if they want to introduce a new technology or machine, they absolutely take into consideration the ISO quality standards.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Bát-Grill Poultry processing Ltd. is a meat industry company. In this branch of the food industry the animal health and processing safety requirements are decisive in terms of the quality of the end product. Besides these the whole production line is also need to be under strict observation so as to deliver the intended output in terms of safety and product quality. The pre-requisites of the application are the operation of the factory and its compliance with domestic and EU regulations, laws. In this regard the location of the company (operating at Bátaszék) does not have a specific role. But in terms of the magnitude of investment required it is quite expensive, especially for smaller companies. In addition, the companies who sell and deploy the system make surveillance audits annually and the certificate can be withdrawn as a consequence. Trainings to employees, sampling plan, maintenance plan, financial plan, balance sheet and other documentations are also required to be produced, making the quality assurance system as "serious" as that is.

- *Describe the results, achievements and typical failures*

The only weakness of the ISO 22000 standard is the lot of work it requires and its high costs of setting up and operation. At the same time it has much numerous advantages. The system supports the product development and innovation, increases customer satisfaction and sales, ensures customer's trust. The consistent product quality and product traceability is indicated on the packaging of the foods with the obligatory unified barcode. The ISO 22000 standard positively affects the performance and the financial figures of the company that uses it.

5. Summarize what makes the case to a good practice

Although the implementation of a food safety and quality management system, which is certified for compliance to the ISO 22000 standard is not obligatory in itself, but it is an essential tool to demonstrate that requirements of customers are met. The system integrates several mandatory elements such as HACCP, pre-requisite program, traceability, labelling rules, etc. In addition to that the certification to the ISO 22000 standard or retailer standards such as IFS, BRC, etc. increases the value added and the trust of the consumers linked to the end product in a meat industry niche where the baseline opportunities for delivering high value added food products are very limited.

4.1.4. FreshSens- photonic sensors

1. **Title of the case description**

Testing food safety with photonic sensors (FreshSens)
IOS, Institute for Environmental Protection and Sensors, Beloruska 7, SI-2000 Maribor, Slovenia (http://www.ios.si/english/)
Author: PTP

2. **Indicate the region:** Slovenia, Southeast Europe
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics		x	x		x	x	x		
Food safety, quality, label		x	x		x	x	x		
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Recent food crises have increased the need for manufacturers to guarantee safety, quality, and traceability. The pressure on food manufacturers to ensure safety is increasing and with it, the need for cheap, durable, continuous monitoring sensors.

FRESH-SENS is an innovative wearable food freshness detection technology for end users (households, retail/wholesale and food service sector) that can completely change the existing "food wasting practices".

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

There is big opportunity in decreasing quantities of lost and wasted food on a global scale by using FRESH-SENS sensors. UN studies are revealing that roughly 1/3 of the food produced in the world for human consumption every year — approximately 1.3 billion tonnes valued at 1.000 billion $ — gets lost or wasted (while still edible). Food wasting is affecting consumers at the end of food value chain very concretely. They are losing money and when handling food inappropriately, they are exposed to serious health issues (e.g. Salmonella) costing EU healthcare billions of EUR. Users can tackle this issue by changing their food handling practices (rarely) or use few of the available sensors. However these face several drawbacks, including limited capabilities and very high prices for premium solutions. In addition, food service and food retail sectors are, due to slow and expensive procedures, very interested in novel approaches to assure

fresh as high quality food which they required to deliver by EU legislation. FRESH-SENS overcame technology challenges by introducing patented optical chemical sensor system. With it, we are addressing an emerging EU and global market of wearable technology, which is expected to reach EUR 31 billion in 2020, when 411 million smart wearable devices will be sold. FRESH-SENS, with it envisaged features, addresses two market sub-segments – healthcare and fitness, which counts for almost 50% of all sold smart devices. FRESH-SENS results in significantly improved consumer food handling practises and could decrease food waste up to 9 million tonnes p.a., while seizing the global business opportunity.

- *Describe the method, procedure, solution implemented*

FRESH-SENS is interdisciplinary approach combining the most advance technologies such as nanotechnology, analytical chemistry, organic synthetic chemistry, electronics, photonics, to achieve accurate, selective, sensitive data about the food safety, quality and its freshness. Apart from simple colour reactions, these signals can be also read out with electrochemical device. Furthermore the FRESH-SENS can be connected also to the mobile phones, using miniaturized electronics, cheap LED's, and sensitive sensor chemical/bio-receptors based on UV/VIS spectroscopy. FRESH-SENS is based on nanomaterials to enhance the sensor sensitivity as well selectivity.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

For a food product to be microbiologically safe and commercially viable, food business operators must produce a product which has a consistently reproducible and acceptable microbiological safety. Part of this consistency is a reproducible and accurately determined shelf-life. The combined knowledge and experience (often derived empirically) of processors and those involved in the storage, distribution and retailing of foods, enable estimates to be made of the likely shelf-life of the product under specific storage conditions.

- *Describe the results, achievements and typical failures*

Colour changed FRESH-SENS is at the moment already lunched on the market. But there is still need to optimize the sensor receptor procedure to decrease the final price of the sensor. The intelligent packaging needs additional tests and certification. The most challenging is now probably the certification of the sensor receptors which will allow the complete integration into the meat packages.

Furthermore the establishment of clear and detailed technical and business plan for pilot implementation and commercialization of FRESH-SENS solution, initially in European then global markets is now the company priority.

5. Summarize what makes the case to a good practice

Globally, we are witnessing an increase in the number of outbreaks of foodborne illness associated with contaminated food. The condition exacts a heavy social and economic cost. Improving the detection of food spoilage is therefore a healthcare priority for Europe and a key opportunity for European SMEs and high-tech businesses in the agro-food and healthcare sectors. Using portable wireless optical chemical sensor for on-

site application as FRESH-SENS can successfully help identify early any food safety threat outbreaks. It promotes excellent science, fosters EU competitiveness, encourages innovation and contributes to multiple EU and global challenges and EU industry policy in particular, by:

- reducing costs and increasing access of quality food to vide variety of consumers in EU and around the world,
- improving quality of life of European citizens,
- opening new opportunities for EU SMEs by building on open-source platforms, connecting medical devices into an IoT web and bringing Big Data algorithms into every day practice,
- moreover, it has a potential to generate new jobs in the next three years, which improves social and economic status of Europe.

4.1.5. Water activity measumements

1. **Title of the case description:**

Ensuring food safety and quality in mayonnaise products

Author: CBHU

2. **Indicate the region:** Central-Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x	x				
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

Mayonnaise products are manufactured without heat processing. The products are intended to be distributed and stored at ambient temperature during their shelf life.

The safety of these products based on the high quality standards of the raw materials and ingredients, the strict hygienic processing technology and as key characteristic the intrinsically safe composition. The pH level and the water activity are particularly important. Bacterial growth is correlated with water activity, not water content. It is established that growth of bacteria is inhibited at specific water activity values. Most bacteria (except S. aureus) do not generally grow below an A_W of 0.9.

In addition to microbiological stability, the following product properties are influenced by the water activity: chemical stability, shelf-life, storage and packaging, texture, color, taste and nutritional value. An adequate water activity value contributes to inhibit the growth of microorganisms and improve the organoleptic properties of products.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The mayonnaise producer SME manufactures and distributes several condiment sauces and dressings. The FBO is located in the Central-Hungarian region.

   - *Describe the method, procedure, solution implemented*

The effects of the ingredients on product safety have been examined.

Preservative factors are considered to be intrinsic (i.e. a property of the food itself) or extrinsic (i.e. an environmental factor applied to the food). Factors of particular importance to food spoilage and safety are: temperature, pH, water activity, heat treatment, packaging, preservatives, physical treatments, combined treatments (hurdle technology).

Mayonnaise products are generally emulsified from sunflower oil, strongly acidified with vinegar and citric acid, combined with salt and sugar and may contain preservatives. The most important and significant factor in inhibiting the growth of pathogenic bacteria is the pH adjusted with acetic acid. The pH of the mayonnaise is typically between 3,0 and 4,2. Only Salmonella is able to grow at pH value lower than 4,2, but on a really high water activity value (>0,96). Microbial survival and growth in these products are greatly affected by the composition of the water phase, such as the concentration of acetic acid, sugar and salt, and pH. The microbiological safety of the mayonnaise is assured by the use of salt and sugar also, because they are water binding chemicals (humectants) and it is possible to remove the available water from a food to a point at which growth of microorganisms is inhibited. Other solutes such as organic acids can be used to reduce the A_W of a food.

The water activity of a product is also affected by addition of starches and emulsifiers and by the presence of fats and proteins.

The mayonnaise contains additional and natural preservatives (mustard). Mustard is known to have antimicrobial activity. The preservatives have a synergistic effect against pathogens as well. Potassium sorbate and metabisulfite is recommended by the FAO and WHO as efficient and safe preservatives widely used in food.

It should be noted, that the mayonnaise processing is based on salted and pasteurized egg yolk, according to the recent practice of the European mayonnaise processors. This industrial manufactured egg yolk prevents the presence of Salmonella in egg yolk.

Key parameters are monitored regularly by the company.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The measurement of A_W in a food product can be quite complex. For example, in food emulsions (e.g. spreads), the overall water activity of a product may be low due to the high level of fat present; however, the water will be present in the spreads as discrete droplets within the product. The water activity within the specific droplets will be higher than that measured for the product as a whole and may allow microbial growth. In this case other preservation factors, e.g. low pH, will be important to prevent growth of certain spoilage microorganisms. Also, in multi-component or layered products, where the different ingredients have a different A_W values, there is a potential for migration of water from one component to another. This could affect the overall stability of the product and thus the shelf-life and safety.

- *Describe the results, achievements and typical failures*

If key parameters are in the required interval (low pH, lower A_w than 0.96; salt content) microbiological stability can be improved. In case of this mayonnaise product there is no pathogen, which is able to growth.

During the food manufacturing, the processing parameters and the product parameters are not constant. They vary from batch to batch and it is important to keep this variability inside the specification from food safety point of view of the product. It is extremely important that the key intrinsic factors (pH, A_w and salt content of the products) remain within the safety range. These key parameters are monitored regularly by the company.

Water activity should not be confused with the water content – the "chemically bound" water – of a product.

Vacuum should be provided during emulsification to avoid mixing air as this would result rancidity in oil.

5. Summarize what makes the case to a good practice

Composition and pH design can influence food safety and production technology applied. The A_w, the pH and acidity are very important intrinsic characteristics affecting the survival and growth of microorganisms in mayonnaise and in food in general.

The pH, the total acetic acid acidity, and the salt and sugar combinations can prevent the growth and survival of Salmonella, therefore can protect the consumer from the pathogen.

4.1.6. Listeria Management in Food Processing

1. **Title of the case description:**

Guide to the Management of Listeria in Food Processing

Author: CBHU

2. **Indicate the region:** Central-Hungary

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label		x	x	x	x				
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case**

- *Describe the specific need or problem being addressed by the case*

The Listeria genus of bacteria is widely present in the environment including in the soil leading to the contamination of raw material. It is commonly found in produce (salad and vegetable materials), raw meat, cured meats (such as ham and bacon), dairy products and raw fish. It is notable that Listeria is able to grow at chill temperatures, reportedly as low as -1.5°C and thrives in damp chill conditions, even in the presence of up to 10% salt.

Listeriosis is a disease that commonly requires hospitalisation and has a mortality rate estimated at 30%. Infants, the elderly, pregnant women and the immunocompromised are particularly vulnerable. A wide range of foods have been implicated in outbreaks e.g. sandwiches, ripened soft cheeses, paté, cooked sliced meats, pizza toppings, cold smoked salmon, and a range of ready-to-eat foods, snacks and desserts. As a wide variety of chilled foods are vulnerable, it gives a small business a sense of what types of foods are at greatest risk.

The organism can be particularly persistent and often difficult to find and eradicate in the processing environment because it is so tolerant of unfavourable conditions. It can form biofilms on production surfaces and standard biocides and hygiene practices are often ineffectual, therefore different approaches are required.

Therefore it is of critical importance that it is carefully managed and controlled in the production environment. The purpose of the guidance is to help small businesses understand the actions that they should be taking to proactively manage and reduce, as far as possible, the incidence of Listeria spp. and in particular the pathogen Listeria monocytogenes in the materials, processes and products in their control.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

A medium sized meat processor located in central Hungary applied the methods described in the guideline, its product range include cured smoked meat products and fermented air dried meat products with starter culture. Pre-packed sliced products for consumers are available for a range of processed meats.

- *Describe the method, procedure, solution implemented*

Robust precautions must be taken to ensure that during post processing Listeria contamination does not take place before or during packing operations. The company has defined measures in its Quality Management System and implemented them rigorously on the shop floor, including:

- A technically competent person with the responsibility and authority to manage Listeria controls;
- A HACCP study which is not generic to pathogen bacteria but built around the specific survival and growth conditions of species, including specific considerations for the control of *Listeria monocytogenes*;
- Ensuring appropriate segregation of the high risk zone for ready to eat products and low risk zone for handling the product during preparation;
- Ensuring that during the production and packaging activities the integrity of the high risk zone is maintained;
- Microbiological sampling and testing plans extended to raw materials, environment, production processes and the final products, with defined maximum limits for incoming raw materials and finished products;
- Cleaning at product changeovers, based on a planning schedule that takes into account Listeria but also allergen cross contamination;
- Restricted pressured water systems and carrying out low pressure cleaning as aerosols can spread Listeria throughout the whole environment and infect refrigeration and air conditioning systems;
- Smooth, easy to clean floor surfaces, with good drainage and no puddles in the production and storage areas;
- Temperature control and check of chilled raw materials, goods under process, end products and the environment;
- Avoiding high amounts of product waiting by lines before and after processing, outside the chilled storage. This also applies to cooked products awaiting slicing or packing, when the product is exposed and vulnerable to re-contamination.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Obstacles and difficulties for the Hungarian SME implementing these good practices include factors such as:

- Being able to survive and grow in chilled conditions means Listeria will also continue to grow in the environment, such as in drains and free standing water, which is plentiful in a meat processing plant;
- A layer of fat and biofilm build up that requires the use of specific detergents within the cleaning schedule to combat build up;
- A number of portable equipment, particularly those which circulate between various production halls and lines including tote bin wheels, cleaning equipment, temperature probes and scales;
- As Listeria too can become resistant to the chemical compounds used in sanitisers, a regular change of cleaning chemicals may become necessary, requiring the re-validation of the disinfection regime.

- *Describe the results, achievements and typical failures*

The Listeria prevention programme has been implemented at this Hungarian meat processor for several years now. A segregated high risk zone was established. One export market expects Listeria analysis (among other pathogens) to be made per production lots which were negative. Raw meat suppliers have been identified capable for delivering Listeria free raw material continuously. Product and environmental monitoring results are analysed and used for the improvement of the sampling plan and the HACCP study. A modular HACCP also allows an easy incorporation of emerging pathogen threats like psychrotrophic non-proteoletic Clostridium botulinum into the risk analysis. A pitfall of fixed location sampling is that it may attract more careful cleaning in the area and giving the false impression of superior status. Objects moving through areas within the plant, especially wheels, are usually an excellent sampling target.

5. Summarize what makes the case to a good practice

Thorough understanding of the growth characteristics of a microbiological risk, competent persons governing and operating the Food Safety system, good maintenance, skilled and disciplined persons operating the plant, along with reliable good quality raw material make up an effective Listeria control scheme and results in a safe finished product.

4.1.7. Good Hygiene Practice Guides

1. **Title of the case description:**

Ensuring microbiological stability for the product during the extended shelf-life and ensuring absence of Listeria monocytogenes in food processing to guarantee safe for consumers

Author: CBHU

2. **Indicate the region:** Central-Hungary
3. **Cross-reference table**

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
Mechatronics										
Food safety, quality, label		x	x	x		x				
Food design										

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

The pursuit of a high level of protection of human life and health is one of the fundamental objectives of food law, as laid down in Regulation (EC) No 178/2002.

Food Business Operators (FBOs) are making great efforts to achieve longer shelf life for their products, and this is what consumers are increasingly expecting. But the products must be microbiologically stable throughout their shelf-life, and must not endanger the health of consumers.

The importance of the risk of microbiological contamination depends on the susceptibility of the product to support the growth or survival of pathogens and the expected storage conditions, shelf life and further treatment of the product at the factory or by the consumer.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

A soy food developer and producer SME in the Central-Hungarian region (which has less than 30 employees) which produces specially sprouted soybean products (with a patented technology) from GMO free Hungarian soybean in a new production plant. The majority of their products are made of sprouted, cooked and minced soybeans,

which they fill into plastic casing and will be further used in the food industry as food raw material.

- *Describe the method, procedure, solution implemented*

During the plant design phase the SME carried out a risk assessment to identify the different risk zones within the processing and storage facilities (this risk assessment is now well summed up by the BRC Global Standard for Food Safety Issue 7 which includes a decision tree as well). According to the risk assessment, a high risk area (HRA) should have been created where they package the cooked material. The "Good Hygiene Practice Guides" provide particular specifications for HRA zones. After further literature work it was concluded that it would be complicated and costly to introduce HRA zones in the production area.

Another solution was found for the sprouted, cooked soybeans by the company that they plan another technological step, where the products would be repeatedly heat treated in package to destroy organisms which have come to the product during processing and packaging. The packaged soya product can bear the second heat treatment, and they do not give other additives to the product which would increase the microbiological stability.

A particular feasibility calculation was carried out taking into account investment costs. They decided to apply heat treatment in package to destroy the bacteria that cause deterioration and the pathogenic organisms with special regard to Listeria.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

FBOs should validate their heat treatment method and the shelf life of the products to prove that the process is professionally correct and reliable and it will work effectively and efficiently to meet the requirements. Whatever the thermal process the need for food manufacturers to prove the safety of their food product through a programme of thermal process validation is a common requirement.

- *Describe the results, achievements and typical failures*

A typical failure can occur if FBOs are not taken into account that in extended shelf-life foods which are vacuum packaged, there may be sufficient time for psychrotrophic organisms to adjust to the chill environment and grow. Although vacuum packed techniques can increase the shelf-life of chilled foods by limiting the growth of microorganisms causing food spoilage, under certain circumstances a bacterium called non-proteolytic Clostridium botulinum may grow in the absence of oxygen. Non-proteolytic C. botulinum is able to grow and produce a harmful toxin at temperatures of 3°C and above.

As chilled storage may be insufficient to inhibit growth of psychrotrophic pathogens it is important to ensure that pathogenic or spoilage organisms of particular concern are destroyed during processing. The time and temperature combination required to achieve this reduction can be calculated from relevant heat resistance data. A heat treatment of 90°C for 10 minutes or equivalent lethality at the slowest heating point in the food must be appropriate.

5. Summarize what makes the case to a good practice

A subsequent heat treatment has been introduced and operated by the SME, and the process is working reliably and effectively to meet the requirements and it is capable of controlling the hazard to a specific outcome. The process was designed to reduce the numbers of pathogenic (eg. Listeria monocytogenes) and spoilage organisms to make their food products safe over a designated shelf life.

4.1.8. Application of Simplified Microbiological Risk Assessment

1. **Title of the case description:**

Application of Simplified Microbiological Risk Assessment

Author: CBHU

2. **Indicate the region: :** Hungary

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label			x	x					
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Food safety must be ensured by the implementation of a well-designed HACCP system, which is built on systematic evaluation of the risks of contamination. At specific cases, when the information on the presence, cross-contamination, growth and destruction/survival of microbes during the steps of food processing is fragmented and/or limited – such as at the production of air dried naturally fermented sausages and salamis, chilled fresh cut herbs, ingredients made of by-products through the use of mild processing, etc. - there is a need for a more detailed evaluation of the risks. There is a need for such relatively simple assessment method, which can be implemented by food businesses themselves or with a limited external support not only by scientific teams and provides information within a relatively short time (a few days, 1-2 months).

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The method was successfully implemented by an SME processing naturally fermented, air dried sausages in Hungary, in R+D projects for developing fresh cut, chilled herbs by a Hungarian SME, in an FP7 project for producing food ingredient obtained from citrus by-products. There is no need for large resources, at the current experience and procedure the task can be completed within 1-2 months.

- *Describe the method, procedure, solution implemented*

The simplified microbiological risk assessment is based on risk profiling. The risk profile is a simple paper-based approach to microbiological risk assessment when all available information is collected on the pathogen, which may be present in the food, on the impact of the food processing, distribution and consumer handling. The collected, many times fragmented information is analyzed systematically following the steps of the risk assessment – hazard identification, hazard characterization, exposure assessment, risk characterisation. During the exposure assessment the risk and the quality/reliability of the information is assessed and rated by a simple scoring system. The lower is the score the lower is the risk and the information is more accurate, reliable. The method can be used for selecting the priorities for actions or further more detailed data collection, for highlighting the most vulnerable steps of the production, for evaluation of the expected impact of planned changes. It is a decision support tool for food safety management complementary to HACCP and predictive microbiological modelling.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

The main constraint can be the lack of the detailed microbiological expertise within the food business. This can be overcome by involving an external expert for risk assessment to the HACCP team, where the HACCP team provides the practical experience on the process.

- *Describe the results, achievements and typical failures*

In all of the cases the process control was improved and the requested level of food safety could be demonstrated to the customers, to provide the satisfactory reassurance that their specific concerns related to the potential contamination with Listeria moncytogenes, Salmonella, Staphilococcus aureus, etc. are properly controlled.

5. Summarize what makes the case to a good practice

A systematic, structured analysis of the available fragmented information on microbiological safety with a relatively simple method can significantly improve the efficiency and reliability of the control of the processes. It can provide additional information to the HACCP system in the cases of new products and processes and complex problems when the critical changes of the pathogen population are not well known.

4.1.9. Application of predicitve microbiological models for assessing food safety

1. **Title of the case description:**

Application of predicitve microbiological models for assessing food safety

Author: CBHU

2. **Indicate the region:** Hungary, Greece

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x		x	x	x				
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

There is a need to assess the growth, survival and death of microbes including pathogens at various combination of different parameters – time, temperature, pH, salt content, water activity, preservatives, oxygen content, etc. Predicative microbiological models are effective tools for calculation of the count of different microbes at combination of different parameters quickly. This information may be necessary for establishing safe shelf-life, assessing the impact of technological changes, the impact of deviations from the required temperature, time, etc.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The method was used by several meat processing companies including SMEs in Hungary, cheese manufacturing SMEs in France, a manufacturer of chemically preserved savory sauces in Hungary, fish manufacturing SMEs in Greece, etc.

There is a need for microbiological expertise for the use of these models. The majority of the food businesses used external expert advice to support the application of the models.

- *Describe the method, procedure, solution implemented*

Predictive microbiological models are mathematical tools to support the design of safe products and processes to assess the effect of different combinations of critical controlling factors such as processing parameters (e.g. time, temperature), and product parameters (pH, salt content, water activity, nitrite content, modified atmosphere in the package, etc.) of the product on the growth, survival and death of the different types of microbes.

These are used as input parameters to a software, and the changes of concentration of the microbes can be calculated. There are several models available for different purposes such as COMBASE predictor system, PATHOGEN MODELLING PROGRAMME (PMP), SymPrevius, for pathogens and FORECAST for spoilage bacteria. Expert advice can help to select the most relevant and cost effective model for a specific purpose. Some of the models are available freely on the Internet, for others subscription rate will be charged.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

The main constraint for a business is the availability of in-house microbiological experts for the use of these models. The necessary microbiological and technical expertise for the application of predictive microbiological models can be purchased as an externalexpert service. The other pre-requisite of the application is a computer. The softwares are available freely on the internet or for a limited fee.

- *Describe the results, achievements and typical failures*

With the use of predictive models particularly by the combined use with simplified industrial microbiological risk assessment the safe shelf-life of ready-to-eat products can be calculated and verified, the effect of the temperature fluctuations of the cold chain on the product safety and deterioration can be assessed. Predictive models can be used at product development for evaluation of the impact of changes of recipe, ingredients, etc. They can be used as decision support tools. The potential for growth of microbes can also be evaluated.

5. Summarize what makes the case to a good practice

Predictive models provide information for assessing the microbiological safety and quality of several food products. They can be used for verification of food safety and quality from microbiological aspects. They provide only estimations, since the combined effect of the food matrix can’t be described precisely by the mathematical models. They are effective design supporting tools for product development, technology development, troubleshooting, and they can provide information to assess whether the growth of pathogens and spoilage microorganisms is realistic in certain food products at the specific combination of different parameters. They can be used for screening whether challenge testing is necessary.

It is a good practice to use simple, cheap mathematical models for screening the microbiological outcomes quickly, before expensive and time consuming experimental work and testing is carried out.

4.1.10. Allergen Management in Food Processing

1. **Title of the case description:**
   Guide to the Management of Allergens in Food Processing
   Author: CBHU
2. **Indicate the region:** Central Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label		x	x	x		x			
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case**
   - *Describe the specific need or problem being addressed by the case*

It is important that information on the presence of food additives, processing aids and other substances having proven allergenic effect should be given to enable consumers to make informed choices which are safe for them. The Food Business Operator shall indicate in the list of ingredients the name of the substance causing allergies in accordance with the rules laid down in Regulation 1169/2011/EU.

A food allergy is an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food. Food allergens are the parts of food or ingredients within food - usually proteins - that are recognized by immune cells and cause the symptoms of food allergy. Most food allergens cause reactions even after they have been cooked or digested. Traces as little as 1 mg protein can trigger an intensive response at a susceptible individual.

Therefore it is of critical importance that allergens are carefully managed and controlled in food, throughout the supply chain. The purpose of the guidance is to help small businesses to understand the actions that they should be taking to proactively manage and reduce allergen cross-contamination during manufacturing and factory operation.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The company is a small-sized food business operator, located in central Hungary, near Budapest. Its product range includes minced meat products (hamburgers, meat balls, meat fingers), breaded cheese-based products, pre-fried spring rolls, filled

puff pastries and scones; all quick frozen. Some of the ingredients and spices used within the products are or carry a number of potential allergens including cereals containing gluten, egg, soy, milk, celery, sulphur dioxide and sulphites.

- *Describe the method, procedure, solution implemented*

Robust precautions must be taken to ensure that allergen (cross-) contamination may not happen during storage, handling, production and packaging as well as when using rework. The company has defined measures in its Quality Management System and implemented them rigorously on the shop floor.

The principal activities implemented at the SME for an efficient allergen control scheme include:

- Supplier selection for raw materials and ingredients; by specification, declaration and subsequent regular audits of the supplier;
- Appropriate storage and segregation of ingredients, whether frozen, chilled or ambient. Use of colour-coded areas and tags per allergen risk;
- A HACCP study which is specific to the plant area and processing line where allergens are used or may occur as result from cross-contamination;
- An updated allergen matrix covering also rework. Reworking is only possible if permitted by the matrix;
- Production scheduling that considers product complexity and allergens and helps to minimise contamination from tools and equipment;
- A cleaning and disinfection programme on product changeovers, that takes into account microbial but also allergen cross-contamination;
- Use of dedicated utensils for weighing out minor ingredients (e.g. flavourings and spice mixes);
- Dedicated maintenance tools per area (pastry and meat) which are cleaned after use and regularly checked for cleanliness by QA
- Make use of the dedicated allergen handling ares, with separate ventilation and vapour/dust extraction per zone, cleaned frequently;
- Staff working with allergens change clothes and rubber gloves when moving between zones;
- Regular trainings to staff on allergens and correct handling
- Verifying the design of the labels for allergens and checking the incoming packaging material for compliance to specifications;
- Compliance checking of the finished product to the packaging;
- Validation of the efficiency of cleaning for allergens by testing for soy, gluten and milk monthly (in products where the allergen is not an ingredient).

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

Obstacles and difficulties for the Hungarian SME implementing these good practices may include factors such as:

- Allergen tests are expensive to be used on a daily basis as a routine tool;
- The production schedule and product changeovers must be optimised for production efficiency, cleaning and allergens;

- Dry cleaning, favourable from hygiene point of view, may prove to be inefficient for removing traces of allergens. Wet cleaning with detergents is more effective on allergens but requires thorough drying of the line before production can resume.

- *Describe the results, achievements and typical failures*

An allergen management programme has been implemented for several years now. Product and environmental monitoring results are analysed and used for the improvement of the sampling plan and the HACCP study.

No complaints or recall/withdrawal, caused by allergens, was necessary.

5. Summarize what makes the case to a good practice

Thorough understanding of potential sources of allergens, including carry-over, competent persons governing and operating the Food Safety system, strict hygiene and maintenance rules, skilled and disciplined persons operating the plant, along with good raw material handling practices result in finished products with high certainty to be free of undeclared allergens.

4.1.11. Compliance to high-risk, high-care requirements at several food processing SMEs and other businesses

1. **Title of the case description:**

Compliance to high-risk, high-care requirements at several food processing SMEs and other businesses

Author: CBHU

2. **Indicate the region:** Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x				x	
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

For appropriate prevention of contamination of ready-to-eat, ready-to-heat food products with pathogens (such as Listeria monocytogenes, psychrotropic, non-proteolytic Clostridium botulinum, Salmonella, etc.) the production environment where unpacked products are handled should meet the operation and segregation requirements of high-risk or high-care areas. Ready-to-eat products are those, which can be consumed without further heat treatment equivalent to 70°C 2 minutes. There is a range specific requirements for the high-risk/high-care zones, which need specific design and operational rules. In new facilities these can be satisfied at the design phase, in old facilities it is more difficult and expensive job to meet these requirements, usually a rebuilding is necessary.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

This good practice case summarizes the experience collected by several food businesses on establishing high-risk/high-care zones.

These include 2 meat processing SMEs manufacturing naturally fermented, air dried, sliced MAP products and sliced, cooked meat products in MAP, 3 large meat processing companies

2 of them manufacturing air dried, naturally fermented, sliced MAP meat products, 2 of them manufacturing cooked meat products (sliced and whole log) in MAP or in vapour resistant casing, a large company manufacturing cut cooked meat products, a dairy SME manufacturing curd and an SME manufacturing IQF sweet corn kernels, all in Hungary. In addition to that there is a wide range of food businesses, both SMEs and large companies in the UK and throughout Europe, which use high-risk/high-care areas to control pathogen contamination with particular focus to the prevention of contamination of the finished products with Listeria monocytogenes.

- *Describe the method, procedure, solution implemented*

The principles of establishing and operating high-risk/high-care zones were implemented by the food businesses at existing food processing plants. The routes of potential contamination with pathogens were considered to identify the necessary changes of the layout and the operation specific to the plant. This included among others the following aspects: physical segregation of the zones, establishing barriers of contamination, access routes and entrance procedures, changing facilities for the staff, transfer of raw materials, packaging materials, finished products, drainage systems, ventillation systems, housekeeping and cleaning, waste removal, protective clothing and laundering, etc. The food business in most of the cases used for external expert advice.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

The layout of the existing food processing plants and the relatively high cost of building a new high-risk/high-care facility and the related loss off availability of the production facility during the rebuilding represent a constraint although operating a high-risk/high-care zone is a basic requirement for ensuring the microbiological safety of ready-to-eat products.

- *Describe the results, achievements and typical failures*

In all cases by systematic and careful analysis of the layout, the potential modification of it including relatively limited rebuilding and investment a specific solution was developed to meet the food safety requirements at moderate costs and limited loss of availability of the production time. In all cases the required control of pathogens was established, the compliance to customer requirements was achieved and a certification to BRC and/or IFS Food Standards was achieved. In many cases the shelf-life of the chilled products increased.

5. Summarize what makes the case to a good practice

The good practice is to apply segregation measures and hygiene barriers to prevent the contamination of ready-to-eat food products with pathogens. The safety of the products can be ensured only by prevention and product testing does not provide reliable protection even if the number of the tests is high. The systematic and tailor made, flexible application of the design principles is also a good practice. Meeting the requirements of the British retailers at feasible costs is also a good practice.

4.1.12. Hygienic design of a Soy food processing factory

1. **Title of the case description:**

Prevention of the possible accumulation of contamination in food manufacturing premises

Author: CBHU

2. **Indicate the region:** Central-Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x		x	x					
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

In processing areas in a food plant every building structure, surface, food machinery and equipment must be designed and constructed to reduce possible accumulation of contamination. Two examples:

"Ceilings (or, where there are no ceilings, the interior surface of the roof) and overhead fixtures" (pipes, ducts, cables) "are to be constructed and finished so as to prevent the accumulation of dirt and to reduce condensation, the growth of undesirable mould and the shedding of particles" (EC No 852/2004). Overhead pipes should not pass over open vessels or production lines. This is to prevent dripping of condensation droplets, which may originate from if the pipes are above a processing area, and contamination from leakage, lagging, flaking paint or dust.

"Windows and other openings are to be constructed to prevent the accumulation of dirt. Those which can be opened to the outside environment are, where necessary, to be fitted with insect-proof screens which can be easily removed for cleaning. Where open windows would result in contamination, windows are to remain closed and fixed during production" (EC No 852/2004).

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

A soy food developer and producer SME in the Central-Hungarian region (which has less than 30 employees) built a new production plant where they had to take into account

these particular construction requirements. The company produces specially sprouted soybean products (with a patented technology) from GMO free Hungarian soybean.

- *Describe the method, procedure, solution implemented*

As recommended by the plant design guide (Campden BRI, G39), service pipes should be routed outside the process area and pass through walls local to their point of usage. All services (pipes, cables, air handling channels) were located above the ceilings (in the attic) and branch exactly above their point of use. Only the minimum required duct length is located in the food manufacturing premises. Pipework services and their supports and hangers in processing areas are made of stainless steel or galvanised steel. Painted steel should be avoided to prevent the risk of paint flaking.

Premises, where the product is unpacked, were designed and constructed without windows. Where windows are necessary due to operating needs they are un-openable and double glazed. This will prevent bird and insect ingress and assist in thermal control within the building. Windows that do open are equipped with tight fitting insect screens which are removable to allow cleaning. Window sills are smooth and sloped from the horizontal at 45° internally to prevent accumulation and facilitate cleaning.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Hygienic design aspects were taken into account when the new food production plant of this case study was designed and constructed, so there was no specific constraint related to the procedure (plant construction).

In case of refurbishing operations of an old, existing plant investment can be complicated and expensive.

- *Describe the results, achievements and typical failures*

The food manufacturing premises are easier to clean and these solutions facilitate to maintain cleaner the premises because they prevent the accumulation of dirt and other contamination. Moreover, service activities are easier because every pipe, cable is grouped and centralized in the ceilings. This also facilitates pest control.

A typical failure can occur if the designers do not take into account that ducts and pipes passing through fire compartment walls must be provided with fire dampers. Where this is not possible suitable fire resistant infill must be used to maintain a barrier at the wall. Furthermore sealing gaps around ducts and pipes must be suitable to prevent pest entry.

5. Summarize what makes the case to a good practice

In hygienically well designed and constructed production plant facilitates the operation for the workers and for the company and makes maintaining hygiene easier. Good hygiene design is essential in preventing end-product contamination. This good practice helps to prevent condensation resulting from different temperatures and to control pests. Furthermore the less contamination the less cleaning work. This not only reduces the running costs but also gives for the food manufacturer better food safety assurance.

4.1.13. Code of Best Practices for cleaning and disinfection of Minimally Processed Vegetables

1. **Title of the case description:**

Code of Best Practices for cleaning and disinfection of Minimally Processed Vegetables

Author: CBHU

2. **Indicate the region:** Central-Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x		x	x		x			
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Chlorine is widely used for minimally processed vegetables (MPV), but it produces unhealthy by-products and its efficiency in disinfection is largely reduced by the presence of organic matter.

In addition, chlorine and its derivatives have received more and more focus for environmental concerns.

The consumption of water and chemicals for decontamination of raw green leafy vegetables and for sanitation of equipment and installations are key indicators of environmental performance of the Minimally Processed Vegetable (MPV) industry.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Like in the European fresh cut produce industry, in the Hungarian minimally processed vegetable industry the convenience salad producers use vide variety of raw green leafy salad mixes. During the last two decades the European and Hungarian market of the minimally processed vegatables (MPV) is growing continuously, among the players can be found both relatively new and small enterprises and larger groups such as the Eisberg Hungary, a member of the Eisberg Group (Eisberg Group is major producer and market leader of the European convenience salad industry). In particular the SMEs have limited information about the alternative environmental performance of sanitation and

decontamination techniques, but this type of information is useful for the leaders of the market as well.

- *Describe the method, procedure, solution implemented*

Considering the green leafy vegetables this tool discusses two alternative technology:

i) firstly to reduce the amount of the washing water with the usage of ozone (recirculated water treated with 36 mg/liter ozone in air and flow of 103 liter/h, the excess of ozone removed by UV irradiation)

ii) Secondly to reduce the consumption of chlorine with onsite generated neutral electrolyzed oxidizing water – NEOW (30,40,65 ppm)

The experimental procedure and the equipment set up is described in detail by the tool in both case.

The experiments at industrial level were carried out in Vitacress, Portugal.

The alternative physical and chemical methods overviewed in this code of practice until now were not directly implemented by the Hungarian producers of the convenince salad mixes, but they can use these on their future process development.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The usage of chlorine is permitted in Hungary at the moment for the decontamination of salad products. Despite that chlorine and its derivatives have received more and more focus for environmental concerns, the relatively low cost level and the high efficiency of the chlorine act as a significant constraint on the rapid distribution of the new alternative methods.

- *Describe the results, achievements and typical failures*

The results and achievements are described in detail by the tool in both case, which can be summarized shortly as following:

i) Results of the ozone experiments to reduce the amount of the washing water:

The water regeneration treatment applied using ozone combined with UV irradiation allows a water consumption reduction of 22% compared with the washing with not treated water. Similar microbial levels were found both in control as well as in treated washing water, therefore to improve the hygienic level of the washing water further research will be necessary. However, and considering the water quality, a 35% reduction of organic matter (chemical oxygen demand - COD) was observed in the washing process after ozone was applied.

ii) Results of the NEOW experiments to reduce the consumption of chlorine:

NEOW seems to be a valid alternative biocide to sodium hypochlorite as similar log reduction of mesophilic counts and other indicator organisms in water were observed when compared with the “traditional” NaClO solution.

The results obtained with 30 to 40 ppm of free chlorine from NEOW did not show any significant difference from the results obtained when higher concentration (60 ppm of chlorine from NEOW) was applied.

Free chlorine generated by NEOW is a good alternative to NaClO and meets the objective of reducing chlorine dosage.

The alternative physical and chemical methods overviewed and described by this code of practice were not directly implemented by the Hungarian producers of the convenience salad mixes. Only the market leader with international background and expertise is able to maintain its competitiveness with ongoing process innovation.

5. Summarize what makes the case to a good practice

The information of the alternative physical and chemical decontamination methods are important for all players of the sector, even if the new decontamination techniques are not ready to use and further research and development should be carried out at industrial facilities.

The tool shows the possibilities how the consumption of chlorine and the amount of the washing water can be reduced.

The experimental procedures and the equipment set up described by the tool can be helpful for other developers us well.

From sustainability point of view both the reduction of the water consumption and the usage of the alternatives for chlorine are essential for the MPV sector in middle term.

4.1.14. Implementation of the Threat Assessment Critical Control Point (TACCP) system

1. **Title of the case description:**

Implementation of the Threat Assessment Critical Control Point (TACCP) system

Author: CBHU

2. **Indicate the region:** Fejér County, Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x	x				x
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Food defence has become a major issue around the world. The food and drink supply chain is increasingly threatened by physical attack or fraud from criminals or terrorists. 25 relevant cases were reported in February 2017 from all around world (Italy, China, USA, France, India etc.).

Due to the emerging threats, the requirements for food defense, authenticity and food fraud are included in the latest versions of IFS Food (version 6) and BRC Global Standard for Food Safety (Issue 7).

IFS, V6 requirements are grouped in three categories:

1. Defense assessment: the company has to have a responsible person for food defense. The food defense hazard analysis and assessment of associated risks have to be performed and documented.
2. Site security: the company has to have procedures for protecting the identified critical areas in the premises, for prevention unauthorized access and for the prevention of tampering.
3. Personnel and Visitor Security: the food defense plan has to include visitors' policy and all employee has to be trained in food defense.

TACCP system a voluntary, possible solution helps to identify and find the priorities the different threats of food and producers.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The Alba Kenyér Sütőipari Ltd. was founded in 1950 and is fully controlled by Hungarian owners since 1996. It is a traditional bakery product manufacturing company in Székesfehérvár, Fejér County, Hungary. The company has about 70 employees.

They produce 30 different types of breads, buns, crescents and 110 different types of pastries on a daily basis. The company has a certified food safety and quality management system.

The company has a certified food safety and quality management system for compliance to the IFS standard.

- *Describe the method, procedure, solution implemented*

For controlling the different threats towards their products and for meeting the requirements of the IFS Standard, Alba Kenyér Zrt. has decided to use this tool, Threat Assessment Critical Control Points (TACCP) to develop their own food defense plan. TACCP is based on HACCP which has been used by the company for decades.

The person who is responsible for food defense at the company participated in the TACCP training of Campden BRI Hungary.

The training made the participants capable of performing the threat analysis and identifying the weak points:

1. Raw material: Alba Kenyér has a lot of raw materials, e.g. different kind of flours transported in containers or raisins, sausages or aromas and other ingredients as well. The TACCP team investigated the risk of substitution and fraud for all raw materials which is clearly different for different type of products (eg. honey, which is easily adulterated and relatively expensive, while flour, which has lower risk of fraud).
2. Accessibility of the premises and production lines: Identified those parts of the premises and the production were identified where the product is the most accessible for deliberate contamination and where the greatest harm can cause for the consumers or for the company.
3. Distribution of the product: most of the times, one truck delivers product to more than one shops/bakeries.

After the identification of the sensitive points and threats the company evaluated their impact, likelihood and the risk then they established preventive actions/control measures for those which were reasonably likely to occur with relatively high negative impact on the company. It helps to prioritize the necessary actions have to be taken e.g.:

- Only the approved person gets access to the steam boiler. It is important because during the baking process steam is injected ensuring the favorable baking environment. Altering the water used to produce the steam in the boiler can contaminate large portion of products and harm a lot of people.
- A visitor policy was implemented. The visitors should be registered the time of access and every visitor needs an accompanying employee. The employees of Alba Kenyér are trained for situations when they see a visitor without an accompanying employee.

- To reduce the risk of unauthorized access, close those doors which don't have to be open all the time. New gate system was installed controlling the persons who enter into the plant.
- The CCTV system was redesigned to be able to monitor all the critical areas as well.
- They implemented a policy on safe storage of truck keys and on safety measures during unloading the truck.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

IFS or BRC certification is a basic requirement to supply product to the retailers. A well-structured food defence plan is a relatively new, however it is more and more important chapter in these retailer standards. All food businesses must have a kind of food defence vulnerability analysis. The most common problems with these plans:

- They are too general.
- They focus on a problem the company already has rather than thinking ahead.
- The company just tries to copy the food defense plan of another company.
- The plan does not focusing on deliberate contamination rather focusing food safety issues.
- Generally the plan is focused on the cases what already happened, not a preventive methods

- *Describe the results, achievements and typical failures*

Alba Kenyér successfully developed and implemented its food defense plan. In addition to satisfy the requirements of IFS, the company shows all of their customers that besides the food safety, the prevention of possible threats is important and prove that they are doing what they can for food defence.

5. Summarize what makes the case to a good practice

The TACCP is a way to introduce an efficient food defence plan. The system has a general structure helping to use this multidisciplinary approach to their own practice. Alba Kenyér implemented this system before any deliberate or incidental contamination would happened.

4.1.15. Energy management

1. **Title of the case description**

Implementation of energy management in a German bakery

Author: UHOH

2. **Indicate the region:** Grundhof, Germany

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x			x				
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Energy management is the effective use of energy to maximise profits and to enhance competitive positions. The effort to introduce energy management in SME is very limited due to the lack of initiation, information available and expertise. Most of the SME cannot afford to appoint a dedicated (energy) manager to look into the energy related activities. There is a well-recognized need to target the SMEs with information on concepts and practises of energy management.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

"Der Grundhofer Vollkornbäcker – Peter Thaysen" () is a craftsman bakery in the state of Schleswig-Holstein, Germany. The bakery was the first craftsman bakery in Germany to have an environmental audit (EG-Öko-Audit-Verordnung no. 1836/93). Its 950 m^2 modern production unit processed daily about 2 tons of flour bread, buns, rolls, cakes and pastries.

- *Describe the method, procedure, solution implemented*

The method consisted on implementation of an energy management at the production unit to improve their marketing strategy. For that, the energy management was included in their organisational structure, bringing the responsibility to the production manager´s control, so it would be easier to make any modification in the production schedule or machines as and when required.

Energy audit is the first step to identify energy saving possibilities of the enterprise. An energy audit includes one series of entries consist of the amounts of energy that were consumed during a period, and a second series lists how the energy was used. The various steps involved in energy audit are:

1) Data acquisition (amounts of energy consumed, their end uses, types of fuel and volume of production)
2) Energy balance sheet: this sheet itemises all relevant input and output energy forms and shows the breakdown of energy used in various process. It is used to identify the ”energy centres”, which may then be analysed to see an area for energy saving potential.
3) Production process: all machineries in the production unit including the equipments indirectly involved in the production process. Based on the rated power of the equipment and their number of operating hours, the total energy consumption can be calculated.
4) Specific energy consumption.

After the energy audit, the following step is the identification of energy saving measures:

1. Technical and economic feasibility: from the energy balance sheet, areas of high energy consumption ”energy centres” were considered as potential areas for energy saving.
2. Energy saving measures for the bakery
3. Conservation in bake ovens
4. Lighting
5. Hot water usage
6. Recalibration of thermostat

Once a choice for the energy saving measures was made based on their technical and economic feasibility, steps were needed to implement the chosen options into practice and to monitor the results, keeping track of the energy consumption of the enterprise, and evaluation over a period of time giving an indication of the success or failure of the energy saving measures.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

- During the energy auditing, when observing housekeeping practices, the operators felt that they were being observed all time, and it caused fear/resentment among the operators.
- Only limited energy consumption data/standards/benchmarks were available for the bakery process. A data sheet was sent to all bakeries in the region, but there was only one response, though the data sheet was sent through the bakery association.
- Though the energy management methodology was developed for entrepreneurships, it might be difficult for them to conduct the energy audit by themselves. So, it would be better to conduct the energy audit, at the initiation stage, by an external consultant or an energy expert.

- *Describe the results, achievements and typical failures*

As a result of introduction of energy management in this bakery, and without much investment, a reduction of 6,5% on total energy consumption was expected.

5. Summarize what makes the case to a good practice

There is a well-recognized need to target SME with information on energy management concepts and practices. The methodology of energy management that was developed and introduced in this German bakery is a clear and consistent path towards introducing energy management in other industrial practices.

- Without much investment, a reduction on total energy consumption is possible.
- It is better to conduct the energy audit, at the initiation stage, by an external consultant or an energy expert.

4.1.16. Multi-head scale of pretzel sticks

1. **Title of the case description**

Multi-head scale for improved productivity of pretzel sticks

Author: UHOH

2. **Indicate the region:** Friedrichsdorf, Germany
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x					x	x	
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

In order for the company to be economically feasible, it is important to reach a specific product output. Consequently, this means the product needs to be weighed accurately in a short matter of time. Especially for sensitive and brittle products like pretzel sticks, care must be taken not to compromise product quality by pushing productivity.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Pauly is a medium-sized company, which produces a variety of salted and baked snacks, located in Friedrichsdorf, Germany. It is a traditional company, which was founded in 1896 under the name Trüller for the production of biscuits, wafers and rusk. Later it was taken over by Nabisco, USA and since 1977 it is part of Intersnack Knabber-Gebäck GmbH & Co. KG. In 2013 the brand switched from Trüller to Pauly after another company takeover. In total, Internsack consists of 1500 employees.

   - *Describe the method, procedure, solution implemented*

In cooperation with Ishida a manufacturer for food packaging, weighing and quality control, Pauly Snacks GmbH implemented a multi-head scale with 16 independent weighing heads.

The product is fed to the top of the multi-head scale where it is dispersed by gravity, vibration or centrifugal force to so-called pool hoppers. Each pool hopper drops the product into a weigh hopper beneath it as soon as the weigh hopper is empty. A computer, attached to the multi-head weigher determines the weight of product in

each individual weigh hopper and identifies which combination contains the weight closest to the target weight, upon which the specific hoppers are opened and product falls into the packaging.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

A comprehensive study of the process, including quality parameters regarding product specifications needed to be conducted, since an out-of-the-box solution was not possible due to product properties.

- *Describe the results, achievements and typical failures*

Pauly Snacks GmbH managed to cut product loss caused by overfilling of pretzel stick packages by 10 %. This was achieved by substitution of three linear scales with a multi-head scale.

5. Summarize what makes the case to a good practice

The case has shown that the productivity was improved, while product loss was minimized. Multi-head scales are applicable to a broad product portfolio and can be individually tailored towards specific applications. In such co-ventures, companies can profit from each other's expertise, thus building a solid knowledge base that can be potentially applied to other problems in the future.

4.1.17. Gyermely Plc.: integrated supply chain management

1. **Title of the case description:**

Gyermely Plc.: integrated supply chain management

Author: CBHU

2. **Location:** Komárom-Esztergom county, Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x						
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

In Hungary the dry pasta is made traditionally with fresh eggs. The philosophy of Gyermelyi Zrt is that high quality products can only be produced from high quality raw materials. The Gyermelyi Group performs all subsidiary tasks of dried pasta production by embracing interconnected sectors within one organisation, thus being able to fully control the quality of everything from the ingredients to the end product. Gyermelyi pasta is made from own grown wheat ground on the spot and carefully selected fresh Gyermelyi eggs, complying with the strict requirements of the ISO 9001:2008 and IFS Food.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Gyermelyi is the market leader pasta producing company in Hungary. It is located in Komárom-Esztergom county, Hungary. The company currently has approximately 230 employees. Gyermelyi pastas and four-egg pasta are accounting for the majority of production.

   - *Describe the method, procedure, solution implemented*

The integrated supply chain integrates groups with different activities like

- plant cultivation,
- flour-milling,

- poultry breeding,
- feed production,
- egg production,
- pasta production,
- bakery.

The plant cultivation branch provides the seed to the farmers, who supply the wheat for the mill, which guarantee standard, high quality raw material. The mill with a modern technology produces the right quality flour for the pasta production and the bakery. The company buys chicklings and rears pullets on its own site in hygienic conditions. The fodder is produced by the group which operates a feed mill as well. The produced eggs are sorted and sold as fresh eggs or processed and used for pasta production. The waste from the egg and poultry breeding is used as fertilizer for plant cultivation and recycled within an integrated system.

The pasta plant has an automated boiler-house providing the hot water for the pasta producing machines' dryers. An indoor silo capacity of 100 000 tonnes is needed for the storage of flours. The computer controlled mixing gives an opportunity to mix the different types of flours to meet the requirements of the different technologies and types of pasta. The storage capacity is at least 16 hours behind the production lines, so the packing doesn't have to take place during the night and the different types of pasta can be mixed.

There is a whole traceability system in place from the pasta production back to the seed growing.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Integrated supply chain management requires certain levels of business scale including financial, physical or human resources. Building a very complex supply chain can result that the company loses its flexibility.

- *Describe the results, achievements and typical failures*

An integrated complex supply chain system was built to ensure the high quality of the products. Furthermore, it helps setting up a more cost efficient production.

For more information:

5. Summarize what makes the case to a good practice

Gyermely successfully implemented an integrated supply chain which gives the company a competitive advantage in the marketplace and help mitigate risks associated with acquiring raw materials and producing the final product.

4.1.18. Training Academy

1. **Title of the case description**

ORVA srl: a training Academy for Agrifood sector

Author: CNA-ER

2. **Indicate the region:** EMILIA ROMAGNA
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x	x	x	x		
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

The training plan adopted by this company has been proposed by the CNA System to answer the need of this company to strengthen the knowledge and awareness of its own management style.

CNA, in collaboration with the ORVA management, has organized an ad hoc training path for the business growth regarding leadership and management of staff, with a special focus on human resources.

The attention to the style of their human resources management is a fundamental aspect for ORVA, which aims to become one of the main drivers in the food sector, therefore a leadership in line with the business needs and values represents an essential competence.

The subjects addressed by the company within the training path are the following:

- Coordination and monitoring
- Recognition process
- Management of criticism
- Delegation process

This path was built in view of the growth objectives of this company, aimed at creating a modern production pole, in which the ethical and responsible values towards the environment, their staff and the overall quality of their products represent a key element.

The training plan in which the ORVA's management participated has also been a base for the need of this company to approach the world of research and University. The close relationship of CNA with the world of research enabled to accompany this company's management in a visit at the laboratories of the Tecnopolo of Cesena, CIRI AGROALIMENTARE, in order to develop integrated projects.

The training and technology transfer paths carried on by this company confirm the need and interest in creating an innovative business, attentive to its staff, founding its success on research, collaboration with Universities and laboratories, in order to develop systematic activities and guarantee a higher quality to its products.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

OR.V.A. was established in 1979 and its headquarter is located in Bagnacavallo, near Ravenna. It employs 180 peoples, with varied experiences and skills.

It represents a reality active in the field of baked products, in particular substitutes of soft bread. In fact, this company manufactures industrial piadinas and other baked products.

Their business organization is represented by a precise and efficient model of planning.

The central areas of ORVA are, in addition to production, the Research & Development department, the technical office, where technological solutions are studied, and the graphics office.

- *Describe the method, procedure, solution implemented*

The innovative processes supported by CNA can be varied and not necessarily connected to a radical change. More often, they regard the implementation of a new procedure, a new working method or an incremental constant change, which, in order to be effective, needs proactive behaviors and the presence of a culture aimed at promoting the relationships system of the company.

This last element represents a starting point in the intervention made in the described case, exemplary both as regards the methodological implementation of the path, and its impact.

The training need expressed by the management of ORVA implied to strengthen the knowledge and awareness of their own management style, in order to focus on the key areas of improvement.

CNA has built a customized training path focused on the leadership style and the management of staff.

As regards the teaching methodology employed within the training path, there has been in front teaching by a coach with an expertise in relationships and team management, and through the analysis of cases, simulations, role play.

A CNA coordinator has monitored the development of the path.

The ORVA managers have received tools enabling to improve the management of criticalities, with a special attention to the enhancement of their personal communication skills in order to make them more effective.

The training path has analyzed the following subjects:

- Coordination and monitoring in order to promptly detect criticalities
- The role of leader and the professional management of the interactions with own team/staff: strategies, tactics and advanced techniques.
- The essential relational tools: the delegation process.
- The relationship between team and organization: the role of leader.
- Exercises: analysis of cases, simulations, role play.
    - *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*
- The intermediary should have abilities and tools able to identify training needs.
- The intermediary should detect the opportunities of public funds.
- The beneficiary should have sufficient economic resources to sustain it.
    - *Describe the results, achievements and typical failures*

The financed training actions have therefore enabled to promote know-how which is:

- *significant*, namely able to involve the participants at cognitive and emotional-relational level;
- *systematic*; namely able to structure actual knowledge networks;
- *stable*; namely able to remain over time as cognitive essential tools to understand what's new;
- *capitalizable*; namely it enabled the participants to master new skills and new knowledge, thus allowing access to other problematic sequences or operative and professional analysis.

The training path has supported the key roles of the company, strengthening the knowledge and awareness of their management style, increasing the awareness towards the functional aspects of the different roles, as well as their potential evolution.

The themes addressed and the skills acquired have had a middle-term positive effect on their communication effectiveness, on their leadership style, on performance and productivity.

5. Summarize what makes the case to a good practice

- need of managerial training within micro and SMEs.
- supporting the capacity building process by training for competences and skills of food related SMEs.
- adequate teaching modalities: front lessons, case study/coaching and project work.

4.1.19. Food and agro-tourism facility

1. **Title of the case description**

All under one roof – food and agro-tourism facility

Author: SCCI

2. **Indicate the region:** Slovakia
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label		x		x	x	x	x	x	
Food design									

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*
- *Describe the specific need or problem being addressed by the case*

The company AGROPARTNER spol. s r.o. was formed by privatization in 1996.

Actually is the company in need of access to finance and access to foreign markets.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The company gradually invested in the purchased objects: reconstruction of potato warehouses in Sološnica, reconstruction of the farm in Prievaly, reconstruction of pig farm in Rohožník, and also investment in the construction of an agro-tourism centre. They did not need start-up support. Main activity of the company is plant production, pigs and beef breeding and production of meat products and selling these products. Beef and pork meat is preserved in the cooperation with the affiliated company EuroGen, spol. s.r.o..

Actual number of employees is 300 in all affiliated companies to the company and all facilities that are operated by AGROPARTNER spol. s r.o..

Meat products of the company have very high quality- they contain 97,5% of meat, no flour is added and they use unique combination of beef and pork meat. That´s why selected products have the mark Regional Product of Záhorie.

In cooperation with this company AGROPARTNER spol. s r.o. runs two vending machines for raw cow milk. Both are situated in small villages in western Slovakia. One is next to the shop Farm Foods Slovenský Gazda in Plavecké Podhradie and the second is at the farm in Plavecký Peter.

- *Describe the method, procedure, solution implemented*

Due to unfavourable situation on the local market with meat production, company had to decrease the production, to close farms or even reduce number of employees.

In case access to finance we have recommended to the company to apply for EU funds at national and European level and take active part in EU projects. What concerns access to market we have recommended closer cooperation with EU chambers and clusters.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The main difficulty for company is high product price volatility and problems with sales of production, but they still have excellent parameters in usability comparable to world competition.

Low prices that are given by retail chains which absolutely do not cover costs needed for production.

It is difficult to obtain a loan from bank or state support.

- *Describe the results, achievements and typical failures*

As part of its diversification, the company invested in the construction of an agro-tourism facility consisting of a modern riding school and a wellness centre Podkova with outdoor playgrounds and accommodation capacities. The company founded the riding club Plavecké Podhradie, which specializes in work with young people, the education of young riders, the training and sale of sports horses. The company also provides accommodation for private horses.

5. Summarize what makes the case to a good practice

The company is constantly developing and dynamically adapting to external and internal conditions and diversifying its operations. In 2014 they have opened shop Farm Foods Slovenský Gazda. This shop offers its customers a wide range of quality Slovak food under one roof. The store also offers Záhorácké hovjadzí® - a fresh tasty meal as well as meat products and pork specialties produced by EuroGen spol. s.r.o. Products are carefully choosen to fit into the concept of Farm Food. When choosing, they take care of the quality of the products, the origin of the raw materials, the place of their processing and the packaging. Freshness and method of preserving food is also important. In the shop they try to offer fresh food without chemical preservation, many of them are bio-quality. The company appeals to local producers, producers from

regions with the production of certain foods, but also to food producers who are not afraid of innovation and bring new and exceptional flavours to the market.

4.1.20. Food quality and labelling consultation

1. **Title of the case description**

Food quality and labelling.

Author: CCIS-CAFE

2. **Indicate the region:** Slovenia
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x	x	x	x	x	x
Food design	x			x					

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

5. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Around 180 members of CCIS-CAFE – small, medium and big companies are facing a problem regarding food law, especially food labelling on daily basis. CCIS-CAFE which is an independent, voluntary, non-profit, interest group of legal entities that carry out lucrative business activities in the agricultural or food sector or related activities on the market can make a big contribution to these issues.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

CCIS-CAFE represents the interest of around 180 agricultural and food companies, registered in Slovenia. CCIS-CAFE offers consulting to small, medium and big companies, most members are SMEs. Every company has an option to contact CCIS-CAFE and pose a question about labelling and food law.

- *Describe the method, procedure, solution implemented*

CCIS-CAFE provides direct professional help in the form of consulting and providing information and also indirect through organization of professional seminars, conferences, etc. Experts at CCIS-CAFE are constantly gaining further education in their field by attending conferences all around the word and also with participating in European projects.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

Some companies do not see the advantages that food law and labelling consulting can give them. The biggest constraints they have to become a member are financial.

- *Describe the results, achievements and typical failures*

Results are better functioning of the company as a whole and in compliance to food regulations. Typical failures are that if the company doesn't take into account the expert advice given they may face problems and also almost always face higher expenses.

6. Summarize what makes the case to a good practice

For a company to gain a consult about labelling means an important cost reduction. Otherwise there may be a scenario where, due to the lack of understanding of the legislation and consequently the preparation of packaging that does not comply with the requirements of the regulation; the company may face an increase in the cost of packaging replacement.

4.1.21. Slovak Horalky

1. **Title of the case description**

Slovak Horalky are produced more than 50 years

Horalky is a Slovak wafer bar with peanut filling and cocoa coating, produced by he company I.D.C. Holding, a.s. under the Sedita brand. It is the best selling wafer of all time in and since 1953.

Author: SCCI

2. **Indicate the region:** Slovakia

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label		x	x	x	x	x	x	x	
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

I.D.C. Holding, a.s. is the largest Slovak producer of confectionary and pastry products. Over past years the company was focused mainly on markets of V4 countries. They have successfuly enter the German market this year and currently the company decided to orientate also into the Arabic market what means not only big market including more countries but also to adapt the design of the products to specific requirements of the client.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The company I.D.C. Holding, a.s. has annual production and sale about 39.000,00 tons of products and with annual turnover about 135 million EUR. The company history is based on more than 100 years tradition of production in plant of Figaro Trnava and 60 years tradition of pastry products manufacture in plant of Pečivárne Sereď.

The company carries out its business activities in an environment of heavy competition, represented by the world largest food companies.

Production companies of I.D.C. Holding, a.s. use traditional recipes and the most modern facilities with regard to all quality requirements within their manufacture process. Certainly the best-known products are Horalky, Tatranky, Mila, Mäta, Lina, Kávenky, Kakaové rezy.

The most favourite confectionary products of the branch company Figaro Trnava are definitely the menthol caramels Snehulky, the whole range of functional candies under the brand of Verbena, rocks lollipops and candies, jelly bonbons and with chocolate coated bananas. Production plant in Cifer produces seasonal Easter and Christmas products and production plant in Ilava produces sponge cakes. The company has built business companies with complete business team, logistics and marketing outside of Slovakia also in Czech Republic, Poland, Hungary and Russia.

- *Describe the method, procedure, solution implemented*

First of all the company had to analyse in depth and in details the German speaking markets to bring products that meet particular requirements what concerns flavours and design of packaging. In second to make survey about potential competitors and distribution companies in the mentioned countries. After good experience the company decided to expand also to Arabic market.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The company did not face the problem with language barrier but with customer ´s knowldge of the products. I.D.C. Holding, a.s. has decided not to make a big promotion campaign in entering the new market, but to set up the direct cooperation with the retail chain Kaufland that has around 500 stores in eastern Germany. Actually they negotiate about distribution not only Horalky but also other confectionery to reach local potential customers.

The big problem the company sees in the secondary payment inability. It means that the payments from their buyers come late or not at all which causes other problems with cash-flow and other production.

- *Describe the results, achievements and typical failures*

In the company the leading management systematically invests to the development, education and trainings. They have very educated and qualified managers, as well as employees.

In order to strengthen the export the company has build modern production plant that contains also logistic centre for better supply to new markets.

I.D.C. Holding, a.s. obtained several quality certificates in compliance with international standards and strengthened its ability to fulfil customer requirements by providing safe foodstuffs, in all aspects complying with the EU legislation requirements for quality and food safety.

Vision of the company is to remain a stable Central-European confectionary producer.

6. **Summarize what makes the case to a good practice**

The company is the largest producer of confectionery despite of the big competition at the world market.

The company uses traditional method of production using the most modern equipment that is regularly innovated. The recipe of the products and the packaging is the same for years.

Portfolio of I.D.C. Holding, a.s. products with brand Sedita is constantly developed and renewed. Every year many innovative new products are added to the portfolio and there are many others prepared to be launched. For example to traditional Kavenky wafers were added Kavenky cappuccino, Kavenky latte, Kavenky arabica.

4.1.22. Innovative fruit jams

1. **Title of the case description**

Fruit treats for more beautiful and sweeter day

Author: SCCI

2. **Indicate the region:** Slovakia

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x	x	x	x	x	x	
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

Company RISO-R, s.r.o. was established in 2005, based on the one hundred year tradition of the cannery in Rimavska Sobota which was founded in 1902. A responsible management approach, a simple organizational structure and a stable team of experienced and qualified employees contribute to the long-term competitiveness and viability of the company. To the future the company would like to expand to the foreign markets and find new selling points for their products.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Company RISO-R, s.r.o. is the only producer in Slovakia of jams, marmelades and fruit spreads. Products are made in a various consumer packages to meet needs of all customers. Customers can find products from RISO-R, s.r.o. in the most domestic retail chains. Industrial processors appreciate jams, marmelades and fruit spreads as a quality raw material for their further processing.

Company has actually 30 employees and sells its products mainly on the Slovak market. Today the company operates as a family company with two-generation family representation in the top management. At the very beginning they rent manufacturing facilities without any financial support.

Since 2008 company put into practice the certificate of quality management system according to the international standard ISO 9001. The certificate was granted by the international certification authority Bureau Veritas Quality International.

Quality of selected products was awarded with the mark Quality Food SK Slovakia.

Company also produces jams suitable for diabetics, sweetened with fructose sugar, offering two flavours: apricot and strawberry.

Main products of the company are jams with high quality obtained by cooking one kind of fresh fruit. Well known product of the company is also plum jam made from fresh fruits. Thanks to their excellent taste and many flavours, for example apricot, strawberry, cranberry, orange, raspberry, amarelle and mix of forest fruits, their products became a part of everyday dining in Slovak households. Demand for the low-energy version of jams is increasing.

In the production and sale of fruit spreads, jams and marmalades, the company is a leader on the Slovak market. Main competitor of the company is the company NOVOFRUCT SK, s.r.o. located in Slovak town Nové Zámky. It is a traditional cannery, which processes fresh fruits, vegetables and meat. The final products are baby food (fruit and vegetables), baby drinks, fruit and canned vegetables, tomato paste, meat spreads and ready meals.

Company has also included new types of fruit jam with a high proportion of fruit, without the addition of beet sugar. Products with its luxurious packaging and appealing content are destined for a demanding consumer.

Superior Jams – flavours: cranberry, briar, cornelian cherry, and blueberry.

- *Describe the method, procedure, solution implemented*

Company has initiated the change of regulation of Slovak government. It helped them to get permission to produce new products which were produced in all neighbour countries, except of Slovakia. By this the company got more competitive.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Strict regulation of Slovak government, permanent changing local legislation, not transparent processes, compliance with EU regulations and high fines for administrative errors.

- *Describe the results, achievements and typical failures*

The company has started to do business without financial state support. They based their success on family approach. In the company they have created stabile and positive working environment with experienced and qualified staff. The company is holding its first position as a local producers of jams, marmelades and fruit spreads.

Success of the company is the fact that after establishment very soon they could place their products into domestic retail chains.

The company was awarded by the certificate Quality Food SK Slovakia.

5. **Summarize what makes the case to a good practice**

- company follows requirements of customers- jams suitable for diabetics;
- only fresh fruits are used in production;
- new innovative flavours of jams;

- lower energy version of jams;
- using healthier ingredients for sweetener;
- jams contains vitamins.

4.1.23. Measuring Overall Equipment Effectiveness

1. **Title of the case description**

Measuring Overall Equipment Effectiveness (OEE) in a mineral water bottling factory

Author: CBHU

2. **Indicate the region:** Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics										
Food safety, quality, label	x	x			x					
Food design										

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

OEE (Overall Equipment Effectiveness) is used for measuring manufacturing productivity. It identifies the percentage of manufacturing time that is truly productive. An OEE score of 100 % means that only good products are manufactured, with absolutely no stop time. Measuring OEE is a manufacturing best practice for identifying losses, benchmarking progress and improving the productivity of manufacturing equipment.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The bottling plant made a refurbishment on the filling line. An OEE analysis was performed after start-up to investigate losses and to maximise production capacity.

- *Describe the method, procedure, solution implemented*

The method used was an implementation of OEE on the bottling line to improve the effectiveness.

The OEE takes into account all losses examining three factors:

- Availability indicator: availability takes account unplanned and planned downtime. T_{actual} means the actual/measured manufacturing time and $T_{planned}$ means the total time that bottling line was expected to work.
- Performance indicator: performance takes into account slow cycles and small stoppages. The $T_{notruntime}$ means the unplanned stops, $T_{runtime}$ means the planed running time of the bottling production line and $N_{produced}$ means the number of bottles.
- Quality indicator: quality takes into account the bottles not meets the quality standards. $N_{produced}$ means the number of bottles during the observed period. W means the waste, the bottles not meeting quality standards.

Downtimes were collected on pre-made forms. The working time was 2×8 hours, reduced by 30 minutes lunch break. The operators had to register the time and duration of all stoppages.

Cause of stoppages, slow cycles and small cycles had to be identified once the repair and/or adjustments were made.

Data were collected per machine: bottle blower, filler-capper, code printer, labeller, palletizing robot. The highest stoppage times were observed during the bottling-capping process. The cause of the stoppages was identified every time. The main cause of stoppages in descending order were: squashed empty bottles on conveyor, jammed caps in rail, changeover mistakes, filled bottle jams, sensor faults, low filler pressure and the cap hopper running empty.

The data collection was repeated after corrections were made.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

Constraints or challenges to tackle with.

- calculation of the planned downtime
- measuring the actual downtime
- calculation of the running time
- finding exact causes of downtime.

- *Describe the results, achievements and typical failures*

As a result of the OEE, waste amount could be decreased. The Availability indicator has improved by 10 %. The Performance indicator has improved by 2 %. The Quality indicator has seen an increase of 0.9 % as well.

5. Summarize what makes the case to a good practice

The measuring the Overall Equipment Effectiveness is an easy used, simple tool for a quick overview each type of loss. The tool can be adapted not only to bottling operations but to other manufacturing and processing activities too.

4.1.24. Root Cause Analysis training for the food industry

1. **Title of the case description**

Root Cause Analysis training for the food industry

Author: CBHU

2. **Indicate the region:** Hungary

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics										
Food safety, quality, label	x	x	x	x	x					
Food design										

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

The customer of the food processors require high quality standard and safe food. The Regulation (EC) No 178/2002 (the 'General Food Law Regulation') require that a food must be both of the nature, substance and quality expected by the consumer, and also not injurious to health for any reason.

The quality management systems applied by the food manufacturers have to be designed for prevention and regular improvement. To avoid the reoccurrence of certain non-conformities, Root Cause Analysis (RCA) can be used to implement ongoing improvements to product safety, legality and quality.

Key clauses of Issue 6 of the BRC Global Standard for Food Safety require effective Root Cause Analysis to be documented and carried out. This analysis shall be made available to relevant staff.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

A Hungarian poultry processing company located in Vas County, Hungary.

- *Describe the method, procedure, solution implemented*

Root cause analysis (RCA) is a method of problem solving used for identifying the root causes of faults or problems. To be effective, root cause analysis must be performed systematically, usually as part of an investigation, with conclusions and root causes that are identified backed up by documented evidence.

To enhance the efficiency of the tool Campden BRI have developed a highly interactive course which covers the background and definitions of Root Cause Analysis. The attendants get to know methods of RCA such as Brainstorming, Ishikawa, Mind maps and 5 Whys. The delegates learn about the 7 key stages of problem solving and the human factors that impact on RCA. The implementation of effective techniques as part of an organizations continual improvement loop and corrective actions are also highlighted by the course.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

During the last few years food industry has started to apply RCA methods, but with limited efficiency due to the lack of knowledge on the RCA techniques, and their effective application in the practice.

- *Describe the results, achievements and typical failures*

A one day training was organized at the premises of a Hungarian processed poultry manufacturer company. The interactivity of the training enabled the delegates and the company to check their own system and try to find gaps in their own system. The trainer moderated the discussions and helped them to use the techniques by the most effective way.

The delegates exercised the key factors or steps of the problem solving process which are the following:

- understanding the problem;
- usage of innovative thinking;
- investigation;
- root cause identification;
- elimination of the root cause / the problem and
- review.

Then by using the 5 why method the RCA team successfully identified cause of the foreign body (piece of soft foil) contamination in finished product which was a longstanding and repeatedly occurring non-compliance for the company.

Based on the analysis, the company could set up necessary procedures and methods to prevent the reoccurrence of this type of foreign body contamination, which was earlier one of the most typical reason of their customer complaints.

General recommendation is to involve in the RCA team delegates right across the entire range of roles within an organisation from Technical to Engineering, Manufacturing, Logistics and Management. At the training the attendees were hygienic manager,

production manager, maintenance manager, quality assurance manager and the technologist)

5. Summarize what makes the case to a good practice

The case is a good example to show how the efficiency of a technique can be improved by a highly interactive knowledge transfer. The RCA methods should be familiarized in the food industry.

The case also underlined the importance of the team effort: to carry out effective Root Cause Analysis a multidisciplinary team should be organized inside the companies. This team should involve all parts of the food business: Quality Assurance, Production, Hygiene, Engineering and Maintenance, etc..

The team should be leaded by a trained person (for example by the Quality Assurance Manager or by the Production Manager, who participated in a RCA training course). If necessary, the team should be assisted by external specialists.

4.1.25. Non-Invasive handheld bacteria counting device for meat

1. **Title of the case description:**

Non-Invasive handheld bacteria counting device for meat

Author: UHOH

2. **Indicate region: Germany**

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x	x	x			x			
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Conventional microbiological assessment of meat are often time-consuming and require off-line or at-line analysis, which can lead to inaccuracies given samples are not handled correctly or if the work space is not thoroughly cleaned prior to the analysis. In the worst case scenario, microbiological test results might only be available at the time, when tested food products already hit the store shelves. Non-invasive on-site measurements can help improve time efficiency and reproducability.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

FreshDetect GmbH is a company from Pullach in Germany, developing and distributing easy-to-use instruments, including the hand-held measuring device BFD-100 for analyzing microbiological quality. Freshdetect was founded in 2013 in continuation of the ZIM project, during which a first prototype of the hand-held device was developed. Currently FreshDetect employs 17 workers.

- *Describe the method, procedure, solution implemented*

The device is constructed around fluorescence spectroscopy, which measures the emmited fluorescence spectrum of both meat and the viable surficial microbes, upon exposure to blue light. Prior calibration of the fluorescence spectrum of non-contaminated meat, characteristic spectra of microbes and meat can be distinguished from one another, which enables assessment of the microbial surface load of the respective meat product. The intensity of emmitted fluorescent light is correlated to the number of viable microorganisms and gives a clear indication about the meat freshness.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

Currently, the device is only calibrated for pork meat. However, the company formulated clear goals for expanding their product portfolio in the future.

- *Describe the results, achievements and typical failures*

Independent lab testing has shown a clear correlation between conventional microbiological analysis and spectroscopic measurements and an improved reproduceability of the non-invasive method.

For the wide-spread distribution and optimization of the device, the European Union granted comprehensive subsidization under the funding scheme of Horizon 2020.

Recently, FreshDetect received the pitch award in the food agritech category at the EIC Innovator's Summit 2018.

5. Summarize what makes the case to a good practice

FreshDetect developed the first reliable handheld measuring device for assurance and optimization of food quality. Since conventional microbiological testing is no longer needed, materials and resources for the production of e.g. plastic Petri dishes can be saved. Overall, It's a cost efficient, fast and sustainable technique, showing potential for future applications.

4.1.26. Cooling packaging for pharma, food & industry

1. **Title of the case description**

Cooling packaging for pharma, food & industry

Author: UHOH

2. **Indicate the region: Reilingen, Germany**

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label		x	x		x		x		
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Innovative solutions for food retailers wishing to send products, fresh or frozen, with confidence through the postal or courier network whilst maintaining the required cold chain are needed.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Schaumaplast GmbH & Co. KG is a medium-sized company based in Reilingen, Germany. The company was founded in 1964 in Viernheim, currently employing roughly 80 persons. The company focusses on packaging and molding solutions from plastics. The product portofolio comprises technical parts for the automotive industry, the building sector, sports and many more. Another central product group is represented by pre-qualified cooling packaging, thermo boxes and cooling elements.

- *Describe the method, procedure, solution implemented*

Schaumaplast's thermobox consists of an outer resistant EPP-casing, vacuum insulation panel (VIP) and a removable, robust inner tray for the protection of VIPs and facile cleaning. The inside of the box is filled with multiple cooling elements. The box is able to maintain a steady temperature within a few degrees for up to 90 hours during summer and 120 hours during winter. Vacuum insulation panels help reduce heat loss due to a low thermal conductivity. The box is able to operate at different temperature regimes (controlled room temperature, chilling temperatures, freezing temperatures)

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Boxes are only pre-qualified for 2-8 °C, all other temperature ranges may need special inquiry

- *Describe the results, achievements and typical failures*

The company was able to greatly extend cooling time compared to other boxes. For their sustainable, multi-use design the company was awarded the “2017 Pack The Future Award” for sustainable plastic packaging.

5. Summarize what makes the case to a good practice

Proper cooling of products has direct impact on product performance, shelf-life and safety and leads to reduced food waste. This cooling solution also functions without electricity.

4.2. Mechatronics

4.2.1. Power quality improvements

1. **Title of the case description**

Power quality improvements in dairy production process

E7 d.o.o., Lormanje 5b, SI 2230 Lenart v Slovenskih Goricah, Slovenia

Author: PTP

2. **Indicate the region:** Slovenia
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics	x	x							
Food safety, quality, label									
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

In food processing productions following Power Quality Problems were identified:

Voltage fluctuations: Voltage may fluctuate within a single phase. Voltage fluctuations depending on the loads, the phase can be measured within a range with a maximum, minimum and average voltage. Motors and equipment are designed to be most efficient at a set voltage and any minor fluctuations, up or down, will decrease the motor's efficiency. Significant voltage fluctuations can cause equipment to shut down or fail.

Unbalanced Voltage: Most industrial electrical loads are designed for 3 phases of current at either 480 volts or 600 volts. A 600 volt motor is optimized when it receives 3 phases of current at 600 volts. Often, electrical systems can become destabilized and each phase will deliver current at a different voltage such as 570, 580 and 590 volts respectively. Even minor imbalances can generate heat and electrical losses.

Unbalanced current: Imbalanced loads can cause phase current imbalances, thus creating negative sequences and circulating currents. This can result in higher equipment failures and maintenance costs. Additionally, imbalanced loads may generate higher demand charges from the utility if the utility is billing demand on the highest phase.

Harmonics: Most AC electrical equipment is designed for AC electricity at 50 or 60Hz and any electrical current above the fundamental is called a harmonic. Harmonics are not only wasted power but can also damage equipment and nuisance tripping of protective devices.

Low Power Factor: In alternating current (AC) systems with inductive loads, (i.e. motors) the current wave form often lags the voltage wave form. The greater the variance, the lower the power factor, the more energy wasted. Additionally, many utilities apply a power factor penalty to electric bills if power factor drops below a pre-determined efficiency.

Transients & Impulses: A transient is a very short increase or decrease over nominal voltage and an impulse is significant increase. Electrical transients and impulses can significantly damage plant equipment and trip protective devices.

Brownouts: A brownout is a temporary voltage decrease from the supply. Brownouts can damage equipment and can also shut down operations.

Momentary Supply Failure: An intermittent supply failure is a temporary loss of voltage. These types of failures can shut down entire facilities and cause production malfunctions.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Business that implemented the case: dairy Pomurske mlekarne d.d.

Main production streams are milk and cheese, which are the basis for all our products such as: milk, butter, cottage cheese, cream, fermented products, products for children and non-dairy products. Cheese range is marketed under the brand name »Ljutomerski sir« alongside of course the finest »Emmentaler«.

Pomurske mlekarne has established a 70 year old reliable and trustworthy partnership with the Slovene farmers and Agricultural Cooperatives. This partnership is reflected in the premium quality products they offer to consumers in Slovenia and abroad.

Even as a fairly small European dairy production company, they have established a strong circle of trustworthy consumers.The changes they are currently facing are the requirements for the sustainable growth and future success of the company. It will provide the solid grounds for development of the third biggest Slovene milk production company with its 144 employees (https://www.pomurske-mlekarne.si/en/about-us/).

- *Describe the method, procedure, solution implemented*

The main challenge is Reducing Energy Consumption Through Power Quality Improvement. Product is designed to the client's specific needs and is built to correct and "re-cycle" losses from up to twelve different problems that were found in dairy industrial facilities. Product is a modular system engineered to effectively and economically optimize power quality, providing guaranteed energy savings, through reductions in power demand and power consumption (KVA/KW and KWH). Product corrects the following power quality problems:

Balance Voltage Across All Three Phases

Product stabilize voltage across all three phases using a combination of LRC tank circuits and phase shifting reactors. Balancing voltage across all three phases reduces heat and electrical losses. NEMA has a 5% limit on imbalanced phase voltages but even a 3% voltage imbalance will generate 18% more heat and heat will generate electrical losses.

Decrease Voltage Flucuations

Product improve voltage within each phase and minimize fluctuations and allow motors to run more efficiently. Additionally, PowerKure has the ability to raise voltage by using LRC tank circuits and zigzag reactors to capture and recycle losses as needed.

Balance Current Across All Three Phases

Product helps balance the load over three phases and mitigates phase currents, thus reducing negative sequences and circulating currents. It uses reactive passive components to help reduce three phase imbalances. Current balancing can often reduce utility bills with reductions in KW, KVA, KVAR and KWH.

Mitigate Harmonics

Product mitigates broadband harmonics or electrical frequencies above 60Hz by first tuning and then detuning the harmonic. It uses multiple filters to capture the harmonics and then re-cycle the losses through the tank circuit. If harmonics are found to be extremely high, additional components will be used to reduce distortion at the targeted spectrum. This reduces electrical losses and improves equipment longevity and performance.

Correct Power Factor

Product optimize power factor between 95% and 99% without traditional capacitor banks and their associated side effects. By correcting the above problems such as voltage imbalances, current imbalances and harmonics, a significant amount of the power factor problems can be eliminated. Additionally, PowerKure will monitor power factor with a regulator and then add capacitance, as needed, to maintain power factor at a pre-defined level.

Surge & Transients Suppression

Product captures minor surges and transients, and then recycles the losses through the tank circuit. Impulses are clipped and sent to ground reducing the chance of equipment damage.

Protect Equipment from Brownouts

Product maintains and increases voltage during temporary brownouts, reducing equipment shut downs. This is an optional feature that can be incorporated into the PowerKure system.

Protect Equipment from Intermittent Supply Failures

Product supplies continuous voltage during intermittent supply failure of short durations, generally 1 second or less. This is an optional feature that can be incorporated into the PowerKure system.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Experiences show that 3% to 6% guaranteed savings is typical for a facility. There are facilities that have excellent power quality and the guaranteed savings is less than 3%. For those facilities the equipment costs may not provide a reasonable payback. However, we have also seen guarantees greater then 6%. After completing a detailed electrical audit of your facility, our engineering staff will give you a proposal that contains both guaranteed savings and the associated equipment costs. By using satellite units and treating many problems closer to actual load(s), we generally exceed our guarantees.

- *Describe the results, achievements and typical failures*

Electricity is a PRODUCT that have quality requirements.

Power Quality is an expression used to broadly describe the entire scope of the complex interaction among electrical producers and suppliers, the environment, the systems and devices supplied by the electrical energy and the users of those systems and devices.

It generally involves the maintainability of the power delivered, the design, selection, and the installation of every piece of equipment, whether hardware or software in the electrical energy system.

Covering all areas from the generation plant to the last customer in the chain of electricity supply, power quality is a measure of how the elements affect the system as a whole.

There are two major categories of Power Quality variations:

- Disturbances:Transients, Voltage Sags (Dips) and Swells, Interruptions of supply
- Steady State Variations: Voltage Regulation, Harmonic Distortion and Voltage Flicker.

Quality requirements are based on: Regulatory pressure on utilities; Deregulation of electrical utility industry; Increased penetration of “non-conventional” types of electricity generators; Increased awareness of power quality issues by the end users; Growth in application of high-efficiency variable speed drives (VSD) and shunt capacitors for power factor correction; Efficiency concerns and power factor correction considerations; Increasing penetration of nonlinear loads (harmonics); Load equipment is/becoming more sensitive to power quality variations than in the past; Interconnections of networks and highly automated industrial processes.

Power Quality is an issue driven by the end users.

5. Summarize what makes the case to a good practice

- PQ Monitoring gives:
- Information to evaluate impacts of power quality variations on production process.
- Information to optimize power conditioning investments.
- Information to develop better equipment specifications.

- Information for contracts with electric utility.
- Information to flag possible equipment problems (motors, transformers, breakers, filters, surge suppressors, UPS equipment, etc.)

4.2.2. Phizero: synergies development

1. **Title of the case description**

Phizero: synergies development within the Agrifood value chain.

(RIF T.2.1.1: KNOWLEDGE TRANSFER within Industrial Research Laboratories, Innovation Centres, Technopoles and SMEs, in particular related to the development of synergies 'with and for' mechatronics companies, towards INDUSTRY 4.0.)

Author: CNA-ER

2. **Indicate the region:** EMILIA ROMAGNA
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics	x	x	x		x				x partnering opportunities	
Food safety, quality, label										
Food design										

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Phizero srl supplies engineering services to companies manufacturing automatic machinery and plants, and produces automatic machinery for companies interested in diversifying and innovating their own production processes.

This company deals in studying, designing and implementing solutions for the industrial automation in the food, medical and packaging sectors.

This company already collaborates with research centers, which are its suppliers, but has also developed its own products, protected by patents.

Phizero took part in a working table dedicated to the needs of companies in the context of industrial research and technology transfer. The participants were both businesses and researchers from the laboratories of the Tecnopole of Bologna.

Through this opportunity it has been possible both to detect new opportunities coming from new suppliers (companies) and co-design new interventions with some laboratories.

The interest expressed by this company was to develop, in collaboration with the MIST E-R laboratory, a research on nanomaterials and sensors to be applied on automatic machines.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Founded in 2006 in Castel Bolognese – Ravenna (Italy), works in the sector of industrial automation, supplying engineering services to companies manufacturing automatic machinery and plants in the food, medical and packaging sectors; it also produces automatic machines for companies interested in diversifying and innovating their own production processes. Phizero has a central core of four partners, three mechanical and an electrical engineers, supported by technicians and engineers, all dedicated to the activity of design and consultancy, while all other business functions are outsourced. Number of employees: 6. This company already collaborates with research centers, which are also its suppliers, but has also developed its own products, protected by patents.

- *Describe the method, procedure, solution implemented*

CNA has signed a protocol agreement with the National Research Council with the aim to define a research and technology transfer program addressed to companies, so as to formalize an operative methodology of intervention, shared both by research laboratories and the businesses beneficiaries of the transfer.

The support to the activity of research in contexts such as product innovation, process and service, new business management tools, approach to new markets and use of incentives for competitiveness favor the competitive, technology and managerial growth of companies.

The format is based on an action process, which starts from the company's needs and, through a matching with a laboratory, is acknowledged within the circles able to facilitate the synergy company-research.

Moreover, companies have the chance to meet and expand their suppliers' network, thus becoming themselves suppliers of other companies.

Phizero participated in an event matching the offer of industrial research and businesses, in order to know what is available in the region as regards their possibility to establish new technology partnerships. This company expressed its interest in developing a research on nanomaterials and sensors to be applied on automatic machines, in collaboration with the MIST E-R laboratory.

This company has faced, together with a group of researchers, some problems concerning sensors in order to apply them on the machinery for the sectors they already cooperate with: Biomedical, Mechatronics, Food and ICT.

In addition, thanks to this initiative, this firm has been able to expand its network of professional contacts, becoming the supplier of other local companies, thus activating positive effects on the economic and social context, with advantages for the whole area.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

One of the main constraints in this model of technology transfer lies in the ability of the intermediary to find the right matching between the suppliers of industrial research solutions and the demand expressed by companies.

The process is certainly easier in a local context, where the environment of innovation is based on a network of spread skills (Research Centers, Innovation centers, laboratories, University) and where the analysis of the entrepreneurial fabric is commonly practiced.

- *Describe the results, achievements and typical failures*

Following the matching and the shared interest with a laboratory, the company will be included in a training path organized by the laboratory itself.

5. Summarize what makes the case to a good practice

- Participation in working tables where it is possible to meet expertise and ad hoc competences able to supply precise answers to the specific needs expressed by companies.
- Better accessibility for companies to the scientific and technological developments that can develop technologies for new products, processes, applications, materials or services.
- Enhancement of their own suppliers portfolio and possibility to become a supplier for other companies, thus activating positive effects on the economic and social context, with advantages for the whole area.

4.2.3. Innovative and competitive dairy product development

1. **Title of the case description**

   Machinery of different functions in service of quality dairy industry products of feta type and cottage cheeses

   Author: STRIA

2. **Indicate the region:** South Transdanubia, Hungary
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics	x	x	x	x	x	x	x	x		
Food safety, quality, label										
Food design										

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

   - *Describe the specific need or problem being addressed by the case*

We describe here a Good Practice case of a middle sized Hungarian dairy industry company that operates at its Kaposvár processing unit with modern and energy efficient dairy industry technology for the purpose of producing new food goods (feta cheeses and cottage cheeses) to satisfy the needs of its new markets in Europe.

The feta cheese, cottage cheese and the cooked (boiled, pasteurized) cheese are developed based on market consultancy activities and especially target the Scandinavian and the UK markets. The cooked cheeses are made at 95 Celsius degrees heat treatment (boiling). At these markets the milk protein loses ground and alternative food components (use of palm, coconut and different vegetable oiles) become more popular sources of energy gained from foods. The machinery in use should support the innovative, competitive dairy product development for the benefit of the concerned markets as well. As a side note, on the Hungarian market ultrafiltered dairy products are still very popular. Fino-Food Ltd. is the main supplier of the own commercial dairy brand of Lidl Hungary Limited Partnership in product categories of liquid milk, sour cream and cottage cheeses.

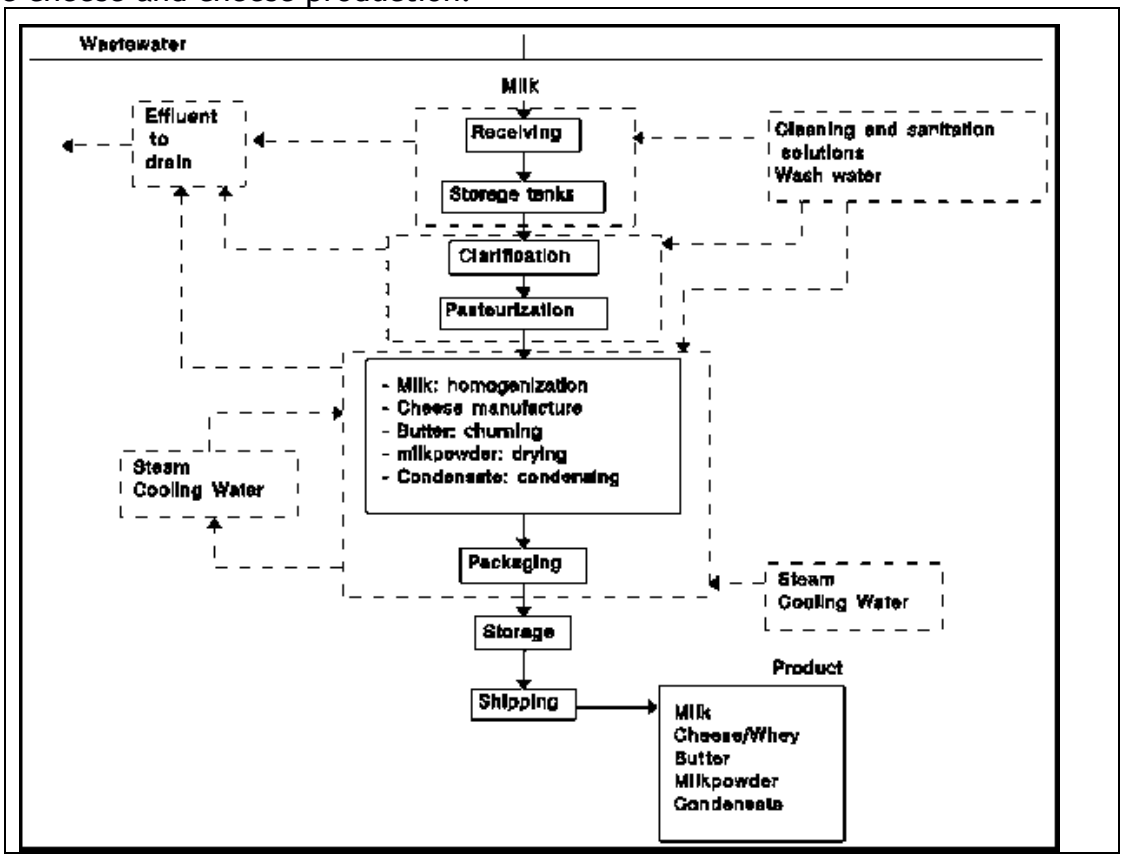
   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Fino-Food Ltd. is Hungarian dairy company located at Kaposvár, Somogy County, South Transdanubia. Its main profile is production of liquid milk, sour milk products, semi hard cheeses and bulk dairy products. Other activities include – among others - selling of raw milk. Fino-Food has 3% share on the national market and processing 40-50 million litres of milk annually, which is 3% of the overall milk processing in Hungary. Fino-Food has its own milk-processing capacity of 180,000 litres per day. The company itself was established in 1889 and currently has 168 workers.

The mechatronics tools (machinery in use) introduced in this Good Practice case serve the development and production of the new products of feta type and cottage cheeses of the company. For more information be kind to visit: http://www.fino.hu/index.php?m=&l=eng

- *Describe the method, procedure, solution implemented*

The flow chart below illustrates the milk processing or in other words, the operation of a dairy. Identical technological chain is in use at Fino-Food, with information technology connection, control and monitoring of the different phases of liquid milk, cottage cheese and cheese production.



Source: www.fao.org

At Fino-Food Ltd. the following machinery is in use for the purpose of reaching the objectives above: machinery for packaging-filling (ELOPAK, TETRAPAK, TREPKO, FINNPACK), machinery for heating, cooling and energy provision (Viesmann, KAESER).

The ELOPAK filling machine is in use at Fino-Food to fill in the dairy products into different size boxes. TREPKO and FINNPACK machines are in use for packaging dairy

products of solid consistency. TETRAPAK machines are in use as part of the preparation phase, also in pasteurizing, skimming and homogenization. Energy and air provision for the whole production line is solved by Viesmann and KAESER technologies.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Fino-Food as a supply side market actor for the successful introduction of the new cheese products are strongly forced to keep cost levels as rational as possible, at the same time to deliver the highest level of quality that the target markets require. For this purpose energy efficient processing technology is needed which guarantees that the company reaches the two mentioned objectives.

The above mentioned technologies are used in a dairy technology chain in general. There are no location, method or procedure specific requirements related to those.

- *Describe the results, achievements and typical failures*

The use of packaging-filling (ELOPAK, TETRAPAK, TREPKO, FINNPACK), machinery for heating, cooling and energy provision (Viesmann, KAESER) technologies enables Fino-Food to provide for high quality feta and cottage cheeses. The whole processing system is IT controlled, there are opportunities to intervene when that is necessary. The properly set machinery is capable to deliver the desired output at the company. Negative externality to be mentioned here is the enormous amount of industrial water which turns into contaminated sewage and that needs to be treated. Also, the use of polystyrene as packaging material generate significant amount of waste at consumers. The technologies at use at a dairy may result in more effective industrial water and energy consumption, but cannot result in terminating the mentioned external effects of milk processing.

5. Summarize what makes the case to a good practice

The Fino-Food case is to be regarded as Good Practice as its uses its modern machinery to cut down operational costs that is vital in the case of developing, processing and introducing new dairy products on the market. IT based control of the whole process helps the management to keep track of/monitor the process.

4.2.4. Völgység Kincse fruit and vegetable juices

1. **Title of the case description**

Producing fruit and vegetable juices with traditional processing and mechatronics technology delivering high quality food goods

Author: STRIA

2. **Indicate the region:** South Transdanubia, Hungary

3. **Cross-reference table**

4.

	1	2	3	4	5	6	7	8	9
Mechatronics		x		x	x	x	x	x	
Food safety, quality, label									
Food design									

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

5. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Völgység Kincse Social Cooperative has two main profound objectives: to provide employment for the local population, especially for those who are regarded as disadvantaged on the labour market, and to produce and sell high quality artisan fruit and vegetable juices for the sustainable and lucrative operation of the members of the cooperative and for the farmers having arable lands in the Völgység micro-region. For these purposes the cooperative uses Voran and Kreuzmayr machinery linked into an IT system capable to take control and providing overview of the production process and stocking of produced food goods.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Völgység Kincse Social Cooperative located at Kisvejke, Hungary is a fruit and vegetable processing food industry company based on traditional rules and economic operation models of cooperatives. Its main activities are fruit/vegetable processing/pressing for its members and for third parties based on external contracts, manufacturing of own products and selling those, also retailing further (non-food) local handcraft products of the Völgység sub-region. Main products of the cooperative are apple, apricot, pear, cherry, sour cherry, carrot, beetroot, buckthorn, herbs, fruit, vegetable, fruit-

vegetable juices made with 100% pure fruit/vegetable content, without using any preservatives or additives. The raw material of these products are cultivated and harvested at different local farms and plantations at a cumulated size of 300 hectares. Main markets of Völgység Kincse products are domestic: the main Hungarian cities (Budapest, Győr, Miskolc, Pécs), and occasionally foreign markets. For more information be kind to visit: https://volgysegkincse.hu/

- *Describe the method, procedure, solution implemented*

Völgység Kincse uses production technology which is artisan-like and at the same time provides for high quality fruit and vegetable juices. The cooperative provides its pressing/processing services with the use of the technology available for its members and third parties, too. The raw material brought by members/third parties is at the first stage selected and cleaned. The following phase is the pressing, which is followed by the pasteurizing. The process is closed with packaging in bag in box, sleeve pockets or glasses. The technological line, despite being very simple, is controlled by a central IT module which registers the raw material, production, final product flows, is also able to keep track of the energy consumption, and take account of the stock of products for selling at the retail shop or by further channels. Völgység Kincse uses Voran (one elevator with pivoting centrifugal mill, one packing press with rotary cage, Voran bag in box machine) and Kreuzmayr (Kreuzmayr filling machine) machinery for producing fruit and vegetable juices.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The production line in operation at Völgység Kincse is at the same time traditional and of handcrafted nature. It can be deployed at any place where there are good quality fruit and vegetable production in a relative large scale, local workforce to be used and market opportunities enabling the lucrative operation of such food industry companies. The introduced IT module is also an affordable and proven to be successful one, not using cutting edge, but traditional IT technology at keeping track of the production process and of product stocks.

- *Describe the results, achievements and typical failures*

The use of the Voran and Kreuzmayr technologies enables Völgység Kincse to provide for stable, high quality of fruit and vegetable juices. Taking inventory of those, satisfying retailer needs are supported by the IT solution that not only monitors raw material - final product flows, but at the same time guaranties the energy efficient operation of the Völgység Kincse social cooperative as well.

6. Summarize what makes the case to a good practice

To be regarded as Good Practice, the use of affordable, traditional, artisan-like technology based on locally produced agricultural raw material is to be mentioned, whilst the operation of the cooperative itself is also under control. Novel element of the practice is the provision for local employment which is also a crucial point of interest in rural regions.

4.2.5. Labelling printing device

1. **Title of the case description**

Labelling printing device

Author: KiGPSO

2. **Indicate the region:** Poland, Masovian Voivodeship
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics		x								
Food safety, quality, label		x		x						
Food design						x				

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

Due to globalization and increasing global trade volume in the complex food value creation chains the exchange of information between several market players is crucial for the food safety. The appropriate exchange of information about the quality and the quantity of goods flowing through the complex food systems is possible thanks to appropriate technologies and information systems. In this context, labelling and traceability solutions play important role for the exchange of information and quality management.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Logopak East is the supplier of highest quality of the industrial print and apply labelling, software solutions and automatic identification equipment. It is medium-sized enterprise located in Warsaw (Poland) and employing over 250 people.

The labelling systems, created by the enterprise, are integrated in the logistics chain, at the interface between production and shipping or the central warehousing /distribution center. The enterprise's offer covers print and apply labelling systems, label applicators and printers, direct thermal and thermal transfer printers, handheld scanners, mobile computers and industrial bar code scanners. The programming and development of software as well as customized applications is executed by enterprise's R&D Department. Logopak East offers consulting, installation of labelling systems, trainings including operation and maintenance of systems.

- *Describe the method, procedure, solution implemented*

The enterprise has implemented an innovative combination of printing and labelling systems with transponder technology. High quality "Logomatic" devices are widely used in the identification process of pallets and other units based on unique bar code labels and readable information (text or numbers). The implementation of the integrated thermo-transfer print engine allows real-time labelling with individual data per packaged good. The labels may be applied to the top, side or bottom of moving products. What's more, this gives an optimal solution for encoding and identifying large quantities of goods. Depending on the food product and its packaging type, the labels may be applied using both contact and non-contact labelling, also the sizes of labels may be adjusted to the requirements. High speed printing and labelling of commercial units as well as usability for serial production create added value.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

The main constraint can be the lack of the detailed requirements specification from the business side. The installation / implementation is always specific for each business type. The implementation is dependent on sector and configuration of the chain. Therefore, consultancy is crucial before implementation.

- *Describe the results, achievements and typical failures*

Usually customizing services up to the specific situation is needed. Thanks to customized solutions, the implementation and training sessions are executed on a very efficient level. It has been noted that after the implementation of Logopak's solutions in food processing companies, the labelling process is much faster and of higher quality.

5. Summarize what makes the case to a good practice.

Labelling and traceability solutions play important role for the exchange of information and quality management. Implementation of a customer-tailored labelling systems enables labelling products in a more efficient way and in higher quality. Therefore, the products may be traced easily. Depending on the food product and its packaging type, the labels may be applied using both contact and non-contact labelling, also the sizes of labels may be adjusted to the requirements. High speed printing and labelling of commercial units as well as usability for serial production create added value.

Thanks to the implementation of customer-tailored labelling process the improvement in below mentioned areas can be visible:

- Tracking and tracing
- Recall management
- Regulations compliance
- Product performance
- Risk assessment and management
- Information for users
- End-user satisfaction

4.2.6. Driver assistance system for agricultural vehicles

1. **Title of the case description**

Driver assistance system for agricultural vehicles

Author: Biz-UP

2. **Indicate the region:** Austria and neighboring countries
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics	x				x		x	x		
Food safety, quality, label										
Food design										

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

Realize more effective and comfortable work on agricultural land for mowing, harvesting or soil cultivation. An assistance system should shorten the working time and the driver is relieved permanently.

A main reason is the possibility to use the system flexibly for a variety of applications and be independent from global positioning systems. The assistance system should use structures on field and meadow for the navigation. This approach allows immediate operation without the need to access stored information on the agricultural area. In contrast, GPS based systems require more information on the agricultural area, and all vehicles need to be equipped with according receivers, which means more effort and typically higher cost. This effort is not necessary for the desired product.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The main businesses are special products for grassland, tillage and seed drill technology, with a focus on creating advantages for the customers. Costumers are small to large scale farms, contractors, machinery rings and associations in the arable and mixed agricultural regions. A wide range of products enables to match the specifications of the different life styles and working conditions of the customers, from small mountain farms in the Alps, to huge operations on the plains in Hungary or Northern Germany. Typical products are mowers, tedders, rakes, loader wagons, ploughs, harrows and seed drills.

   - *Describe the method, procedure, solution implemented*

A laser-based surveying sensor supports agriculture in the mapping and automation of operations.

A 2D laser distance scanner system developed by the Linz Center of Mechatronics GmbH (LCM) specially developed for use in agriculture with robust evaluation electronics allows flexible use for a variety of applications.

The relative position determination of the tractor against structures on field and meadow actively supports the driver and optimizes the various work processes. For example, it is possible to reliably recognize the hay swath and calculate its cross-section during loading. Intelligent evaluation algorithms transform these data into a reliable image of the environment and steering trajectory and provide corresponding control commands to the tractor both for optimal steering and velocity control.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

A specific constraint is to use the system flexible for a variety of applications and be independent from global positioning systems. Moreover the system is used in harsh outdoor environment, in outdoor temperature ranges and wet conditions.

- *Describe the results, achievements and typical failures*

In order to compensate for the effects of vibrations of the scanner during the journey, the inclination of the tractor against the ground and a large number of different environmental influences in the measuring signal, the algorithms were implemented in specially constructed, robust evaluation electronics. Particular attention has been paid to interference immunity, as well as the detection and resolution of fault conditions, so that the control signals supplied to the tractor are suitable for automated driving operation.

This new system improves many disadvantages of existing systems, e.g. the mounting of the compact sensor on the tractor cab does not interfere with the maneuverability of the trailer and allows the integration of several applications in a system.

5. Summarize what makes the case to a good practice

The driver assistance system for agricultural vehicles makes it possible to increase the efficiency of the harvesting application with relatively little cost and space expenditure, and to introduce the harvest more quickly, more precisely and more cost-effectively.

4.2.7. OEE (Overall Equipment Effectiveness) for bottling process

1. **Title of the case description:**

OEE (Overall Equipment Effectiveness) for bottling process

Author: Biz-UP

2. **Cross-reference table**

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
Mechatronics	x	x			x		x	x		
Food safety, quality, label	x	x			x		x	x		
Food design										

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

3. **Short description of the case (from ½ page – 3 pages)**
   - *Describe the specific need or problem being addressed by the case*

A bottling company became aware of the need for a top-level performance, flexibility and functionality with demanding mechatronics in order to **digitize the bottling process**. The challenge was, that at this company five different bottling plants had to be digitized.

   - *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

As an innovative market leader, the company dominates and designs the beer market in Austria. The uniqueness of the Brewery is due to its brand portfolio with international, national and regional beer brands. The performance spectrum, reliability and the high quality claim is recognized and makes them to the preferred partner in the beverage sector. The trade is geared towards sustained value growth and secures financial success. The enthusiasm for the products and the consumers as well as the genuine enjoyment is alive.

   - *Describe the method, procedure, solution implemented*

An automation system for the whole bottling process was implemented. This includes all necessary hardware as well as according software. The automation in this alcohol industry as well as the data exchange of the different machines is controlled by a special ERP (Enterprise-Resource-Planning) system and monitored and secured by the PLC (programmable logic controller).

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

The challenge was that digitization of each of the five plants had to be built with the same parts, in order to ensure a transparency in the processes. However, not only the processes but also the critical parts have to be monitored in order to react more quickly to a possible failure of the plants.

- *Describe the results, achievements and typical failures*

OEE (Overall Equipment Effectiveness) is the gold standard for measuring manufacturing productivity. Simply put – it identifies the percentage of manufacturing time that is truly productive. An OEE score of 100% means you are manufacturing only Good Parts, as fast as possible, with no Stop Time. In the language of OEE that means 100% Quality (only Good Parts), 100% Performance (as fast as possible), and 100% Availability (no Stop Time).

Measuring OEE is a manufacturing best practice. By measuring OEE and the underlying losses, you will gain important insights on how to systematically improve your manufacturing process. OEE is the single best metric for identifying losses, benchmarking progress, and improving the productivity of manufacturing equipment (i.e., eliminating waste).

Through the new control systems and the automation of the processes the beer producing company found out a productivity mode very quickly. After half a year production the desired quality of bottling was achieved. By a meaningful rule parameterization, the automation systems (Siemens) also helped saving energy. That applies especially for the over 800 drives for each plant, which are all based on frequency converters. The waste heat can be used further in the plant.

4. Summarize what makes the case to a good practice

Actually, the digitization of different plants has been realized, operated independently of one another, but linked through a uniform operating concept.

Optimal deployment of staff and synergies in maintenance and training thanks to the shared control center.

Reduction of data entry to a minimum thanks to eventdriven, automated data transfer from SAP to SIMATIC IT and SIMATIC Braumat.

Energy savings thanks to optimized controller settings.

The MES (Manufacturing Execution System) is used for the daily analysis of critical points and parts in the plant.

4.2.8. Novel NDT method for monitoring seal of aluminium packaging of convenience food

1. **Title of the case description**

Novel NDT method for monitoring seal of aluminium packaging of convenience food

Author: Biz-UP

2. **Indicate the region:** Upper Austria

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics	x	x			x		x	x		
Food safety, quality, label	x	x			x		x	x		
Food design										

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

Convenience-food is, in many cases, sold in sealed aluminum packagings. The polymer seal is manufactured in a highly automatized and fast hot sealing process.

This seal has to ensure two different aspects: it has to be tight and strong to ensure proper shelf life of the product even when the seal is stressed during heat treatment in production or during transport and manual handling. And in the same time it has to allow for easy opening of the bowl by the customers.These quality needs of the seal are determined by process parameters during sealing – and the main control parameter is the resulting thickness of the seal. Thus, this resulting thickness of the seal has to be monitored.The standard approach is, to take a sample out of the process, cut the seal area and etch away the aluminum. The residue after the etching is the polymeric seal – and its thickness is measured manually by means of micrometer gauge.This measurement process is neither easy to carry out nor easy to be mechatronically automatized. So, another way was sought to perform the measurement.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

This case was implemented in Austria in a cooperation between a packaging materials company (with 900 employees) and the research company RECENDT, specialized on NDT-solutions.

- *Describe the method, procedure, solution implemented*

Laser Ultrasound (LUS) is a rather novel technology in NDT (non-destructive testing). It is an extremely accurate high resolution ultrasound testing method. The ultrasound waves are created by laser beams which can be perfectly focused on tiny or fragile structures. By very accurate measurement of the time-of-flight of the very high frequency ultrasound, the thickness of material, e.g., this sealing layer under test, can be precisely determined.

LUS is a non-destructive and contactless method. This makes it highly appropriate for being automatized by application of mechatronic solutions.

In this case, we analyzed the options and needs of the client and finally realized an automated at-line measurement station, where a sample bowl is manually placed in a measurement device and the measurement, the data analysis and the generation of a report are done automatically.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

No constraints from the business side. As a completely automatized solution was presented, which does not need any conceptual modifications of the production process but only optimizes the measurement process there have not been any objectives.

There were slight constraints about the used laser light. As the LUS system is put in a housing, the danger caused by the laser is eliminated.

- *Describe the results, achievements and typical failures*

The standard method described earlier was time consuming and tedious. Due to this fact, it was not arbitrarily scalable, limiting the density of the safety net of quality control.

By implementing a novel and sophisticated NDT-technology in a fully automatized mechatronic system we allow for operation by standard skilled personnel.

At the moment, an at-line solution was implemented (fitting the needs of the client), but there are no technical reasons preventing a scale-up, multiplication or inline-integration of the system.

The solution prevents health hazards borne by the standard method where handling of acids was necessary and allows the operators to concentrate on more productive tasks than performing tedious measurements: they can focus on the process and optimize the configuration of the machines – based on the data from automated quality control.

5. Summarize what makes the case to a good practice

The method presents a cost efficient way to provide a tight quality assurance, ensuring optimum product performance and user satisfaction.

By implementing a novel and sophisticated NDT-technology in a fully automatized mechatronic system we allow for operation by standard skilled personnel.

The solution prevents health hazards borne by the standard method where handling of acids was necessary.

4.2.9. IR spectroscopy for the detection of sugar-ends in potatoes

1. Title of the case description

IR spectroscopy for the detection of sugar-ends in potatoes

Author: Biz-UP

2. Indicate the region: Upper Austria

3. Cross-reference table

	1	2	3	4	5	6	7	8	9	
Mechatronics	x	x			x					
Food safety, quality, label	x	x			x					
Food design										

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. Short description of the case (from ½ page – 3 pages)

French fries, made of potatoes, get (dark) brown after frying, if the sugar concentration in parts of the potatoes is too high. These potato sugar ends are not visible with the naked eye.

To ensure high quality of the end product, the potatoes with sugar ends or other quality-affecting anomalies shall be sorted out.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The company that implemented the solution, located in Eastern Austria, is a medium sized company with 90 employees, which produces frozen products, made from potatoes. About 100 million kilograms of potatoes from Lower Austria and Burgenland are processed every year. Apart from frozen French fries, also deep-frozen potato dough and a variety of different deep-frozen dumplings are produced.

- *Describe the method, procedure, solution implemented*

Near infrared (NIR) spectroscopy is commonly used in quality control in food processing. In most cases this quality control is performed offline, and only on a random basis. Within a one year project a system was developed which scans the potatoes that are transported on a conveyor belt, derives the chemical composition of the potatoes and sorts out the faulty potatoes. The technology behind is called hyperspectral imaging. This is a high resolution imaging IR spectroscopy method, which determines the chemical composition laterally resolved, with a quite high speed. The gained data

is then calculated with using chemometrical methods and displayed in false color images.

The naked eye cannot recognize a sugar end, whereas the IR imaging system can easily detect this faulty region, which is then displayed in red color.

Additionally, also potatoes with putrid regions are detected by the system.

All potatoes, which do not follow the quality standards are sorted out automatically.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

As IR spectroscopy is very well known for quality control in food processing, there was no principal constraint against the method. But as IR spectroscopy was in this company only known and randomly used offline, in a laboratory, the company was skeptical whether the system would be able to be used inline. As the potatoes are transported quite fast on the conveyor belt, the quality control system also had to follow this speed.

- *Describe the results, achievements and typical failures*

The developed quality control system is capable of automatically sorting out potatoes with sugar ends or putrid regions. This leads on one hand to higher quality of French fries, because the brown regions, coming from the high sugar content, are avoided. Additionally, the system automatically sorts out putrid or damaged potatoes, which leads to a higher speed of processing potato products and thus higher efficiency of the production plant.

A user has to be aware that this is not an off-the-shelf product, so it takes some time to teach the system with the correct parameters for the chemometrical deriving of the chemical composition.

5. **Summarize what makes the case to a good practice**

This case shows, that a well known technology can be further developed to be implemented inline in the production of potato products.

The potato products offer higher quality and the production process is made more efficient.

4.3. Design

4.3.1. Business model development- GALA COSMETICI srl

1. **Title of the case description**

GALA COSMETICI srl: a new business model

(RIF T.2.1.1 VISUAL THINKING TECHNIQUE: BUSINESS MODEL CANVAS FOR FOOD DESIGN (SYNERGIES BETWEEN FOOD and ICT, DESIGN AND CULTURAL AND CREATIVE INDUSTRIES)

Author: CNA-ER

2. **Indicate the region:** EMILIA ROMAGNA
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label									
Food design	x	x			x	x			

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

THE SPECIFIC PROBLEM CONCERNS HOW TO CONCRETLY HELP MICRO AND SMALL COMPANIES, NOT ENOUGH STRUCTURED, TO TURN AN IDEA INTO A VIABLE PROJECT.

SPECIFIC NEEDS:

- THE CHALLENGE OF INTEGRATION BETWEEN THE DIFFERENT COMPONENTS OF THE SUPPLY CHAIN AND THE LACK OF COMMUNICATION AMONG THE STAKEHOLDERS INVOLVED
- THE LIMITED CONTACTS BETWEEN THE MANUFACTURING INDUSTRIES AND THE ADVANCED TECHNOLOGY PROVIDERS
- LOW LEVEL OF MANAGERIAL SKILLS:
    - Involvement of Product and process designers, Interaction designers, Start-uppers
- LOW INTERNATIONAL PROJECTION
- THE LACK OF DIGITALIZATION OF REGIONAL SMES

Within the field of supporting business services, CNA is promoting the implementation of a visual thinking technique, the business model canvas for food design related SMEs (synergies between food and ICT, design and cultural and creative industries).

Gala Cosmetici, a company dealing in natural cosmetics, is one of the most representative cases of deep analysis on the level of innovation, through a structured interpretation.

The analysis regarded mapping the following areas: innovative culture, understanding the business, strategy, structure capability and resources and processes.

Some specific needs on management emerged thanks to this analysis.

In particular, the needs of this company were ascribable to the following contexts:

- Management style
- Planning an effective commercial action
- Non-defined business model

This tool offered suggestions and indications of improvement to be applied to the company.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

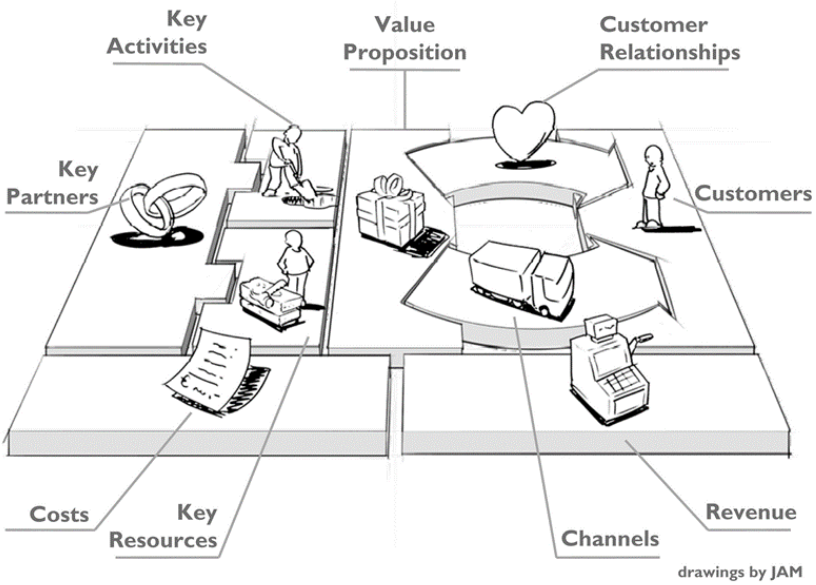
Gala Cosmetici s.r.l. is located in Forlì (Italy) and was created in 2004 for the initiative of three friends and professionals of the sector who decided to join their competences, motivation and experiences to offer a new modality to produce for third parties in the sector of natural cosmetics. The company was established in 2004 and its headquarters are located in Forlì. Number of employees: 30.

This company is specialized in the design and production of natural and organic cosmetics for the care of face, body and hair, using ingredients deriving from coconut, oat, almond and aloe.

For Gala Cosmetici the future of cosmetics is ORGANIC, meant as a combination of innovation and creativity.

- *Describe the method, procedure, solution implemented*

THIS TECHNIQUE IS A STRATEGIC MANAGEMENT AND LEAN STARTUP TEMPLATE FOR DEVELOPING NEW OR DOCUMENTING EXISTING BUSINESS MODELS. IT IS A VISUAL CHART WITH ELEMENTS DESCRIBING A FIRM'S OR PRODUCT'S VALUE PROPOSITION, INFRASTRUCTURE, CUSTOMERS, AND FINANCES. IT ASSISTS FIRMS IN ALIGNING THEIR ACTIVITIES BY ILLUSTRATING POTENTIAL TRADE-OFFS. HERE BELOW THE TOOL:



- In the framework of innovation and research collaboration and S3 implementation, in the Emilia Romagna region we are working on new forms, functions and applications for the craft products in order to provide the most extensive customization, in relation to the identity characteristics of the Made in Italy, to:
    - 1. develop **innovative business models**, also with reference to new consumption models, to new distribution channels and new forms of customers relationship management;
    - 2. improve the use of advanced technologies and skills for the **production of multi-platform contents** to stimulate the development of new solutions of usability of products/services;
    - 3. favor the development of **new formats and innovative communication solutions** able to add to products and services a symbolic and identity, as well as relational and experiential value, apt to strengthen their competitive capacity in the reference markets;
    - 4. increase the use of **participatory technologies** for the production of contents (co-design) with the objective to favor the customization and personalization of products/services;
    - 5. favor **economies of scale** in the supply of products/services stimulating a larger diffusion of ICT tools and of design thinking and design management.

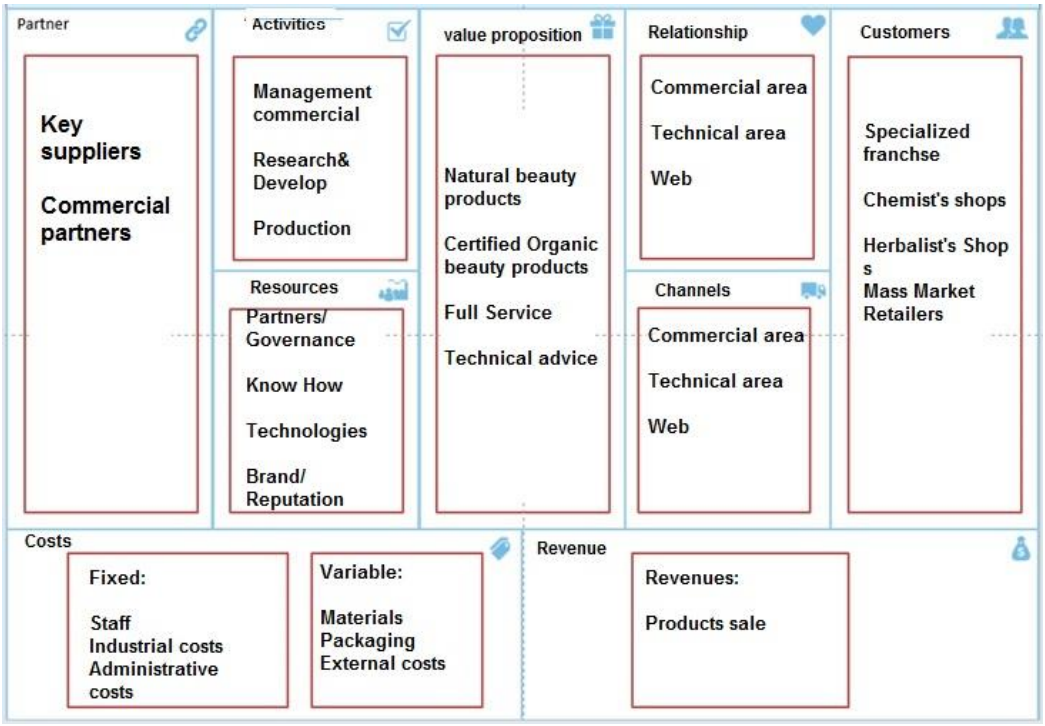
PRODUCTION PROCESS TO INVOLVE:

- Design thinking
- Design management
- Lean business model
- Graphic design and Content management
- Collaborative tools of fund raising/market promotion (crowdfunding)

BUSINESS MODEL – INPUT FOR NEW SOLUTIONS

- Crowdfunding and sharing economy platforms
- New consumption models
- New public typologies
- New collaboration modalities

The analysis of the company's needs started from the use of the Business Model Canvas, in which the nine elements forming the company have been represented in the form of blocks.



The Model highlighted the core processes of this company:

- Resources
- Value proposition
- Relationship

The weak points of the company regard the supply market and the dependence from customers. In collaboration with the business management, a specific action plan has been defined, regarding the following areas:

1) Human resources
2) International development
3) Partnership

Through this path, the business management has implemented the following solutions:

1) Activation of a training path addressed to the internal staff.
2) Definition of an international commercial development plan

3) Aimed research of commercial and technology partners and customers with whom to establish possible collaborations.

- *Describe the results, achievements and typical failures*

The business model canvas, applied by an expert to a SME, enables to identify the improvement areas in a short time and identify the most adequate actions to launch, thus adopting the most effective solutions.

Thanks to the use of this model, the managers have been able to implement effective internal actions to improve their business management.

Moreover, thanks to the support of professionals the company has defined an international commercial plan, identifying some target customers and markets towards which promoting their products.

5. Summarize what makes the case to a good practice

The methodology used is fast, immediate and flexible, as it enables to change perspective and ideas easily and in real time. The great freedom of thought and the easy exposition of ideas the method allows favor the creation and development of innovative ideas and particularly allow the whole team to easily express and understand the different points of view, building highly specialized, valuable and also ample proposals.

The use of this tool enables to enhance and define within the company:

- A strategic vision of the sector it belongs to;
- An internal development path;
- The times to enter a market;
- The competitive modalities, stressing the ability to create value and the sustainability of the business.

4.3.2. FOOD - ART packaging

1. **Title of the case description**

Innovative combination of FOOD - ART packaging

Perger 1757, Gingerbread and Candle making, d.o.o., Glavni trg 34, 2380 Slovenj Gradec, Slovenia (http://www.perger1757.si/en/)

Author: PTP

2. **Indicate the region:** Slovenia
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label									
Food design						x	x		

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Packaging is not only believed to influence buying decisions, but sometimes it is also a medium to communicate the brand's concept and story. Just like food breathes life into our effete bodies (and souls), innovative packaging can help food brands conjure up a lively and friendly image in the minds of the consumers.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Business that implemented the case: Perger 1757, Gingerbread and candle production - small production (8 employees), Slovenia, East Slovenia, Bakery and Confisserie

Typical products: excuisite organic ginger bread, organic jelly bonbons, mead - OL, honey wine and honey brandy.

- *Describe the method, procedure, solution implemented*

The design is contemporary yet traditional, effectively visualizing the high quality of the products.

The key differentiation of this brand is the hand-made manufacturing process that goes hand in glove with traditional recipes since 1757.

Combination of excuisite product with top design: example of Energy heart Gingerbread

The symbol of the truth, beauty and love. Handmade with passion, love and precision, especially for demanding customer. With exclusive gingerbread energy hearts, customers can find inner peace, strength and satisfaction.

Ingredients: Several types of wholemeal flour, Slovenia's finest honey, Slovenian herbs, unrefined cane sugar, glucose syrup, royal jelly, propolis, pollen and crystal clear water from the depths beneath Peca – the land of a King Matjaž. The check of the quality of the mixture that goes into honey dough is following a method already used by our ancestors in 1757. A fresh chicken's egg is lowered into the mixture prepared that very same day. If the egg remains on the surface of the mixture and does not sink, they know we have the right mixture for making Perger's Honey Biscuits of the very finest quality. Product was designed by Oskar Kogoj.

Oskar Kogoj Nature Design:

Oskar Kogoj is famous Slovenian artist. He combines tradition and modernity in his works of art.

A gift can be something of the highest quality, a great achievement of the human mind, research, innovativeness and creativity. It can be an object enriched with history or, if it is designed by Kogoj, an object enriched with Slovenian cultural heritage and modern creativity, which conveys a message about something Slovenian, something that contributes significantly to making our small country known all around the world.

They are all of Slovenian origin, made by Slovenian craftsmen from various materials including glass, porcelain, ceramics, wood, stone, metal, hand-made paper, etc. Each of these materials is a medium through which the artist communicates with the energy of the transcendental.

These items speak about Slovenian culture and promote, strengthen national consciousness.

Perger items have been given as gifts to many presidents, ministers, members of royal families and other famous persons and have thus acquired a worldwide reputation.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

There might be some storage and technical production specific constraints.

- *Describe the results, achievements and typical failures*

To make the tradition even more modern, they focused on the trend of DO IT YOURSELF. People are browsing the web massively to find recipes for real gingerbread. They have saved this, in two years they have developed a product that squeezes in delicious ecological honey biscuits within 5 minutes. Above all, they are also suitable for allergies, as they do not contain eggs, oil and milk.

In year 20017, within the contest Agrobiznis the company received first prize for the most innovative food granted by Slovenian financial newspaper Finace. The most innovative food is Bio honey dough, with which you can prepare a healthy and delicious snack in only 5 minutes:

- Without eggs, oil and milk.
- With royal jelly, propolis and pollen.
- Healthy, quality, ecological.
- Top-notch.
- Made in Slovenia according to the unique family procedures from 1757.

5. Summarize what makes the case to a good practice

Family business Perger 1757 (producer of organic traditional Slovenian products: ginderbread products, other organic honey sweets – for eg. Honey candies, natural lollipops, mead OL-old slovan non alcoholic honey drink, exclusive energy candles etc…) combined innovativity and products with famous Slovenian designer Oskar Kogoj and created exclusive products that are given to presidents, ministers, members of royal families. They have now a longstanding collaboration with the Protocol of the Republic of Slovenia. Products are handmade in the masterful-gingerbread-pastry-candle workshop with a tradition since 1757. The ninth generation of the family is now running the business.The Slovenian arts and crafts products are high quality and meet the requirements of the cultural-historical and ethnographic perspective. They are beautiful, packed in elegant packaging and suitable for a range of gifts and opportunities. The gifts that we have presented as protocol gifts of the Republic of Slovenia have been accepted everywhere, both at home and abroad, with great gratitude.

4.3.3. Life Berry

1. **Title of the case description**

Life Berry

Author: KiGPSO

2. **Indicate the region:** Poland, Masovian Voivodeship

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label	x						x		
Food design		x							

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

The manufacturer of soft fruits produces juices, which have not been to date on the market positioned its new purified juices as eco and premium in order to fill the gap in the profitable segment. Short chain distribution increases margins.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

Small and medium enterprise located in Mazovia Region in Central Poland, specialising in soft fruits juices production. Various compositions of juices are possible up to customer needs and order via internet.

- *Describe the method, procedure, solution implemented*

Based on the market research, the company has developed new products, positioned as eco and premium products. Their own berry plantation allows to reduce weaknesses of the market i.e. information asymmetry with regard on quality and quantity. The chain includes plantation and processing. The distribution is executed mainly via internet.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The consumers' requiremnts change continiously which force the company to perform market research frequently. Since the main distribuiton channel is the online distribution, it narrrows down the target audience as some segment of the consumers refuse to shop online.

- *Describe the results, achievements and typical failures*

The company produces eco and premium fruit juices by using its own plant as a source of the fruit. This method shortened the supply chain and increase the trust of the consumers towards the brand. The brand recevied recognizion as a premium and trustworthy brand. The achievement was a direct distribution and/or omission of wholesalers.

5. Summarize what makes the case to a good practice.

Thanks to the introduction of the new products on the market (eco and premium brand) added value can be offered to the customer. A valuable beverage (up to own composition) at a price that is acceptable in terms of profit for the producer and the final price for the customer can be offered and distributed mainly via internet channel. The company offers variety of fresh juices what meets customers' requirements. Brand is recognized as premium and trustworthy. What is more direct distribution and omission of wholesalers is added value bot for the customer and the enterprise.

4.3.4. Silesian Grain

1. **Title of the case description**

Silesian Grain

Author: KiGPSO

2. **Indicate the region:** Poland, Silesia Region

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics										
Food safety, quality, label	x				x		x			
Food design		x								

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

The food supply chain typically consists of independent stages of the chain specializing in some specific group of processes i.e. purchasing and trade, manufacturing, distribution.

The transactions between the stages of the chain are taking place on the market, therefore the functional weaknesses of the market i.e. information asymmetry, property rights, transaction costs, external effects can occur. To reduce weaknesses of the market i.e. information asymmetry with regard on quality and quantity of agricultural products the group of farmers established the group Silesian Grain that includes the next stage of chain – processing.

The group "Silesian Grain" was created to reduce weaknesses of the market i.e. information asymmetry with regard on quality and quantity of agricultural products. In order to have full and real-time information, an IT solution has been created - namely the data on quality and quantity of all resources used by farmers, as well as, seed treatment, fertilization, full cycle of sowing and so on.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The full control of the process from the field to the finished product through the supply chain and production within the Group has been implemented. Cereals are processed in mills and processed in a unique flour mill. 5500 ha and cereal processing located in Silesia Region.

- *Describe the method, procedure, solution implemented*

Own plantation allows to reduce weaknesses of the market i.e. information asymmetry with regard on quality and quantity. The chain includes plantation and processing. Main distribution through internet.

The farmers incorporated in the Silesian Grain operate the system collecting quality and quantity data on their crops. The system allows to analyze the full cycle of sowing, seed treatment and fertilization as well as crop protection by spraying. Furthermore, tracking and tracing process is much more reliable. This traceability system gives also opportunity to forecast what are the risk in the future – e.g. lack of a proper quantity and/or quality of any resource needed for cultivation process.

The farmers are obliged to insert the data into the system in a real-time. Thanks to this, all the data is up-to-date. Furthermore, the solution is the platform for exchange of experience between the farmers - they can see the data input from others members of the group. Thus, it is not only the traceability tool, but also learning tool for the farmers.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

If a farmer wants to join the Silesian Grain Group, a number of requirements connected with IT have to be fulfilled. Interesed farmers need to have IT infrastructure allowing to implement this IT solution. Also the data needs to be updated into the system in a real time.

- *Describe the results, achievements and typical failures*

The achievemnts are as follows:

- The brand for grain milling products from Silesia region was created, the brand is recognized at the local / country level.
- Full control of the process from the field to the finished product through the supply chain and production within the Group.
- Cereals are processed in mills and processed in a unique flour mill.
- Each memeber of the Group has insight into the opinions and purchaising decisions of farmers
- The cause-and-effect sequence of the market mechanics becomes more transparent

5. Summarize what makes the case to a good practice.

Thanks to the Silesian Group end-user is provided with a product that consists of raw materials from one region. Various components of milling products are possible.

Insurance of high quality and full traceability is provided. The farmers incorporated in the Silesian Grain Group operate the system collecting quality and quantity data on their crop. The system allows to analyze the data on fertilization process or seed treatment. The farmers can also track the crop protection by spraying as well as the full cycle of sowing.

The system allows to analyze the full cycle of sowing, seed treatment and fertilization as well as crop protection by spraying. The system answers the questions “what” and “how much”, as well as allows answering the question “why” some decision-taking processes took place. Furthermore, tracking and tracing process is much more reliable.

The IT solution enables also to foreseen some risk that may occur in the future, e.g. lack of a proper quality and/or quantity of any resource. The farmers that are incorporated in the Silesian Grain Group have a holistic overview on the resources and process in the group. Thus, the exchange of experience and cooperation between farmers is implemented.

4.3.5. Goppion Caffe's packaging redesign and integrated storytelling actions

1. **Title of the case description**:

How Goppion Caffe' revamped "DOLCE", its most reknown coffee blend, through a tasteful redesign of the packaging and other integrated storytelling actions

Author: UNISEF

2. **Indicate the region:** Italy

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics					x					
Food safety, quality, label						x	x			
Food design					x	x	x	x		

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Goppion Caffe' was noticing a continuous decrease in the volume of sales of its blend "Gran Miscela Dolce", the first ever to be produced by the company in 1948 and continuously in production since then. The target was to revert the trend of its sales while being careful not to divert the interest of present customers of the other products of the company but attracting new customers toward Goppion's production.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

GOPPION CAFFE' S.p.a. is a producer of roasted coffee blends. Its headquarter and production site is located in Preganziol (TV), Italy just 20 km north of Venice. It has an overall staff of 35 people and an additional team of 15 representative agents. It imports coffee grains from South America, Africa and Asia and exports its final products mostly in Europe and Asia.

- *Describe the method, procedure, solution implemented*

Goppion Caffe' decided to support its old-famed flagship "Gran Miscela Dolce" through an integrated set of actions of storytelling to let its customers perceive and understand the source of Goppion's knowledge and competence in coffee processing and blending. The company went through a thorough recollection of the history of coffee trade,

processing and consumption in Europe, which started in Venice at the end of 16th century and then developed and spread through the the Venetian republic trades and political relationships. Goppion Caffe' then distilled and poured this information in a new packaging design and other storytelling supporting materials, also making use of graphics taken from ancient paintings of Francesco Guardi, all-Europe famous painter for his portraits of Venice life during the 18th century. Goppion also established an agreement with the Painting Gallery of Ca' D'Oro in Venice in order to access and reproduce the originals paintings.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The main constraint to the implementation of the solution has been the full adherence to the packaging machinery the company already had in place. For this reasons, changes to the physical features of the packages have not been even contemplated.

- *Describe the results, achievements and typical failures*

The implementation of this storytelling actions operated through wise integration of packaging design, information support materials and training of customers has resulted in the restart of the growth in sales of Dolce line of products without cannibalizing any of the other Goppion's lines of product.

5. Summarize what makes the case to a good practice

Care and sensibility in organizing and carrying different integrated actions regarding:

- cooperation agreement with acknowledged partners to recollect content to be storytold
- packaging solution of the product
- training activities for representatives
- reading material available at point of sales
- multimedia content available at company's website

4.3.6. DEEP FROZEN® a superior protocol to better preserve quality of the seafood

1. **Title of the case description**:

DEEP FROZEN®: from the sea straight to your dish fresher, healthier, tastier than ever seafood

Author: UNISEF

2. **Indicate the region:** Italy

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics		x			x					
Food safety, quality, label		x	x	x	x		x			
Food design		x	x	x	x	x	x	x		

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

The purpose of the Fiorital is to bring the flavors of the freshly caught fish from the seas on the dish of its customers.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

FIORITAL S.p.a. is a company operating in the field of fresh fish storage and commerce, located in Venice (Italy) and with a staff of 260 people. Since the 1990's it operates also as fish product processor. Its production of sea products comprises both fresh and frozen seafood items.

- *Describe the method, procedure, solution implemented*

To succeed in its purpose, Fiorital has developed Deepfrozen®, an exclusive protocol through which extreme cold (between -60° and -120° C) is promptly applied to the fish directly on board or when just unloaded from the boat. This technology, combined with a careful selection of the raw material, let the product preserve over time its flavor, hydration, nutritional characteristics and original freshness. The whole process is continuously monitored by a strict analysis and control system, which last year entailed the performing of over 32.000 analysis tests.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Fiorital had to overcome the constraints of the methods in use to farm the seafood and prepare the raw material. They succeeded adopting a self-developed processing protocol that sets limits about freshness, health and safety which are 50% lower than those enforced by international regulations and standards.

- *Describe the results, achievements and typical failures*

The appreciation at the consumer level is so high that already Large Retail Organizations are opening their distribution channels to this novel way of offering seafood, despite the specific care needed to guarantee a -60°C cold chain.

5. Summarize what makes the case to a good practice

This case is a model of good practice in the company's approach of taking in account every step of the seafood processing chain from the sea to the dish on the table, to the point of developing a processing protocol that surpasses by far any regulation requirement to the point of surprising consumers' expectations.

4.3.7. PGI WHITE ASPARAGUS- how to improve your company's warehouse rotation index with a clever packaging design

1. **Title of the case description**:

PGI WHITE ASPARAGUS-how to improve your company's warehouse rotation index with a clever packaging design

Author: UNISEF

2. **Indicate the region:** Italy

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics	x									
Food safety, quality, label	x	x		x	x	x				
Food design	x			x	x	x				

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Dealing with the packaging of White Asparagus, OPO Veneto was facing a really nasty instance of an usual problem. OPO has to deal with 2 different PGI brands and 3 different producers of White Asparagus, so variety in brands and marks called for a huge quantity of differently labeled yet similar packages. And, as the selling season of the asparagus only lasts two months, unused packages risked to wait an additional year before going into use: something they cannot endure, because the thin cardboard they are made of will degrade after being stored for months in the cold and humidity of a regular warehouse.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

ORGANIZZAZIONE PRODUTTORI ORTOFRUTTICOLI (OPO) VENETO, located in Zero Branco (TV), Italy is a leading Italian Producer Cooperative company operating in the field of fruit and vegetable distribution. It encompasses more than 500 member farmers. OPO Veneto is probably the most important distributor of Italian fruit and vegetable excellencies in the Italian and European markets. It has a yearly turnover of 40 mln €.

- *Describe the method, procedure, solution implemented*

To solve the White Asparagus issue OPO Veneto and its consultants devised a two-parts cardboard package: a *tray,* to contain the vegetable, and a *sleeve cover* that protects the produce and also displays all the labeling, graphics and trade marks related to the specific PGI and/or producer.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure, solution*

Constraints were related to:

- the business model offered by package providers: packages suppliers offers best deals for packages supplied in batches of many thousands of pieces per order,
- the short selling season of the Asparagus, that lasts for two months only,
- the fragmentation of the Asparagus producers, typical of local and traditional cultivated production.

- *Describe the results, achievements and typical failures*

With this original packaging solution OPO Veneto has been able to always use the same "half" of the package (the tray) for any of the different types/brands of Asparagus it distributes, so that the stock of *trays* gets completely used in one selling season. The label-holding *cover* parts of this new design result easier to manufacture and thus can be more easily printed in small batches, subsets of the whole quantity originally delivered by the box supplier. With the new design, the rotation index of the packages for White Asparagus had an improvement of more than 40%.

5. Summarize what makes the case to a good practice

A clever design has improved product management, reducing the time of rotation of the packaging and resulting in meaningful benefit for the company in terms of both occupied warehouse area and financial costs. Additional benefit is the enhanced capability to customize the packaging to the requirements of different producers or customers.

4.3.8. SGAMBARO's organic pasta packaging

1. **Title of the case description**:

With a fine touch: SGAMBARO's successful organic pasta packaging

Author: UNISEF

2. **Indicate the region:** Italy

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics		x		x						
Food safety, quality, label		x		x						
Food design				x	x	x		x		

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages**

- *Describe the specific need or problem being addressed by the case*

Sgambaro needs customers to immediately perceive the unusually high quality standard of its new line of organic pasta and understand its healthiness, cooking performance and organoleptic properties. The company decided to develop a new packaging design with the aim of prompting as much as possible the idea of competence, tradition, care, safety and health.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

SGAMBARO S.p.a. is a durum wheat pasta producer located in Castello di Godego (TV), Italy. With a staff of 50 people, it produces 150 tons of pasta every day. The company sports a 20mln € yearly turnover, with a 10% export share. The three top export countries are Germany, USA and the Japan/Korea area.

- *Describe the method, procedure, solution implemented*

Following an exhausting search in the market among the solutions offered by the packaging operators, Sgambaro opted for a paper-like plastic film to substitute the material used in its traditional bag packaging. The aim is to have the package hinting at the traditionally healthy nature of the contained pasta. The company took this chance also for an integrated redesign of the graphic image of its whole line of packages. The company includes this new packaging solution as an integral part of its

constant action of communicating Sgambaro's long-time corporate behavior devoted to renewable energy usage and environment protection.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Specific constraints Sgambaro had to face relate to the packaging machinery the company has available at the end of the production lines to operate the packaging, which did not allow the use of new materials. Sgambaro overcame this block by acquiring a new packaging line, which will allow the use of the latest currently available packaging films and also of the next generation of more sustainable materials that are already in an advanced stage of development. Another issue the company currently is dealing with relates to the methods to check the perception customers have of its packaged products once they are displayed on the shelves in the supermarkets.

- *Describe the results, achievements and typical failures*

Sgambaro has obtained good feedback from sales surveys it has organized in a few large foodstores. However, the company is not able to compare the sales results with historical data as organic pasta is a new line of product for them.

5. Summarize what makes the case to a good practice

There are three main aspects that make this a case of good practice. First, the careful design that has integrated the traditional-and-reliable look-and-feel of the innovative paper-like packaging film with the brand image of a food company devoted to health, well being and environment. Second, the resolution the company has taken in the strategic decision to invest substantial resources in new machinery. Third, the understanding the company has gained - even if only at the end of the process - that there is need for metrics which will allow to objectively compare the effectiveness of the packaging at conveying to consumers the messages the company is trying to express.

4.3.9. NATIVO- packaging organic food with moral values

1. **Title of the case description**:

NATIVO-how Goppion Caffe' explained to customers of its organic coffee blend that Fairtrade is something to take care of

Author: UNISEF

2. **Indicate the region:** Italy

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics										
Food safety, quality, label				x		x				
Food design		x		x		x				

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

In entering the niche market of organic coffee, the need for Goppion Caffe' was to have customers notice the novelty of its NATIVO new line of organic coffee and acknowledge the attitude of the company towards moral values like naturalness, health and safety.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

GOPPION CAFFE' S.p.a. is a producer of roasted coffee blends. It headquarters and production site is located in Preganziol (TV), Italy just 20 km north of Venice. It sports an overall staff of 35 people and an additional team of 15 representative agents. It imports coffee grains from South America, Africa and Asia and exports its final products mostly in Europe and Asia.

- *Describe the method, procedure, solution implemented*

Goppion Caffe' decided to highlight the introduction of the NATIVO new line of organic coffee siding it with the embrace of the Fairtrade International protocol, the initiative to support sustainable development and empowerment of disadvantaged producers and workers in developing countries. This commitment enabled the company to act on two different media supports to communicate the advent of the new product: one was the graphics of the packaging, the other was a specific brochure to introduce and explain

the Fairtrade protocol that at the time was very little known of. The adopted graphics use simple design and warm colours to recall a "clean" working environment located somewhere in Southern countries or Central America.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The main constraint to the design of graphics of the packaging has been the need of maintaining the physical packages the company already had in use. Another constraint has been to adhere at the different ways customers get in touch with the product: through cans on shelves in food-stores or thorugh cups on tables in coffee bars. A lot of care has been put in deciding size, fonts and graphic format of the brochure used to explain the Fairtrade protocol and the meaning of Goppion Caffe's commitment to it.

- *Describe the results, achievements and typical failures*

These actions have generated a very good reputation for the company among both coffee consumers and coffee professional operators. However, results are mild in terms of specific turnover, as consumers seem to be not ready yet to pay a little more just in support of networks of "special" suppliers. The Netherlands represents at the moment the most important market for NATIVO, probably because there is a greater sensibility of customers toward social and sustainability issues.

5. Summarize what makes the case to a good practice

This case is a good example of "all-around branding": using any chance to consolidate and extend the image of the company, in a mutual virtuous exchange with its products.

4.3.10. Development of vegan lupine-based products

1. **Title of the case description**

Development of vegan lupine-based products

Author: UHOH

2. **Indicate the region:** Germany
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9	
Mechatronics										
Food safety, quality, label										
Food design							x	x		

1.Cost efficiency
2.Quality assurance
3.Risk assessment and risk management
4.Compliance to regulations
5.Product performance
6.Information for users
7.User's satisfaction
8.User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Food consumers are becoming increasingly aware of what they eat, in terms of composition, with special focus on allergenic or pseudo-allergenic substances (e.g. lactose) and potential health benefits. Over the last decade many consumers have been strongly invested in lowering their intake of animal-based products like milk, cheese, meat and eggs, as a consequence of a rising conscience about production processes and animal welfare. Individual eating habits have become an important aspect for personal lifestyle choices and hence push product diversity and development of food products with plant-derived ingredients. The recent business case addresses the development of lactose-, gluten- and cholesterol-free, non-GMO vegan, lupine-based products, as viable plant-based alternatives to animal-based products like milk or yoghurt. Lupine can be grown across the globe, excluding the equator and are able to partly satisfy the demand for proteins in different regions.

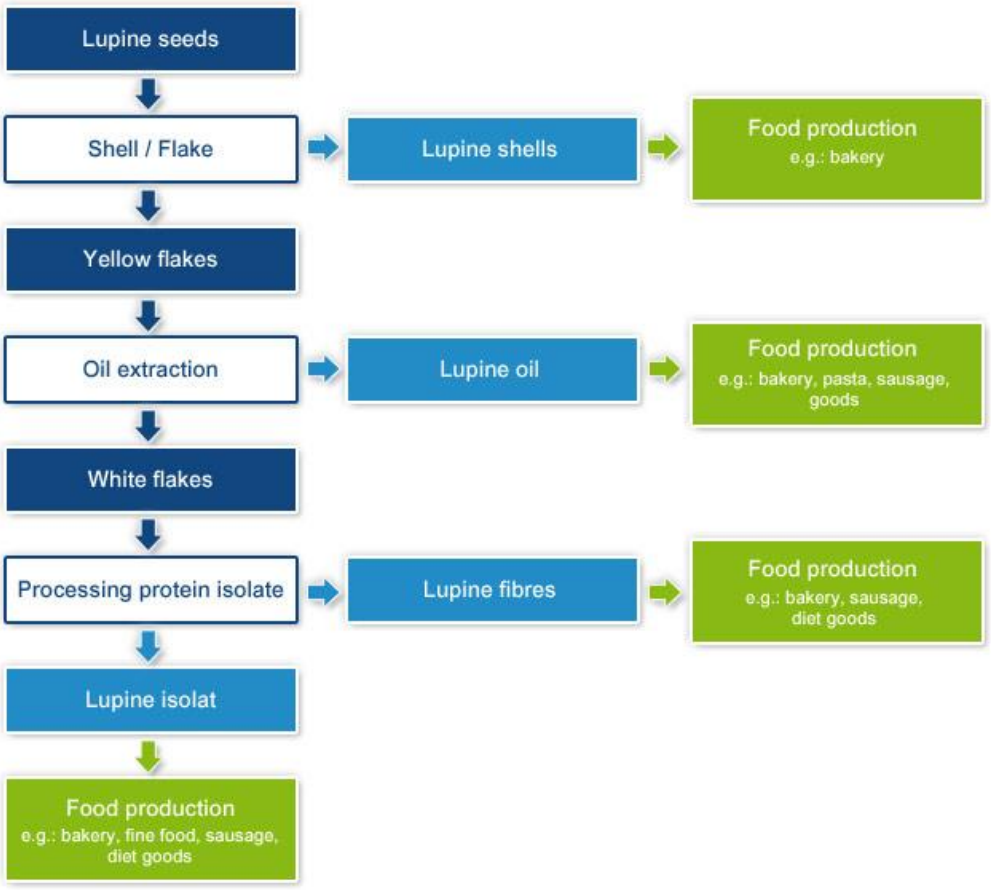
- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

The Prolupin GmbH is a small-sized company, established in 2010 as a Fraunhofer Institute (IVV) spin-off company and based in Grimmen, Germany. The IVV has a long-time experience in fundamental research in the field of extracting plant-based

substances like proteins, fibres and oil. Nowadays, Prolupin GmbH employs 20 people. The product portfolio includes a variety of lupine-protein isolates, lupine oil and lupine fibres on the B2B side and a product line launched under the umbrella brand “MADE WITH LUVE” including lupine-based drinks, spreads, ice cream, desserts, pasta and yoghurts on the B2C side.

Describe the method, procedure, solution implemented

The company implemented a self-developed worldwide patent of extracting different components (protein, oil and fibres) from blue sweet lupine, aimed at recovering 90 % of total protein fractions to ensure a sustainable and economic process.



(taken from https://www.prolupin.com/production-process.html, 03.09.2018)

https://www.prolupin.com/indexen.html

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Extraction success largely depends on the protein source and process conditions. Proteins are very susceptible to high temperatures and their solubility is greatly determined by the pH value of the extraction medium. Severe processing, involving high temperatures and acidic or alkaline conditions often lead to functionality loss and deterioration of protein nativeness. This means, that the extraction process is not

necessarily transferable to other legumes or plant protein sources, but rather specific for lupine protein.

- *Describe the results, achievements and typical failures*

To date, Prolupin developed over 20 different products launched under the umbrella brand MADE WITH LUVE. During the 2015 Anuga Cologne exhibition their raspberry-flavoured yoghurt-alternative was graded one of the top innovations of the exhibition. Prolupin was rated one of the 25 best Startups in Europe in the frame of the European Venture Contest in 2015. In 2016 Prolupin was added to the list of "2015 Global Cleantech 100 Ones To Watch".

5. Summarize what makes the case to a good practice

Prolupin has identified a market demand for healthy, plant-based products and combined with the know-how of Fraunhofer IVV gained throughout research, developed a series of vegan products for the European market. As a key requirement, sustainability has been addressed by choice of a suitable raw material, which can be grown nearly everywhere and has a high nutritional value. As a company closely linked to a research institution, Prolupin is also concerned with the sustainable cultivation of lupine and contributes to the potential of successfully growing lupine worldwide, as a nutritive protein source and alternative to animal-based protein.

4.3.11. Banding instead of wrapping

1. **Title of the case description**

Avoid packaging waste - banding instead of wrapping

Author: UHOH

2. **Indicate the region:** Lower Saxony, Germany
3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label									
Food design	x	x		x			x		

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

Whether customer or salesman, everyone is increasingly paying attention to avoiding waste packaging and conserving the resources of the environment for themselves and for generations to come. This is exactly where A+P Service Peter Schiffmann e.K. comes in with a banding machine for a variety of applications, especially in the fruit and vegetable sector.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

In order to get away from packaging films, A+P Service has launched a new banding machine, in cooperation with Swiss company ATS Tanner and has developed a cardboard tray that protects the goods while also being recyclable.

- *Describe the method, procedure, solution implemented*

The so-called US-2000 makes it possible to set both fixed and variable banderole lengths, so that the banding of different goods is possible without changing the machine. For this reason, this technology can not only to be used with elongated objects such as asparagus, but also for other formats in the industry. "Not only apples and pears but also difficult products such like avocados, persimmons, oranges,

tangerines, grapefruit etc. can be held together and packed in this bowl with a single banderole," says managing director Peter Schiffmann.

Key benefits of the US-2000 include simple, largely automatic loading and great performance. The loading is done manually, but then the process is started by a photocell or foot pedal. The device has an integrated thermal transfer printer, so data can be flexibly printed on the banderole; data such as daily changing lot numbers and EAN codes. The application of a separate logo is possible, depending on the customer, as A+P emphasizes. Various programs can be stored on and retrieved directly from the device.

Just like the punnet, the banderole is recyclable, confirms Schiffmann. An integrated printer that will print all important data (logo, EAN code, lot number, size, etc.) directly onto the banderole, will make a label unnecessary. The banderoles are suitable for various bowl sizes up to 2 Kg (those with 8 apples, for example)

Through the same system, goods without carriers like bananas, rhubarb, leek, etc. can be banded and priced. "A versatile machine that impresses people not only through its

environmental friendliness but also trough its simple handling. It is unnecessary to change the machine from carrier goods to goods without carriers," Schiffmann says.

The banderoles are available in different colours and widths. Banderoles can also be made individually according to customer requirements, with or without layout. The management of the company is convinced of the flexibility, mobility, economy and ease of use of its devices.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

Information not available.

5. Summarize what makes the case to a good practice

- Flexible, mobile and economical: Key benefits of the banding machine US-2000 include simple, largely automatic loading and great performance.
- Use of recyclable banderols and punnets, avoiding packaging films for fruits and vegetables.

4.3.12. Innovative near-zero packaging for PET bottles and can multipacks

1. **Title of the case description**

Innovative near-zero packaging for PET bottles and can multipacks

Author: UHOH

2. **Indicate the region:** Kleve, Germany

3. **Cross-reference table**

	1	2	3	4	5	6	7	8	9
Mechatronics									
Food safety, quality, label									
Food design	x	x					x	x	

1. Cost efficiency
2. Quality assurance
3. Risk assessment and risk management
4. Compliance to regulations
5. Product performance
6. Information for users
7. User's satisfaction
8. User's feedback and reaction
9. Others

4. **Short description of the case (from ½ page – 3 pages)**

- *Describe the specific need or problem being addressed by the case*

The worldwide plastic production volume adds up to 300 million tons annually. Plastic products are manifold and can be found in many shapes and forms, for example in plastic bottles, plastic dishes and cuttlery, cosmetics and textiles and many different packaging materials. According to a recent EU report, 700 kilograms of plastic waste finds its way into the ocean, posing a major threat to marine animals and the eco-system., more and more measures are planned to be set into practice tackling this problems, such as new policies aiming to banish single-use plastic products, or enormous ocean cleaning projects. Due to rising media attention on this topic customers are becoming increasingly aware of the consequences of excessive plastic use and are looking for alternative, sustainable solutions to counteract the global accumulation of plastic waste.

- *Describe the business, which implemented the case (size, country, region, location, food sector, typical products, resources)*

NMP Systems is a subsidiary of KHS GmbH in Kleve, Germany. The NMP Systems unit is respnsible for bringing Nature MultiPack™ to market. From a single source, NMP Systems provides complete solutions – inclusing equipment, materials, software

printing expertise, packaging and services. The KHS GmbH is a global company established in 1868 by Karl Kappert and Luis Holstein, who founded the company in Dortmund, Germany. Typical products include packaging and filling systems for beverage, food and non-food applications.

- *Describe the method, procedure, solution implemented*

Multipacks use a few small accurately placed dots of transparent, peelable adhesive on the bottle's or can's surface to form the Natural MultiPack™ in different configurations, avoiding commonly used shrink-wrapping, hi-cone rings or other secondary packing solutions. PET bottles are bonded together to form 2x2 and 2x3 multipacks. Cans are bonded together to form 1x3, 1x4, 2x2, 2x3 and 2x4 multipacks.

- *Describe the specific constraints of the business related to the implementation of the method and/or related to the location, method, procedure , solution*

The company developed special adhesives, that are specifically tailored towards certain surfaces (PET and aluminum cans), meaning an ad-hoc transfer to other materials is unlikely.

- *Describe the results, achievements and typical failures*

The company was able to create a secondary packaging solution, which uses up to 85 percent less material and 67 percent energy, making it an energy-efficient near-to-zero packaging. Typical failures, although not explicitly mentioned, might include insufficient adhesion between the bottles or cans.

5. Summarize what makes the case to a good practice

The presented packaging solution addresses an important environmental issue and contributes to a sustainable production by effectively reducing plastic waste. The company partnered with Carlsberg group, a large beverage enterprise, to launch their product globally under the name “Snap Pack” to pursue their ambitious sustainability goals. Overall, this solution is a great example for sustainable packaging.

5. Analysis of the case studies

One good practice may be relevant for more than one main discipline (Mechatronics, Food safety, quality and labelling and Food design). They have several benefits which help SMEs to improve their competitiveness by showing successful ways to implement such tools. One good practice may be associated with more than one targeted benefits out of the listed nine.

1. Cost efficiency

52% of the good practices focus on improving the cost efficiency in the food safety, quality and labelling area, such as 4.1.1- Detection of foregin bodies and 4.3.4- Silesian Grain.

19% of the identified good practices are related to cost efficiency in mechatronics such as 4.2.1- Power quality improvements and 4.2.9- IR spectroscopy for the detection of sugar-ends in potatoes.

7% of the good practices are related to design area such as 4.3.1- Business model development- GALA COSMETICI srl and 4.23- Food quality and labelling consultation.

ID of regional case studies improving cost efficiency can be seen in Table 1.

	Food safety, quality, labelling		Mechatronics	Food design
Improving cost efficiency	4.1.1 4.1.2 4.1.5 4.1.9 4.1.11 4.1.12 4.1.13 4.1.14 4.1.15 4.1.18	4.1.20 4.1.22 4.1.23 4.1.24 4.1.25 4.2.7 4.2.8 4.2.9 4.3.2 4.3.4 4.3.7	4.2.1 4.2.2. 4.2.3 4.2.6 4.2.7 4.2.8 4.2.9 4.3.7	4.1.20 4.3.1 4.3.7 4.3.11 4.3.12

Table 1: ID of regional case studies improving cost efficiency

2. Quality assurance

62% of the collected good practices focus on quality assurance such as 4.1.2- Food safety consultation and 4.1.17-Gyermely Plc.: integrated supply chain management.

26% of all regional good practices are related to quality assurance in the area of mechatronics such as 4.1.4-FreshSens- photonic sensors and 4.2.8- Novel NDT method for monitoring seal of aluminium packaging of convenience food.

12% of all collected regional best case studies are in the area of food design and focus on quality assurance, such as 4.3.4- Selesian Grain and 4.3.6. DEEP FROZEN® protocol to preserve quality of the seafood.

ID of regional case studies improving quality assessment can be seen in Table 2.

	Food safety, quality, labelling		Mechatronics	Food design
Improving quality assessment	4.1.1 4.1.2 4.1.3 4.1.4 4.1.5 4.1.6 4.1.7 4.1.10 4.1.11 4.1.14 4.1.15 4.1.16	4.1.17 4.1.18 4.1.19 4.1.20 4.1.21 4.1.22 4.1.23 4.1.24 4.1.25 4.1.26 4.2.5 4.2.7 4.2.8 4.2.9 4.3.6 4.3.7	4.1.4 4.2.1 4.2.2. 4.2.3 4.2.4 4.2.5 4.2.7 4.2.8 4.2.9 4.3.6 4.3.8	4.3.1 4.3.2 4.3.4 4.3.6 4.3.9 4.3.11 4.3.12

Table 2: ID of regional case studies improving quality assessment

3. Risk assessment and risk management

50% of all identified case studies are related risk assessment and risk management in the food safety, quality and labelling area, such as 4.1.14- Implementation of the Threat Assessment Critical Control Point (TACCP) system and 4.1.18- Training Academy- ORVA srl.

10% of all the collected regional case studies focus on mechatronics, such as 4.1.4- FreshSens- photonic sensors and 4.2.2- Phizero: synergies development in the benefit category of risk assessment and risk management.

2% (1 case study) the good practice cases was related to food design (4.3.6. DEEP FROZEN® protocol to preserve quality of the seafood).

ID of regional case studies improving risk assessment and risk management can be seen in Table 3.

	Food safety, quality, labelling	Mechatronics	Food design

Improving risk assessment and risk management	4.1.1 4.1.2 4.1.3 4.1.4 4.1.5 4.1.6 4.1.7 4.1.8 4.1.9 4.1.10	4.1.11 4.1.12 4.1.13 4.1.14 4.1.17 4.1.18 4.1.20 4.1.21 4.1.22 4.1.24 4.1.25 4.1.26 4.3.6	4.1.4 4.2.2. 4.2.3 4.2.5	4.3.6

Table 3: ID of regional case studies improving risk assessment and risk management

4. Compliance to regulations

55% of all collected good practices related to compliance to regulations are in the food safety, quality and labelling area, such as 4.1.8- Application of Simplified Microbiological Risk Assessment and 4.1.19- Food and agro-tourism facility.

7% of the good practices are in the field of mechatronics, such as 4.2.3- Innovative and competitive dairy product development and 4.2.4- Völgység Kincse fruit and vegetable juices which are related to compliance to regulations.

12% of the good practices are in the food design area and focus on compliance to regulations, such as 4.3.9- NATIVO- organic coffee blend.

ID of regional case studies improving regulations compliance and its assessment can be seen in Table 4.

	Food safety, quality, labelling		**Mechatronics**	**Food design**
Regulations compliance and its assessment	4.1.1 4.1.2 4.1.3 4.1.5 4.1.6 4.1.7 4.1.8 4.1.9 4.1.10 4.1.11 4.1.12	4.1.13 4.1.14 4.1.18 4.1.19 4.1.20 4.1.21 4.1.22 4.1.24 4.3.6 4.3.7 4.3.8 4.3.9	4.2.3 4.2.4 4.3.8	4.1.20 4.3.8 4.3.9 4.3.11

Table 4: ID of regional case studies improving regulations compliance and its assessment

5. Product performance and its assessment

52% of all identified good practice cases are related to food safety, quality and labelling, such as 4.1.15- Energy management and 4.1.21- Slovak Horalky which focus on the product performance and its assessments.

24% of the good practices are related product performance and its assessments in the area of mechatronics, such as 4.1.4- FreshSens- photonic sensors and 4.2.8- Novel NDT method for monitoring seal of aluminium packaging of convenience food.

12% of the case studies are related to product performance and its assessments is in food design area, this is 4.3.1- Business model development- GALA COSMETICI srl and 4.3.7- 4.3.7. PGI WHITE ASPARAGUS- how to improve your company's warehouse rotation index with a clever packaging design.

ID of regional case studies improving product performance and its assessment can be seen in Table 5.

	Food safety, quality, labelling		Mechatronics	Food design
Product performance	4.1.1 4.1.2 4.1.3 4.1.4 4.1.5 4.1.6 4.1.9 4.1.14 4.1.15 4.1.18 4.1.19	4.1.20 4.1.21 4.1.22 4.1.23 4.1.24 4.1.26 4.2.7 4.2.8 4.2.9 4.3.4 4.3.6 4.3.7	4.1.4 4.2.2. 4.2.3 4.2.4 4.2.6 4.2.7 4.2.8 4.2.9 4.3.5 4.3.6	4.3.1 4.3.5 4.3.6 4.3.7 4.3.8

Table 5: ID of regional case studies improving product performance and its assessment

6. Information for users

31% of all case studies are in the food safety, quality and labelling area, such as 4.23- Food quality and labelling consultation and 4.1.22- Innovative fruit jams which are connected to the category of Information for users.

7% of all good practices related to Information for users are in the mechatronics area, such as 4.1.4- FreshSens- photonic sensors and 4.2.3- Innovative and competitive dairy product development.

17% of all collected good practice cases focus on food design and related to the information for users category, such as 4.3.1- Business model development- GALA COSMETICI srl and 4.3.2- FOOD - ART packaging.

ID of regional case studies providing information for users can be seen in Table 6.

	Food safety, quality, labelling		Mechatronics	Food design
Information for users	4.1.1 4.1.2 4.1.3 4.1.4 4.1.7	4.1.10 4.1.13 4.1.18 4.1.19 4.1.20 4.1.21 4.1.25 4.3.5 4.3.9	4.1.4 4.2.3 4.2.4	4.2.5 4.3.1 4.3.2 4.3.5 4.3.6 4.3.8 4.3.9

Table 6: ID of regional case studies providing information for users

7. User's satisfaction

38% of all identified good practices focus on user's satisfaction in the area of food safety, quality and labelling, such as 4.1.1- Detection of foregin bodies and 4.3.3- Life Berry.

17% of all regional case studies focus user's satisfaction in the area of mechatronics, such as 4.1.4- FreshSens- photonic sensors and 4.2.4- Völgység Kincse fruit and vegetable juices.

7% of the case studies are in food design focus on user's satisfaction, such as 4.3.2- FOOD - ART packaging and 4.3.5- Goppion Caffe's packaging redesign and integraded storytelling actions.

ID of regional case studies improving user's satisfaction can be seen in Table 7.

	Food safety, quality, labelling		Mechatronics	Food design
User's satisfaction	4.1.1 4.1.2 4.1.3 4.1.4 4.1.16 4.1.18 4.1.19 4.1.20 4.1.21	4.1.22 4.1.26 4.2.7 4.2.8 4.3.2 4.3.4 4.3.4 4.3.5 4.3.6	4.1.4 4.2.3 4.2.4 4.2.6 4.2.7 4.2.8 4.3.5	4.3.2 4.3.5 4.3.6 4.3.10 4.3.11 4.3.12

Table 7: ID of regional case studies improving user's satisfaction

8. User's feedback and reaction

26% of the good practices are in the area of food safety, quality and labelling, such as 4.1.3. Bát-Grill Poultry Processing Ltd.: Food safety and quality assurance system and 4.1.16- Multi-head scale of pretzel sticks.

12% of the regional case studies focus on mechatronics, such as 4.2.3- Innovative and competitive dairy product development and 4.2.4- Völgység Kincse fruit and vegetable juices.
7% ofthe good practice cases were related to food design like 4.3.8. SGAMBARO's organic pasta packaging.

ID of regional case studies collecting user's feedback and reaction can be seen in Table 8.

	Food safety, quality, labelling	**Mechatronics**	**Food design**
User's feedback and reaction	4.1.1 4.1.2 4.1.3 4.1.11 4.1.16 4.1.19 4.1.20 4.1.21 4.1.22 4.2.7 4.2.8	4.2.3 4.2.4 4.2.6 4.2.7 4.2.8	4.3.5 4.3.6 4.3.8 4.3.10 4.3.12

Table 8: ID of regional case studies collecting user's feedback and reaction

9. Other

2 good practices (8% of the total) are connected to food safety, quality and labelling. First one was the 4.1.14. Implementation of the Threat Assessment Critical Control Point (TACCP) system, the second one was 4.1.20- Food quality and labelling consultation.

None of the good practice cases were related to mechatronics or food design.

Table 9: Analysis of case studies (numbers)

Nr of case studies	Novelties, benefits and added value								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Improving cost efficiency	**Improving quality assessment**	**Improving risk assessment and risk management**	**Regulations compliance and its assessment**	**Product performance and its assessment**	**Information for users**	**User satisfaction and its assessment**	**User's feedback and reaction**	**Other**
Food safety, quality and labelling	23	28	23	23	23	14	17	11	3
Mechatronics	8	11	4	3	10	3	7	5	0
Food design	5	7	1	6	5	7	6	4	5

Table 10: Analysis of case studies (percage)

Percent of case studies	Novelties, benefits and added value								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Improving cost efficiency	**Improving quality assessment**	**Improving risk assessment and risk management**	**Regulations compliance and its assessment**	**Product performance and its assessment**	**Information for users**	**User satisfaction and its assessment**	**User's feedback and reaction**	**Other**
Food safety, quality and labelling	49	60	49	49	49	30	36	23	6
Mechatronics	17	23	9	6	21	6	15	11	0
Food design	11	15	2	13	11	15	13	9	11

6. Summary

Aim of the Deliverable D.T2.2.2- Regional good practice was to identify relevant technologies and techniques that can be used under sustainable principles where significant savings or quality improvements were made in regions representing by I-CON project partners.

In the previous Deliverable D.T2.2.1- Global/European good practice guideline, European and worldwide good practices were presented aiming to be an extension of the current Deliverable.

47 good practice cases were reported in Deliverable D.T2.2.2 from all region I-CON partners can cover.

Certain good practice cases are application of preventive food safety management systems such as the application of Good Hygienic Practices (4.1.7) or Listeria Management (4.1.6).

Other cases focus on the designing of a food producing facility, from a hygienic point of view and resource efficiency point of view as well.

Some of the collected good practices focus on knowledge transfer, training opportunities and the marketing side of the food industry.

Tools related to quality improvement and new, innovative products as good practices were also listed in this Deliverable.

Next phase of the I-CON project will be the development of D.T2.2.3-Handbook tool which will answer to questions related to transferability and sustainability of the elaborated good practice reports and tested methods presented.