

Handbook tool

Good practice cases





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Who we are

Partners from seven central European countries join their forces to improve entrepreneurial competences and skills in remote areas through food innovation potentials, led by the Pomurje Technology Park (Slovenia).

Slovenia

- Pomurje Technology Park
- Chamber of Agricultural and Food Enterprises

Austria

- Business Upper Austria

Hungary

- Campden BRI Hungary Ltd
- South Transdanubian Regional Innovation Agency

Italy

- CNA Emilia Romagna
- Industry Association Service & Training of Treviso and Pordenone

Germany

- University of Hohenheim

Poland

- Polish Chamber of Food Industry and Packaging

Slovakia

- Slovak Chamber of Commerce and Industry

Who funds us

Our project is funded by the Interreg CENTRAL EUROPE Programme that encourages cooperation on shared challenges in central Europe.

With 246 million Euro of funding from the European Regional Development Fund, the programme supports institutions to work together beyond borders to improve cities and regions in Austria, Croatia, Czech Republic, Germany, Hungary, Italy, Poland, Slovakia and Slovenia.



Improving competences and skills through food sector innovations



2. Introduction

In the framework of the I-CON project, ten competent partners bringing knowledge competences and reliable and strong relationships with their local environments will collaborate to improve entrepreneurial competences and skills in remote areas through food innovation potentials.

The I-CON partners developed this D.T2.2.3-Handbook tool which consists of good practice solutions coming from the area of food safety, quality and labeling, mechatronics and food packaging design and it represents a collection of solution I-CON partners are able to provide as support to the food industry.

The case studies were identified based on the needs, challenges and barriers of the food industry, especially the SMEs in the Central European region covered by the I-CON project.



3. Method

The case studies are grouped by the three main discipline:

- Food safety, quality and labeling
- Mechatronics
- Food design.

Two templates were developed by CBHU in order to identify the global, European (D.T2.2.1) and regional good practice cases (D.T2.2.2) and collect information on transferability and sustainability aspects of each case study.

Case studies describe the benefits of each implemented tools/solutions by providing the cross reference table.

The Handbook tool includes the lessons learnt and answers to questions related to transferability and sustainability of the elaborated good practice reports. These case studies were chosen because they were related to the needs and requirements of companies from a certain Central-European region.

The template covered the following aspects:

- 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 case studies



4.1. Food safety, quality and labelling



4.1.1. Platform of crossed internal audits

1. Title of the case description

Platform of crossed internal audits
Author: PTP
Country/ region addressed: France

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines / 4.1.3 Platform of crossed internal audits

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓	✓	✓	✓	✓
Food design									

4. Concise description

The case is a good example to what exchange means, which can facilitate to obtain or consolidate the national and international certifications of different systems like ISO 9001 Quality management systems, ISO 22000 Food safety management system, retailer standards (BRC, IFS) and/or ISO 14001 Environment management systems.

The system of audit between firms (hereafter called Platform of Auditors) was set up by French companies. The platform helps companies (from small companies to big international groups) in continuous improvement of their quality system with the realization of internal audits. The key points of the success of this platform are:

- The qualification of the auditors,



- Their experience,
- The compliance with the rules of confidentiality and reciprocity,
- The big number of auditors available,
- The reactivity of the system.

There are more and more companies present within the platform, thus more and more audits are carried out each year. Other areas are interested by the installation of a platform of this type. The integration of new reference frames or new audited standards (like ISO 26000) have been thought about for next years.

The success of the case is highlighted by the positive feedback of the official auditors during certification audits. The platform with cross-functional internal audit teams allows for flexibility in assigning internal audit processes and allows for audits to be objective and increases opportunities for continual improvement.

The methods used by this case can be transferred by study visits, by Transfer Protocol, by familiarisation and training and / or by adoption of skills and knowledge.

The lessons learnt from the case are the following:

- „Fresh look“ at food safety audit programmes;
- Movement from compliance to value added audits;
- Food industry professionals equipped with skills to plan and conduct effective internal and supplier audit processes that enable to meet requirements and identify opportunities for continual improvement;
- Shift organizational focus from compliance to continual improvement;

Crossed Internal Audit



- Empower food industry professionals to effectively use audit tools and techniques to identify strengths, weaknesses and opportunities for improvement;
- Maximization of effectiveness and efficiency of food safety operations with limited resources;
- Discussion of informal benchmarking with industry sector peers.

From sustainability point of view, the important aspects are: the capacity building, the motivated members of the platform, the developed linkages within platform, the strong, lasting and equitable partnerships and the built trust.

Other potential application in the future can be the field of food sensors.



4.1.2. Guideline for Cleaning Suited Equipment

1. Title of the case description

Guideline for Cleaning Suited Equipment
Author: CBHU
Region: Global

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines /4.1.7 Guideline for Cleaning Suited Equipment

3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label	✓		✓	✓		✓			
Food design									

4. Concise description

During the last decade, the market of the fresh cut produce industry have undergone relatively rapid growth. However, the consumer-driven demands for more sustainable technologies pose new challenges for the fresh-cut industry.

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 conditions.

In addition the information of the alternative equipment sanitizing strategies given by the guideline are relatively easy to integrate into courses specifically organized for the industry in the



subject of cleaning and disinfection food equipment.

The novelty of the guideline is the quantification of the consequences of the design improvement in terms of hygiene for the fresh-cut food industries. Data obtained here are relevant to be used in risk analysis processes.

New solutions of hygienic design can significantly reduce the cross-contamination from machine surfaces. New diagnostic assays are available for rapid and reliable on site detection of biofilms. The small enterprises are not able to finance the time and cost consuming research of this area. Therefore, the public research results of the European projects focusing into this area are helpful for the industry.

This guideline was collected by the SUSCLEAN consortium at the end phase of the project. Before the completion as one of the expected results the guideline was propagated in leaflets, handouts, posters, open institute days and workshops. The completed code was disseminated in the public part of the project website. Among the listed tools the workshops and the open institute days were the most effective to disseminate the code.

The guideline can be used in seminars held for the fresh cut industry as well as for the manufacturers of the machinery. This kind of knowledge can be shifted to the companies by training courses covering cleaning and disinfection, microbiology, machinery design etc.

To promote the implementation of the “Guideline for Cleaning Suited Equipment” and to generate awareness of the convenience salad industry the link of free downloadable guideline should be directly sent and circulate for the potential user. (http://www.adria.tm.fr/vars/fichiers/Programme-Recherche-et-Developpement/Guideline_for_Cleaning_Suited_Equipment.pdf)

Cleaning Suited Equipment



All fresh cut product manufacturers can implement certain parts of the guidelines, if they have not used before the methods and tests described. Due to the fact, that the different types of guidelines are mostly completed at the end phase of the research projects, special and greater emphasis must be laid on the post-project dissemination activities (e.g. directly circulate the link of this type of free downloadable guidelines). The guideline also useful for the machinery designer.

It is also recommended to translate into the national language of the potential users the background, the aims and the target audience. Also would be useful to translate into the national language the table of content.

As general conclusion it could be suggested for the industry driven organizations to integrate of the knowledge described in this type of guidelines into their industry focused training programs (e.g. alternative methods of cleaning and disinfections for the food industry).

It should be emphasized in general - independently from this tool, that detailed expectations related to the machinery design and technologies of the cleaning and disinfection should be requested by the food industry when a company purchases new machinery. In case of limited knowledge it is recommended for the industry ask external industry experts to specify the requirements before purchasing.

Further information: see the downloadable guideline

http://www.adria.tm.fr/vars/fichiers/Programme-Recherche-et-Developpement/Guideline_for_Cleaning_Suited_Equipment.pdf



4.1.3. Coolomats

1. Title of the case description

Coolomats
Author: KIGPSiO
Global

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines /4.1.12 Coolomats

3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label	✓	✓					✓		
Food design									

4. Concise description

“Coolomat” is an automated locker system offered by a medium size company in Silesia, (Poland), operating in food delivery sector. The system provides the opportunity to the consumers to order their food online, but it spares time for them as they can choose the location to delivery their products.

Thanks to “Coolomats”, end-users have access to fresh and healthy food at any time at their chosen location. In general, the usage of online shopping, including shopping of food products is increasing significantly. Complex IT management systems are needed to keep this trend and to increase customer satisfaction. By working with local suppliers, the “Coolomats” not only supports their development but also provides the quality and freshness of food products to its



customers.

The temperature of the lockers are adjustable which enables the consumers to order frozen, chilled and fresh products as well. At the stage of order picking in the store, the purchases are divided according to the storage temperature. Frozen (even -20C) go to one net, cool (around +4) to the second net. Courier delivers the order to “Coolomats” and leaves everything as intended. Reception of the order is based on SMS or QR code, which the customer receives after delivering the order by the courier in the machine.

Both suppliers and end-customers enjoy the benefits using “Coolomats”. The supplier brings the packaged products to the “Coolomats” from which the customers take it. It saves time and fuel - with one relatively short course, the supplier can “catch” many customers. Whereas the customer gains the same benefits as from the other vending machines. The customer is able to do online shopping, but they do not need to be at home to pick the order up. A convenient location can be chosen by the customer and they can pick the order up whenever they want - the “Coolomats” can be used 24 hours a day. The customer satisfaction can be improved also by the fact that products may be delivered even the same day when the order is placed.

In this case, shortening of the supply chain allows to increase the margin for the stages of the chain involved in value creation. Furthermore, this solution promotes ecological business.

Lessons learnt, the idea of “Coolomats” is an initiative for multiple local producers and is a contractual agreement between producers and chain partners. Entering into cooperation with actors who already are involved in such an initiative is the easiest way to start operating in this area. Furthermore, the website of the

Coolomats



company includes usable information on the benefit to join such business.

From sustainability point of view it should be highlighted, that due to shortening of the supply chain, reduction of resources involved in distribution process can be achieved, reduction of external effects i.e. emissions related to logistics is possible. To keep the proposed solution running advanced IT management system is required. Periodic market research is needed in order to find the optimal locations for new “Coolomats”.

“Coolomats” list the location of available lockers on their website, what is very transparent for the customers. There are also information, such as requirements and benefits, for the people who want to rent the ground for the “Coolomats”.

The solution is possible to apply for any frozen and fresh products. The recommendation is to expand the business to other cities. The next step could be to install smaller versions of “Coolomats” even closer to the end-customer, e.g. inside closed housing estates or in the stairwells.

Further information: <https://coolomat.com/?lang=en>



4.1.4. Biosensor system

1. Title of the case description

Biosensor system (lactate biosensor) that ensures quality and efficiency in the fruit juice industry.
Author: CCIS-CAFÉ
Global

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines / 4.1.9. Biosensor system (lactate biosensor) that ensures quality and efficiency in the fruit juice industry

3. Cross-reference table

	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
Mechatronics	✓	✓							
Food safety, quality, label	✓	✓	✓		✓				
Food design									

4. Concise description

Biosensor system (lactate biosensor) is an efficient sensitive early warning system, which indicates a critical undesired bacterial spoilage during fruit juice production. The methodology was developed under the QUALI JUICE project.

The commercial lactate biosensors can be used to measure lactate concentration in juices during production of juice concentrate and in juices.

The good practice of the case is highlighted by the fact, that this type of biosensors are usually introduced when there is a risk of spoilage. The sensor helps to identify the need of a repeated pasteurization. The requirements and considerations for safe and hygienic production, handling



and processing of fruit and vegetables into semi-industrial products destined for further processing and packaging are very high. Biosensors contribute to the fact that food sources are managed in a way that ensures that contaminants are not present in the food and/or food ingredients to levels which would render end products potentially harmful to human health or unsuitable for human consumption.

Lessons learnt, that this biosensor system technology enables the manufacturers to detect quality deterioration.

If producers are made aware of contamination at an earlier stage, manufacturers can pasteurize the juice and then send it to market. Since this measure consumes energy - thereby raises production costs - it should only be introduced when there is an acute risk of spoilage. In this way, quality assurance which can be offered at a fair price to the customer is guaranteed since efficient production with minimum waste means optimized costs for the manufacturer.

Implementation of biosensors contributes to sector's goal to provide to the consumers a high-quality, convenient and tasty product.

The results of QUALI_JUICE project indicate that commercial biosensors for L-lactate can be used in juice production industry to control the production process and quality of final product. The final choice of the device (biosensor) by the future user (juice producing company) would be defined by its particular demands (simplicity of the measurements, possibility of usage at line) and economic impact (price of the device and consumables).



4.1.5. Innovative food packaging

1. Title of the case description

Innovative food packaging that extends shelf life and reduces footprint.

Author: PTP

Global

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines / 4.1.10 Innovative food packaging that extends shelf life and reduces footprint.

3. Cross-reference table

	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
Mechatronics	✓	✓	✓		✓				
Food safety, quality, label	✓	✓	✓		✓	✓			
Food design	✓	✓	✓		✓				

4. Concise description

The new innovative packages developed by the project BIO4MAP (<http://www.bio4map.eu/>) allow the easy recyclability and it is fully compostable in conditions according to the standard UNE-EN 13432. At production agricultural waste (leaves, greenery) is used as a raw material source for wax based coating production. The developed approach, technique and technology satisfies the top trends in packaging (sustainable food packaging that increases shelf life for fresh pasta and cheese, at a cost 25 percent lower than the other alternatives, and an environmental and carbon footprint reduced by up to 29 percent).

The knowledge, awareness and experience on the active and intelligent packaging in the form of biodegradable, recyclable multilayer transparent film were gained by a multinational European



consortia.

The fully biodegradable and recyclable multilayer transparent packaging film is suitable for modified atmosphere packaging that can be used for all fresh food products which demand modified atmosphere packaging to extend shelf life.

The new biopolymer laminates developed can compete with existing products, because they also involve adapting the protective gas to the specific permeation properties.

It should be emphasized, that from sustainability point of view the developed approach of active and intelligent packaging can be extended beside cheese and fresh pasta to all fresh food that requires a modified atmosphere.

The developed techniques and technologies of co-extrusion, coating and thermoforming processes can be used for development of other packaging materials. All fresh food that requires a modified atmosphere packaging to be preserved can have a benefit from the use of this new packaging.



Food Packaging



4.1.6. Food quality and safety animation clusters called clubs



1. Title of the case description

Food quality and safety animation clusters called clubs as tool for exchange and transfer of knowledge

Author: PTP

Region addressed: Provence-Alpes-Côte d'Azur Region, France



2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines / 4.1.1 Food quality and safety animation clusters called clubs as tool for exchange and transfer of knowledge



3. Cross-reference table

	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
Mechatronics	✓	✓	✓	✓	✓				
Food safety, quality, label	✓	✓	✓	✓	✓	✓	✓		
Food design	✓	✓	✓	✓	✓				



4. Concise description

Food safety and quality experts are interested in strengthening their expertise and knowledge, in good professional and supportive network. The good practice provided by CRITT Agroalimentaire PACA shows that target-oriented professional clubs can provide information about chosen specific field of expertise, enhance personal and professional development and provide endless networking opportunities.

The aims of this cluster called 'clubs' on different subjects are to provide platform for gathering information using different techniques to.



- Get accurate nutritional information for food labels;
- Investigate ways to keep food fresh, safe and attractive;
- Find ways of producing food more quickly and cheaply;
- Test the safety and quality of food.

Using this tool, the food experts and researchers can gain knowledge and experiences of areas like processing technology, food labelling, food safety and quality.

The tool highlighted the importance and efficiency of a platform/club for regular information and knowledge, opinions and experiments exchanging on the food chain.

The lessons learnt from the case are the following:

- Exchange of information is of high quality
- The possibility to meet other companies' experts is strongly appreciated by all the participants.

As the practice is mainly knowledge-based, easily transposable to other countries according to the local circumstances, applicable at all sections of the food supply chain, therefore at food industry SME production as well.

Further information:

- <https://www.myworldofwork.co.uk/my-career-options/food-scientist-or-food-technologist>
- <http://blog.cccctech.com/top-10-reasons-to-join-a-professional-organization>



4.1.7. Introduction of Pain de Belledone as part of the Bio Solidaire® initiative

1. Title of the case description

Introduction of Pain de Belledone as part of the Bio Solidaire® initiative
 Author: STRIA
 Region addressed: Savoie, France

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines / 4.1.4. Introduction of Pain de Belledone as part of the Bio Solidaire® initiative

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓	✓			
Food design									

4. Concise description

The good practice shows how the local economy can be promoted by relying on the strengthening of geographical and relational proximity between the food chain actors. The relational proximity means better mutual knowledge and solidarity between the involved actors. The BioSolidaire label is an efficient tool towards those consumers who consume more and more local food products as part of their regular diet.

Pain de Belledone has developed economic and technical partnerships with local cereal farmers. Aims of this cooperation are:

- re-create connections along the food farmers, millers, bakers,



- to contribute to the maintenance of an economic activity in rural area to ensure the economic sustainability of that region,
- to provide reliable business and professional partnership for the producers of the agricultural products
- to provide a reliable choice for customers a responsible purchasing of products that bear ecological, economic and social values.

The tool highlighted the importance of the cooperation of the local community based on mutual benefits and fair practices which can facilitate the exploitation of niche market opportunities. Specific labelling based on verifiable claims increases attractiveness for consumers and enhance consumer trust.

The organic labels referring organic production and organic solidarity are mainly knowledge-base. This good practice is easily transferable to other countries based on tailoring that the local circumstances. The approach, which is not exclusive, can be implemented in other European countries.

Further information:

- <http://www.infolabel.be>
- <http://www.pain-belledonne.com>



4.1.8. Member Interest Group of Campden BRI UK

1. Title of the case description

Member Interest Group of Campden BRI UK
 Author: CBHU
 Global

2. Reference for the good practice case

D.T2.2.1. Good practice Guidelines / 4.1.2. Member Interest Group of Campden BRI UK

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓	✓	✓	✓	✓
Food design									

4. Concise description

Learning and innovation have been discussed not just as opportunities but as pre-conditions for the sustainability of the food sector.

Collective research and networking are attractive for companies which are not focusing on radical innovation, but just trying to improve the quality of their products and/or the efficiency of their production process and systems and extending their product assortment through incremental innovation.

Campden BRI UK organize Member Interest Groups (MIGs) which are a pre-competitive collaboration between their members. The sector based and the discipline based Member Interest



Groups (MIGs) provide opportunity for the companies who share a topic of interest to meet and share experience, knowledge and ideas and learn from each other while the costs of learning are equally distributed among the members as they pay an annual fee for being a Campden BRI Member.

There are 3 MIG meeting every year where main results of the topic related member-funded researches are presented and, during the discussions the participants can influence the direction of the future researches.

Furthermore, these meetings are a good opportunity for networking with colleagues who have the same interest.

This collaboration does not create any competitive situation between the members as all partner can decide individually how they use the knowledge they get from a MIG meeting, still the cost of the researches are significantly lower.

This collective learning approach can be adopted between different sectors by establishing interdisciplinary Member Interest Groups.

Further information:

There is a dedicate part to MIG on the website of Campden BRI.

<https://www.campdenbri.co.uk/research/migs.php>

Campden
BRI UK



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

1. Title of the case description

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

Author: UHOH

Region: Bad Schwartau, Germany

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.1. 4.1.1. Detection of foreign bodies

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓		✓	✓	
Food design									

4. Concise description

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 food radar detection method is able to detect even small plastic pieces or fruit stone fragments.

For the new food radar system Schwartauer Werke in Bad Schwartau (a German producer of jams, fruit preparations, dessert dressings, cereal bars and syrups) worked together with the Swedish company Food Radar Systems AB. The Swedish 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.

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, paper).

The case is a good example for the practice, how the strategic alliance of two companies can develop new solutions for foreign body detection in food industry, 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. Additionally, the product recalls and the food waste can be minimized. This also helps with the companies' image, as bad press is always more remembered than good press.

The conclusions of the case are the following:

- The strategic alliance of two companies to improve food safety can be a good example for other companies to follow.
- Using a known technology like microwaves to achieve a so far unknown goal in a traditional sector.
- The innovation improves food safety, reduces the risk of contamination and comes together with cost reductions due to less food waste and thus is being sustainable.

The technology is patented. The food producers can test their own food products with the new foreign body detection system in the pilot plants of the companies.

The radar system can be applicable for the food sectors producing emulsions and pumpable products.

Further information: Food Radar System AB, Sweden, <http://www.foodradar.com/contact.php>



4.1.10. Food safety consultation



1. Title of the case description

Food safety consultation
Author: CCIS-CAFE
Region: Slovenia



2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.2. Food safety consultation



3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓	✓	✓	✓	✓
Food design									



4. Concise description

CCIS-CAFE (Chamber of Commerce and Industry of Slovenia / Chamber of Agricultural and Food Enterprises) 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.

CCIS-CAFE provides direct professional help in the form of consulting and providing information and also indirect through organization of professional seminars, conferences to its member companies. 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.



For a company to gain food safety consultation is a substantial possibility to understand how can improve its activity in compliance with food safety standards.

CCIS-CAFE incorporates, represents and links the agricultural and food industry in respect to public authorities and European branch associations; it forms viewpoints and policies towards the social partners and other domestic and foreign associations, it promotes the development of the sector and knowledge flow, ideas and good Slovenian and European practices in the branch.

The case highlights the importance of the role of an association as a multiple purpose adviser.

The system of CCIS-CAFE regarding food safety is well organized and can be easily transferred to other chambers in Slovenia and abroad.

Further information: CCIS-CAFÉ, Dimiceva 13 - SI 1504 - Ljubljana - SLOVENIA.



4.1.11. Guide to the Management of Listeria in Food Processing

1. Title of the case description

Guide to the Management of Listeria in Food Processing
 Author: CBHU
 Region: Central-Hungary

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.6. Listeria Management in Food Processing

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓					
Food design									

4. Concise description

Listeriosis caused by *Listeria monocytogenes* can be serious and has a high hospitalization and fatality rate. *L. monocytogenes* is widespread in the environment and can contaminate a wide range of foods. The risks are well recognized and have to be controlled effectively by application of a coherent prevention program.

Implementation of targeted control of *L. monocytogenes* must be facility and process specific. A medium sized meat processor located in central Hungary applied the methods described in the guideline. The case is an example 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, adequate temperature control, 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.

Key elements for the successful application of Listeria control includes a comprehensive HACCP, right application of High risk zone principles, systematic identification of the potential Listeria contamination sources, control of cross-contamination, frequent environmental monitoring and repeated training of staff.

An effective Listeria control requires a pragmatic approach, transfer of methods to other companies is best achieved through industry-specific guidelines, consulting, trainings and hygiene audits.

The sustainable use of the tool is guaranteed by the consistent application: once the method was introduced, a careful management of the operation and monitoring of the Listeria free status of the product and environment, and systematic review of the results and repeated training of the staff is necessary.

The method can be used in all ready to eat food manufacturing business (meat, dairy, ready meals, sauces as well as quick frozen minimally processed fruits and vegetables that may be consumed without cooking, like quick frozen corn), dealing with foods in which Listeria monocytogenes can grow.

The given practices can be transferred to other food industries in particular where chilled process and storage conditions apply and serve as a foundation for setting up an effective Listeria control plan. Such food businesses include dairy, fish and meat processing, catering and food services but also primary processing (e.g. quick frozen corn and green peas) as catering customers also want to avoid the potential for cross contamination in their facility and set equal microbiological targets for all incoming products.



Management Listeria



4.1.12. Good Hygiene Practice Guidelines

1. Title of the case description

Good Hygiene Practice Guides: 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

Location: Central-Hungary

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.7. Good Hygiene Practice Guides

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label		✓	✓	✓		✓			
Food design									

4. Concise description

To ensure the safe shelf life of a product, the hygiene practice of a food producer and the hygienic level of the factory (plant design, different risk zones within the processing and storage facilities) must be in accordance with the susceptibility of the product.

The case of the soy food producer is a good example to show, how the safety of the product can be assured by the above listed factors and by a repeated heat treatment of the packed product: 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 (e.g. *Listeria monocytogenes*) and spoilage organisms to make their food products safe over a designated shelf life. The lessons learnt from the case are the following:

- A risk assessment is required to take into account the microbiological hazards of the finished product.
- The industry self-control means that based on the regulation the food producer defines the methods, tools and solutions in itself, what necessary and adequate to fulfil the legal requirements and monitor and validate their implementation and effectiveness in itself.
- The determination of the required level of segregation is one of the key element in food hygiene. To understand the low-risk / high-risk / high-care segregation is essential for the food processors.
- If a product can withstand heat treatment, based on feasibility calculations it is possible to decide which solution should be applied (create HRA zones or a subsequent heat treatment in package) to minimize the risk of microorganism growing and producing harmful levels of toxin, throughout the shelf-life of the product.
- For extended shelf-life foods the process should reduce non-proteolytic strains of *Clostridium botulinum* by a factor of 10⁶ (6D process).

Good Hygiene Practice Guidelines



The publications to help the transferability of the method of this elaborated good practice can be summarized as following:

- “Good Hygiene Practice guidelines” which are available for several industrial sectors providing of sector specific detailed explanations and recommendations. (Campden BRI)
- “BRC Global Standard for Food Safety Issue 7” helps to understand the low-risk / high-risk / high-care segregation
- “Heat processing of packaged foods: guidelines for establishing the thermal process” (Campden BRI, G56)
- “Validation and optimization of thermal processing systems: cookers, pasteurizers and sous vide systems” (Campden BRI, G74)
- “Pasteurization: a food industry practical guide” (Campden BRI, G51)
- “Evaluation of product shelf-life for chilled foods” (Campden BRI, G46)

From sustainability point of view the thermal processing is at the centre of food preservation, ensuring that foods are safe from microbiological contamination and remain high in nutritional and sensory attributes. There is an ever growing range of food products preserved by thermal technologies ranging from sterilization (such as canning) to milder pasteurization heat treatments (such as cook-chill). Both the learnt lessons and the related publications listed above can be useful in knowledge transfer.

The repeated heat treatment of the packed product can be recommended for other pasteurization processes too. These type of in-pack processing (where the product is heated and cooled in its own hermetically sealed packaging) or continuous flow (where the product is pasteurized outside the pack and then filled into the pack in a clear or aseptically controlled environment) are common place.



4.1.13. Guide to the Management of Allergens in Food Processing

1. Title of the case description

Guide to the Management of Allergens in Food Processing
Author: CBHU
Location: Central-Hungary

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.10. Allergen Management in Food Processing

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label		✓	✓	✓		✓			
Food design									

4. Concise description

In EU legislation, there are 14 groups of food allergens that must be labelled on food and drink. A food allergy is an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food. 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.

Based on the implemented allergen management program the Hungarian SME was able to avoid



complaints or recall/withdrawal caused by allergens. 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.

The key elements for the successful allergen management and control, as important lessons learnt summarized by the case are the comprehensive HACCP, right application of allergen zoning principles, systematic identification contamination sources, control of cross-contamination, awareness on cleaning requirements between product changeovers and regular monitoring and validation thereof, and repeated awareness training of staff.

The transfer of practices is best achieved through allergen management guidelines and consulting, trainings, Good Manufacturing Practice audits on the site and in co-operation with the suppliers. Once an allergen management programme is introduced and validated for a given food manufacturing site, a careful management of the operation and monitoring of the allergen of the product and environment, systematic review of the results and consumer feedback, and repeated awareness training of the staff is necessary.

As recommendation the given practices can be transferred to any other food businesses (including not only the food manufacturer, but also the catering and food services).



4.1.14. Hygienic design of a food processing factory

1. Title of the case description

Prevention of the possible accumulation of contamination in food manufacturing premise

Author: CBHU

Location: Central-Hungary

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.12. Hygienic design of a Soy food processing factory

3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label	✓		✓	✓					
Food design									

4. Concise description

The hygienic design aspects (e.g. design and construction of floors for food production areas, walls, ceilings, air quality, the pipework services for food production and their supports and hangers etc.) are essential as prerequisites for food safety.

This case with a Soy food processing factory is a good example to maintain the hygiene easier by a well designed and constructed production plant facilitates the operation for the workers and for the company. 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.



The lessons learnt from the case is, that both the risk of microbiological, chemical, physical contamination of the food, and the risk of ingress of pests is reducible by a systematic application of the hygienic design principles for structures and machinery of a food processing. There is a need to systematically and regularly review the design of a food manufacturing plant from the aspect of hygiene.

It should be highlighted, that from knowledge transfer point of view the “Guidelines for the hygienic design, construction and layout of food processing factories G39” (Campden BRI) can be used to create knowledge. The method of hygienic design can be easily transferred by pictures, drawings, schematic illustration with brief explanation. Specific training can be provided on hygiene design. A hygiene/GMP audit of the specific site can be applied and consultancy can be provided.

This method can be recommended and applied widely in all food sectors to reduce accumulated contamination in the producing areas.



4.1.15. Food quality and labelling consultation

1. Title of the case description

Food quality and labelling.

Author: CCIS-CAFE

Region: Slovenia

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.20. Food quality and labelling consultation

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓	✓	✓	✓	✓
Food design									

4. Concise description

Food law especially food labelling rules impose many obligations on food business operators. CCIS-CAFE provides direct professional help in the form of consulting and providing information and indirect through organization of professional seminars, conferences.

Using this tool, the food business operators can reduce the cost of lack of knowledge or understanding of the legislation, especially of bad product labelling.

The tool highlighted the importance of the food related technical advisory and assistant system, the need for advisory forum for SMEs.



The system of CCIS-CAFE regarding food labelling is well organized and can be easily transferred to other chambers in Slovenia and abroad.

Further information: <https://www.gzs.si>



4.1.16. Integrated supply chain management Gyermely Plc.: integrated supply chain management

1. Title of the case description

Gyermely Plc.: integrated supply chain management
 Author: CBHU
 Indicate the region: Komárom-Esztergom county, Hungary

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.17. Gyermely Plc.: integrated supply chain management

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓	✓						
Food design									

4. Concise description

The integrated system provides a full control of the food chain which results in high quality and cost effectiveness. By complementary use of different capabilities along the food chain related to egg, poultry and pasta production and processing results in a better core competence in pasta manufacturing. Gyermely Plc. implementing integrated supply chain managed to reduce its cost, to mitigate risks associated with acquiring raw materials and producing the final product by.

The integrated supply chain covers the activities of the Gyermely Plc. from farm to the final product.

- grain and feed crops cultivation,



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

The tool highlighted the importance of the close collaboration among the actors of the food chain. The wheat route is supervised from the seed production to the milling so the quality of the flour meets the requirements of pasta manufacturing. The available grain base raw material allows the flour adequate nutritional values required for pasta production to be technologically and qualitatively optimized. The own egg production is supervised from the chicken to the eggs so the company can trace all product through all stages of chain. This kind of system gives an effective tool in risk assessment and risk management.

Using this tool, the company managed to build up an economically and efficiently active business. The principles of integrating several steps of the food chain under one owner of establish a collaboration of several businesses along a value chain based on the use of complementary resources, capabilities and competences for improving efficiency, developing new products, improving quality can be applied in other food sector. Successful European examples are known from the meat, poultry industry.

Studying the case study, it can be used as a model training on value chain management.

Further information: <http://gyermelyi.hu/>



4.1.17. Airborne’s TraceMe honey traceability application

1. Title of the case description

Airborne’s TraceMe honey application
 Author: CBHU
 Region: Leeston, New Zealand

2. Reference for the good practice case

D.T2.2.1. Good practice Guidelines / 4.1.6. Airborne’s TraceMe honey application

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓	✓			
Food design									

4. Concise description

Premium quality and high-priced foods are often counterfeit or adulterated. Food manufacturers as supply side market actors have to do something reasonable about this.

Airborne Ltd., the company in the study, is a manufacturer of honeys and beeswax in New Zealand. This company produces among others Mānuka monofloral honey, which is a rich source of amino acids, vitamins, minerals and has a considerably high level of enzymes that have an antibacterial effect. This honey is the most expensive type of honey in the world. That is why it is being adulterated increasingly worldwide.

The company has developed an online application (the TraceMe application) for consumers



to authenticate the variety, quality, origin and parameters of the honey in the jar they have purchasing confirming that it is true to label. To use the app, consumers can easily scan the QR code on the label with their smart phone or go to the company's website, and enter the batch number of the honey to see what's in the jar and where it came from.

The case highlights, that an easy-to use, free application can be a good way to collect information on the purchased products. This application make it easy for the consumers with smartphones to get access to history of the source and status of an item. Lessons learned from the case are, that consumers have become conscious, integrated members of the food chain. Food scandals and food safety issues raised their awareness towards the composition of the purchased products. Providing an application which is suitable to trace back the product to the hives (for honey products) increase the trust of the consumers. Furthermore, by using a relatively new approach shows, that the food business tries to be up-to-date in all field.

This on-line application is also an example for ethical marketing strategy. It is a great opportunity to add extra marketing advantage for the product and increase the sale volume.

From sustainability point of view, the following statements can be made:

- TraceMe is an online application, it has to be regularly updated to consumers can use the latest versions of their mobile phone.
- The displayed information has to be in harmony with the regulations and standards. These also have to be monitored and considered during the update of the application
- Advertise the existence of the application



Airborne honey



in order to win more consumer groups.

For other applications, it is important to note that a traceability system which based on the use of QR codes can be applied in any food industry or in the car industry, or even any other merchandise. It can be adapted for all sort of products, it can be put on vehicle to monitor the transportation condition.

Further information: <http://www.airborne.co.nz>



4.1.18. Water activity measurements

1. Title of the case description

Ensuring food safety and quality in mayonnaise products

Author: CBHU

Region: Central-Hungary

2. Reference for the good practice case

D.T2.2.2. Regional Good practice case reports/ 4.1.5. Water activity measurements

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓				
Food design									

4. Concise description

The growth of bacteria is inhibited at specific activity values, so food business operators should evaluate the effects of the pH and water activity (A_w) combinations in each case of the specific products. The key parameters of mayonnaise were monitored by a producer SME.

Using this tool, there were not pathogen in case of this mayonnaise, which was able to growth.

The tool highlighted the importance of the parameters required interval (low pH, lower A_w than 0.96; salt content) microbiological stability could be improved. As the parameters vary from batch to batch and change, it is extremely important that the key intrinsic factors remain within the safe range. The level of available water can be lowered by physical processes which remove



water, such as drying and concentration, or by the addition of solutes such as salt and sugar, which form chemical bonds with water and prevent it from being used.

It is important to note that in some multi-component foods there may be a variation in A_w within the product. Where A_w is used either alone or in combination with other factors to control the safety of a food it is important that it is controlled to ensure that it is at the required level for every production batch. Due to the nature of the test used to determine water activity, it is unlikely that the level of this factor can be determined throughout all parts of a product. It may therefore be necessary to approach a specialized laboratory to do measurements of A_w and to interpret the data.

Water activity measurement technique can be used in various food processing applications for fresh, mid-dry and dry products. In addition to the food industry the determination of water activity plays an impact role in the tobacco, pharmaceutical and cosmetics industries as well as in seed storage.



4.1.19. Green Packaging Solutions from Grain Fields

1. Title of the case description

Landpack - Green Packaging Solutions from Grain Fields
 Author: UHOH
 Location: Munich, Germany

2. Reference for the good practice case

D.T.2.2. Global case study report /4.1.11. Landpack - Green Packaging Solutions from Grain Fields

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓	✓	✓		✓		✓		
Food design									

4. Concise description

More and more consumers choose to order online fresh products. The delivery of these products cause issues for some supermarkets and other suppliers, especially those who specialized in organic and ecological products. These companies require eco-friendly packaging that provide the desired and needed insulation and damping properties.

Agricultural by-products are often treated as waste without recycling, as they do not meet the criteria necessary for animal or human feed.

Landpack produces climate-neutral, ecological insulating packaging boxes made from dry stalks of cereal plants, which are by-products in agricultural production. The packages are odorless,



moisture-regulating and can be applied for a variety of products, such as fresh and chilled food (fish, meat, dairy, or bakery products), as well as heat- and shock-sensitive products (glass-bottles drinks, confectioneries, canned food, etc.).

In terms of regionality, Landpack established collaborations with many local farmers supervising the whole process chain, therefore providing constant quality.

The short description of the procedure, that the straws are pressed into bulk, plate-like panels during a thermal pressure process (without using adhesives) and encased in a corrugated cardboard material, which is provided by a different company. The company filed a patent for their process. Lessons learned from the case:

- Establishment of a strategic alliance consisting of partners in different areas of expertise for co-development and commercialization of a novel product provided low-risk for the company and access to specialized know-how increasing the potential for successful market integration.
- Using design as an innovation vehicle for a traditional sector translated into new possibilities of material usage and product differentiation
- Simplistic communication, payment models and services improved acceptance of customers and improved satisfaction for farmer and user.

From sustainability point of view, it is needed to be stated, that the concept of using agricultural by-products as packaging material is a great alternative to conventional packaging. Landpack uses abundant by-

Green Packaging Solutions Grain Fields



products from grain farming and converts them into a functional isolation material. With regard to the environmental impact, panels are pressed without using adhesives. The slogan of the company: „Sustainable insulation packaging from straw and hemp - innovative, ecological, compostable.”

Compared to EPS packaging Landpack’s packaging uses no chemicals and only a fraction of the energy needed to produce the EPS packaging is required to produce Landpack’s boxes.

For other applications, it should be noted that the concept can be transferred globally and to a variety of plant species. Apart from packaging and insulation material these products can be used as damping materials as well. Landpack has some requests for developing additional products such as motorcycle rider’s helmets or sport and horse protection.

Further information: <http://landpack.de/>



4.1.20. Testing food safety with photonic sensors

1. Title of the case description

Testing food safety with photonic sensors (FreshSens)

Author: PTP

Location: Slovenia

2. Reference for the good practice case

D.T.2.2.2 Regional case study reports/ 4.1.4. FreshSens- photonic sensors

3. Cross-reference table

	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
Mechatronics	✓	✓			✓	✓	✓		
Food safety, quality, label	✓	✓			✓	✓	✓		
Food design									

4. Concise description

Nowadays, consumer demand for food quality, safety and traceability has increased because of the recent food crises and an increasing number of outbreaks of foodborne illness associated with contaminated food and the pressure on food manufacturers to ensure safety products is increasing with it.

Studies confirm that food wasting is also a big issue, about 1/3 of the food produced in the world for human consumption gets lost or wasted (while still edible) every year. So there is great potential in reducing food waste on a global scale using new methods and applications.

IOS (Institute for Environmental Protection and Sensors) has developed a new, innovative freshness



detection technology (FreshSens) that may change the „existing wasting practices“. FreshSens is a patented optical chemical sensor system, which is a novel approach to assure fresh as high quality of food. The technology is developed for end users (consumers, food service and food retail sector).

The innovation of the technology is that, opposite to the sensors available up to now which was slow and expensive procedures, FreshSens overcame technology challenges, combining the most advance technologies, by introducing optical chemical sensors system to achieve accurate, selective and sensitive data about the food safety, quality and its freshness. So it could decrease food waste. On the other hand it must be noted, that improving the detection of food spoilage is 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 FreshSens can successfully help identify early any food safety threat outbreaks.

From sustainability point of view, it need to be stated, that sensor signals can be also read out with electrochemical device. Furthermore the FreshSens 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. It reduces costs and increases access of quality food to wide range of consumers.

FreshSens sensors have been developed for detecting freshness of food, but it addresses two market sub-segments as well, such as healthcare and fitness.

Further information: IOS, Institute for Environmental Protection and Sensors, Beloruska 7, SI-2000 Maribor, Slovenia: <http://www.ios.si/english/>.



4.1.21. 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

Location: Fejér County, Hungary

2. Reference for the good practice case

D.T.2.2.2. Regional case study report/ 4.1.14. Implementation of the Threat Assessment Critical Control Point (TACCP) system

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓				✓
Food design									

4. Concise description

Nowadays, food defence has turned into a major issue around the world because of the increased number of deliberate food contaminations and frauds.

Due to the emerging threats, the requirements for food defense, authenticity and food fraud are also included in the latest versions of IFS Food (version 6) and BRC Global Standard for Food Safety (Issue 7). IFS, V6 requirements cover the following three categories: defense assessment, site security and personnel and visitor security.

The case with a traditional bakery product manufacturing company in Hungary is a good example to show how to control the different threats towards the products. The company has used Threat



Assessment Critical Control Points (TACCP) as a tool to develop its own food defense plan. The TACCP system helps to identify the weak points and threats, evaluate their impact, likelihood and the risk. Then preventive actions/control measures have to be established 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.

The use of TACCP is a good practice to introduce an efficient food defense plan. The system has a general structure helping to use a multidisciplinary approach to the company's own practice.

The lessons learned from the case is that solutions are needed to be wider than just Due Diligence testing and just to protect property of the company. It is important for food manufacturers and retailers to conduct regular forward-looking risk reviews which are focusing on their own supply chains.

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

It should be highlighted that from knowledge transfer point of view, the method can be easily applied to any food producer. The way of thinking is similar to the well-known HACCP approach. The most effective methods to transfer the knowledge are the different type of trainings and consultancy. Generally, in an SME, there are not enough resources for building an effective system from the base, only get resources for the operation. It is important to take into consideration the specific conditions of the company, the geographical, technological and social environment.

From sustainability point of view, a continuous update necessary both for the training materials

Implementation TACCP System



and reviewing the different cases which arises all over the world and adjust the system to the changes of the operation and the business environment.

The new users of the system have to consider the special conditions, new information from all over the world related to any threats and the possible technological developments.

For more information: Campden BRI Hungary (campden@campdenkht.com)



4.1.22. Implementation of energy management

1. Title of the case description

Implementation of energy management in a German bakery

Author: UHOH

Location: Grundhof, Schleswig-Holstein, Germany

2. Reference for the good practice case

D.T.2.2.2 Regional case study reports/ 4.1.15. Energy management

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label	✓	✓			✓				✓
Food design									

4. Concise description

Energy management is the effective use of energy. It helps to reduce energy consumption, contributing to the reduction of energy costs, thereby it assists to maximise the profit and increase the company's competitiveness.

Unfortunately, most SMEs cannot afford to hire a specialist (e.g. a dedicated energy manager) for energy efficiency analysis and energy-related activities. Thus there is a well-recognized need to target the SMEs with information on concepts and practices of energy management.

The case with Bäcker Thaysen (which is a craftman bakery in Germany) demonstrates how the energy management should be used and what its benefits are. As a part of the implementation of



energy management the bakery has identified energy saving possibilities by the help of an energy audit. An energy audit consists of different steps, e.g. data acquisition, energy balance sheet, production process analysis from energy consumption side, specific energy consumption. After the energy audit, the following step is the identification of energy saving measures (e.g. technical and economic feasibility, conservation in bake ovens, hot water usage, lighting, recalibration of thermostat). After energy saving measures have been selected 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, and evaluation over a period of time giving an indication of the success or failure of the energy saving measures.

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

The implementation of energy management is a good practice and the method of energy management that was developed and introduced in this bakery is a clear and consistent path towards introducing energy management in other practices.

The lessons learned from the case is, that by the efficient use of resources and optimization of production process, the expected energy consumption can be reduced, even without larger investment. But it is better to ask help from an external consultant or an energy expert to conduct the energy audit at the initiation stage.

From knowledge transfer point of view, the method can be easily applied to any bakery. The experience of the bakery in the study indicates that there could be a significant potential to save energy in other bakeries where no energy conservation campaign/saving measures have been taken. Hence, the energy management approach can be one answer to reduce energy consumption and meet CO₂ emission mitigation obligations.

From sustainability point of view, monitoring and evaluation are essential for sustainable use. It is recommended to conduct annual energy audits to monitor the new developments in energy consumption and to review the energy consumption figures with an emphasis on the energy intensity. In addition, optimizing the production process and making it more efficient offers the opportunity to produce higher added value products in large volumes that promote healthy nutrition, thereby increasing the competitiveness of the business and helps to preserve and expand existing sales channels.

The management system used to increase resource efficiency, can be adapted to further processes. Following a similar methodology, it is possible to identify the various source of loss of bakery and any food processing. There can be a significant potential to save energy in other bakeries, and also in similar SME food producers.



4.1.23. Training Academy for Agrifood sector

1. Title of the case description

Training Academy for Agrifood sector
Author: CNA-ER
Location: Emilia Romagna, Italy

2. Reference for the good practice case

D.T.2.2.2 Regional case study reports/ 4.1.18. Training Academy

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓	✓	✓		
Food design									

4. Concise description

Companies should have a rational training plan to strengthen the knowledge and awareness in order to be effective and to support their improvement. CNA EMILIA ROMAGNA, supported by its educational and training body, organized an ad hoc training path for the business growth regarding leadership and management of staff, with a special focus on human resources, because the company's growth objectives are based on skilled workforce.

The training and technology transfer paths carried on by the companies involved in the training confirmed the need and interest in creating 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.



Using this tool gives the companies opportunity to receive 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 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 topics addressed and the skills acquired have had a positive effect on effectiveness of their communication, on their leadership style, on the performance and on the productivity.

It is important to make the local competence system available to the small businesses of the area, in a perspective of constant improvement. Food related SMEs can support the capacity building process by training for competences and skills. Regional associations, like CNA, can favor the use of such resources by identifying public funds opportunities available for companies in order to support their development.

It is a functioning method since it employs monitoring, enabling to promptly obtain the information regarding the quality, relevance and progress of the training path. The information gathered through the monitoring actions has supported the evaluation from the project management and has resulted of great use to integrate innovative and improving elements in the planning of following training paths, also helping to identify further training needs.

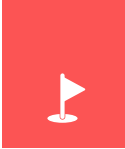
From sustainability point of view, it should be noted, that the sustainable use of this kind of mechanisms to access knowledge requires a

Training Academy Agrifood



systematic analysis of a company's needs and a subsequent design of specialized training paths, to be activated according to the opportunities of public funding (regional/European) or to the availability of a budget from the company itself.

It is advisable to invest on a public-private partnership to guarantee development and innovation for companies, also at international level.



4.1.24. Application of Simplified Microbiological Risk Assessment

1. Title of the case description:

Application of Simplified Microbiological Risk Assessment

Author: CBHU

Location: Hungary

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.1.8 Application of Simplified Microbiological Risk Assessment

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label			✓	✓					
Food design									

4. Concise description

In some cases when the information on the microbiological risks, their causes and their control is not satisfactory, there is a need for a more detailed analysis of the risks than it is carried out in a usual HACCP study. The additional analysis can be provided by the simple, structured approach of microbiological risk profiling usually in combination with predictive microbiological modelling. This additional information implemented into the HACCP system can significantly improve the reliability of the food safety control, can be used for validation of the food safety management system and to provide satisfactory reassurance to the customers on proper control of the risks in response to their specific concerns on microbiological safety.

There is a guideline available (“Industrial microbiological risk assessment: a practical guide 2nd



Ed 2007”) on the application of the method. There is a training course available at Campden BRI and Campden BRI Hungary and expert consultancy is also available.

There are several cases, when simplified industrial microbiological risk assessment can provide an efficient help to validate food safety measures. There is a need to create awareness of the food business of the potential risks associated with their products and processes regularly.

Simplified industrial microbiological risk assessment can be used for a wide range of food applications. In addition to processed meat and vegetable products, ready to eat foods it can be used for dairy products, fresh cut produce, ready meals, chilled and frozen products, etc.



4.1.25. 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
 Location: Hungary

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.1.11. Compliance to high-risk, high-care requirements at several food processing SMEs and other businesses

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓	✓	✓	✓				✓	
Food design									

4. Concise description

For efficient prevention of pathogen contamination (particularly that of *Listeria monocytogenes*) of ready-to-eat products with a systematic design of segregation measures and hygiene barriers is necessary. The measures should be based on the consideration of the routes of contamination including 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, ventilation systems, housekeeping and cleaning, waste removal, protective clothing and laundering, etc.



Alternatives for in pack heat treatment for at least 70°C 2 minutes or equivalent should also be considered. By careful application of these principles to the specific case, the required level of microbiological safety can be ensured in existing facilities at reasonable cost.

There is a guideline available from the BRC (“Understanding High Risk, High Care, and Ambient High Care” - BRC Global Standard for Food Safety Issue 7), there is also a guideline on hygienic design of factories from Campden BRI (Guidelines for the hygienic design, construction and layout of food processing factories - Guideline 39, 2003). Campden BRI Hungary is running training courses on the topic and provides trouble-shooting and consultancy services.

The compliance to requirements of high-risk, high-care, ambient high-care zones is mandatory requirement of the British Retailers and it is included into the BRC standard. For reliable prevention of *Listeria monocytogenes* contamination of ready-to-eat products there are no other alternatives, except cooking in packaging. If the awareness of the benefits of application of these zone design principles is created systematically at food SMEs, there will be a permanent interest for these solutions for several years.

The potential of increasing food safety at manageable costs make the application of this method more attractive for food businesses.

High-risk, high-care zones can be applied in several sectors such as for processed meat products, cheese, fresh cut produce, ready meals, chocolate manufacturing, chilled ready-to-eat produce, cut, chilled sweet corn.



4.1.26. Application of predictive microbiological models for assessing food safety

1. Title of the case description:

Application of predictive microbiological models for assessing food safety

Author: CBHU

Location: Hungary, Greece

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.1.9. Application of predictive microbiological models for assessing food safety

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓		✓	✓	✓				
Food design									

4. Concise description

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.

The overview prepared by Campden BRI gives a short introduction to the science of computer based microbiological models, shows and explains in general the application of the following models: FORECAST, CIMSCEE code, COMBASE predictor system, and PATHOGEN MODELLING PROGRAM (PMP). The potential user of the models can find inside the “white paper” links to the models.

At the end of the Predictive microbiological models “white paper” there are Tables 1 - 8, which are related to the FORECAST, COMBASE, and PMP models , in which the range of the input parameters as range of the use are listed. These Tables can be very helpful, in particular in the model selection.

See further details:

- on the website of Campden BRI UK, or in direct link: <https://www.campdenbri.co.uk/white-papers/predictive-microbiological-models.php>
- in the website of Combase (<http://www.combase.cc/index.php/en/>)
- in the website of USDA from the Pathogen Modeling Program (PMP) (<https://pmp.errc.ars.usda.gov/PMPOnline.aspx>)

Expert advice can be obtained from technical centres in the UK, France, in Hungary (Campden BRI, Hungary), Greece, USA, etc.

Many food businesses may benefit from the application of predictive microbiological models. The broad range of potential users can ensure the sustainability of the application of these tools. There is a need to make them aware on the benefits of this tool through white papers, presentations, etc.

The predictive microbiological models can be applied for decision support and troubleshooting in the meat, dairy, cereal, chilled and frozen food, canned food, ready meals, fish processing sectors.



4.1.27. ESN Guidelines

1. Title of the case description:

ESN (European Sensory Network) Consumer Testing Guidelines
 Author: CBHU
 Location: Hungary

2. Reference for the good practice case

D.T.2.2.1. Good practice Guidelines / 4.1.14. ESN Guidelines

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label					✓	✓	✓		
Food design									

4. Concise description

Even if the companies believe that their new product idea is a guaranteed winner, testing the market before launching can help them to weaken what they're selling or how they're selling it, helping them maximize their profits, etc.

The ESN Consumer Testing guideline follows the ESN practical strategic thinking, as a result of an ongoing dialogue between the ESN members and industry partners.

The topics covered in the guide intend to provide help in the choice of adequate consumer testing method for the people dealing with marketing, new product development (NPD) to give proper answer for decision makers and using the right methods, etc.



The Guidelines include recommendations on different methods. One is the preference map which is a suitable method to identify which attributes are contributing most to the differentiation among products. A company used this method to compare the different varieties/types of raspberry raw materials. The research concluded that the traditional variety, Fertődi Zamatos raspberry growing by the company have better sensory characteristic, more aromatic and sweeter and rather preferred by the consumers, than the imported varieties.

The results can be used well as an argument in the commercial / trade agreements on benefits. It also gave useful information to other frozen food companies using this variety.

The guide is available online on the ESN website. It provides systematic, structured information about the methods in an industry user format which enables all industry players to use it.

Trainings on the different methods are available for companies.

For more:

- <http://www.esn-network.com/>



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

1. Title of the case description

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

Author: CBHU

Location: Hungary

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.1.23. Measuring Overall Equipment Effectiveness (OEE) in a mineral water bottling factory

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label	✓	✓			✓				
Food design									

4. Concise description

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.

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.



Tactual means the actual/measured manufacturing time and Tplanned means the total time that bottling line was expected to work.

- Performance indicator: performance takes into account slow cycles and small stoppages. The Tnotruntime means the unplanned stops, Truntime means the planed running time of the bottling production line and Nproduced means the number of bottles.
- Quality indicator: quality takes into account the bottles not meets the quality standards. Nproduced 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.

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.

Mineral
OEE
Water



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.



4.1.29. Root Cause Analysis trainings for the food industry

1. Title of the case description

Root Cause Analysis trainings for the food industry

Author: CBHU

Location: Hungary

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.1.24. Root Cause Analysis trainings for the food industry

3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label	✓	✓	✓	✓	✓				
Food design									

4. Concise description

If a non-conformity places the safety, legality or quality of food products at risk, it is essential to identify the root cause of the non-conformity, than to implement any necessary actions to prevent the reoccurrence. Root Cause Analysis (RCA) is a method of problem solving used for identifying the root causes of faults or problems. To be effective, RCA must be performed systematically, usually as part of an investigation, with conclusions and root causes that are identified backed up by documented evidence.

RCA is applied in Hungary by food manufacturers too. However, the efficiency of the RCA is limited in many cases: the typical constrains of the RCA are related to the knowledge of the RCA techniques, and their effective application in the practice. To enhance the efficacy of the tool



Campden BRI have developed a training course.

The case is a good example to show how the efficacy of a technique can be improved by a highly interactive knowledge transfer. The RCA methods should be familiarized in the food industry: therefore a training course is useful knowledge transfer tool to train this technique.

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 concerned with the high quality and safe food product: Quality Assurance, Production, Hygiene, Engineering and Maintenance, etc..

The team should be led 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.



4.2. Mechatronics



4.2.1. Digitization of the starch factory

1. Title of the case description:

Digitization of the starch factory
Author: BIZ-UP

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines /4.2.6. Digitization of the starch factory

3. Cross-reference table

	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
Mechatronics	✓	✓			✓	✓	✓	✓	
Food safety, quality, label	✓	✓			✓	✓	✓	✓	
Food design									

4. Concise description

Digitization supports the operator of all relevant information in one place and avoids errors by double input of data. The critical parts are monitored and therefore the efficiency of the system has increased.

Quality of process signals and its transmission can be crucial if used in older plants, due to interfering signals of other machines.

Especially in global companies there has to be put strong effort on data security and on IT security in general.



Consulting overall business processes to develop the best solution for a complete system together with the customer is very challenging, because each plant is unique, but also vitally important, so that all branches of this global company.

Digitization supports customers in the efficient and comprehensible control of production processes. Thus, energy can be saved as well as raw products while maintaining high quality of the final beverage.

The definition of the overall strategy of a company in the area of digitization before the start of the implementation of sub-areas is essential.



4.2.2. Migration of existing Control Systems

1. Title of the case description:

Migration of existing Control Systems
Author: BIZ-UP

2. Reference

D. T2.2.1. Good practice Guidelines / Migration of existing Control Systems

3. Cross-reference table

	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
Mechatronics	✓	✓			✓	✓	✓	✓	
Food safety, quality, label	✓	✓			✓	✓	✓	✓	
Food design									

4. Concise description

Digitization supports the operator of all relevant information in one place and avoids errors by double input of data. The critical parts are monitored and therefore the efficiency of the system has increased.

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The definition of the overall strategy of a company in the area of digitization before the start of the implementation of sub-areas is essential.



4.2.3. PCS7 (Process Control System) for Dairy

1. Title of the case description:

PCS7 (Process Control System) for Dairy
Author: BIZ-UP

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines / PCS7 (Process Control System) for Dairy

3. Cross-reference table

	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
Mechatronics	✓	✓			✓	✓	✓	✓	
Food safety, quality, label	✓	✓			✓	✓	✓	✓	
Food design									

4. Concise description

As it was the first time to integrate new PCS7 APF (advanced process functions) and a specified Touch Panel TP4Dairy, the company has made valuable experience on these new options for dairies.

As the described automation solution is provided by Siemens, who is well known for its Industry 4.0 products, one can assume, that they are willing to solve any automation problem in any specific application. Alternatively, B+R, specialized on automation and Industry 4.0 solutions is also located in Upper Austria and has already realized several automation solutions in food and beverage industry. There are also Upper Austrian SMEs developing Industry 4.0 solutions in special dedicated niche markets.



Apart from increasing the quality by decreasing the energy demand, the automation solution also guarantees highest hygienic standards due to reduced manual handling of food products.

This automation solution has shown that it is easier to introduce Industry 4.0 aspects when building a new plant and compared to this relatively difficult to retrofit an already existing system. In this case the planning phase needs to be performed carefully.



4.2.4. Weight Saving by Testing and Stress analyses for Agriculture Machines

1. Title of the case description:

Weight Saving by Testing and Stress analyses for Agriculture Machines

Author: BIZ-UP

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines / Weight Saving by Testing and Stress analyses for Agriculture Machines

3. Cross-reference table

	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
Mechatronics	✓	✓			✓				
Food safety, quality, label									
Food design									

4. Concise description

The documentation must be very accurate in order to receive the approval of an accreditation office, e.g. TÜV.

Though every mechanical part is different, the overall concept for reconstructing and/or redesigning vehicle parts with light-weight structure can be transferred to many other applications in agriculture and food industry.

For a sustainable environment-friendly agriculture, a lighter weight of tractor or trailers is an important step.



Some TÜV certificates are required as evidence of sustainable use.

Weight saving by testing and stress analyses for food processing machines is also possible and with reduced weight of e.g. moving parts smaller drive systems are necessary. This leads to energy savings and is thus more sustainable for the environment.



4.2.5. OEE (Overall Equipment Effectiveness) for bottling process

1. Title of the case description:

OEE (Overall Equipment Effectiveness) for bottling process
Author: BIZ-UP

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports / 4.2.7. OEE (Overall Equipment Effectiveness) for bottling process

3. Cross-reference table

	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
Mechatronics	✓				✓		✓	✓	
Food safety, quality, label	✓				✓		✓	✓	
Food design									

4. Concise description

Digitization of different plants is very challenging, especially when the have to be controlled with the same control system.

Digitization supports the operator of all relevant information in one place and avoids errors by double input of data. The critical parts are monitored and therefore the efficiency of the system has increased.

Transfer Methods for this practice might be:

- Consulting overall business processes to develop the best solution for a complete



system together with the customer. Because each plant is a unique

- The method can be adopted for other bottling plants, e.g non-alcoholic beverages.
- Addressing the sensor in real-time, which was used in this case, can be further used for other automation applications.
- OEE can obviously also be applied in SMEs, because e.g. in Austria there are many small breweries, who fill their beer into bottles, in fully automated bottling lines.

Digitization supports companies in an efficient and comprehensible control of production and is commonly used as long as the machines, plants, etc. in the factory are producing goods - several of years.

The definition of the overall strategy of a company in the area of digitization before the start of the implementation of sub-areas is essential.

Overall
Equipment
Effectiveness



4.2.6. Driver assistance system for agricultural vehicles



1. Title of the case description

Driver assistance system for agricultural vehicles
Region: Austria and neighboring countries
Author: Biz-UP



2. Reference

D.T.2.2.2. Regional case study reports/ 4.2.6. Driver assistance system for agricultural vehicles



3. Cross-reference table

	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
Mechatronics	✓				✓	✓	✓		
Food safety, quality, label									
Food design									



4. Concise description

The driver assistance system for agricultural vehicles is a major relief but cannot drive completely autonomously and take full responsibility. The application will therefore only go beyond the status of an assistance system with extremely great effort.

Nevertheless, the system can be adapted to many applications as soon as a geometrical structure can be navigated. These structures are present in agricultural field work in all cases by the cultivation of the field or the harvest on the field.

One lesson was the realization that the application for navigation additionally requires a modeling of the agricultural machine so that the feeder is controlled in such a way that the processing



device on the hanger is over the right place.

Transfer Methods for this practice might be:

- Navigation based on geometric structures near the ground
- Modeling of the vehicle for a correct path planning so that the processing on e.g. the feeder in the right place.
- Combine different sensor signals (image processing, tilt, vibration) for a functioning whole system
- Concepts for robust sensor technology and electronics in agricultural applications in outdoor areas
- Methods for the control of an agricultural device and visualization of the results of measurements in the vehicle

Sustainable use is seen in the more effective work on agricultural soils and is adaptable for many applications. The independence from a global localization system and the simple adaptation to many applications is advantageous.

Every application in which a vehicle can be moved autonomously using structures on field and meadow.

Driver Assistance System



4.2.7. The FRISBEE tool

1. Title of the case description

The FRISBEE tool
Author: CCIS-CAFE
Global

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines/ 4.2.2. The FRISBEE tool

3. Cross-reference table

	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
Mechatronics	✓	✓	✓			✓			
Food safety, quality, label	✓	✓	✓			✓			
Food design									

4. Concise description

The FRISBEE tool is a software for assessing cold chains with respect to quality of products, energy use and the CO2 emission (environmental) impact of the refrigeration technologies involved in the cold chain. It contains validated kinetic models that can predict how the quality and safety changes along the cold chain as a function of temperature and time. The tool was developed within the frame of FRISBEE project supported by the EU.

To be competitive the European food industry requires new processes that are economic to operate. The FRISBEE project have developed new market opportunities (nanostructured material, household refrigerators with PCM, super chilling) for European industry and provided them with a competitive advantage. SMEs in particular will benefit from development and demonstration of



high-tech (e.g. nanostructured materials: Bionica start-up created thanks to innovating material developed within FRISBEE), eco-efficient processing and smart control applications.

The FRISBEE tool allows the end user to select a specific food product and to define a custom cold chain. The user can choose default settings or can define the settings of a specific cold chain to the lowest level of detail.

To achieve its aims, FRISBEE project compiled new databases of technologies and food product temperatures. It developed quality, energy and environmental assessment tools to develop and evaluate novel and emerging refrigeration technologies for the European food industry. Work also involved assessing the current cold chain and consumer expectations within Europe, as well as conducting a survey on the needs of refrigeration operators.

The sustainability is a key aspects of the food chain. To reduce the wastage of the chilled food the development of new tools, concepts and solutions for improving refrigeration technologies along the European food cold chain is important.

The FRISBEE Tool is freely available for download by any interested party upon acceptance of this license agreement.

The FRISBEE Tool can only be used for simulating and optimizing the sustainability indicators (namely, quality and safety, energy use and global warming potential) associated with refrigeration technologies in the agro-food cold chain for the food products included in this version.

Further information: <http://frisbeetool.eu/FrisbeeTool/about.html>

The Frisbee Tool



4.2.8. SAFE-BAG

1. Title of the case description

The SAFE-BAG (Novel continuous in-pack decontamination system for fresh produce).
Author: CCIS-CAFÉ
Global

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines/ 4.2.4. The SAFE-BAG

3. Cross-reference table

	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
Mechatronics	✓	✓	✓	✓	✓				
Food safety, quality, label	✓	✓	✓		✓				
Food design									

4. Concise description

A novel continuous in-pack decontamination system for fresh produce is described by the tool: the food package is treated between two high voltage electrodes, the high-voltage process ionizes the gas within the electric field, including the gas contained within the package. It is this mix of active species which results in the anti-microbial effect.

The novelty of this technology lies in generating the plasma inside a sealed package containing the produce, which facilitates rapid treatment and eliminates the risk of post-process contamination.

The impact of the results hold benefits for consumer safety and confidence, extended shelf-life and increased demand for fresh produce, which will in turn impact on the competitiveness of



hundreds of European fresh-cut processing SMEs.

Demonstration of the method indicated that increasing the treatment time always resulted in increased decontamination efficacy.

Scientists tested the treatment on bags containing strawberries, cherry tomatoes and spinach, using *Escherichia coli* and *Salmonella* as the test bacteria. They found that strawberries and cherry tomatoes were not adversely affected, but spinach wilted regardless of treatment mode.

The end-users of the technology are able to differentiate their products and gain competitive advantage, through:

- Increased safety profiles of fresh produce;
- The enhancement of microbiological and organoleptic quality parameters by comparison with current processing protocols will lead to shelf-life extension;
- Reduced water usage: the dry preservation technology will allow a considerable reduction in water as well as wastewater generation;
- Replacement of chlorine: there is a need to eliminate/reduce chlorine from the disinfection process because of its effectiveness and the concerns for the environment, as well as health risks.

Key importance was given to the management of the intellectual properties and in agreement of the dissemination of non-confidential information throughout the project. A preliminary business plan, as well as a post project development word, have been laid out.

By having access to a technology such as SAFE BAG, fresh-cut fruit and vegetable suppliers will be equipped to provide products that deliver on safety, taste and freshness. This will result in an increased confidence in ready-to fresh-produce by the consumers, which will in turn impact

Safe Bag



4.2.9. Green Biotech Cluster of Basilicata (BIOGREEN)

1. Title of the case description

Green Biotech Cluster of Basilicata (BIOGREEN)

Author: STRIA

Region: Basilicata Region, Italy

2. Reference for the good practice case

D. T2.2.1. Good practice Guidelines/ 4.2.1. Green Biotech Cluster of Basilicata (BIOGREEN)

3. Cross-reference table

	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
Mechatronics	✓	✓		✓	✓	✓			
Food safety, quality, label									
Food design									

4. Concise description

The good practice shows that even though innovation is fundamentally considered a cost the presence of a core group of innovative and motivated enterprises can act as best in class models and help in attracting and pushing for further public initiatives. The Green Biotech Cluster of Basilicata's good practice has merits of organizational and technological restructuring at the food industry companies as part of the complex solution, consisting of tangible (machinery, for example) and non-tangible (as knowledge development and innovation brokering) ones.

Using this tool, the good practice covers the following areas:

- the structuring and lunch of the cluster by relations with SMEs and large enterprises,



- financial support to start-ups, intellectual property management, brokerage of innovation, technology transfer, Advisory Unit to the business, product development,
- program for the development of human capital for businesses.

The tool highlighted the importance of the cooperation among the actors of the region based on mutual benefits and fair practices which can facilitate the exploitation of niche market opportunities.

The concept of the Green Biotech Cluster Good Practice is easy to transfer to other countries as its main aims are: establishing a governance and infrastructure collaboration system among key actors' present in the region; facilitate the access of SMEs to innovation and research project to improve their competitiveness and foster local development by increasing the number of SME in high tech fields, and increasing the employment of young and graduated people.

As the practice is mainly knowledge-based, easily transposable to other countries according to the local circumstances.



4.2.10. 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
Location: Slovenia



2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.2.1. Power quality improvements



3. Cross-reference table

	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
Mechatronics	✓	✓							
Food safety, quality, label									
Food design									



4. Concise description

The changes for the European food industry is currently facing are the requirements for the sustainable growth and future success of the food business. Experiences show that by the implementation of the improvements of the electrical power 3% to 6% guaranteed savings is typical for a facility. Therefore the improvements of the electrical power is important, in particular within food business like dairy Pomurske mlekarne d.d., who implemented the case.

The 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.

One of the main challenge is the reducing the energy consumption through power quality improvement. The 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 this case in dairy industrial facilities. The 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).

After a detailed electrical audit of the facility, a proposal is completed by the engineering staff of the service provider, which contains both guaranteed savings and the associated equipment costs. The power quality 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.).

The target groups for good practice transfer are food companies who are facing the following problems: lost production, plant downtime, damaged equipment, higher maintenance costs, shorter equipment life, damaged product, lost revenue, KW & KWH losses, power factor penalties and increased motor heat.

With the improvement of the energy quality and energy savings both the electric energy cost

Power Quality Improvements



and the breakdown of machines due to poor electricity can be reduced, and consequently it will reduce the production failure too. The return of investment estimated in 3-4 years.

It can be useful for any kind of food processing with automated lines.

Further information: Pomurske mlekarne d.d., Slovenia, (<https://www.pomurske-mlekarne.si/en/about-us/>)



4.2.11. Knowledge transfer within industrial research laboratories, innovation centres, technopoles and SMEs within the Agrifood value chain

1. Title of the case description

Knowledge transfer within industrial research laboratories, innovation centres, technopoles and SMEs within the Agrifood value chain: the case of a company in the sector of robotic and automation.

Author: CNA-ER

Region: EMILIA ROMAGNA

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.2.2. Phizero: synergies development

3. Cross-reference table

	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
Mechatronics	✓	✓	✓		✓				
Food safety, quality, label									
Food design									

4. Concise description

Access to the scientific and technological developments for companies enables to develop of new technologies, products, processes, materials or services. The company 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 Technopole 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.



Using this tool gives companies opportunity to acquire new knowledge and solutions through a matching between entrepreneurs and researchers to facilitate the synergy company-research, analyzing rapidly and concretely the problems expressed by companies. Using technology transfer companies can discuss directly with researchers on specific themes, and receive suggestions on how to manage the issues expressed.

The tool highlighted that being a member of the network can be an additional opportunity for the company as well. The companies participating in these working tables have the chance to present themselves and meet others, thus expanding their network of suppliers, becoming themselves suppliers of other companies.

For the technology transfer to be effective, it is necessary to overturn the matching format company-research. It is recommended that the process starts from below, from the companies. A coherent search for partners of industrial research solutions can be activated, through the mediation of the appointed centers.

Further information: CNA Innovazione, Italy, www.cnainnovazione.net

Knowledge
Transfer
Research



4.2.12. 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

Region: South Transdanubia, Hungary

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ Völgység Kincse fruit and vegetable juices

3. Cross-reference table

- 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

	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
Mechatronics		✓		✓	✓	✓	✓	✓	
Food safety, quality, label									
Food design									

4. Concise description

Producing fruit and vegetable juices with traditional processing can be a sustainable and lucrative operation of the farmers of a micro-region. Völgység Kincse Social Cooperative uses Voran and Kreuzmayr machineries to produce high quality artisan fruit and vegetable juices.

Using this tool, the cooperative provides sustainable service from social, environmental and economic points of view for the fruit and vegetable producers of a region.

The tool highlighted the importance of the need of processing capacity for fruit and vegetable production in the micro region as well. An effective way of increasing the value of fresh fruit and vegetable is the safe, high-quality processed product, in this case the production of juice.



The operator/owner of the equipment provides service to the small producers of the region while processing the product of cooperative members. The season-independent operation of the cooperative's food processing unit delivers high quality, but at the same time affordably priced food goods with local workforce.

The Good Practice is very much focused on juice and vegetable production, other fields of applications are not possible. The mechatronics solutions of the Voran and Kreuzmayr technologies, though, could be used in the beverage industry in a wider scale, for example providing ingredients for complex food products.

Other mechatronics solution could be the operation of mobile devices, depends on the location of the raw material/small producers in the region.

Further information: <https://volgysegkincse.hu>



4.2.13. Improvement of water consumption and implementation of a sustainable water cycle

1. Title of the case description

Improvement of water consumption and implementation of a sustainable water cycle by sewage treatment plants in several dairy plants of FrieslandCampina

Author: UHOH

Location: Aalter, Belgium; Heilbronn, Germany

2. Reference for the good practice case

D.T.2.2. Global case study report/ 4.2.3. Improvement of water consumption and implementation of a sustainable water cycle by sewage treatment plants in several dairy plants of FrieslandCampina

3. Cross-reference table

	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
Mechatronics	✓				✓				✓
Food safety, quality, label									
Food design									

4. Concise description

Large amount of water is required for food production directly and indirectly. This begins with watering in food cultivation and feed and is proceeded in production lines. There are more opportunities to increase water efficiency, thus increasing costs and sustainability. Water consumption can be significantly reduced in food production and the produced wastewater can be reduced as well.

This case illustrates that how a wastewater treatment method with water cycling can reduce the water consumption and make the water cycle during production more efficient and sustainable. Some plants of a big dairy company, FrieslandCampina, (e.g. Heilbronn, Germany; Aalter, Belgium) operate their own water waste treatment plants to improve their cost and energy efficiency and



to reduce the produced wastewater. A part of the water used is treated and recycled. Thus the production site in Aalter could reduce its water consumption by 60 %.

The method includes of several steps, such as physical, chemical and biological processes to remove contaminants. During this process produced sewage sludge can be further processed again for energy production to either run the wastewater treatment plant or use it for other purposes. This makes the process energy efficient and increases its sustainability. It is simply a water waste treatment plant combined with a biogas plant.

Lessons learned from the case:

- Using already known technology for wastewater reduction and improving cost efficiency while being sustainable
- Not always novel processes or techniques are needed

Since sewage treatment plants are already known, the method is quite simple, there are no restrictions concerning the method.

From sustainability point of view, the sewage treatment plant itself is sustainable in reducing the company's water consumption significantly. If the plant further processes the sewage via a biogas process, the improvement of energy efficiency can be intensified, because the energy can be used again.

For other applications, it should be noted that sewage treatment plants cannot only be implemented in dairy plants but all other production sites where it makes sense.

Improvement Water Consumption



4.2.14. 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

Location: South Transdanubia, Hungary

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.2.3. Innovative and competitive dairy product development

3. Cross-reference table

	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
Mechatronics	✓	✓	✓	✓	✓	✓	✓		
Food safety, quality, label									
Food design									

4. Concise description

Food manufacturers as supply side market actors are strongly forced to keep their operating cost as rational as possible, but to provide the highest level of quality that the market requires. Furthermore the market needs continuous development and introduction of new, healthier products. For these purposes energy efficient processing technology is needed which guarantees that the company reaches its objectives.

A Hungarian dairy industry company, applies a modern and energy efficient machinery for the purpose of producing new food goods to satisfy the needs of its new markets in Europe. The machinery in use (packaging-filling machinery, machinery for heating, cooling and energy provision) contributes to more efficient production, thereby decreases operational costs, what is



vital in the case of developing, processing and introducing new dairy products on the market. The whole processing system is IT controlled, which helps the management to monitor the process.

The case highlights that the use of a modern energy efficient dairy industry processing technology under IT based system control provides for quality dairy outputs at a rational cost level. Furthermore the cost efficient operation can help the product development and the successful market introduction of the new products. These all enable the company to be present on the targeted European markets with its new products.

From sustainability point of view, it needs to be stated, that the company produces its affordably priced dairy products with local workforce and contributes to local employment. The by-products emerging during the manufacturing process are mainly used again and in those case if not, they do not contain harmful additives. The region is capable for producing the raw material (the milk) of cheese production at a fair price. The company gives livelihood to local farmers and some of the necessary raw material is ensured by own cattle farms, which meaning vertical integration.

Making the production process more efficient offers the opportunity to produce higher added value products in large volumes, thereby the competitiveness of the business will increase that helps to preserve and expand existing sales channels.

For other applications, it is important to note that although the case is focused on dairy industry, its further optional fields of applications can be identified. The mechatronics solutions of packaging-filling, the machinery for heating, cooling and energy provision are in use at meat and soft beverage industry companies, partly at the canning and refrigeration industry as well. At the case of each mentioned industries specific settings and composition of their respective production lines require industry specific knowledge for the successful and financially viable operation of a given company.

Dairy Production Development



4.2.15. Multi-head scale for improved productivity of pretzel sticks



1. Title of the case description

Multi-head scale for improved productivity of pretzel sticks

Author: UHOH

Region: Friedrichsdorf, Germany



2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/4.1.16 Multi-head scale for improved productivity of pretzel sticks



3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label	✓	✓					✓	✓	
Food design									



4. Concise description

The products like sensitive and brittle pretzels need to be weighed accurately in a short matter of time. In cooperation with Ishida a manufacturer for food packaging, weighing and quality control, Pauly Snacks GmbH, a German company implemented a multi-head scale with 16 independent weighing heads.

Using this tool the company 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.

The tool highlighted the importance of the close collaboration between two or more companies like the packaging machinery manufacturer and the food producer which can provide good and



satisfying results if communication is appropriate and neither of the companies is “left in the dark”. 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.

Economic feasibility is always important from the company point of view. Accurate and fast weighing tool, like multi-head scale ensures less product loss and less wastage, saving resources, while improving customer satisfaction and reducing reclamations.

Multi-head scales are applicable to a broad product portfolio and can be individually tailored towards specific applications. Multi-head scales have been used for many different products:

- Confectionery products (sweets, sweet baked good)
- Meat products (chicken wings, meat balls)
- Fruit (olives, sweet fruits)
- Fish products
- Seeds
- Cereal products
- Frozen Fruits and vegetables

Further information:

- Ishida is an international company with locations all over the world, thus locally available: <http://www.ishida.com/ww/en/>
- Pauly Snacks GmbH can be contacted via: <http://www.trueller-snacks.de/en/index.php>
- University of Hohenheim



4.3. Design



4.3.1. Business Model development

1. Title of the case description

Business model development: the case of a small company in the organic products sector
 Author: CNA ER
 Region: Emilia Romagna

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.3.1. Business model development- GALA COSMETICI srl

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label									
Food design	✓	✓			✓	✓			

4. Concise description

Within the field of supporting business services, CNA ER 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).

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

The analysis of the company's needs started from the use of the Business Model Canvas. This business model enables to identify the improvement areas in a short time and identify the most adequate actions to launch, thus adopting the most effective solutions.



The methodology used by this case 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 favour 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.

By using the visual thinking logic, the Business Model Canvas enables to share and simplify complex concepts regarding the company's functioning, making them understandable for everyone. The companies using this methodology obtain a clear and schematic vision of any business project and an immediate result.

This model has enabled to analyse the company's needs and to represent graphically the core processes on which the management should invest to enhance their own competitive advantage, with benefits for the whole organization.

This methodology is international and easily transferable, it also enables to identify the strategic activities that "must" be implemented in order to create and support the value proposition, to reach customers and obtain revenues.

It is fit for all kinds of businesses, regardless of their sector or size, especially SMEs, both in services and manufacturing.

Business Model Development



From sustainable point of view the first key aspect is the identification a person inside the company to take care of managing the business model canvas. The second essential aspect is to train key members of the management and the staff on the concept and application of the business model canvas.

To replicate this model it is necessary:

A constant interaction with the business management in order to identify the business strategy and vision.

To train a person within the company (also through the support of a consultant) to continue and integrate the work carried out by the consultant.

That the entrepreneur have a clear idea of the present market and of the one the company targets to address its marketing efforts.

The availability of the owner or the management to collaborate with a consultant in order to identify the critical points and define the strategies and actions to be undertaken.

Further information: CNA Innovazione, Italy, www.cnainnovazione.net



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
 Location: Slovenia

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.3.2. FOOD - ART packaging

3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label									
Food design						✓	✓		

4. Concise description

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.

Family business Perger 1757 (producer of organic traditional Slovenian products: gingerbread products, other organic honey sweets - for e.g. Honey candies, natural lollipops, mead OL-old slovan non-alcoholic honey drink, exclusive energy candles etc...) combined innovative thinking and products with famous Slovenian designer Oskar Kogoj and created exclusive products that are given to presidents, ministers, members of royal families. They have developed new products



that are the result of many years of tradition and offer unique benefits to the user.

The gift presented by them as protocol gifts of the Republic of Slovenia have been accepted everywhere, both at home and abroad, with great gratitude.

Their family's values are at the heart of everything they do. They've become an integral part of daily activities and the framework for how they run business and how they live their lives:

- Family is a circle of strength.
- Respect tradition and keep the family recipes a secret.
- Love what you do.
- Respect nature and the gifts it provides.
- Use only the best, 100 % natural ingredients.
- Keep the promises you make.
- Create unforgettable memories.

Present an innovation that will bring even more memorable moments and best ecological tastes to homes! The case can be used as model of innovative businesses that are exploiting traditional and cultural heritage connected with top designers. Similar methodology and approach can be used in many innovative food-art combinations in different food sectors.

Further information: Perger 1757, Gingerbread and Candle making, d.o.o., Slovenia, <http://www.perger1757.si/en/>



4.3.3. Frutaformas- healthy snackification

1. Title of the case description

Frutaformas - reshape fruit
Author: UHOH
Location: Portugal

2. Reference for the good practice case

D.T.2.2.1. Global case study report/ 4.3.2. Frutformas - reshape fruit

3. Cross-reference table

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

Mechatronics									
Food safety, quality, label									
Food design	✓	✓	✓	✓	✓	✓	✓	✓	

4. Concise description

Nowadays there are several growing problems associated with unhealthy eating habits (e.g. childhood obesity) in the world. The composition of food is not always in favor of healthy eating.

Frutaformas, a Portuguese company, produces dehydrated fruit snacks through a natural process, without any added sugar, oil or preservatives. The company aims to satisfy the needs of consumers regarding eating more healthy products. The company's products are made from fruit, which have Certificate of Origin (e.g. fruit that is grown, produced, manufactured and processed in a particular region - Alcobaça apple, Rocha pear, Açores pineapple and Fundão cherry). Products are marketed in different shapes: slices, lingots and hearts. There is also "Little Fruit" product, which presents the fruit in a "healthy and fun way" to children, in order to encourage them to eat fruit



in a healthy and 100 % natural way.

The study shows, that in the case of a product manufactured with conventional and well-known technology, it is possible to achieve a higher value by using locally sourced and certified fruit raw materials and manufacturing it in a healthy way (without any added sugar or oil and any additives) exhibiting a nutritional intake to fresh fruit. The products are healthy and attractive alternatives to sugary snacks for children. As a result of these, the demand for fruit-based snacks and fruit ingredients are increasing and there will be new appetite for nutritional greens/fruits.

The method and the products of Frutaformas are not patented and they are easy to reproduce. The important point is that locally grown fruits are used and the products are made without any addition of sugar, oil and additives.

Further application possibilities: snackification of everything - replacing conventional breakfast foods with breakfast pouches, bites and biscuits and healthy snacks.

For more information: <http://www.frutaformas.pt/>



4.3.4. Design for Details: DOPLA

1. Title of the case description:

Design for Details: how DOPLA's Lowered 200R plastic Cup redesign allowed a whopping 20% volume reduction!

Author: UNISEF

2. Reference for the good practice case

D.T.2.2.1. Global case study report/ 4.3.3. Design for Details: DOPLA

3. Cross-reference table

	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
Mechatronics	✓	✓		✓			✓		
Food safety, quality, label									
Food design	✓	✓		✓		✓	✓		✓

4. Concise description

Any improvement asks for a price to pay, and this must be appropriately evaluated on a case-by-case basis. The more compact shape of the Lowered 200 R Cup results in a less easy detachment of a cup from its stack. This is meaningless when the detachment is operated by hand, i.e. in home or café-environment; it becomes however an important issue when the detachment must happen automatically, i.e. vending machines.

Transfer Methods for this practice might be:

- design consultancy (coaching and/or direct contribution) design advice, R&D personnel coaching, redesign direct contribution;



- marketing consultancy (coaching and/or direct contribution): consumer surveys, consumer identification, product required features correct recognition;
- organization consultancy (coaching): infra-company tools and methods for trans-departmental cooperation.

ReDesign for details is a practice that should be routinely operated on any product with a reasonable life span. Fine tuning shape and geometry of a product can optimize the use of materials and energy and reduce CO2 emissions along the whole life-cycle of a product. In the way Design gives the non-previously existing solution to a problem, Redesign can then give a better solution thanks also to the experience gathered with the previous release of the product.

Redesign is an approach that carefully applied can result of great advantage to any product with a reasonable life-span.



4.3.5. Automatic Milk Dispensers

1. Title of the case description:

Automatic Milk Dispensers
Author: UNISEF

2. Reference for the good practice case

D.T.2.2.1. Global case study report/ 4.3.2. Automatic Milk Dispensers

3. Cross-reference table

	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
Mechatronics	✓	✓		✓			✓		
Food safety, quality, label									
Food design	✓	✓		✓		✓	✓		✓

4. Concise description

Consumers can enjoy choosing by their own the food (milk) producer enough to balance the burden of going to other places than a supermarket. Initial investment for an Automatic Milk Dispenser is high enough to discourage many would-be candidate buyers among small cattle farmers.

Transfer Methods for this practice might be:

- design consultancy (coaching and/or direct contribution) design advice, R&D personnel coaching, redesign direct contribution;
- marketing consultancy (coaching and/or direct contribution): consumer surveys,



consumer identification, product required features correct recognition.

To be noticed that in case of small businesses (i.e.: family-run farms), it might be required to assemble a group of similar businesses in order to render economically viable the development of a solution to their common problem. Trade Associations and Chambers of Commerce are among the best candidates to take on this role of group-assembler and/or stakeholders representative.

Packaging is the part of a product that allows its delivery from the manufacturing site to the final user in optimal conditions. The case of Automatic Milk Dispensers remind us that the problem is not “to have the best packaging” but “to deliver in optimal conditions”.

This approach can result of great interest to small businesses that strive to sell their produce directly to final consumers, as it represents a successful solution to solve the specific requirements of preservation/hygiene without requiring the need of additional sales assistants.



4.3.6. Sensory Analysis of plastic bottles

1. Title of the case description:

Sensory Analysis of plastic bottles
Author: UNISEF

2. Reference for the good practice case

D.T.2.2.1. Global case study report/ 4.3.2. Automatic Milk Dispensers

3. Cross-reference table

- 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

Mechatronics									
Food safety, quality, label						✓	✓	✓	
Food design			✓	✓		✓	✓		

4. Concise description

The customer company must be sincerely involved in the definition of the context of evaluation and of the desired output parameters, otherwise the results of the Sensory Analysis will hardly prove to be useful for any further evaluation and/or action the company intends to undertake.

Transfer contexts for this practice might be:

- design consultancy (coaching and/or direct contribution) design advice, R&D personnel coaching, redesign direct contribution, brief definition;
- marketing consultancy (coaching and/or direct contribution): product positioning, consumer surveys, consumer identification, product required features correct



recognition, brief definition.

Always confirm to have full intellectual and emotional involvement both from top management and from any employee directly involved in the definition and preparation of the Analysis, otherwise there will be a quite insufficient probability for the client to obtain a beneficial outcome after the Analysis.

Two evident cross-sectorial trends for Food & Drinks customers lead to packaging reduction and to naturalness, two clear signs similar eco-sustainable attitude. These trends call for the need to develop new concepts of packaging and, moreover, to check how consumers receive them. Sensory Analysis may demonstrate fundamental to verify and qualify the way innovative packaging solutions are perceived by consumers; that's to say, how much these solutions succeed in letting customers correctly perceive the features of the food and drinks products they are to choose.

The use of Sensory Analysis for packaging evaluation can prove extremely useful for any good (or produce) that is to be chosen by a customer BEFORE he/she has a chance to test (or taste) it.



4.3.7. Goppion Caffè’s packaging redesign and integrated storytelling actions

1. Title of the case description:

How Goppion Caffè’ revamped “DOLCE”, its most reknown coffee blend, through a tasteful redesign of the packaging and other integrated storytelling actions

Author: UNISEF

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.3. 5. Goppion Caffè’s packaging redesign and integrated storytelling actions

3. Cross-reference table

- 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

Mechatronics					✓				
Food safety, quality, label						✓	✓		
Food design					✓	✓	✓	✓	

4. Concise description

Packaging and/or graphic design alone is essential but not enough to make the customers understand the knowledge and history squeezed into the product. In these situations, companies need to continuously support representatives and customers (in this case: coffee shops and bars) with trainings, tasting sessions, presentation events and educational contents propagated through traditional and new media.

In order to reach broader target audience and increase their volume of sales, the Italian coffee blend company, Goppion Caffè’ created a new packaging design and storytelling materials for one of their lines of product. As part of the new design they used graphics taken from ancient paintings of Francesco Guardi. This integrated set of actions of storytelling aimed to present



the Goppion's knowledge and competences in coffee processing and blending while creating appealing packaging for their product.

The collaboration between two, seemingly different areas (e.g. food production and art) can raise the awareness of the consumers towards the products. The method is adaptable for any food and beverage products. Methods to transfer this practice can be the following:

- design counseling (coaching and/or direct contribution) product briefing, design/graphic advice, redesign direct support;
- marketing counseling (coaching and/or direct contribution): product briefing, consumer surveys, consumer identification, correct recognition of required product features, planning and implementation of integrated marketing actions;
- cultural counseling (direct contribution, coaching): cultural/historical facts collection, counseling from and connection with well recognized cultural institutions.

This good practice highlights that the combined use of high quality ingredients and high quality packaging solutions results in a more conscious use of the product. It also helps to reduce the amount of waste, since a packaging which is more effective in inspiring mind-conscious thinking might prevent people to let the product expire before complete use, which is sometimes the case with products with extended expiry dates.

Goppion Caffe's Packaging



4.3.8. 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. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.3. 6. DEEP FROZEN® a superior protocol to better preserve quality of the seafood

3. Cross-reference table

	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
Mechatronics	✓				✓				
Food safety, quality, label	✓	✓	✓	✓		✓			
Food design	✓	✓	✓	✓	✓	✓	✓		

4. Concise description

DeepFrozen® is a protocol to ensure that the seafood preserves its flavour, hydration, nutritional characteristics and original freshness. The protocol covers the whole seafood processing chain from the sea to the dish and it establishes such requirements which surpasses any regulation requirements to satisfying consumers' expectations.

Seafood processed following the DeepFrozen® protocol results a higher appreciation of seafood and enables a much wider distribution of fresh food while reducing food waste because of poor preservation.

Such a product/process innovation, even if carefully crafted, represents such a breakthrough in



the market that additional time and continuous effort is needed to let the consumer experience and appreciate new food and cooking habits. It seems that innovative packaging solutions, new kitchenware, new tableware might result of great help in spreading a new way of enjoying healthier, tastier DeepFrozen® seafood.

Transfer Methods for this practice can be:

- design counseling (consulting, direct support) product briefing, design advice, redesign of packaging solutions and tools for DeepFrozen® seafood processed items;
- marketing counseling (consulting, coaching, direct support): product briefing, consumer surveys, consumer identification, assessment of consumers' perceptions, market deployment of DeepFrozen® seafood;
- organization counseling (consulting, coaching, direct support): tools and methods for planning and implementing DeepFrozen® protocol within an organization, within its chain of suppliers and among the network of its customers.

Such initiatives can be adopted for any food products where the highest possible level of freshness will be acknowledged and appreciated by consumers.



4.3.9. 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. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.3. 7. PGI WHITE ASPARAGUS-how to improve your company’s warehouse rotation index with a clever packaging design

3. Cross-reference table

	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
Mechatronics	✓								
Food safety, quality, label	✓	✓		✓	✓	✓			
Food design	✓			✓	✓	✓			

4. Concise description

The Italian OPO Veneto company developed new packaging for their white asparagus to reduce the waste originates from the unused packaging materials. The company deals with different producers and different PGI brands of white asparagus which requires unique labelling for all varieties, all brands.

Since the used packaging material degraded after a few months in a warehouse, a solution was needed to reduce the waste.

The Company created a packaging with two parts: 1) a tray to contain the vegetables and 2) sleeve to cover the product and display the appropriate label. The trays are applicable for all



varieties of white asparagus and only the sleeve is needed to be customize.

This design has improved product management, reduced the time of rotation of the packaging and resulted a 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.

As this two-parts packaging design proved so effective in the extremely difficult situation of the White Asparagus, the action is now to be continued. OPO Veneto aims to apply it also to others of its products.

Transfer Methods for this practice might be:

- design counseling (coaching and/or direct support) product briefing, design advice, R&D personnel coaching, product redesign;
- marketing counseling (coaching and/or direct support): product briefing, consumer identification, correct recognition of required product features;
- organization counseling (coaching and/or direct support): lean production techniques.

This practice can be used in any situation where:

- the supplied minimum quantity of packaging is larger than the quantity needed for one year of production,
- features in the packaging that are subject to frequent change (i.e.: labeling, graphics, brand, etc.) can be grouped in a separate part (i.e.: whole box vs tray-and-cover).

PGI
White
Asparagus



4.3.10. SGAMBARO’s organic pasta packaging

1. Title of the case description:

With a fine touch: SGAMBARO’s successful organic pasta packaging
Author: UNISEF

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.3. 8. SGAMBARO’s organic pasta packaging

3. Cross-reference table

	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
Mechatronics	✓			✓					
Food safety, quality, label	✓			✓	✓				
Food design				✓	✓	✓		✓	

4. Concise description

The recent trends shows that more and more consumers search healthy and eco-friendly products. Also the appearance of the packaging can convince the consumer to buy or not to buy certain products. In the packaging area, the popularity of the eco-friendly packaging is increasing.

Based on these trends, an Italian company re-designed their packaging which now better express the healthy nature of the product, while the used material (paper-like plastic) is a step forward to the customers’ demand for more eco-friendly packaging solutions.

The company has clearly understood that decision about the effectiveness of a packaging solution at conveying the messages the company is trying to express cannot be decided by individuals



on the basis of emotion or opinion. At the end of the first iteration of their new packaging development process, they have resolved to turn to Sensory Analysis to obtain reliable data and repeatable results to lay their further decisions on.

Transfer Methods for this practice might be:

- design counseling (coaching and/or direct support) product briefing, design advice, MKTG personnel coaching, product design support;
- marketing counseling (coaching and/or direct support):product briefing, consumer identification, correct recognition of required product features, evaluation of product perception (Sensory Analysis).

Recalling health and environmental values to consumers paves the way for a better attitude toward responsible use of food and natural resources in general. The implementation of an enhanced packaging technology is prospecting the use of more sustainable packaging materials in the near future.

The use of Sensory Analysis can prove useful in any situation where there is the acknowledged need to check the effectiveness of a packaging solution against the product brief as agreed upon at the starting of the development project.



4.3.11. NATIVO- packaging organic food with moral values

1. Title of the case description:

NATIVO-how Goppion Caffè explained to customers of its organic coffee blend that Fairtrade is something to take care of
Author: UNISEF

2. Reference for the good practice case

D.T.2.2.2. Regional case study reports/ 4.3.9. NATIVO- packaging organic food with moral values

3. Cross-reference table

	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
Mechatronics									
Food safety, quality, label				✓		✓			
Food design		✓		✓		✓			

4. Concise description

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.

Goppion Caffè put their organic coffee, NOTIVO on the market and they used the new brand to embrace the Fairtrade International protocol, the initiative to support sustainable development and empowerment of disadvantaged producers and workers in developing countries. In this way, the company can earn the consumers trust and respect as they show their dedication towards societal issues and well-being.

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 colors to recall a “clean” working environment located somewhere in Southern countries or Central America.

At the moment consumers seem to show an increasing interest in products sporting the Fairtrade certification mark following the awareness actions operated by some important food-stores players in the market.

Transfer Methods for this practice might be:

- design counseling (coaching and/or direct contribution) product briefing, design/graphic advice, design direct support;
- marketing counseling (coaching and/or direct support): product briefing, consumer surveys, consumer profiling, correct recognition of required product features, planning and implementation of integrated marketing actions;
- strategic counseling (direct support, coaching)

Any product holding the Fairtrade mark is certified to guarantee that producers and traders have met fair trade standards, that’s to say that at least a minimum price has been paid to producers to ensure that producers can cover their average costs of sustainable production. It acts as a safety net for farmers at times when world markets fall below a sustainable level. When the market price is higher than the Fairtrade Minimum Price, the buyer must pay the higher price.

This approach can prove of great advantage to any food and beverage product that needs customers:

- to recognise the fair procurement of

NATIVO
Organic
Food



ingredients and materials grown/farmed in areas where there is an recurring risk for producers to be treated unfairly,

- to gain access to an articulate explanation of the features of the product that otherwise cannot find its place with the usual labelling options.



Improving competences and skills through food sector innovations



5. Summary

Aim of the Handbook tool was to present the lessons learnt and answers to questions related to transferability and sustainability of the previously elaborated good practice reports. These case studies were chosen because they were related to the needs and requirements of companies from a certain Central-European region.

The Handbook tool includes 55 good practices, 29 from the food safety, quality and labelling area, 15 from the mechatronics area and 11 out of the 55 good practice cases were focused on food packaging design.



Handbook Tool



About the authors

The I-CON project partnership was made upon knowledge and experiences from past and current initiatives dealing with innovation and cross-sector topics, with emphasis on food sector. Special thanks to the staff members of the partner organizations.



Pomurje
TECHNOLOGY PARK



Gospodarska zbornica Slovenije
Chemical Innovation in Domestic Products



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