LOWINFOOD

Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

GA No. 101000439

D6.5 Practice Abstracts second batch

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LOWINFOOD Consortium

N.	Full name of the organisation	Short name	Country
1	Università degli Studi della Tuscia	UNITUS	Italy
2	Alma Mater Studiorum Università di Bologna	UNIBO	Italy
3	Sveriges Lantbruksuniversitet	SLU	Sweden
4	FH Munster University of Applied Sciences	ISUN	Germany
5	The James Hutton Institute	JHI	United Kingdom
6	Universitaet Fuer Bodenkultur Wien	BOKU	Austria
7	Tampereen Korkeakoulusaatio SR	TAU	Finland
8	Charokopeio Panepistimio	HUA	Greece
9	Osterreichisches Okologieinstitut	AIE	Austria
10	Elhuyar Fundazioa	ELH	Spain
11	Matomatic AB	MATO	Sweden
12	Unverschwendet GmbH	UNV	Austria
13	Akademie Deutsches Baeckerhandwerknord gGmbH	ADB	Germany
14	Foresightee (terminated on 30/01/2023)	FOR	Belgium
15	Leroma GmbH	LER	Germany
16	Mitakus Analytics UG	MITA	Germany
17	Kitro SA	KITRO	Switzerland
18	Regione Emilia Romagna	RER	Italy
19	Pianeta Cospea srl	PICO	Italy
20	Cogzum Bulgaria OOD	COZ	Bulgaria
21	Uppsala Kommun	UPP	Sweden
22	Recuperiamo srl	REG	Italy
23	Antegon GmbH	FT	Germany
24	Confederazione Nazionale dell'Artigianato e della piccola e media impresa Associazione di Viterbo e Civitavecchia	CNA	Italy
25	Assemblée des Régions Européennes Fruitières Légumières et Horticoles	ARE	France
26	L.V.L Anonymi Emporiki Toyristiki Kksenodoxeiaki Kataskevastiki Etaireia	BLU	Greece
27	Iridanos-Inabelos Anonymi Etaireiatouristikes Ksenodoxeiakes Kai Agrotikes Epixeiriseis	THA	Greece

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Summary

This deliverable contains the resume and contents of the second batch of practice abstracts, containing 10 abstracts. The abstracts are aimed at describing the innovative knowledge produced during the implementation of the LOWINFOOD project, and they specifically refer to the LOWINFOOD innovations for food loss and waste prevention, which are being demonstrated as part of project's activities. 10 more abstracts are expected to be delivered in the third batch (in February 2025) resulting in a total set of 25 practice abstracts by the end of the project in February 2025, also considering the set of 5 Practice Abstracts already compiled in D6.4, submitted in April 2022.

A practice abstract is a short summary describing the main information / recommendations / practices that can serve to the end-users in their daily practice. The end-user material to be produced contains a substantial number of summaries for practitioners in the European Innovation Partnership for Agricultural productivity and Sustainability (EIP-AGRI) website common format ("Practice Abstracts"), including the characteristics of the project (e.g. contact details of partners, etc.).

The full package of 25 practice abstracts will contain all the outcomes/recommendations which are ready for practice. The format of the LOWINFOOD Practice Abstracts will follow the guidance and templates available on the EIP-AGRI website.

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Introduction to the deliverable

LOWINFOOD is a project committed to co-design, together with actors of the food chain, low-waste value chains by supporting the demonstration of a portfolio of innovations in a set of value chains particularly concerned by food loss and waste (fruits & vegetables, bakery products and fish), as well as in at-home and out-of-home consumption. The innovations were selected among promising solutions that have already been developed and tested by some partners of the consortium, with the aim to provide the necessary demonstration and upscale to allow market replication.

The LOWINFOOD consortium comprises 26 entities, located in 12 different European countries, and ranging from universities and research institutes to start-ups, foundations, associations, and companies working in the food sector.

The present deliverable containing the second set of Practice Abstracts (PA) is part of the WP6 "Communication, dissemination and market replication" of LOWINFOOD, aimed at spreading the project's results and outcomes. After discussing the topic in the Executive Board Meeting held online on 12 June 2023, the content for the second batch of PAs was agreed among Executive Board members:

PA Nº 6: Marketable products from surplus fruit and vegetables
PA Nº 7: Bringing raw materials to the right place with LEROMA
PA Nº 8: Reduce retail food waste with forecasting
PA Nº 9: Innovating supplier-retailer agreements to avoid waste of bakery products
PA Nº 10: Fish supply chain dialogue to reduce waste in Scotland
PA Nº 11: Predicting Food Demand with Mitakus
PA Nº 12: Nudge pupils to reduce food waste
PA Nº 13: Innovative education reducing food waste in Austrian schools
PA Nº 14: Research in a multi-actor approach
PA Nº 15: Efficacy of innovations against food waste

It was decided that the priority must be given to innovations that were not compiled in the previous first Practice Abstracts batch:

PA Nº 1: Stakeholder dialogues for bakeries in Italy
PA Nº 2: FoodTracks – Better decisions for bakeries
PA Nº 3: KITRO – Reduce food waste, save money by AI
PA Nº 4: CozZo: Reducing food waste in households using a mobile application
PA Nº 5: REGUSTO and monitoring of waste on the restaurant-home route

Therefore, almost all innovations are already discussed in the Practice Abstracts. However, three innovations are not included in the practice abstracts yet: The Software to manage withdraws of fruit & vegetables and donating them to charities, the Stakeholder dialogue in

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the bakery sector in Finland and the dialogue between stakeholders of the German fish supply chain. These will be part of the third batch, together with some other useful information and lessons learned during the project, which will complete the abovementioned full set of 25 Practice Abstracts that LOWINFOOD will provide.

PAs from n.1 to n.5 correspond to the first batch produced as part of deliverable D6.4, in April 2022; PAs from n.6 to n.15 refer to the 10 abstracts produced as part of this deliverable. Each practice abstract has been developed in the framework of a specific work package of LOWINFOOD. This correspondence is shown in the table below.

Table: Correspondence of the PAs with LOWINFOOD work packages

WORK PACKAGE	PRACTICE ABSTRACTS CORRESPONDING TO THIS WORK PACKAGE
WP1. Evaluation of the innovations in a multi-actor approach	PA Nº 14: Research in a multi-actor approach PA Nº 15: Efficacy of innovations against food waste
WP2. Innovations against loss of fruits & vegetables	PA Nº 6: Marketable products from surplus fruit and vegetables PA Nº 7: Bringing raw materials to the right place with LEROMA PA Nº 8: Reduce retail food waste with forecasting
WP3. Innovations against loss of bakery products	PA Nº 1: Stakeholder dialogues for bakeries in Italy PA Nº 2: FoodTracks – Better decisions for bakeries PA Nº 9: Innovating supplier-retailer agreements to avoid waste of bakery products
WP4. Innovations to prevent and reduce fish losses and waste	PA Nº 7: Bringing raw materials to the right place with LEROMA PA Nº 10: Fish supply chain dialogue to reduce waste in Scotland
WP5. Innovations against waste of all foods in out-of-home and at-home consumption	PA Nº 3: KITRO – Reduce food waste, save money by AI PA Nº 4: CozZo: Reducing food waste in households using a mobile application PA Nº 5: REGUSTO and monitoring of waste on the restaurant-home route PA Nº 11: Predicting Food Demand with Mitakus PA Nº 12: Nudge pupils to reduce food waste PA Nº 13: Innovative education reducing food waste in Austrian schools

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In order to make this information exchange smoother among actors, the EIP-AGRI has established a common format for submitting the practice abstracts, which facilitates knowledge flows on innovative and practice-oriented projects from the start till the end of the project. The use of this format also enables farmers, advisers, researchers and all other actors across the EU to contact each other. Furthermore, this common format includes a guidance which defines the length that the description text should have, as well as the option to add the text in the native language(s) that has(ve) been used when carrying out the activity that is described.

LOWINFOOD has designed a specific template following the common format and guidance established by the EIP-AGRI, to make the practice abstracts more eye-catching (see below), and has created a dedicated section on the project's website to publish them.

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PRACTICE ABSTRACT No: 6

Marketable products from surplus fruit and vegetables

"The crooked cucumber" is one of the better-known examples of food that is not very marketable. Fruit and vegetables may not end up on the usual consumer shelves for a variety of reasons: produce that measures a few grams or millimetres too much or too little, produce with damaged peel or skin. Pretty or not, these foods are still perfectly edible and valuable. Finding suitable buyers for them, however, often comes up against logistical and economic limits.

The company "Unverschwendet GmbH" (UNV) from Vienna (Austria) has developed a business concept to close the gap between supplier and buyer of surplus food. UNV exclusively buys surplus food, i.e. food that cannot be marketed or is produced in excess for various reasons (e.g. due to overproduction, due to errors in the ordering system). They created acceptance criteria that need to be stated by the supplier, e.g. reasons for surplus food as well as information on allergens and hygienic requirements. Suppliers also have to sign a contract that the surplus is sold for less than the current market value. This is important to prevent incentives for further surplus production. Furthermore, they have classified surplus food into different grades to support price negotiations.

Generating trust and willingness to cooperate are essential in this business segment and these are the key competences of UNV. Farmers, wholesalers, deep-freeze warehouse are suitable partners on the supply side. Direct distribution to food service and retail sector is not feasible on the demand side due to inefficiency (high time efforts) or too strict requirements (from retailers). Instead, large companies were acquired and supplied with fresh or semi-finished products from surplus food. UNV has continuously managed to create a sustainable network between supply and demand of surplus food and increased the distributed amount of surplus food per transaction from a few tons in 2021 to between 10 and 30 tons in 2022.

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Additional information

Up to 25% of losses of fruit and vegetables are recorded in Austrian agriculture. At the same time up to 80% of the goods that do not end up in supermarkets would have been perfectly edible.

The lack of contact and logistical challenges between suppliers of surplus food and demanding industry hinders distribution.

An innovative business concept is created by Unverschwendet GmbH (https://www.unverschwendet.at/) to bridge the gap between supply of surplus food and demand. This concept saves tons of fruit and vegetables and is an additional source of turnover for local farmers.

All Practice Abstracts prepared by LOWINFOOD can be found here!

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ABOUT LOWINFOOD

The LOWINFOOD project, launched in 2020 and coordinated by the University of Tuscia, Italy, is working to deploy and improve a set of 14 innovative solutions to the food waste problem, by demonstrating their effectiveness and market potential. The core activities of the project are all focused on the evaluation of the efficacy of these innovations in reducing food losses and waste, in terms of the amount of food waste avoided as well as their environmental and socio-economic impact.

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PRACTICE ABSTRACT No: 6

Marktfähige Produkte aus überschüssigem Obst und Gemüse

„Die krumme Gurke“ ist eines der bekannteren Beispiele für Lebensmittel, die nicht oder wenig marktfähig sind. Obst und Gemüse kann aus verschiedensten Gründen nicht in den üblichen Regalen für Konsumenten landen: Produkte, die einige Gramm oder Millimeter zu viel oder zu wenig messen, Produkte mit schadhafter Schale oder Haut. Ob hübsch oder nicht, diese Lebensmittel sind immer noch einwandfrei genießbar und wertvoll. Geeignete Abnehmer dafür zu finden, stößt allerdings oft auf logistische und wirtschaftliche Grenzen.

Das Unternehmen "Unverschwendet GmbH" (UNV) aus Wien (Österreich) hat ein Geschäftskonzept entwickelt, um die Lücke zwischen Anbieter und Abnehmer von Überschussware zu schließen. UNV kauft ausschließlich überschüssige Lebensmittel, das heißt Lebensmittel, die aus verschiedenen Gründen nicht vermarktet werden können oder zu viel produziert werden (z. B. durch Überproduktion, durch Fehler im Bestellsystem). Es wurden Annahmekriterien entwickelt, die vom Lieferanten angegeben werden müssen, z. B. Gründe für überschüssige Lebensmittel sowie Informationen über Allergene und hygienische Anforderungen. Die Lieferanten müssen auch eine Klausel unterschreiben, dass die Überschüsse unter dem aktuellen Marktwert verkauft werden. Dies ist wichtig, um Anreize für eine weitere Überschussproduktion zu verhindern. Außerdem werden die überschüssigen Lebensmittel in verschiedene Güteklassen eingeteilt, um Preisverhandlungen zu erleichtern.

Vertrauen und Kooperationsbereitschaft sind in diesem Geschäftsfeld unerlässlich und Schlüsselkompetenzen von UNV. Landwirte, Großhändler, Tiefkühllager sind geeignete Partner auf der Angebotsseite. Auf der Nachfrageseite ist der Direktvertrieb an die Gastronomie und an den Einzelhandel aufgrund von Ineffizienz (hoher Zeitaufwand) oder zu strengen Anforderungen (seitens des Einzelhandels) nicht machbar. Stattdessen wurden Großbetriebe als Geschäftspartner gewonnen und mit frischen oder halbfertigen Produkten aus Lebensmittelüberschüssen beliefert. UNV ist es mit einem nachhaltigen Netzwerk gelungen, die vermittelte Menge an überschüssigen Lebensmitteln pro Transaktion von einigen Tonnen im Jahr 2021 auf 10 bis 30 Tonnen im Jahr 2022 zu erhöhen.

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PRACTICE ABSTRACT No: 7

Bringing raw materials to the right place with LEROMA

LEROMA aims to revolutionize the procurement process in the food industry.

Digital, efficient, and simple: this is what today's industry processes should look like. Especially in the B2B (business-to-business) sector, the exchange between external parties should be made less complicated. In the food industry, food manufacturers often spend weeks looking for raw materials for their products that meet the required quality standards, while raw material suppliers search for buyers for their goods.

LEROMA, a startup from Düsseldorf, provides both manufacturers and suppliers with a digital B2B platform with the aim of simplifying the procurement process at the beginning of the value chain. Raw material suppliers can advertise their products on the platform, contributing to a constantly growing global database. This is available to food manufacturers and other industries free of charge and can even be filtered according to product-specific criteria - the platform's unique selling point. In this way, manufacturers can find the ideal raw material with just a few clicks and avoid a time-consuming search.

Manufacturers can also buy and sell raw materials at favourable prices on the Surplus Exchange, a digital marketplace for leftover materials, residual items, and surpluses, to save money and reduce food waste. At the beginning of the value chain, where LEROMA operates, a large proportion of food waste is generated. Reasons for this include the fact that too much or the wrong amount was purchased due to high minimum purchase quantities, that raw materials were supplied with unsuitable technical criteria, or that a customer dropped out at short notice.

If raw materials can no longer be processed in one's own company, it makes sense to offer them to companies in the food industry on the surplus exchange. Buyers save money, avoid long waiting times and bypass high minimum purchase quantities. This allows them to respond flexibly to short-term customer requests or trends.

LEROMA aims to raise awareness of the potential of these raw materials, which can still be used within and outside the food industry, and to encourage various industries to make greater use of raw materials that are already available, thus contributing to a sustainable circular economy.

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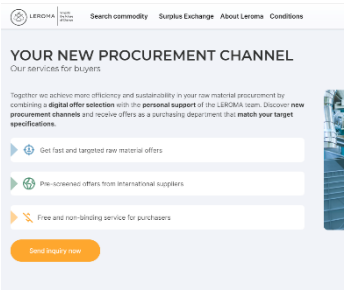

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PRACTICE ABSTRACT No: 7

Additional information

The LEROMA innovation reflects the concept of circular economy, that is how materials or scraps that are no longer useful for a certain process can feed other industrial processes where it is used as raw material.

https://www.leroma.de/

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PRACTICE ABSTRACT No: 7

Rohmaterialien mit LEROMA an die richtige Stelle bringen

LEROMA hat zum Ziel, den Beschaffungsprozess in der Lebensmittelindustrie zu revolutionieren

Digital, effizient und einfach: So sollten Prozesse von heute aussehen. Gerade im B2B-Bereich soll der Austausch zwischen zwei Parteien unkomplizierter sein. In der Lebensmittelindustrie suchen Lebensmittelhersteller oft wochenlang nach Rohstoffen für ihre Produkte, die den geforderten Qualitätsstandards entsprechen, während Rohstofflieferanten nach Abnehmern für ihre Waren suchen.

LEROMA, ein Startup aus Düsseldorf, stellt beiden Parteien eine digitale B2B-Plattform mit dem Ziel zur Verfügung, den Beschaffungsprozess am Anfang der Wertschöpfungskette zu vereinfachen. Rohstofflieferanten können ihre Produkte auf der Plattform bewerben und so zu einer stetig wachsenden globalen Datenbank beitragen. Diese steht Lebensmittelherstellern kostenlos zur Verfügung und lässt sich sogar nach produktspezifischen Kriterien filtern – das Alleinstellungsmerkmal der Plattform. So finden Hersteller mit wenigen Klicks den idealen Rohstoff und ersparen sich eine zeitraubende Suche.

Außerdem gibt es die Überschussbörse, einen digitalen Marktplatz, wo Unternehmen Rohstoffe zu günstigen Preisen kaufen und verkaufen können, um Geld zu sparen und Lebensmittelabfälle zu reduzieren. Am Anfang der Wertschöpfungskette, wo LEROMA tätig ist, entsteht ein erheblicher Teil der Lebensmittelabfälle. Gründe dafür sind unter anderem, dass aufgrund hoher Mindestabnahmemengen zu viel oder generell falsch eingekauft wurde, Rohstoffe mit ungeeigneten technischen Eigenschaften geliefert wurden oder ein Kunde kurzfristig ausfällt.

Können Rohstoffe im eigenen Unternehmen nicht mehr verarbeitet werden, ist es sinnvoll, sie über die Überschussbörse anderen Unternehmen anzubieten. Käufer sparen Geld, vermeiden lange Wartezeiten und umgehen hohe Mindestabnahmemengen. Dadurch können sie flexibel auf kurzfristige Kundenwünsche oder Trends reagieren.

LEROMA möchte das Bewusstsein für das Potenzial dieser Rohstoffe schärfen, die innerhalb und außerhalb der Lebensmittelindustrie noch Verwendung finden können, und verschiedene Industrien dazu ermutigen, bereits vorhandene Rohstoffe stärker zu nutzen und so zu einer nachhaltigen Kreislaufwirtschaft beizutragen.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 8

Reduce retail food waste with forecasting

The Swedish University of Agricultural Sciences has developed an innovative forecasting software aimed at reducing food waste, particularly in the fresh fruits and vegetables sector. This software utilizes cutting-edge machine learning and artificial intelligence techniques to achieve its goals. By analysing sales data from three Italian stores, which have accumulated years of data specifically from the fresh produce department, the software generates models that focus on daily sales forecasts for a specific set of crucial products identified by the stores.

The algorithm powering the forecasting software considers various factors to make accurate predictions. It considers the previous 30 days of sales data, as well as the day of the month, month of the year, and day of the week. Additionally, it factors in information about holidays, pricing, and promotional periods to predict the quantities of each product that will be sold. To evaluate the accuracy of the model, forecasts have been generated for an entire year and compared against the actual sales data recorded on corresponding days.

The performance of this model represents a significant improvement over current practices, demonstrating an approximate 50% enhancement in the accuracy of the forecasts.

The next step involves integrating the software into the retail stores and conducting tests to assess its effectiveness in real-world settings, to evaluate how the availability of more accurate sales forecasts can reduce the frequency and extent of food waste at retail stores.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 8

Additional information

Food waste in the European retail sector

The food waste at the retail stage in Europe amounted to approximately 4 million tonnes of fresh mass in 2020. This accounts for almost 7% of the total food waste across the entire supply chain.

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PRACTICE ABSTRACT No: 8

Prevedere le vendite per ridurre gli sprechi alimentari nella distribuzione

La Swedish University of Agricultural Sciences ha sviluppato un innovativo software di previsione delle vendite con lo scopo di ridurre gli sprechi alimentari nella filiera dell'ortofrutta. Il software utilizza tecniche avanzate di apprendimento statistico e intelligenza artificiale per prevedere le vendite di prodotti ortofrutticoli nei supermercati. Nell'ambito del progetto LOWINFOOD, il software viene testato in tre punti vendita della grande distribuzione, situati in Italia. Basandosi sulle serie storiche di dati di vendita del reparto ortofrutta, il software genera modelli che restituiscono previsioni di vendita giornaliere per un insieme specifico di prodotti chiave.

L'algoritmo che alimenta il software valuta diversi fattori per garantire previsioni accurate. Prende in considerazione i dati di vendita dei 30 giorni precedenti, il giorno del mese, il mese dell'anno e il giorno della settimana. Inoltre, tiene conto delle informazioni sulle festività, sui prezzi e sulle offerte promozionali per prevedere la quantità venduta di ciascun prodotto.

Per valutare l'accuratezza del modello prima dell'inizio del test, sono state generate previsioni su un intero anno (già trascorso), confrontandole con i dati di vendita reali registrati nei giorni corrispondenti.Le prestazioni di questo modello rappresentano un significativo miglioramento rispetto alle pratiche attuali di previsione delle vendite attive presso i punti vendita considerati, dimostrando un miglioramento di circa il 50% nell'accuratezza delle previsioni.

Il passo successivo prevede l'integrazione del software in più punti vendita e l'esecuzione di test per valutare l'efficacia in contesti reali, valutando in che misura la disponibilità di previsioni di vendita più accurate è in grado di ridurre la frequenza e l'entità degli sprechi alimentari presso i punti vendita.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 9

Innovating supplier-retailer agreements to avoid waste of bakery products

The supplier-retailer interface is a key hotspot of food waste in the Swedish bakery sector, partly due to the reversed logistic management system applied to a large part of the national bread value chain: "take back agreements" (TBA). This holds the bakeries responsible for forecasting, producing and delivering their products, and also responsible for unsold products from an economic and a waste perspective. As the bread waste is mainly generated in the supermarkets, but currently owned by the bakeries, the retailers have limited mandate and economic incentives to reduce the waste – leading to overproduction and inefficient bread management. By quantifying how much waste is generated at the supplier-retailer interface and simulating the outcome of multiple waste reducing scenarios, we can assess the potential benefits and identify limitations of future waste management options.

Five industry actors, including bakeries, retailers and logistic companies, contributed in stakeholder dialogues through which information was shared about the current and future potentials within the bread supply chain. This was used to quantify the waste of bakery products in Sweden (both savory and sweet) sold under TBA, which will next be simulated alongside the potential benefits of removing the TBA or applying changes to it.

The preliminary results suggest that there was considerable waste reduction potential in innovations such as data sharing and price reduction. This result is valuable for supporting incentives for future waste reduction work, both at bakeries and supermarkets. The outcome of this task can also provide guidance on which waste reduction pathway has the highest potential benefits with respect to source reduction and environmental impact.

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PRACTICE ABSTRACT No: 9

Additional information

The Swedish bakery sector

On average, a total of 75 kg of bread and baked goods is consumed per person each year in Sweden, which on a national level translates to around 762 000 ton of bakery products consumed annually. The Swedish bread supply chain is estimated to generate 80 500 tonnes of bread waste each year. Most of this is generated at the household and retail level. At the bakery level, waste is estimated at 12 000 tonnes per year, which includes waste dough, flour, and other ingredients. Household bread waste is estimated to be 30 000 tonnes per year, accounting for 37% of the total waste of bread. Retailer waste is estimated at 28 000 tonnes, representing 35% of the total, similar to the value found for households. The majority of waste at retail level consisted of prepacked bread sold under TBAs.

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CONSORTIUM

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PRACTICE ABSTRACT No: 9

Identifiering av nyttan med åtgärder för minskat svinn av bröd och

Samverkan mellan leverantörer och återförsäljare ger idag upphov till en betydande mängd matsvinn inom den svenska bagerisektorn, delvis på grund av det återtagssystem som tillämpas på en stor del av svenskt bröd och bageriprodukter som säljs färdigpackat. Genom att kvantifiera hur mycket svinn som genereras i leverantörer och återförsäljare, och sedan simulera påverkan av olika svinnminskningsinnovationer, kan vi bedöma de potentiella fördelarna och identifiera begränsningar kring hur brödsvinnet kan minska i framtiden.

5 branschaktörer, inklusive bagerier, återförsäljare och logistikföretag, deltog i intressentdialoger där information delades om nuvarande och framtida potentialer inom brödförsörjningskedjan. Detta användes för att kvantifiera flödet av bageriprodukter i Sverige (både matbröd och fikabröd) som omfattas av återtag. Härnäst kommer olika strategier för att minska svinn simuleras, för att identifiera vilken åtgärd som har störst svinnminskningspotential samt störst miljönytta.

De preliminära resultaten tyder på att det finns en betydande nytta med datadelning mellan producenter och återförsäljare, samt även med prissänkning i butik. Dessa resultat bidrar till att stödja framtida incitament för minskat svinn av bröd och bageriprodukter genom att visa på nyttan med olika innovationer. Resultatet kan även ge vägledning kring vilka strategier som har största potentiella fördelarna med avseende på svinnminskning och miljönytta.

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PRACTICE ABSTRACT No: 10

Fish supply chain dialogue to reduce waste in Scotland

Among the drivers of food waste, those related to social dynamics are particularly difficult to address since supply chain stakeholders have potentially contrasting goals. This requires mutual understanding and long-lasting collaboration and is very relevant for perishable products like seafood. Thus, in LOWINFOOD, we run a dialogue between stakeholders of the whole Scottish fish supply chain.

Our dialogue has four goals: develop an in-depth overview of waste hotspots; identify policy gaps and opportunities; promote awareness of innovative solutions; and favour their adoption by creating new relations or strengthening existing ones. Our stakeholders can exchange ideas as well as fish products and by-products at risk of becoming waste. We have been engaging with stakeholders dealing with fish for human and non-human consumption: fishermen's and processors' associations, primary and secondary processors, retailers, by-products users, policy-makers, and research and innovation institutions.

Due to the high value of seafood products, the supply chain is efficient in allocating them to the most profitable use. Still, some mismatches between economic and environmental goals remain. Waste quantification is poor, and issues such as the offshore disposal of unwanted catch remain very sensitive. Spatial dispersal makes the transportation of by-products towards potential users unprofitable in many instances, even more when users are located overseas. For this reason, the creation of localised clusters of industry and innovators is key.

Successful cooperation requires the building of trust between industry stakeholders across all levels of the value chain, and with researchers and innovators that might be perceived as outsiders, as well as to make the reputational benefits of innovation clear. Small actors should be supported in adapting to change rather than blamed for their possibly unsustainable practices.

Our stakeholder dialogue started in July 2021 and will continue until October 2024. Interested stakeholders can get in touch through our Hutton website: https://www.hutton.ac.uk/research/projects/lowinfood-%E2%80%93-multi-actor-design-low-waste-food-value-supply-chains.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 10

Additional information – Scotland's seafood sector

The seafood sector plays a key role for Scotland's economy and society. Besides contributing to domestic food security, fish and seafood account for 60% of Scotland's food exports, valued at £1 billion or €1.16 billion (204 thousand tons) in 2021. In 2019, more than 14,000 people were employed in the seafood sector, many in remote coastal and island communities (Scottish Government, 2022). In 2015, Zero Waste Scotland estimated that 190,000 tons of fish and shellfish by-products were generated across Scotland each year – a significant opportunity to create value from waste.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 11

Predicting Food Demand with Mitakus

The Mitakus is a forecasting software that is used in the out-of-home-sector, such as in business or university canteens, to predict sales, i.e., the number of guests buying meals. Mitakus helps food service businesses to improve their planning and forecasting by producing the right amount of food and lowering food waste in the process.

The food service businesses provide Mitakus with historical sales data of their different menu lines. Mitakus then cleans the data and uses AI to identify patterns. Variables such as the season, weather, menu line, and day of the week are taken into consideration. Based on the algorithms derived by Mitakus, forecasts for sales are made. This enables decision makers to better adjust the production volume to the actual demand.

The forecast provided by Mitakus can be accessed online and can be used as a planning tool. Chefs and supervisors can compare tool predictions for specific meals and even ingredients, to their own planning. Usually, users work on a weekly basis with the tool, viewing the forecast and making adjustments if necessary. These can involve changing the purchase volume or making short-term adjustments to cooking volumes on a specific day. If the purchase volume can be reduced due to more accurate planning, food cost may be lowered.

While an innovation can save a company money by producing just the right amount of food and wasting less, Mitakus may also reduce stress. With a reliable forecast, the decision of whether the food will suffice for everyone or if more should be produced (and possibly wasted) becomes easier.

In the LOWINFOOD project, we test and evaluate Mitakus in two university canteens and two business canteens. We expect that Mitakus will reduce food waste, because the volume of food needed can be predicted better. We are still testing the innovation right now.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 11

Additional information: Data requirements

To work properly, Mitakus needs clean and reliable sales data to build a forecast on. Using Mitakus has become more challenging because of the pandemic – the historical data used to calculate the forecast may be from lockdowns or before the pandemic. Since then, many restaurants have changed their approach, menu, or pricing. The costumers also may be more likely to work from home, use canteens less or prefer different hours than before.

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PRACTICE ABSTRACT No: 11

Die Nachfrage vorhersagen mit Mitakus

Die Innovation Mitakus wird in der Außer-Haus-Verpflegung genutzt, zum Beispiel in der Studierenden- oder Betriebsverpflegung, um die Nachfrage der Gäste vorherzusagen. Somit unterstützt Mitakus die Betriebe darin, ihre Planung zu verbessern und dabei Lebensmittelabfälle zu reduzieren.

Die Betriebe senden Mitakus Verkaufsdaten der letzten Monate oder Jahre. Mitakus bereinigt die Daten anschließend und nutzt künstliche Intelligenz, um Muster zu identifizieren. Dabei werden Variablen wie der Wochentag, die Jahreszeit, die Menüzusammenstellung oder das Wetter in Betracht gezogen. Durch die von Mitakus bereitgestellten Vorhersagen können Entscheidungsträger in den Betrieben in ihren Planungsaktivitäten entlastet werden.

Die Vorhersagen von Mitakus können sind online über ein Dashboard verfügbar. Küchenleitungen können ihre eigene Planung für Gerichte oder sogar Zutaten mit den Mitakus-Werten vergleichen. Üblicherweise nutzen die Betriebe Mitakus wöchentlich, um die prognostizierten Verkaufszahlen einzusehen und ihre Planung entsprechend anzupassen. So kann z.B. die Einkaufsmenge lang- oder kurzfristig verändert werden, wodurch der Wareneinsatz der Betriebe sinken kann. Kurzfristig können Betriebe ihre Produktionsmenge an die vorhergesagte Verkaufsmenge anpassen.

Die Innovation Mitakus kann dabei helfen, Kosten zu reduzieren, da passgenau eingekauft und Überstände und Abfälle vermieden werden. Zusätzlich lässt sich so ggf. auch Stress im Arbeitsalltag reduzieren: Die Entscheidung, ob Essen kurzfristig nachproduziert werden muss, fällt durch Mitakus leichter.

Im LOWINFOOD-Projekt testen und evaluieren wir Mitakus in zwei Universitätsmensen und zwei Betriebsrestaurants. Wir erwarten, dass weniger Essen weggeworfen wird und sind aktuell dabei, die Innovation zu testen.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 12

A plate waste tracker to nudge pupils to reduce food waste

The Matomatic plate waste tracker, developed by Matomatic AB, a Swedish company, is a technological innovation designed to enhance children's awareness of the food waste issue. It achieves this by engaging with students in school canteens and providing information about the food they discard directly at the point of disposal. This innovation incorporates a scale connected to a tablet computer. The scale is positioned beneath the bin where plate waste is deposited in the eating hall at the school canteen. Whenever something is thrown away by a guest, the mass of the item is displayed to the individual along with relevant metrics (environmental & economic) illustrating the impact of its waste. In addition, the plate waste tracker enables guests to provide anonymous feedback regarding the reasons behind their food waste, which can be invaluable for canteen staff in their day-to-day operations. This feedback mechanism serves as a valuable tool for understanding the factors contributing to food waste and empowers the staff to make informed decisions and improvements based on this feedback.

The tool also informs guests and staff about the total plate waste per school per day and week which adds educational aspects for the guests.

In the context of LOWINFOOD, the plate waste tracker has been successfully implemented in 10 primary schools in Sweden, 3 schools in Germany, and 5 schools in Austria. The potential for expanding its usage to other markets exists, particularly in canteens where encouraging guests to minimize food waste is a viable option. The effectiveness of the innovation in reducing waste depends on the initial scope for improvement. Establishments that have identified plate waste issues would benefit the most from implementing a plate waste tracker.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 12

Additional information

Food waste in the European food service sector

The European food service sector's contribution to food waste equals 12 % of the total amount of food being wasted, i.e., 11 million out of 88 million tonnes are caused by this sector.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 12

Att ”nudge” elever att slänga mindre mat

Tallrikssvinnsvågen utvecklad av Matomatic AB är en teknologisk innovation som är utformad för att öka barns medvetenhet om problemet med matsvinn. Detta uppnås genom att visa hur mycket mat den enskilda individen slänger och visa dess miljöpåverkan i termer som barn kan relatera till. Själva innovationen består av en våg som är ansluten till en surfplatta. Vågen placeras under behållaren där mat från tallriken slängs. Varje gång något slängs visas vikten på föremålet som nyss slängdes för gästen tillsammans med andra relevanta mätvärden som visar konsekvenserna av själva tallriksvinnet. Dessutom möjliggör tallrikssvinnsvågen för gästerna att lämna återkoppling till kökspersonalen om varför något slängdes, vilket kan vara ovärderligt för personalen i skolköket i deras dagliga arbete. Denna återkopplingsmekanism möjliggör för att förstå faktorer som bidrar till matsvinn och ger personalen möjlighet att fatta informerade beslut och göra förbättringar baserat på återkopplingen.

I projektet LOWINFOOD har tallrikssvinnsvågen framgångsrikt implementerats i 10 grundskolor i Sverige, 3 skolor i Tyskland och 5 skolor i Österrike. Potentialen att utöka användningen till andra marknader finns, särskilt i skolmatsalar där det är möjligt att uppmuntra gäster att minimera sitt matsvinn. Effektiviteten hos denna innovation för att minska matsvinnet beror på den initiala potentialen till förbättring. Verksamheter som har identifierat problem med tallrikssvinn skulle ha störst nytta av att implementera tallrikssvinnsvågen.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 12

Das Bewusstsein in der Schule schärfen, um Lebensmittelabfälle zu reduzieren

Die von der schwedischen Firma Matomatic AB entwickelte Tellerreste-Waage (Plate Waste Tracker) ist eine technologische Innovation, die das Bewusstsein der Kinder für das Problem der Lebensmittelverschwendung direkt beim Schulmittagessen verbessern soll. Schülerinnen und Schüler können ihre Tellerreste selbst mittels einer Waage abwiegen und erhalten direkt die Information über die von ihnen weggeworfene Lebensmittelmenge und deren Auswirkung (Umwelt & Kosten). Der „Matomatic Plate Waste Tracker" besteht aus einer Waage, die mit einem Tablet-Computer verbunden ist. Die Waage befindet sich unter dem Behälter, in dem die Essensabfälle der Schülerinnen und Schülern entsorgt werden. Jedes Mal, wenn etwas weggeworfen wird, wird die Menge des Abfalls zusammen mit den relevanten Informationen angezeigt. Dies erfolgt z.B. in Form eines Vergleichs mit dem durch eine bestimmte Kilometeranzahl verursachten CO_2-Ausstoß eines Autos. Darüber hinaus können die Gäste die Gründe, warum sie nicht aufgegessen haben, anonym angeben. Diese direkten Rückmeldungen sind für das Personal bei der täglichen Arbeit von unschätzbarem Wert. Denn dadurch hat das Mensapersonal die Möglichkeit, Verbesserungen vorzunehmen (z.B. die Menge der ausgegebenen Speisen anzupassen oder Menüzusammensetzungen zu ändern) und so können Lebensmittelabfälle reduziert werden.

Das Tool informiert Gäste und Personal ebenfalls über die gesamten Tellerreste der Schule pro Tag und pro Woche. Diese Information kann den Mitarbeitenden der Küche und den Gästen aufzeigen, ob Veränderungen in den Prozessabläufen oder im Verhalten bereits zu einer Veränderung der Abfallmenge geführt haben.

Im Rahmen von LOWINFOOD wurde die Matomatic Tellerreste-Waage in zehn Grundschulen in Schweden, drei Schulen in Deutschland und fünf Schulen in Österreich erfolgreich eingesetzt. Das Potenzial für eine Ausweitung auf andere Einrichtungen ist vorhanden. Die Tellerreste-Waage bietet eine innovative und praktikable Lösung, um die Tellerreste zu reduzieren. Einrichtungen, die bereits Probleme mit Tellerabfällen erkannt haben, können am meisten von der Einführung einer Tellerreste-Waage profitieren.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 13

Innovative education reducing food waste in Austrian schools

The innovative educational concept for school canteen staff and pupils helps to avoid food waste in schools. In Austria's catering sector, there is often a lack of awareness and sensitisation to the issue of food waste. Food is wasted in Austrian canteens from purchasing, over preparation and serving, to consumption. In order to build the necessary knowledge and put it directly into practice, these subjects were introduced and discussed in workshops with the employees of the school canteens and pupils, and then put into practice in the common preparation of meals.

The overall goal was to identify avoidable food waste in preparation, serving, and consumption through the innovative educational concept and to reduce it in the long term. In addition to raising awareness, target group-specific practical measures are presented and positive incentives to become active are developed. A Michelin-star chef demonstrated the correct handling of food during preparation to strike up a discussion around food waste prevention practices in canteens. The common challenge in the workshop is to cook as many portions as possible from one shopping basket while producing a minimum amount of waste.

In order to test the impact of the educational concept, it will be carried out at up to 12 schools in Austria. The aim of this part of the project is to answer some questions about the potential to reduce food waste in canteens, save costs and create awareness. The concept will be used as a validated method and valuable tool for canteens and restaurants.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 13

Additional Information

Austrian out-of-home catering sector

In Austrian canteens and restaurants, a significant amount of food is wasted. Compared to the food served, the avoidable food waste in these businesses ranges between 3 and 55 percent. Projected to the whole country this means that approximately 175.000 tons of food is wasted in Austrian canteens and restaurants.

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PRACTICE ABSTRACT No: 13

Innovatives Bildungskonzept zur Vermeidung von Lebensmittelabfall

Das innovative Bildungskonzept für Schulen hilft Lebensmittelabfälle in Schulen zu vermeiden. In der Gastronomie fehlt es oft an Bewusstsein und Sensibilisierung zum Thema Lebensmittelabfall. Vom Einkauf über die Zubereitung bis hin zur Ausgabe der Speisen werden in österreichischen Kantinen Lebensmittel verschwendet. Um das benötigte Fachwissen direkt in die Praxis zu bringen wurde in Workshops mit den Mitarbeiterinnen und Mitarbeitern der Schulkantinen sowie den Schülerinnen und Schülern das notwendige Wissen vermittelt, diskutiert und im Anschluss beim gemeinsamen Kochen direkt umgesetzt.

Das übergreifende Ziel ist, durch das innovative Bildungskonzept vermeidbare Lebensmittelabfälle in der Zubereitung, Ausgabe und beim Verzehr zu identifizieren und langfristig zu reduzieren. Neben der Bewusstseinsbildung sollen zielgruppenspezifische Handlungsmaßnahmen vorgestellt und positive Anreize zum Aktivwerden geschaffen werden. Dabei zeigte ein Sternekoch den richtigen Umgang mit den Lebensmitteln bei der Zubereitung der Speisen. Gemeinsames Ziel im Workshop war es, aus einem Einkaufskorb so viele Portionen wie möglich zu kochen und dabei so wenig Abfall wie möglich zu produzieren.

Um die Wirksamkeit zu testen, wird das Konzept an bis zu 12 Schulen in Österreich durchgeführt. Dabei sollen Fragen über beispielsweise das Reduktionspotenzial der Lebensmittelabfälle in Kantinen, Kosteneinsparungen und Bewusstseinsbildung beantwortet werden. Das Konzept wurde gemeinsam mit Kolleginnen und Kollegen der Schwedischen Universität für Agrarwissenschaften (SLU) entwickelt und dann an nationale Unterschiede angepasst. Das Bildungskonzept soll als validierte Methode und wertvolles Werkzeug für Schulkantinen und Restaurantbetriebe eingesetzt werden.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 14

Research against food waste in a multi-actor approach

What gets measured, gets managed. This famous quote also applies to the fight against food loss and waste (FLW).

Measuring the amounts of FLW, and their impact, is crucial to understand which initiatives and innovations can really help. For example, innovations that process FLW into bio-based materials can be beneficial because of the reduction in waste but may not make sense from an environmental perspective because of the additional energy/resource input required. Or they can generate new income and jobs in the bio-based packaging industry at the expenses of the waste management industry, which requires a calculation of the net gain. Also, a holistic approach is necessary to avoid shifting FLW from one sector to another. For a future implementation of promising innovations, an appropriate evaluation is therefore essential.

Measuring food waste requires the involvement of the people who work every day in food companies, restaurants, catering etc. Hence, LOWINFOOD researchers apply a multi-actor approach to involve different actors of the food supply chain. In this collaboration, researchers look at robustness of methods for the evaluation, practitioners contribute with making these methods feasible in real life. This can be challenging, but also beneficial when used for selected aspects.

The evaluation of innovations to prevent and reduce FLW is conducted for the efficacy as well as the environmental, social, and economic impacts. Two systems are compared:

- Conventional food supply chain (baseline); the system before implementation of innovation and
- Low-waste food supply chain (monitoring); the system after the implementation of innovation

The main challenge is finding the most robust but at the same time most feasible data collection method. The experience within LOWINFOOD showed that partners can judge quite well, which method can successfully be applied. This decreases the risk of failures and increases the quality of data.

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PRACTICE ABSTRACT No: 14

Additional information

The complementary knowledge of multi-actors can join forces for a successful implementation of innovations to cut down food wastage. Mutual discussions about barriers and solutions as well as shared knowledge of best practices but also of failures can stipulate a transformation from business as usual to a more efficient and sustainable business.

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 15

Efficacy of innovations against food waste

Accelerating progress towards Sustainable Development Goal Target 12.3 in the European Union is a crucial mission, and the European Commission has put forth ambitious efforts to make it happen. LOWINFOOD is a visionary project that spearheads the charge with innovative solutions tailored for: 1) processing & manufacturing and 2) retail & consumption. These technological, social, and organizational innovations hold the key to reducing food waste in different value chains.

LOWINFOOD goes beyond mere aspirations by providing concrete data-driven results: measuring the efficacy of each innovation in food waste reduction is considered crucial to the project. A comprehensive multi-actor approach has been meticulously crafted based on Delegated Decision 2019/1597 of 3rd May 2019. Through a Delphi consultation with scientific partners and in-depth interviews with innovators, we've laid the groundwork for reliable measurement (KPIs, indicators, methods).

Two data collection phases have been foreseen to measure efficacy: the baseline, which offers an invaluable understanding of food waste in selected environments before the application of the innovations; and the monitoring, which collects data during or after the application of the innovative solution.

Through this meticulous data collection and rigorous analysis, we can confidently showcase the true impact of our efforts in curbing food waste. Our commitment to precision and accuracy ensures that we pave the way towards a future where sustainability and waste reduction go hand in hand.

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Country/region

All countries involved in the implementation of the innovations

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Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

PRACTICE ABSTRACT No: 15

Additional information

In order to accelerate the EU's progress towards Sustainable Development Goal Target 12.3, the Commission is proposing to set legally binding food waste reduction targets to be achieved by Member States by 2030. More specifically, Member States are required to take the necessary measures to reduce food waste by the end of 2030: 1) by 10%, in processing and manufacturing; 2) by 30% (per capita), jointly at retail and consumption (restaurants, food services and households). The legislative proposal, amending the Waste Framework Directive, provides for a formal review of progress made by Member States, by the end of 2027. Source: LINK

All Practice Abstracts prepared by LOWINFOOD can be found here!

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ABOUT LOWINFOOD

The LOWINFOOD project, launched in 2020 and coordinated by the University of Tuscia, Italy, is working to deploy and improve a set of 14 innovative solutions to the food waste problem, by demonstrating their effectiveness and market potential. The core activities of the project are all focused on the evaluation of the efficacy of these innovations in reducing food losses and waste, in terms of the amount of food waste avoided as well as their environmental and socio-economic impact.

CONSORTIUM

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