FoodTuristic

A GOOD PRACTICE USER GUIDE FOR CULINARY AND HOSPITALITY VOCATIONAL EDUCATION & TRAINING

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LYCÉE HÔTELIER
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ITS INSTITUTE OF TOURISM STUDIES
IN ACADEMIC AFFILIATION WITH THE EMIRATES ACADEMY OF HOSPITALITY MANAGEMENT

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FoodTuristic

A Good Practice User Guide for Culinary and Hospitality Vocational Education and Training

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About the project

Food waste in Europe is a significant issue, with around **88 million tonnes** of food wasted annually, according to the European Commission. This amounts to **approximately 173 kilograms per person per year**. A 2022 report highlighted that about **10% of all food produced in the EU is discarded**, contributing to economic losses and environmental harm. The EU's food waste is responsible for about 6% of total greenhouse gas emissions. While households account for nearly half of the waste, food waste also occurs throughout the supply chain, from farms to retailers. Efforts to reduce waste are gaining traction, but much work remains.

The FoodTuristic project addresses the **lack of green technology curriculum** in European culinary and hospitality schools, which have traditionally focussed more on **gastronomy and hospitality management skills**. It is funded via the Erasmus Key Action 2 framework, with the project running from November 2023 - November 2025.

Our project aims to develop **digital resources for educators and students** in hotel and culinary schools across four partner countries to reduce food waste, develop circular economy skills, and localise food production.

This guide is accompanied by a **Vocational Education and Training (VET)** course delivered as a digital badge, a website, a mobile application, and a good practice guide, to address the green skills gap in European culinary and hospitality schools.

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FoodTuristic

About the project

Our project will reduce **food waste, utilise food waste** in novel technology composting systems, and adopt new technologies to grow appropriate foods onsite.

The skills developed by project output users will have **strong legacy potential and benefit the reduced carbon impact of schools and industry**.

Between 2023 and 2025 the project partners will produce many VET educational resources, tested with hotel schools across Europe. These include this present user guide, a free mobile application available for download, a website, a VET course and supporting videos and images.

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FoodTuristic

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FoodTuristic

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FoodTuristic

Introduction

In today's world, **sustainability** is no longer a choice—it is a necessity. Vocational Education and Training (VET) schools play a crucial role in shaping the future workforce, particularly in industries like hospitality, agriculture, and food services, where food waste is a **growing challenge**. As educators, it is vital to not only teach practical skills but also to instill values of environmental responsibility.

Technology offers **innovative solutions** to combat food waste, from smart kitchen appliances that track food usage to AI systems that recommend recipes using leftover ingredients. Integrating these advancements into **VET school curriculums** not only helps reduce waste but also prepares students for a future where sustainability and technology go hand in hand.

This guide explores how VET schools can leverage **modern technologies to minimise food waste**, turning classrooms and kitchens into hubs of eco-friendly innovation. Let's equip the next generation with the tools and knowledge to build a more sustainable world—starting with their plates.

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Thematic Areas

In addressing the urgent issue of food waste, technology offers a wide array of solutions. For VET schools, teaching students how to harness these innovations not only equips them with valuable skills but also instills sustainable practices that will benefit industries and communities alike. This guide is structured around three core themes: **using technology to reduce food waste**, **repurposing food waste with technology**, and **using technology for local growing**. Each theme is an important component in building a holistic approach to sustainability.

1. Using Technology to Reduce Food Waste

The first step in addressing food waste is prevention. By leveraging modern technologies, we can significantly cut down on the amount of food that goes to waste in kitchens, classrooms, and cafeterias. Smart appliances, apps, and data-driven systems are now widely available to monitor food use, track expiration dates, and optimise food inventory management.

For example, **smart fridges** equipped with AI can notify users when food is nearing its expiration date, while **food waste management apps** provide recipe suggestions for leftover ingredients. **Inventory management software** can help schools and businesses reduce over-purchasing by predicting accurate quantities needed for upcoming meals or lessons. Teaching students how to use these technologies prepares them for a future where minimising waste is part of their daily practice.

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Thematic Areas

2. Repurposing Food Waste with Technology

Even with the best prevention strategies, some food waste is inevitable. However, this waste doesn't have to end up in landfills. The second theme focuses on how technology can help repurpose food waste, transforming it into valuable resources such as energy, fertiliser, or animal feed. Technologies like **composting machines** and **food waste digesters** are now compact and efficient, making it easy to turn organic waste into nutrient-rich compost. In larger setups, **bio-digesters** can even convert food waste into biogas, providing an eco-friendly energy source. These systems not only reduce the environmental impact of food waste but also teach students about the **circular economy**—the concept of reusing waste to generate new resources.

3. Using Technology for Local Growing

Growing food locally is another powerful strategy to minimise waste, and technology can make this process more efficient and accessible. From **indoor gardening systems** to **hydroponics** and **aeroponics**, these innovations allow students to grow fresh produce year-round, right in the classroom or school kitchen. Indoor gardens that use **automated lighting, watering systems, and nutrient management** are perfect for urban environments or areas with limited agricultural space. These systems reduce the need for transportation, packaging, and long supply chains, which are major sources of food loss. Additionally, they provide students with hands-on experience in sustainable farming techniques, allowing them to understand the full cycle of food production, consumption, and waste reduction.

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The Scale of the Challenge

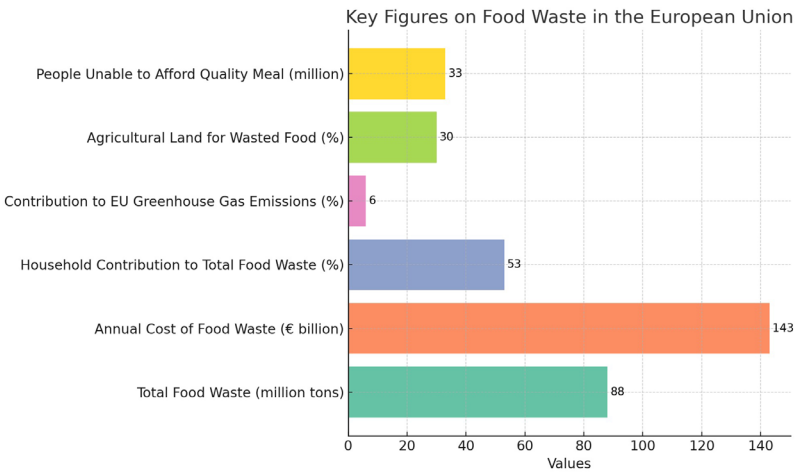
Food waste is a significant issue in the European Union, with far-reaching consequences for the environment, economy, and society. Approximately **88 million tonnes** of food are wasted annually across the EU, costing an estimated **€143 billion**. This waste occurs throughout the food supply chain, from agricultural production to household consumption, with households alone contributing to about **53%** of the total.

The environmental impact of food waste in the EU is substantial. Food waste contributes to **6% of the EU's total greenhouse gas emissions**, exacerbating climate change. It also leads to inefficient use of natural resources, including land, water, and energy. Around **30% of agricultural land** in the EU is used to grow food that is never consumed, which also wastes the water and energy invested in its production, further straining the environment.

Economically, food waste represents a huge loss of value in both the public and private sectors. Reducing food waste could lower costs for businesses in the food industry, from producers and processors to retailers and consumers. Moreover, tackling food waste could provide significant economic benefits by fostering innovation and creating jobs in food recovery and redistribution initiatives.

On a social level, food waste exacerbates inequalities, as nearly **33 million people** in the EU cannot afford a quality meal every second day. Reducing food waste could help improve food security by redirecting surplus food to those in need.

The EU is committed to addressing this issue through the **European Green Deal** and has set a target to halve per capita food waste at the retail and consumer level by **2030**, as part of the **Farm to Fork Strategy**. Addressing food waste is crucial for creating a more sustainable, resilient, and equitable food system across Europe.



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How Can Technology Help?

Technology can help **Vocational Education** and **Training (VET)** students to significantly reduce food waste by enhancing their skills and decision-making in real-world food production, processing, and service settings.

Smart inventory systems, AI-driven demand forecasting tools, smart air filters for fridges, localised growing, and composting, can help students in **culinary and hospitality programmes** better manage ingredients, ensuring precise portioning and reducing excess.

IoT-enabled devices like smart fridges can track food expiration and suggest recipes using ingredients nearing spoilage, helping students develop efficient kitchen management habits. Beyond culinary arts and hospitality, in agriculture and food production courses, VET students can utilise precision **farming technologies**, such as sensors and data analytics, to monitor crop conditions and minimise losses during harvesting and storage. These tools allow students to **optimise food production while reducing waste** due to overplanting or improper handling.

Additionally, food tracking apps and waste analytics tools provide some potential insights into **waste patterns**, helping students make informed decisions about purchasing, portion control, and menu planning. Learning how to incorporate **sustainable packaging technologies**, such as vacuum sealing and smart packaging, can also extend the shelf life of food products, further reducing waste.

By incorporating these technologies into their training, VET students can develop a deeper understanding of sustainable practices, which they can carry into their **professional careers**, contributing to broader efforts to reduce food waste in the hospitality, agricultural, and food processing sectors.

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SDGs

The Sustainable Development Goals (SDGs) are a set of **17 goals adopted by all United Nations Member States in 2015**. 17 global goals serve as an urgent **call to action** for all countries, both developed and developing, to work together in a global partnership. These strategies promote health, education, economic growth and reduced inequality. They want to fight **against global warming and preserving oceans and forest.**

These goals form the foundation of the **United Nations' 2030 Agenda for Sustainable Development**, aiming to foster a more equitable and sustainable world for current and future generations. Each goal represents a critical area where international cooperation can make a significant change.

Here are the 17 SDGs goals :

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SDGs

FoodTuristic aligns with the SDG 2 by working to reduce food waste. The goal is to **prevent edible food** from going to waste, helping to increase food availability for those in need. By minimising food waste, FoodTuristic aims to enhance **food security** and contribute to a world where everyone has access to nutritious food. This mission is essential in the fight against hunger, as reducing waste can improve resource efficiency.

FoodTuristic is transforming culinary and hospitality education by **integrating sustainability and innovative technologies** into training. That is why it supports Quality Education (SDG 4). Through hands-on **learning with technologies** like AI waste tracking, composting systems, and digital food-sharing platforms, students gain valuable skills in sustainable food management. This not only enhances educational quality with cutting-edge tools but also prepares future hospitality professionals to lead in reducing food waste and fostering a circular economy. This approach builds practical, environmentally conscious skills that empower students to make a positive impact in their field.

FoodTuristic is helping conserve water resources by **promoting technologies that reduce food waste and support sustainable practices**, which in turn help conserve water resources. That is why it supports Water and Sanitation (SDG 6). Solutions like composting and anaerobic digesters reduce waste that could otherwise contaminate water supplies, while on-site food growing technologies minimise the need for water-intensive imports. By teaching students how to manage resources efficiently, FoodTuristic encourages water conservation and responsible waste management in the culinary and hospitality sectors.

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SDGs

FoodTuristic encourage SDG 8 by promoting food waste reduction. When food is wasted, it represents a **significant financial loss across the food supply chain**, from producers and retailers to consumers. By reducing food waste, FoodTuristic helps organisations and individuals conserve resources and money, improving economic efficiency and fostering more sustainable practices

The FoodTuristic project is driving innovation in the culinary and hospitality industries by **introducing cutting-edge technologies** for sustainable food management. That is why it aligns with **Industry, Innovation, and Infrastructure** (SDG 9). For example, using AI-driven waste monitoring, composting systems, and sustainable food growing methods, the project fosters innovation in food waste management. It encourages the development and adoption of cutting-edge solutions, helping build sustainable infrastructure within educational institutions. By training students on these technologies, the project promotes the growth of a more sustainable and efficient industry.

FoodTuristic is linked to SDG 11 by offering new technologies that help cities manage food resources more responsibly. Indeed, FoodTuristic enables communities to adopt sustainable practices, ultimately enhancing urban resilience and resource efficiency.

For instance, digital platforms facilitate the **distribution of unsold food** to those in need, reducing waste while supporting local communities. AI-monitored food waste bins track and analyse waste patterns by food type, allowing cities to tailor waste reduction initiatives. Advanced composting solutions enable communities to process food waste in site, turning it into valuable compost for local agriculture. By implementing these technologies, cities can minimise waste, save costs, and contribute to sustainable development.

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SDGs

FoodTuristic is committed to promoting sustainable food practices in culinary and hospitality education but also for homes, encouraging responsible consumption and waste reduction. That is why it supports **Responsible Consumption and Production** (SDG 12). Here, technologies like food waste tracking, composting, and repurposing food scraps are good examples of the project contribution to this SDG. It also **teaches students how to reduce waste, optimise resources, and make more responsible choices** in food management. By integrating these practices into daily operations, FoodTuristic encourages a culture of **responsible consumption**, empowering future professionals to minimise waste and promote sustainability in the industry but also individuals to start using the resources the project is giving.

The climate action is very important because it plays a significant role in **reducing the environmental impact of food waste**. Food waste is a major contributor to greenhouse gas emissions, as decomposing food in landfills releases methane. So, FoodTuristic helps reduce these emissions and mitigate the effects of climate change.

The project's innovative technologies, such as anaerobic digesters for composting, AI-monitored waste bins, and smart freezers, optimise the resource and minimise the environmental footprint of food production and consumption. Furthermore, practices like repurposing food waste into products and vertical farming support sustainable food production that reduces the need for land, water and energy.

FoodTuristic thrives on **collaboration, bringing together culinary schools, tech innovators, and sustainability experts** to tackle food waste and promote sustainable practices. That is why it contributes to **Partnership for the Goals** (SDG 17). By working together, these stakeholders share knowledge, resources, and innovative solutions to reduce food waste and promote sustainable practices. FoodTuristic strengthens partnerships within the educational and hospitality sectors, creating a unified approach to achieving sustainability goals and encouraging collective action towards a more sustainable food system.

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Using Technology to Reduce Food Waste

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Artificial Intelligence Food Bins

About the technology/ innovation:

AI Food Bins are smart waste management solutions that use artificial intelligence and machine learning to sort, track, and manage food waste more effectively. They are designed to help households, businesses, or regions (e.g. a cooperative of restaurants) reduce food waste and improve recycling efforts.

How the technology works:

- AI food bins operate using a combination of advanced sensors, cameras, and artificial intelligence algorithms to effectively manage and sort food waste.
    - When food waste is deposited into the bin, sensors and cameras identify the type of waste by analysing its shape, color, and composition.
    - Using AI and machine learning algorithms, the bin's system classifies the waste into specific categories, such as fruits, vegetables, meat, or packaging materials.
    - The bin then sorts the waste into the appropriate compartment or issues a prompt to guide users in correctly disposing of the waste.
- Additionally, AI food bins track the amount and types of waste generated over time, collecting data to analyse waste patterns and provide insights into reducing food waste.

Artificial Intelligence Food Bins

Key Lessons if your school is installing an AI food bin

Educate on Sustainable Practices:
Use the AI food bins as a practical tool to teach students about sustainable food management practices. This includes lessons on reducing food waste, recycling, composting, and understanding the environmental impact of waste. Real-time data from the bins can be used in case studies to analyse waste patterns and develop strategies for minimising waste.

1

2

Integrate with Curriculum:
Incorporate the technology into courses on hospitality management, culinary arts, and environmental science. Students can learn how AI-driven tools can improve operational efficiency, reduce costs, and enhance a hotel's sustainability credentials.

Demonstrate the Benefits:
Highlight the practical benefits of AI food bins, such as reducing food waste disposal costs, improving kitchen hygiene, and enhancing guest satisfaction by promoting a commitment to sustainability. Use data from the bins to demonstrate tangible savings and environmental benefits over time.

3

4

Promote Hands-on Learning:
Allow students to interact with the AI food bins directly. Encourage them to experiment with the technology, such as by tracking different types of waste, analysing data, and suggesting improvements. This hands-on experience will help them understand how AI can be leveraged in a real-world hospitality setting.

Artificial Intelligence Food Bins

Key Lessons if your school is installing an AI food bin

Involve Students in Maintenance and Analysis:

Task students with managing the operation and maintenance of the AI food bins, including troubleshooting technical issues, replacing filters, and analysing waste data. This experience teaches them the importance of regular maintenance for AI-driven tools and provides insights into the operational challenges they may face in a professional environment.

Encourage Innovation:

Use the installation as an opportunity to inspire innovation. Challenge students to think creatively about how AI technology could be further developed or adapted for other uses in the hospitality industry, fostering an entrepreneurial mindset and a culture of continuous improvement.

Develop an Interest in Sustainability Among Students:

By installing AI food bins, the hotel school sends a message to both its students and to other faculties and regional stakeholders about its commitment to sustainability.

This can inspire a broader cultural shift, encouraging both staff and students to adopt more sustainable practices in all aspects of their education and daily life.

An AI food waste bin at the Hodson Bay Hotel, Ireland, November 2023

Artificial Intelligence Food Bins

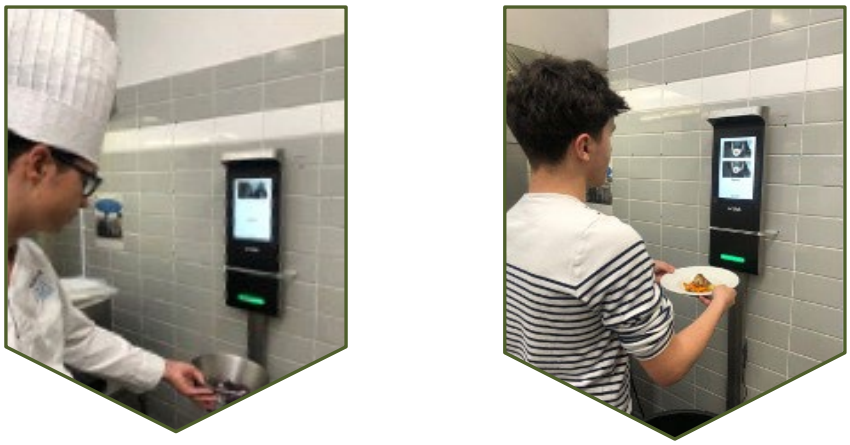
Key Lessons if your school is installing an AI food bin

Use the same scales and distinguish between production waste and consumption waste :

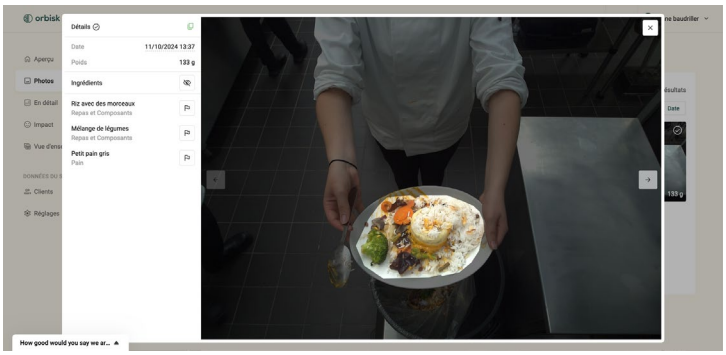
It may be worth choosing a technology that distinguishes between these two sources of waste, simply by recognising the nature of the containers. Stainless steel salad bowl or saucepan: waste produced in the kitchen; plate: waste from customer consumption.

Refine data recognition.

For each photo it is possible to modify the description of the recognised ingredients, which contributes to enriching the database and improving the effectiveness of this technology.



An AI food waste bin at the Lycée Hôtelier Dinard, France, September 2024



The AI recognises the different components of this plate. Here it recognised bread even though it was a chicken ballotine. The cooking teacher or a student can modify the ingredients to achieve more realistic results. (LHD September 2024)

Artificial Intelligence Food Bins

Key Lessons if your school is installing an AI food bin

Ensure the quality of the shots taken to guarantee the quality of the data collected. For example, if the waste is emptied into the bin too quickly, the application cannot recognise the contents of a plate and cannot quantify the type of waste.

In these two photos, the software records the weight of the waste as 'unknown'.
Lycée Hôtelier Dinard, September 2024

Using a connected scale in a catering school: many people will be using this technology (at the Dinard catering school for the year 2024/2025: 28 teachers and 370 students).

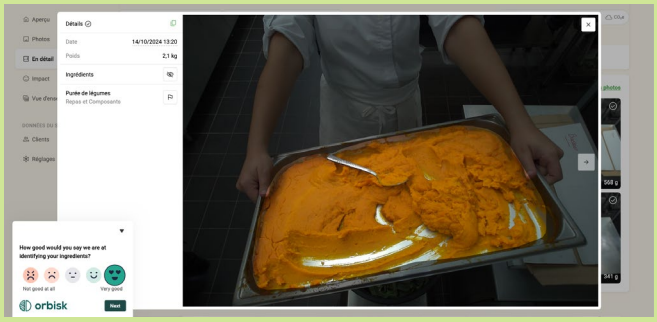
The main benefit is to raise awareness of food waste on a massive scale, as each of these people will have immediate access to the data during a cooking or service lesson.

The main difficulty lies in the need to train this large number of people in the use of this technology so that the impact on waste is optimal. (At the lycée hôtelier de Dinard, at least two students per group were trained to use the scales.)

Artificial Intelligence Food Bins

Using data to make decisions

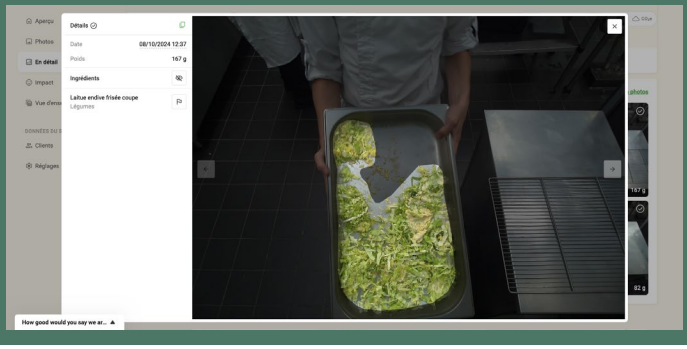
Measure production waste to better adjust the quantities produced to customer portions:



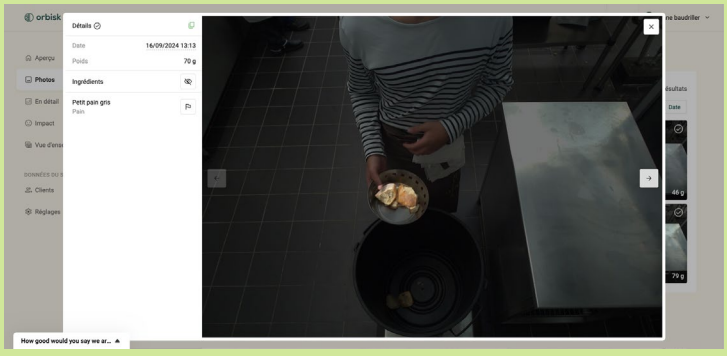
Example : 2.1 kg of vegetable puree thrown away in the kitchen. Objective for the next lesson: review the quantities produced in relation to the number of expected customers.

Record what is thrown in the trash to improve sorting in the kitchen.

Example : 167 g of salad thrown away in the kitchen. Objective for the next course: Better sort compostable and non-compostable waste



Measure what is not consumed by customers to modify commercial services.



Example : 70 g of bread to throw away from a table (2 customers). Objective: should we serve small individual balls of bread or offer smaller slices of bread?

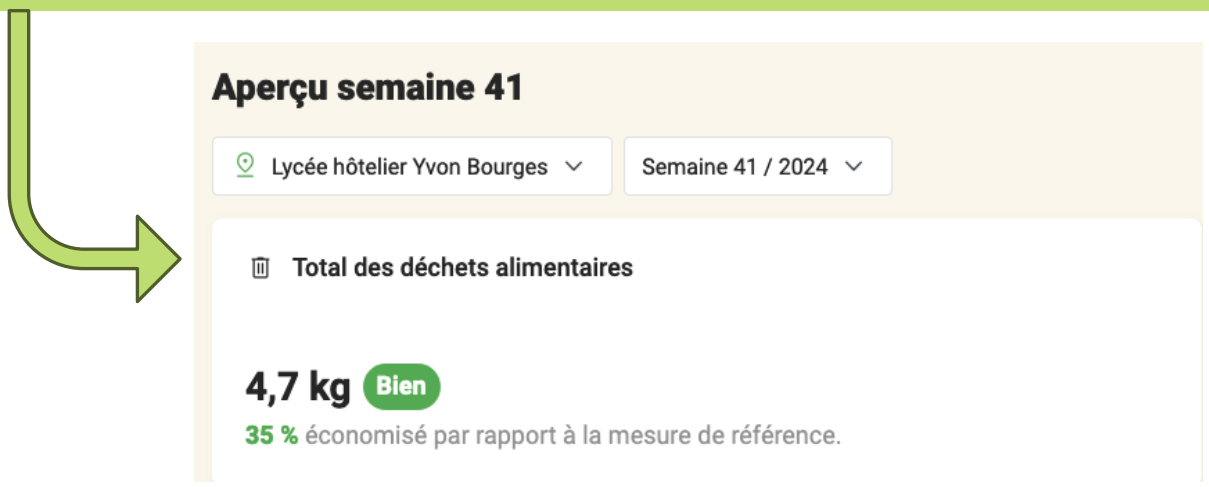
Artificial Intelligence Food Bins

Using the results

The AI calculates the **average weight of food waste** (excluding cutting waste) to determine a "reference measurement". In Lycée Hôtelier de Dinard, the reference measurement is 10.3kg of edible food thrown away on average per week (since the start of the experiment on May 16, 2024).

The AI calculates the differences with this reference measurement for a specific period.

On the dashboard, the weight of food waste avoided (in kg but also per customer) is obtained; its carbon and financial impact.



During week 41, 4.7kg of food waste was recorded, a reduction of 35% compared to the baseline measurement. (Lycée Hôtelier Dinard, October 2024)

The results of the dashboard are easy to use and rich in lessons for improving kitchen and restaurant service practices.

Smart air filters for fridges

What are they?
Smart air filters for fridges are designed to improve the air quality inside a refrigerator by eliminating odours, reducing bacteria, and maintaining freshness for a longer period. They usually combine advanced filtration technologies, such as activated carbon or ionisation, with smart features like sensors and connectivity.

Shelfy, one example of a brand in this area, operates by combining ionisation and activated carbon filtration to purify the air inside a refrigerator. The ionisation process releases negatively charged ions that attach to airborne particles like bacteria, mould spores, and odours, causing them to clump together and fall out of the air. The activated carbon filter absorbs and neutralises particles, effectively removing unpleasant smells and contaminants.

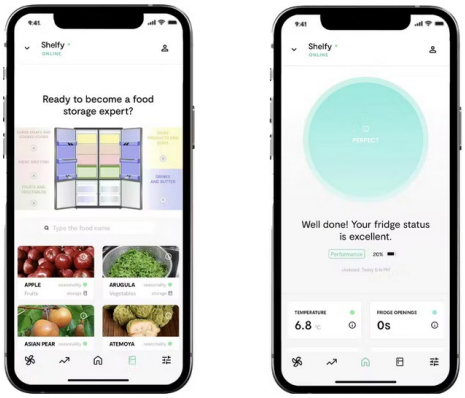
How the technology works:
Shelfy's built-in sensors monitor the fridge's air quality and humidity levels in real time, automatically adjusting its purification intensity as needed.

It connects to a smartphone app via Bluetooth, allowing users to track air quality, receive alerts for filter replacements, and monitor battery life. Shelfy is designed to be energy-efficient and easy to use, ensuring that the air inside the fridge stays fresh, clean, and conducive to keeping food fresher for longer. The unit cost €149 in 2024.

Smart air filters for fridges

Key lessons if your school is installing a smart fridge filter:
Using a smart fridge filter like Shelfy in a hotel school's kitchen or food storage areas offers several key lessons that can be beneficial for both students and the school/ university. Here are some of the most critical lessons:

Promoting Food Safety and Hygiene:
A smart fridge filter like Shelfy helps students understand the importance of maintaining a hygienic food storage environment by reducing bacteria, mould, and odours. They learn how advanced technologies, such as ionisation and activated carbon, can keep food fresh for longer periods, minimise cross-contamination, and uphold safety standards in a professional kitchen setting.



The application also allows you to monitor the opening of the fridge door and keep an eye on the temperature. This could be interesting for students to collect this data to study food hygiene and safety.

Understanding the Role of Technology in Reducing Waste:
Shelfy and other similar brands provide real-time data which can help estimate the air quality and freshness levels within the fridge, helping students understand how technology can prevent food spoilage and reduce waste. This lesson emphasises efficient inventory management and sustainable practices, crucial skills in running a successful hospitality operation.

Smart air filters for fridges

Key lessons if your school is installing a smart fridge filter

Hands-On Experience with Smart Technologies:

By using smart filters, students gain practical experience using smart kitchen tools, preparing them for the increasing use of technology in modern hotel management. They learn how to use connected devices, interpret data, and make decisions that improve operational efficiency and guest satisfaction.

Using this technology is very simple and accessible to even the youngest students.

It is charged by a simple USB cable and can be used for 3 consecutive weeks.
Cleaning is quick and easy: just open the device and rinse the filter with cold water.

Reinforcing the Importance of Preventive Maintenance:

The filter's automatic notifications for replacement and cleaning offer a practical lesson in preventive maintenance. Students learn to monitor equipment proactively, ensuring optimal performance, minimising downtime, and understanding the direct impact of equipment upkeep on operational costs and food quality.

Smart air filters for fridges

Key lessons if your school is installing a smart fridge filter

Demonstrating Sustainability Practices:
By using a smart filter that extends the life of stored food and reduces the need for frequent replacements, students are taught about sustainability in a practical, tangible way. This reinforces lessons on reducing waste, optimising resources, and implementing green practices — all critical topics in today's hospitality industry.

For example, students at the Lycée Hôtelier in Dinard carried out a test on three foods: a carrot, a black radish and sage.



The test aims to compare the visual development and weight of similar foods.

Student data captured from experimenting with a smart fridge filter, Lycée Hotelier de Dinard, May 2024

Smart air filters for fridges

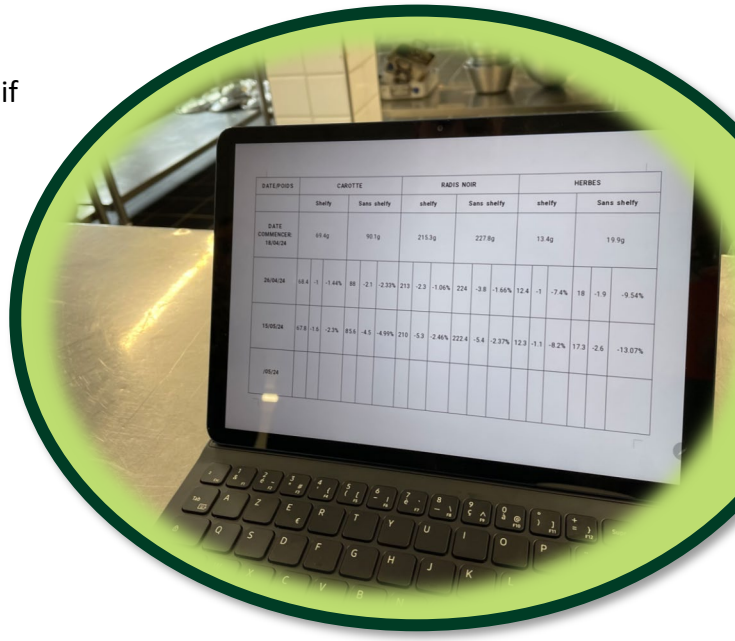
Process :

They weighed the foods at the start.
They then placed them in two different containers and wrapped them in cling film.
They placed them in two different fridges, one with a filter and another one without.
They then collected the data for one month.

Test results :

Herbs showed the biggest difference in weight loss, followed by carrots, then black radishes.

The test is simple to set up with students and inexpensive, especially if aromatic herbs are produced in the school.



It can be an opportunity for students to test hypotheses in practice, and understand the processes of food preservation processes.

Food		Carrot				Black radish				Aromatic herb			
Weighing day	Duration	With fridge filter		without fridge filter		With fridge filter		without fridge filter		With fridge filter		without fridge filter	
18/04/2024	Test start	69,4		90,1		215,3		227,8		13,4		19,9	
26/04/2024	8 days	68,4	-1,44%	88	-2,33%	213	-1,07%	224	-1,67%	12,4	-7,46%	18	-9,55%
15/05/2024	27 days	67,8	-2,31%	85,6	-4,99%	210	-2,46%	222,4	-2,37%	12,3	-8,21%	17,3	-13,07%

Smart air filters for fridges

Key lessons if your school is installing a smart fridge filter

Enhancing Guest and Operational Experience:

Understanding how a smart fridge filter contributes to a fresher kitchen environment and reduces odours helps students recognise how behind-the-scenes technologies enhance guest experience indirectly. Clean, fresh food storage reflects well on a hotel/ restaurant's commitment to quality and hygiene, crucial elements in customer satisfaction and brand reputation.

Change behaviors

Fridge filter technology can strengthen awareness-raising efforts to change behaviour.
The filter can, for example, be installed in a shared fridge in school canteens. Instead of being thrown away at the end of the meal, foods not consumed by students and staff school (e.g. fruit, unopened bread, etc.) can be placed in a fridge and used later or bring back home at the end of the day.

Such initiatives called "fridge solidarity" are being developed in France.

Virtual Reality headset and training material

About the technology/ innovation:

A virtual reality (VR) headset can revolutionise vocational education and training (VET) by offering immersive, hands-on learning experiences in a safe and controlled environment. It allows learners to engage with realistic simulations of complex tasks, such as machinery operation, medical procedures, or construction work, without the risks associated with real-world practice. VR can enhance understanding by providing interactive, 3D environments where students can visualise concepts, practise skills repeatedly, and receive instant feedback. This technology not only improves retention and skill development but also makes training more accessible, cost-effective, and adaptable to diverse learning needs.

How the technology works:

Virtual reality (VR) headsets work by immersing the user in a computer-generated 3D environment, simulating the experience of being physically present in a different setting. The headset includes two small screens (one for each eye), which display slightly different images to create a stereoscopic effect, giving the illusion of depth.

Some recommended videos to test:

1. From Waste to Taste | VR 360º in Rio de Janeiro, Brazil
https://www.youtube.com/watch?v=3huh0WwHvZ4
2. FareShare Field to Fork
https://www.youtube.com/watch?v=h0ZNKJcGqEw
3. Food Nation VR 360° - Sustainability
https://www.youtube.com/watch?v=yZCiPT91ZjQ

Virtual Reality headset and training material

Getting Started

1. **Choose the Right VR Headset**: Select a VR headset that suits your needs and budget. Popular brands include those from Meta, PlayStation and Google and a budget of €300 to €600 per headset will get you started.

2. **Find Educational VR Content**: Look for existing VR experiences related to food waste, sustainability, or environmental education. There are many suitable videos on YouTube to get started.

2. **Set Up the VR Environment**: Ensure a safe and open space for using the headset, where learners can move around freely. Set up tracking sensors or use built-in tracking features for optimal immersion and interaction.

3. **Integrate into Curriculum**: Incorporate the VR experience into your educational programme. Design lessons or workshops where students use VR to explore the food supply chain, practice food preservation, or understand the environmental impacts of waste.

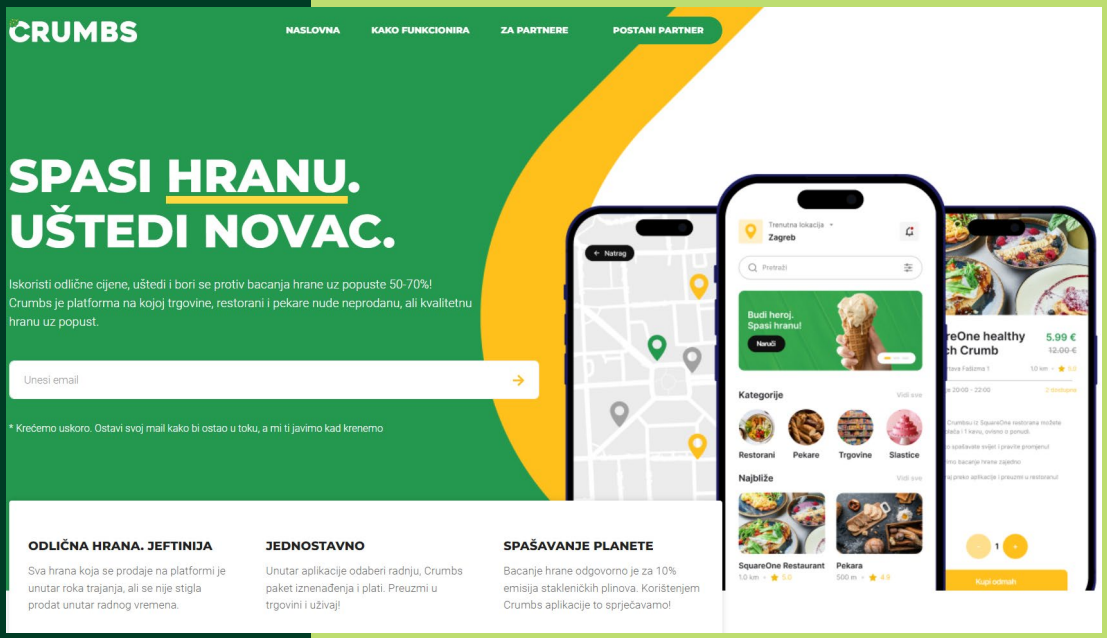
4. **Facilitate Reflection and Action**: After the VR session, engage learners in discussions or activities to reinforce the lessons. Encourage them to apply what they've learned, such as reducing waste at home or school, and track their progress through real-life tasks.

Crumbs: Get Food Left at the End of the Workday at a Lower Price

Every day, a massive amount of edible food is **thrown away** around the world. In Croatia, a group of dedicated individuals has developed an app called ***Crumbs*** (Drobtinice). Through the app, people will be able to buy food from bakeries or restaurants that didn't sell by the end of the day at significantly reduced prices.

The average Croatian citizen throws away upto **70 kilograms of food annually**. Even more food is discarded by bakeries, restaurants, and stores. Some estimates suggest that bakeries in Zagreb throw away up to **€150 worth of unsold food** each day by the end of business.

"When we miscalculate sales, we throw away between €100 and €300 worth of food at the end of the workday, which we will avoid with the new app," says Nikolina Antić, co-owner of the Zagreb restaurant Square One.



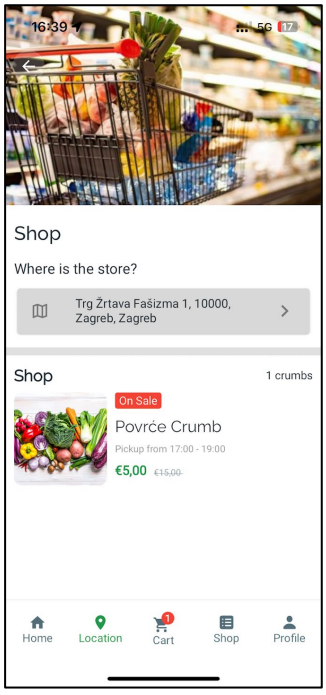
Crumbs: Get Food Left at the End of the Workday at a Lower Price

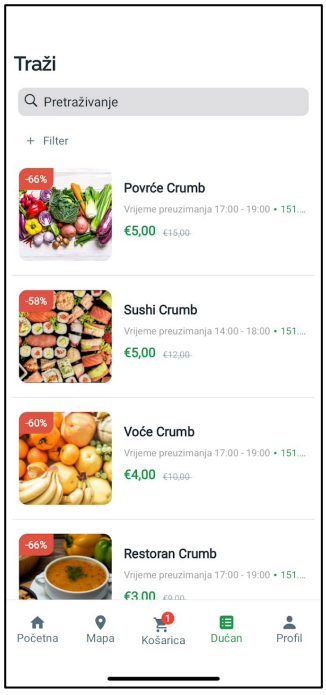
The app “Crumbs”, a Slovenian made application, available on Google Play, connects buyers with food sellers, allowing them to purchase surplus food at discounts of 50 to 80 percent.

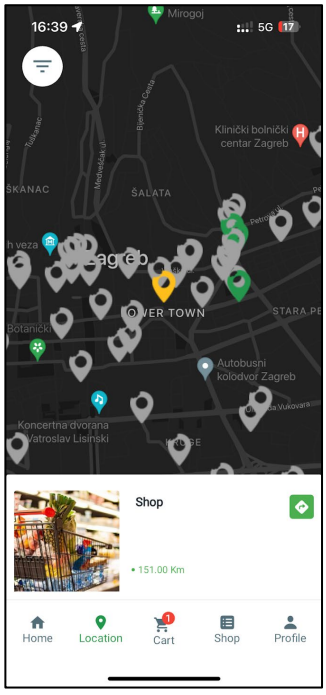
"The user will be able to see which food establishment is closest, select the food, pay for it, and then pick it up in person," explains the app’s creator Antonio Matušan.

More than 50 food providers in Zagreb have already joined the platform, and the creators plan to expand to other Croatian cities in the future.

The developers aim to collaborate with food banks and soup kitchens, all in an effort to reduce food waste.







Too Good To Go – a technology that connects customers with restaurants and shops

What is Too Good To Go?

Too Good To Go is a website and a mobile app that helps coffee shops, bakeries, restaurants and supermarkets reduce food waste by offering surplus food in the form of surprise bags with a discount price, it allows the customers to purchase food items that would otherwise be discarded with 1/3 of the original price.

According to Too Good To Go, more than 1/3 of food is wasted globally every year, this is more than 2.5 billion tonnes of food which costs $1.2 trillion, and this food waste is responsible for 10% of greenhouse gas emissions. Too Good To Go is a technology that connects customers with shops and restaurants, matches demand with supply, and encourages the shops, restaurants and customers to “rescue” food and help the planet by preventing food waste.

Too Good To Go – a technology that connects customers with restaurants and shops

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How does Too Good To Go help business?

According to the Too Good To Go website, the app benefits the business in 3 ways – 1. reducing food waste, 2. earning back money on stock that would have been thrown away, 3. attracting new customers – 76% of customers who discover a store through Too Good To Go will return as full-paying customers.

For businesses, it is free to sign up for Too Good To Go, however, when businesses start to sell food on the app, an annual fee will be charged, and a commission will be charged on each Surprise Bag sold. According to their Impact Report 2022, Too Good To Go expanded fast since it was founded in 2016. 20 million new users were registered, and they worked over 80,000 new stores in 2022. A total of 79 million meals were saved in 2022, avoiding nearly 200,000 tonnes of CO_2 emissions.

Composting/ Reusing Food Waste Through Technological Intervention

Co-funded by the Erasmus+ Programme of the European Union

REENCLE an electric composter

Reencle is an electric composter that uses **beneficial microorganisms** to break down food waste naturally, turning it into **compost.** It provides a modern solution for reducing organic waste, featuring quiet operation and energy efficiency.

How does REENCLE work?

1. Set up REENCLE with our microbes

Unpack your REENCLE, dump in our packet of microbes, and let the colony start working.

2. Dispose up to 1 kg of food scraps per day

Feed your compost by disposing of food scraps regularly.

3. Empty your composter every 1-3 months

Spread your nutrient-dense fertilizer in your garden or on your houseplants.

Why would REENCLE benefit a hotel school?

It is the first electric composter with microorganisms.
REENCLE Reduces the volume of organic waste by up to 90%.
The waste decomposition cycle lasts less than 24 hours.
REENCLE is a silent operation, under 28 dB.
The 3-layer filter system ensure odour free composting.

REENCLE an electric composter

Nutrient-rich compost in less than 24 hours
Compared to other electric composters, Reencle does not use high heat to process waste. Waste fermentation and decomposition begins with the help of microorganisms.

Microorganism-friendly temperature
Consistent temperature allows the microorganisms to remain active in fermenting and decomposing food waste in a relatively short period of time.

Odor-free and silent
Reencle is odour free thanks to the three-layer filtering system that incorporates a charcoal filter. The filter is located on the back, and can be removed and replaced.

Easy opening with motion sensors
The motion sensor will automatically open the lid, making it easy to dispose of food waste. Approach the front slowly, and cover the sensor with your foot for 2-3 seconds, and the lid will open.

Hands-free opening
A sensor on the lower part of the composter ensures hands-free opening.

Silent stirring tank
Continuous stirring helps break down food waste very silently, with noises under 28 dB.

Easy filter change
The filter ensures clean air and prevents the appearance of flies, and odors do not spread.

www.skaza.com

Pumpkin Seed Oil – A Case Study

About the technology/ innovation:
Production of pumpkin seed oil is an important part of rural tradition in eastern Slovenia and the oil is used in households every day for salad dressing. The average family uses around 1L of pumpkin seed oil per month (20,00 EUR/L).

After the oil is extracted from pumpkin seeds, the side product 'prga' is left behind. This product is rich with proteins and fibre and usually prga is fed to animals.

The oil producer Kocbek started to add new value to prga; with collaboration with different partners Kocbek started to develop new products entirely.

Reusing pumpkin seed oil to create side products

How the process works:
Pumpkin seed oil is a nutritious and versatile oil, but its production generates valuable byproducts that can be utilised in various ways.

1 litre of pumpkin seed oil equals 7 kg of dried pumpkin seeds
10 litres of pumpkin seed oil equals 8 kg of prga

Pumpkin Seed Oil – A Case Study

1. Pumpkin Seed Meal

What It Is: The remaining solid material after oil extraction from pumpkin seeds.
Uses:
Baking: Incorporate it into bread, muffins, and cookies for added protein and fibre.

2. Pumpkin Seed Cake

What It Is: The coarse, fibrous material left after oil extraction, similar to cake but not sweet.
Uses:
Animal Feed: A nutritious addition to livestock feed due to its high protein content.
Composting: Enrich compost with this material to improve soil fertility.

3. Pumpkin Seed Oil Residue

What It Is: A small amount of oil and other residues remaining after the main extraction process.

Uses:
Skincare: Apply directly to the skin or mix with other ingredients for moisturising or anti-aging treatments.
Hair Care: Use as a conditioning treatment for hair, adding shine and softness.
Cooking: If safe and edible, use in cooking for added flavour or nutritional benefits.

Pumpkin Seed Oil – A Case Study

4. Pumpkin Seed Flour

What It Is: Finely ground pumpkin seed meal, often created by additional milling.

Uses include for gluten-free baking - substitute in gluten-free baking recipes for a nutty flavour and added protein, and as a thickener - use as a thickening agent for soups, sauces, and stews.

Tips for Maximising Benefits

Storage:
Keep byproducts in a cool, dry place to prevent spoilage.
Quality Check: Ensure byproducts are free from mould or off-smells before use.
Experiment: Try different applications to find the best uses for your byproducts.
By utilising these by-products, you can minimise waste and enhance your cooking and wellness routines.

Embracing the repurposing of waste products not only reduces environmental impact but also sparks creativity and innovation in finding valuable uses for what might otherwise be discarded.

A pumpkin seed press

Two Sample Pumpkin Seed Products

Pumpkin Seed (prga) macaroon: 1,90 EUR/pcs

A luxurious delight, the macaroon is prepared with prga, the side product of pumpkin seed oil production. The new flavour is an exciting combination of pumpkin seeds, pumpkin seed oil and white chocolate. The product is made in collaboration with the fine dining Restaurant Seven in VGST Maribor. Adding a recognizable gastronomy partner in this challenge helped Kocbek with promotion and sale of this product.

Pumpkin snack: 3,50 EUR/60 g

The pumpkin seed snack (pictured) is a crunchy chip made with the prga derived from pumpkin seed oil production. This snack is full of flavour. It is also a source of protein, fibre, antioxidants, as well as minerals (including magnesium, copper, zinc, iron and manganese).

Added value for side products in food production/ The Prga story

- Detecting the Challenge in Food Waste (Side Product)
- Analysing the Market & Developing the Niche Product from the Side Product
- Testing New Product
- Launching of Product
- 7Ps of Marketing
- Monitoring of Innovation

ORGANKO XL (120 L)

ORGANKO XL is 120-litre bokashi composter, designed specifically for the hospitality industry. This innovative solution empowers hotels, restaurants, and catering businesses to turn organic waste into nutrient-rich compost. With ORGANKO KL, kitchen waste can be transformed into a sustainable resource while showcasing commitment to environmental responsibility.

Large-scale kitchens in hotels and schools

Capture and compost all kitchen scraps from food preparation and guest meals, reducing waste sent to landfills and creating an eco-friendly practice for guests to appreciate.

Self-sustainable restaurants and cafés

Create compost to grow your produce, and efficiently manage food waste from daily operations, including peelings, leftovers, and kitchen trimmings.

Catering and event venue waste collection

Quickly compost large volumes of food waste from events, weddings, or conferences, providing a sustainable solution for clients and guests.

Why would a hotel school try this method?

- 120-litre capacity, it handles high volumes of food waste.
- Airtight design prevents foul odours and pests.
- The Bokashi method accelerates the composting process, reducing waste volume by up to 25%.
- Reduces waste disposal costs, demonstrates eco-friendly practices to customers, and repurposes food waste into valuable compost.

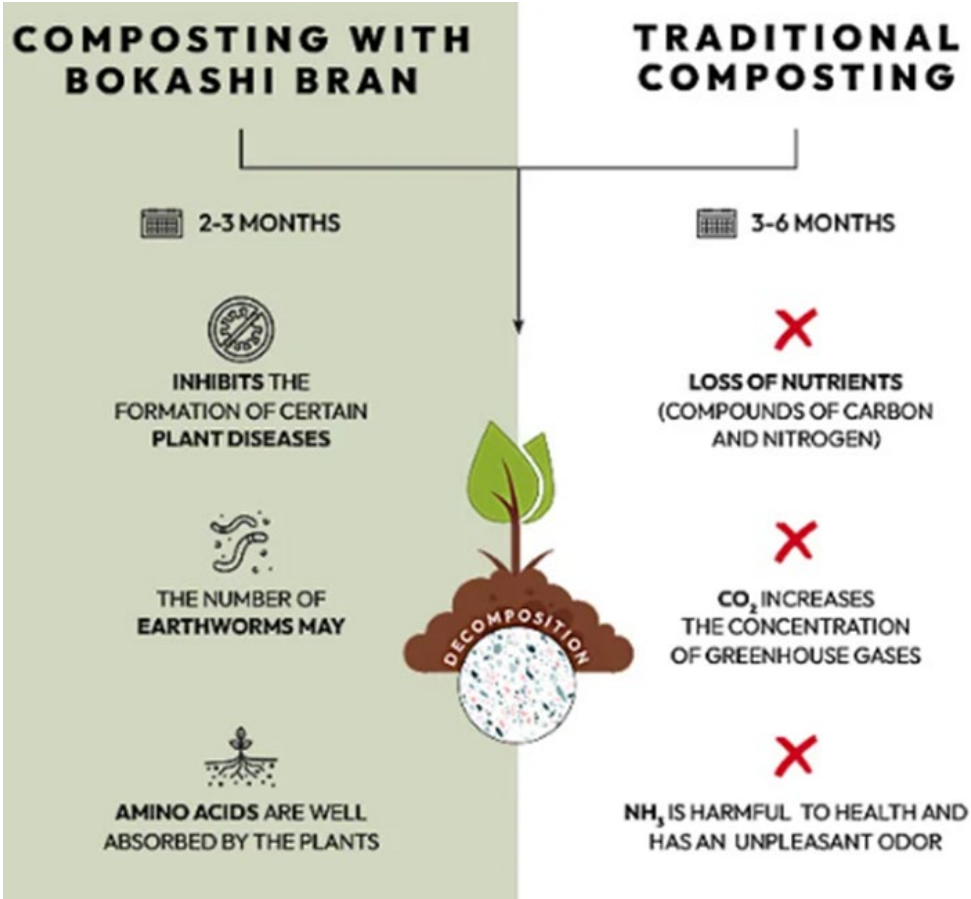
ORGANKO XL (120 L)

Uses ORGANKO bokashi bran (biogen)

Bokashi bran contains beneficial microorganisms and is a key ingredient during bokashi composting, since it acts as a composting accelerator. These effective microorganisms from the bokashi bran prevent rotting - instead, waste starts to ferment.

While traditional composting takes 3 to 6 months, bokashi composting is done in half the time. Bokashi composting produces two valuable by-products: nutrient-rich compost for the garden and a "liquid gold" fertiliser made from fermented liquid by-products.

The user-friendly design requires minimal training or effort to operate. The composter is easy to set up and maintain, with a simple process for adding waste and draining the bokashi liquid.



www.skaza.com

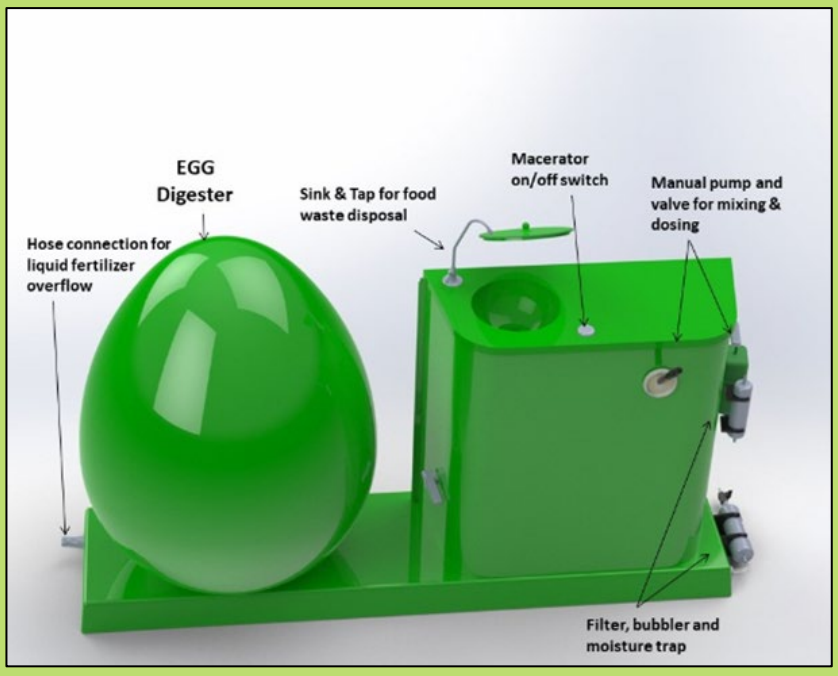
MY GUG, A Case Study from Ireland

About the technology/ innovation:

MyGug is a product that aims to solve problems we face with food waste in our modern world. Food waste is a great challenge for all and creates many environmental problems. MyGug turns this problem into a solution. MyGug is a digester that uses the natural process of anaerobic digestion to convert your food waste into a usable biogas and a liquid bio-fertiliser. The biogas can be used directly in the home or business for cooking or heating and the liquid bio-fertiliser can be used for growing food.

How it works:

- Food waste (raw and cooked) is disposed of with water through a food macerator installed in the MyGug outdoor cabinet.
- The macerated food waste flows directly to a balance tank.
- The food waste is then pumped to the MyGug egg digester at regular intervals where it is digested using the natural process of Anaerobic Digestion. Biogas is produced. The gas is filtered to remove H2S and travels to a gas bag installed outdoors.



- A small biogas pump will pressurise the gas for use in the kitchen.
- The biogas can be used on a cooking hob, providing clean cooking energy free of charge.
- The rich organic liquid feed can be used as a feed for plants.

MY GUG, A Case Study from Ireland

Case Site Location: Rebecca's Kitchen, Kilbrittain, Co. Cork, Ireland

Rebecca's Kitchen is a thriving café, based in West Cork in Ireland. As her business began to expand, Rebecca realised that she had a food waste problem, and was looking for technological solutions. Although she was doing a lot of composting, she quickly realised as the business expanded, that she needed a more sustainable solution.

After conducting her research, she installed a MyGug biodigester, or 'egg', which would take care of the cafe's food waste, while also generating a clean cooking gas for Rebecca and liquid fertiliser that she could use in her garden. After wiping down each day, she takes the day's food waste outside and feeds it to the egg. Most of the cafe's cooking is now done off the biogas which Rebecca describes as 'like any other gas' she cooks on.

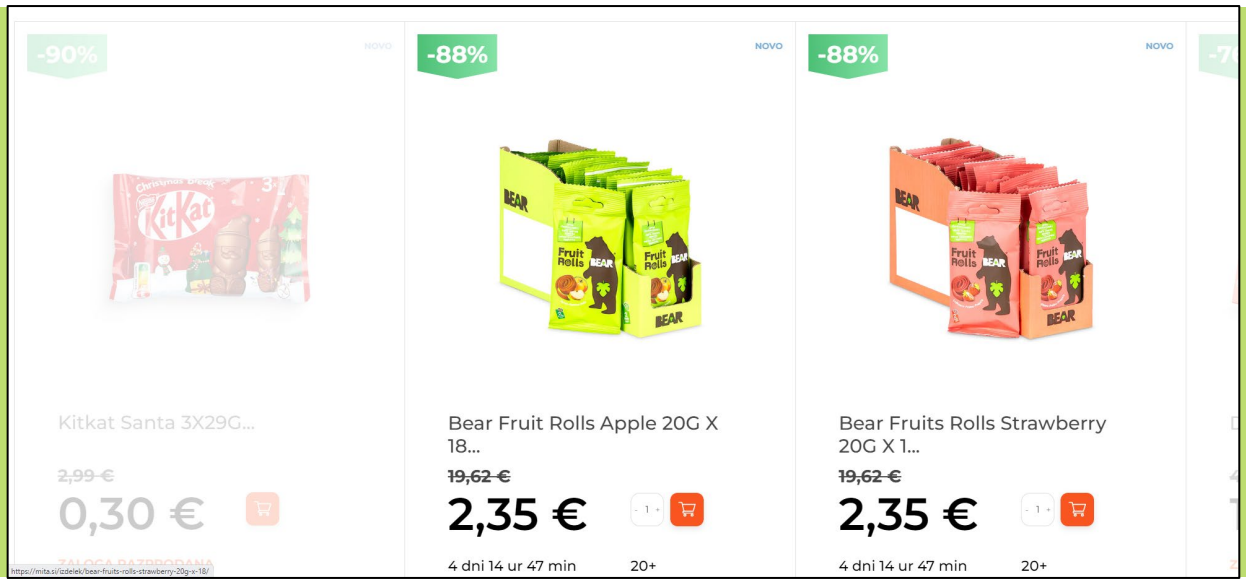
Rebecca has kept her original gas tank as she has one appliance that can only run on LPG gas. But she can't remember the last time she had to fill it. 'The egg has dramatically decreased my cost in gas,' Rebecca says. 'There was an initial setup fee. But since then, I've had very little cost.' The fertiliser by-product, is also working out really well for use in their vegetable garden.

MY GUG, A Case Study from Ireland

One **unforeseen benefit** has been the egg's popularity with customers. It is visible from the road, so as soon as people drive up, they're interested. Rebecca often looks out and sees people examining the egg or reading the information provided. It's a simple circular economy that has solved the problem of how to deal with food waste for Rebecca's Kitchen. According to Rebecca, it's about more than just the practical payoffs of having two by-products that have helped to **reduce costs**. She feels that there is a sense of achievement knowing that she is generating gas and compost for use in the business, and is ultimately helping our environment.

MITA buy-before-expire store

The **hyper-growth of the global economy** has led to hyper-waste. Some products become waste even **before they reach the consumer**, which what is called surplus. There are several reasons for this. The supply of products on the market often **exceeds demand**, promotional items may be intended for only a specific event or period, even though their shelf life is much longer. **Storing products** can sometimes be more expensive than the product's value, and fear of shortages also plays a role, among other factors. To protect our planet, the amount of waste generated must be reduced. Waste is any material or object that someone discards, intends to discard, or is required to discard. Waste can represent a **huge loss of resources** in the form of materials and energy, while managing and disposing of it can have serious environmental impacts. At least **50% of global waste** consists of industrial waste generated during manufacturing or industrial processes.



Mission of Mita is to travel across Europe, searching for premium brand products and saving them from destruction. They aim to offer them to customers who will appreciate and enjoy them to the fullest, whether by consuming or using them.

MITA buy-before-expire store

Why Limited Stock?

Stock and products are constantly changing because they depend on the amount of surplus available on the market. The exact supply of surplus products is unpredictable, leading to a variable selection in store. The goal is to sell every piece/item without any of them being destroyed.

Why Limited Time?

Promotions are time-limited because storing products increases their costs. These costs reduce the profitability of the final sale or make it impossible for them to offer the products at such low prices as in our online store. Due to limitations of storage capacity, products are sold as quickly as possible at an attractive price point. A larger warehouse would only lead to accumulation of stock, leading to even greater levels of waste.

Why Low Prices?

Low prices can be offered because Mita purchase large quantities of surplus production or store stock from across Europe (not just Slovenia).www.mita.si

Lessons for Hotel Schools

The store’s model highlights the importance of efficient stock management, emphasising the need to align supply with actual demand to prevent surplus. In the context of hospitality education, this principle can be applied by teaching students how to manage inventory carefully, particularly perishable goods in kitchens or housekeeping supplies. Mita's approach to limited-time promotions and variable stock demonstrates how dynamic management practices can help reduce waste and enhance profitability. Hotel managers can adopt this strategy by encouraging students to implement flexible purchasing practices, creatively utilise near-expiry products, and minimise overstocking. Furthermore, the store's focus on offering surplus at low prices while reducing storage costs underscores the importance of balancing operational expenses with sustainability goals, a crucial lesson for hospitality management students who will face similar challenges in balancing profitability and resource conservation in their future careers.

It’s Fresh! Stickers – case study

Ethylene reduction stickers, commonly knownas *It’s Fresh! Stickers*, represent an innovative solution designed to extend the shelf life of fresh produce. These stickers work by absorbing ethylene gas, a naturally occurring compound that accelerates the ripening of fruits and vegetables. This technology is primarily used in the packaging of fresh produce to delay spoilage and reduce food waste both in supply chains and households.

- **Non-invasive application**: The stickers are placed directly in packaging without coming into contact with the produce itself.
- **Selective absorption:** The active compounds in the stickers selectively absorb ethylene, leaving other gases unaffected.
- **Extended freshness:** By slowing the ripening process, the stickers can extend the shelf life of produce, particularly for ethylene-sensitive fruits like berries, tomatoes, and bananas.

Ethylene reduction stickers are embedded with materials that specifically target and absorb ethylene gas. The stickers are made from an active ingredient—often a mineral or clay compound—that captures and neutralises ethylene molecules. These stickers are placed inside packaging or shipping containers, where they work continuously to absorb ethylene as the produce releases it. The stickers are capable of extending the freshness of produce by several days to weeks, depending on the type of fruit or vegetable.

www.itsfresh.com

Localised Growing Systems

Co-funded by the
Erasmus+ Programme
of the European Union

Indoor Gardening: Smart Growing Systems

What is the technology?

As urbansation continues, it has become more and more challenging to sustain a healthy diet. Indoor Gardening is promoted as a way to grow herbs, fruit and vegetables all year round using technology. Indoor Gardening technologies typically utilise light-emitting diode lights (LEDs), nutrient monitoring systems, and automated watering systems, often complemented with mobile applications.

Some sample products include AUK (Scandinavia) and Gardyn (USA). The systems are promoted primarily for home use, but we see many possibilities for integrating them into hospitality and culinary school kitchens. The benefits would be to facilitate growing during the typical academic year (crossing winter and spring semesters) and to educate students about the technological potential of indoor farming.

How does it work?

Indoor gardening, particularly using systems like the Auk indoor garden, combines hydroponics and smart technology to grow plants efficiently indoors. These systems typically allow for the growing of herbs, vegetables, or flower year-round without soil, instead relying on water and nutrients.

Gardyn - https://mygardyn.com/product/gardyn-home-kit/

Indoor Gardening: Smart Growing Systems

1. Hydroponic System (Soilless Growing)

In systems like the Auk indoor garden, plants are grown **hydroponically**, which means they don't require soil. Instead, they rely on a **water-based nutrient solution**. The roots of the plants sit in or above the water, where they absorb nutrients directly.

•**Water reservoir:** The Auk system has a water tank where you add water and a nutrient solution.

•**Nutrient absorption:** Plants get all the necessary nutrients through the water, which promotes faster growth than traditional soil-based gardening.

2. LED Grow Lights (Simulating Sunlight)

Because it is indoors, these systems use **LED grow lights** to provide the necessary light spectrum for photosynthesis. The Auk system uses full-spectrum LED lights that mimic sunlight, helping plants grow even in low-light indoor environments.

•**Light cycles:** The LED lights often operate on automated timers to simulate natural day and night cycles, encouraging optimal growth.

•**Energy efficiency:** LED lights are energy-efficient and adjustable for different growth stages (e.g., seedling, vegetative, and flowering stages).

3. Smart Technology (Automated Controls)

Many indoor garden systems, including Auk, integrate **smart technology** for easy monitoring and maintenance. These features may include:

•**Automated watering:** Some systems automatically circulate water to keep the roots hydrated, reducing the need for manual watering.

•**Light and water monitoring:** The system might come with sensors to track water levels and light intensity, notifying you when to refill water or adjust settings.

•**App integration:** Some devices are app-controlled, allowing you to manage the garden remotely, adjust light cycles, and get reminders when nutrients need replenishing.

4. Compact and Space-Efficient Design

These systems are designed to be compact, making them ideal for small apartments or spaces with limited access to natural sunlight. They are often modular and stackable, allowing for garden expansion as needed.

Indoor Gardening: Smart Growing Systems

5. Steps to Set Up an Indoor Garden

1.Planting:

Insert seeds or young seedlings into small plant pods (made of materials like coconut coir or sponges) within the system.

1.Adding Water and Nutrients:

Fill the water tank and add a nutrient solution.

1.Turn on the LED Lights:

These will provide the light needed for the plants to grow.

1.Monitor Growth:

The system will notify you when water or nutrients need replenishing. You can track the progress via an app or LED indicators on the system.

6. Benefits of Indoor Gardening Systems

- **Year-round growing:** You can grow crops regardless of the outdoor climate.
- **Low maintenance:** These systems require little upkeep compared to traditional gardening.
- **No soil, no mess:** Without soil, there is less mess and a lower chance of pests.
- **Fast growth:** Hydroponic systems generally produce faster-growing plants due to direct nutrient absorption.

Shrooly: Automated & Effortless Mushroom Growing At Home

Shrooly is an innovative, fully automated device that let people **grow gourmet and medicinal mushrooms** at home in days or weeks, depending on the types of mushroom growing.

Shrooly is designed to provide a **suitable environment** for growing mushrooms by continuously measuring and adjusting light, humidity, and fresh air. It features a filter to collect spores, a display menu on top, and a companion app to keep users informed.

To get started, fill the water tank once, place the growing kit inside, and start the cultivation process through the app. Customers can use pre-selected pods from Shrooly or use their own culture with the pods purchased from Shrooly. Depending on the species, users will be able to harvest their mushrooms in **about 7 days**.

Shrooly's Contribution to Localising Food Growing -

- Enabling home food production
- Reducing food miles
- Encouraging self–sufficiency
- Promoting Sustainability and Reducing Waste
- Educational benefits

How could a hotel school manager integrate this technology in the curriculum?

Shrooly's model of home-grown gourmet and medicinal mushrooms demonstrates how technology can support **efficient, small-scale food production** with minimal environmental impact, by reducing food miles and promoting self-sufficiency. This concept can be applied in hotel management education by encouraging students to explore ways of **integrating localised food production** into their culinary practices, potentially incorporating the cultivation of fresh ingredients like mushrooms directly on-site, reducing reliance on external suppliers and lowering food waste. Shrooly's automated system also highlights the potential of **smart technology** to manage controlled environments efficiently, ensuring optimal growing conditions, which could inspire future chefs and hospitality managers to implement similar technologies in their operations for resource conservation and sustainability.

The **educational benefits** of Shrooly's model can serve as a practical teaching tool in a hospitality curriculum, showcasing the benefits of growing ingredients sustainably and understanding the food production process from farm to table. By incorporating such hands-on learning experiences, students gain a deeper understanding of food sourcing, reducing waste, and creating a sustainable culinary ecosystem, preparing them to be more **environmentally conscious professionals**. Shrooly's emphasis on reducing waste and promoting sustainability can thus align with broader industry trends, helping hotel school managers to equip students with the skills needed for future challenges in a resource-conscious world.

Micro-sprouts : A case study from France

This is a case study about a low technology localised growing system.

What is micro-sprouts ? Already well known in the world of gastronomy, micro-sprouts are the first double leaves that make up the seed, also known as cotyledons. Each of which has their own tantalising effect on the senses: flavour, fragrance, feel, or presentation. Eating micro shoots is like eating very young and tender salad leaves.

What is the difference between Micro-sprouts and sprouted seeds?

Sprouted seeds and micro-sprouts come from the same type of seeds. Sprouts are seeds that have just started to grow and still have their cotyledons (or “seed leaves”), while micro-sprouts are harvested just after their first true leaves have formed.

Micro-sprouts need to grow longer than sprouts seeds, which also means they contain more nutrients and dietary fiber than sprouts.

Micro-sprouts have a much lower risk of foodborne illness than sprouts seeds, due to differences in their growing conditions. Micro-sprouts are grown with more ventilation and less humidity, making harmful bacteria less likely to spread.

Micro-sprouts: A case study from France

How to grow micro-sprouts ? Micro-sprouts require high light, preferably natural sunlight, low humidity, good air circulation and are planted with a very low seed density.

Workflow

It all starts with sowing and it **doesn't take more than 10 minutes**.

In Lycée Hôtelier de Dinard, plastic and polystyrene trays were used, on which a layer of topsoil and another of potting soil were put (alternative techniques include the use of cellulose sheets).

The seeds are dispersed in the tray by limiting the density. In our experiment, we planted 3 different kinds of seeds in the same time. (Arugula, Red Radish and Purple Mizu).

A little watering is enough before placing the tray in a mini-greenhouse.
The humidity necessary for the development of micro-greens is provided by an aquarium located at the bottom of the mini-greenhouse.

No additional watering was necessary to see the microgreens grow in less than 10 days.

Micro-sprouts: A case study from France

Key considerations if your school is testing this localised growing system

This offers a hands on experience with simple growing technology. Even fairly simple equipment may be enough to grow micro-sprouts.

A ventilated mini-greenhouse with access to natural light, plastic containers and potting soil are sufficient. **Humidity** can be provided by manual watering or a humidifier (aquarium).
In areas that do not allow access to this natural light, it is possible to use interior garden systems. Example: Novagrow.

The microgreens grown in the Novagrow garden grow on mats of natural, compostable fibres, rather than in the ground.
The natural ventilation of this equipment eliminates the **risk of mould**.
Its LED lighting is automatically programmed on a 16 hour on/8 hour off cycle, which provides the **seeds with enough light to develop**.

The speed and ease of implementation which allows students to quickly see the results of their experimentation.

As the production cycle is short, it allows students and teachers to **test, adjust and validate the entire process** before using the micro-sprouts in the cooking workshops.

Offer students the opportunity to promote their experience to customers.

Students in the kitchen, will be encouraged to take care of the plants they use in their recipes. Also, in restaurant, they will also be able to explain and promote their approach to customers.

To test this out, it is recommended to start with **radish microgrowth** as this is the simplest production method.

Polytunnel installation and a rainwater collector: A case study from a French greenhouse

About the technology/ innovation:

The **greenhouse** is a translucent garden shed intended for growing plants, plants or vegetables, while protecting them. Cultivation can be done in the ground or in pots.

The translucent part is made of **plastic or glass**, and the frame can be made of **wood or steel**. There are greenhouses with tarpaulins, models with polycarbonate sheets, and others with glazing.

The materials used for the walls of a greenhouse are transparent to let the **sun's rays pass through.**

This solar radiation becomes thermal energy and heats the atmosphere inside the garden greenhouse, which provides both light and heat to the plants.

Temperatures can rise very quickly in the greenhouse and fruit and vegetable plantations will then **require abundant and regular watering.**

2 teachers and 4 students experienced installing and managing a polytunnel greenhouse at the Lycée Hôtelier de Dinard

Polytunnel installation and a rainwater collector:
A case study from a French greenhouse

Workflow

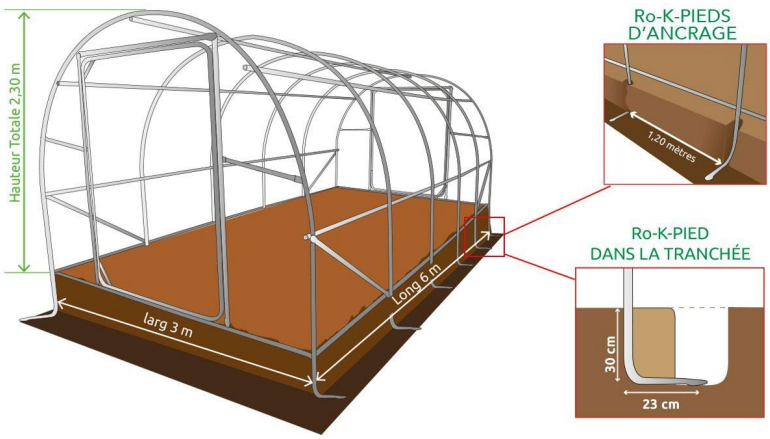
1. **The first step is to decide on the type of the greenhouse**

The simplest to install and also the most economical is the tunnel greenhouse. It is made up of metal hoops topped with a plastic tarpaulin, more precisely polyethylene.

2. **The second step is to decide on the size of the greenhouse.**

The size of the pictured greenhouse is 18 aquare meters. The minimum recommended size is 5m2 to be able to move around easily.

The larger the greenhouse, the easier it will be to control the temperature, but it will take longer to heat.



3. **The third step is to decide on the location.**

It is suggested where practical to place the greenhouse close to the places of use (to encourage students and teachers to participate in its maintenance), but the polytunnel it is not the prettiest design, therefore not too visible to customers.

- Installation

The greenhouse is quite quick to assemble if there are enough people to hold the frames and level the space where it will be installed. One morning was enough with a team of 10 people.

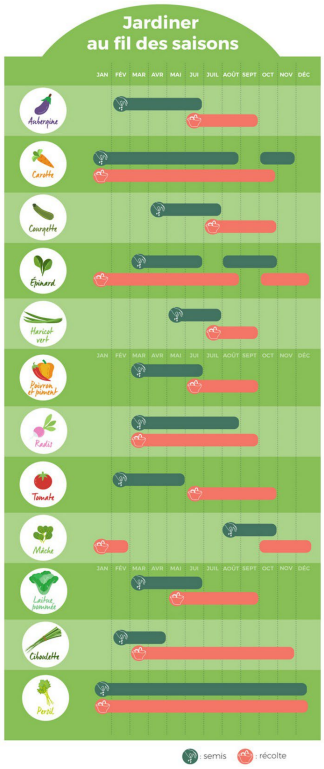
Polytunnel installation and a rainwater collector: A case study from a French greenhouse

Key lessons

Discover the seasonality of vegetables and fruits

Local production in greenhouses allows students to **observe seasonality** and learn to respect it. A tunnel makes it possible to hasten the crops by a month compared to the outside.

To choose the seedlings to be carried out in a greenhouse, you must take into account the **natural calendar of the plant species**, but also the school calendar. Students and teachers must be present for sowing and harvesting.



Implement an experimental approach to develop sciences and technologies skills

The objective of experimental sciences and technologies is to understand and describe the real world, that of nature and that constructed by man, **to act on it, and to control the changes induced by human activity.**

Installation and use by teachers with students is an investigative process that develops curiosity, creativity, critical thinking and interest in scientific and technical progress.

In our experiment, the project was carried out jointly by cooking and science teachers.

For example :
For the assembly of the greenhouse and the choice of the collector, two areas of mathematics teaching are mainly concerned: geometry and quantities and measurements.
with the rainwater collector.

Calculating the flow rate to be provided to different plants and at different times of the year makes it possible to anchor the learning of mathematical notions perceived as abstract by some students in reality.

Polytunnel installation and a rainwater collector: A case study from a French greenhouse

Monitor and manage the hygrometric supply of plant
Temperatures can **rise very quickly in the greenhouse**. Anecdotal evidence suggested that a lack of watering achieved poor results. Several watering techniques exist but drip or automatic watering appear to be the most advantageous: **sufficient and autonomous watering.**

Each dripper is individually adjustable to adapt to **any type of vegetable plants**. Whatever the quantity of water in your reserve, the speed of the flow is controlled thanks to the float located inside each dripper. Depending on the setting selected and the number of plants to be watered, it is possible to obtain watering autonomy of 5 to 30 days. Results: With a drip system, it is possible to use up to **8 times less water than traditional watering by diffusing water 24 hours a day.**

Drip watering system: very easy to use because it works without batteries, programmer and electricity. **Possibility of modifying the water flow** (11 speeds). This watering system adapts to all reserves: tanks, water collectors.
If the system is connected to a rainwater collector, it is advisable to place a copper tube 15-20 cm long at the bottom of the reserve to delay the formation of photosynthetic algae.

Automatic watering system with programmer: More expensive, this system allows **remote control of watering in the polytunnel.** A mobile application allows you to set, pause and adjust watering programs. This watering programmer also gives the possibility of having a weather report and notifications to be informed of weather conditions.

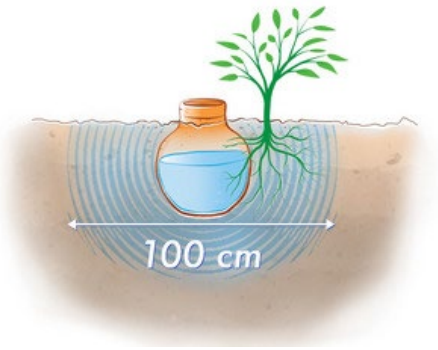
Polytunnel installation and a rainwater collector: A case study from a French greenhouse

Key lesson

Sometimes it is not about high tech solutions. In addition to the monitoring of growing conditions using technology in a polytunnel, experiments also included a low tech, ancestral watering technique.

The technique used involved irrigation jars fitted with a lid (oyas or ollas watering pottery made from terracotta).

Buried up to the neck and filled with water, they are sufficiently porous so that the earth **surrounding them can absorb moisture oozing from the pottery.**



Since no evaporation occurs underground, the roots therefore benefit of optimized microporous watering. The plant only draws water by suction which she needs.

This system allows a supply of water **3 times less frequent** than manual watering. And provides exceptionnal water savings of the order of 50 to 75%.

In fact, only the targeted plant benefits from irrigation. It draws by suction only the water it needs. Since the Oya is buried or planted, there is no evaporation. In the end, **almost 100% of the water spent is actually used by the plant.**

Learn about Technology History ...

The oldest known traces of the clay pot irrigation system were found in China 4,000 years ago. We also know that this technique was used in Ancient Rome.

It is still used today on the African and Asian continents, where mechanization remains poorly developed and where water distribution networks via plastic pipes are rarely present.

... to face the challenges of global warming

The clay pot irrigation technique is interesting for the development of crops in arid areas.

The Cashel Palace Hotel, County Tipperary, Ireland

The Cashel Palace - food waste digestor reduces food waste by 66%

About the technology/ innovation:

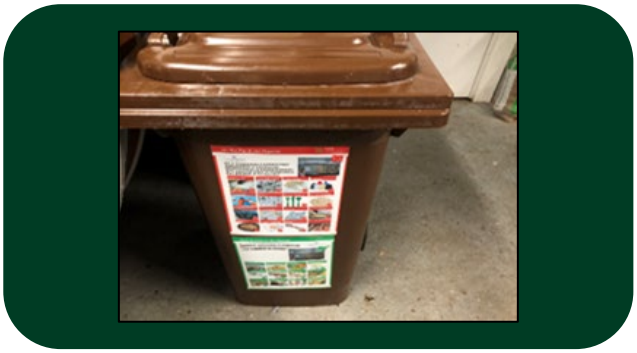
Dating back to 1732, the Cashel Palace was meticulously restored by its current owners reopening in March 2022 and offering 42 bedrooms. The hotel has expansive gardens looking towards the Rock of Cashel and its facilities include a Spa, the Guinness Bar, The Bishop's Buttery, The Queen Anne Room, a Cocktail Bar and a Banqueting Suite. Led by Director of Culinary Stephen Hayes, the food offering is primarily **locally sourced from the surrounding pastures** of the Golden Vale and its Bishop's Buttery Restaurant achieved 1 Michelin Star in 2024. Gerard Moylan is the dedicated Sustainability Manager.

Food Digester

A *Harp Renewables* food digester was installed when the hotel opened in March 2022 and it is located in a separate building close to the hotel kitchens. A dedicated wash area for **composite bins** is located in this room, as is a storage area for the bins (both full and empty).

How it Works

Food is segregated in the kitchen and is transported via the composite bins to the **Food Digester**. The cycle for the unit takes 24 hours and the unit automatically dumps out the finished product into a receptacle. The **resulting compost** can be used on the flower beds in the hotel gardens, but a new initiative closes the guest sustainability circle. As the hotel has calculated that each guest leaves approx. 700g of food waste, on the guest's departure, a bag of the compost produced by the digester is left in their car, with relevant instructions on usage, to be used in their own garden. In terms of the packaging of this compost, a brown bag is used, the label on the bag uses special glue which breaks down quickly and even the ink used on the label is biodegradable.



Small receptacles are used in each station in the kitchen to **collect compostable food waste** and signage has been produced with clear photographs to aid staff members. This has been translated into **10 different languages** to mirror the nationalities of the staff in the hotel. Training is also provided on the system to all staff. Green Ambassadors are also in place throughout the hotel to promote sustainable initiatives and a Green Committee is in place.

Issues to Address

The initial compost produced by the digester was tested by *ALS Life Sciences* in Clonmel to elicit the levels of Nitrates, Phosphorus and Potassium (NPK). It was discovered that high nitrogen levels present were affecting its effective use in the garden as a compost. The Kitchen Team were instructed to blanch all raw items before putting them in the compost bins and raw items were removed from the system. The compost product also has to be mixed with soil on a 1:7 (soil) ratio before use.

The finished product was not fine enough for garden bed usage.

The resulting compost **can not be used on fruit plants** in the weeks before picking due to the potential Salmonella and E.coli threats which this would pose. This is noted on the label of the compost bag given to the guest.

Benefits

- The hotel has closed the circle on guest food waste production.
- Reduction in bin costs – weight and volume by up to 66%
- To market the hotel's sustainability credentials
- Odourless process

Relevant Websites

www.cashelpalacehotel.ie

- www.harprenewables.com

A case study about Gozo Culinary Tourism, Malta

Introduction to Gozo culinary tourism

This case study focuses centrally on comparing two Gozitan sites including participant observation of the **Magro Food Village** and a tour and tasting at the **Tuta Agro Tourism**. The representations of Gozitan culinary and cultural authenticity depicted at Tuta and the Magro Food Village are not fully representative of the diversity of the island. However, these are two of the most visible representations for visitors to Gozo. Not only are visitors to the Magro Food Village and Tuta Agro Tourism able to bring home foods, drinks, and other goods, but they also leave with a sense of what is "authentic" according to those with the power to select and present a specific view of what it means to be Gozitan and Maltese. Therefore, being closer to origin—either in location or in familial connection—means being closer to the original and more valuable.

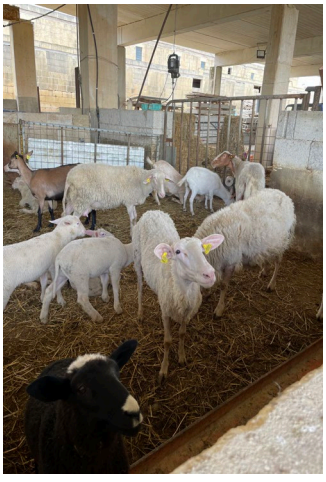
Magro Food Village

The Magro Food Village, located in the city centre of Xewkija, Gozo, offers a variety of experiences ranging from a seasonally available tour of the tomato processing factory to cooking classes featuring traditional Gozitan foodstuffs led by master chefs. The company is currently in the hands of the fourth generation of the Magro family. Not only does the company offer tourists the chance to learn about the history of the company and purchase food and souvenirs, but, depending on the visitor's interest, a variety of activities is also available. These include a free tour of the Savina Creativity Centre, a free (but pre-booked) tour of the Magro Food Village, including the tomato processing plant and the dairy centre, and a prebooked session in the Magro Village Kitchen, including lectures, group activities, and cooking classes for a fee.

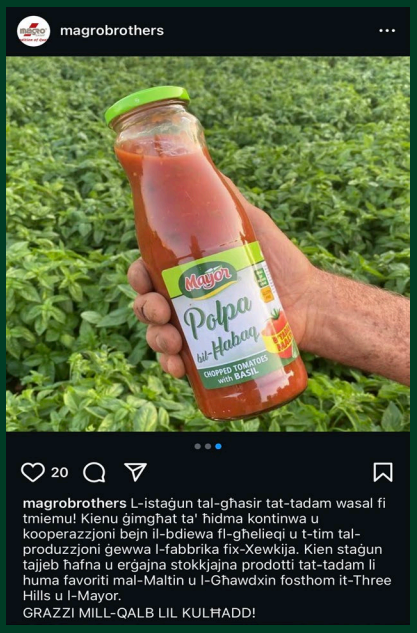
Tuta Agro Tourism

Compared to the Magro factory and Food Village, Tuta Agro Turism offered quite a different experience, though the central themes remained the same. Tuta is a family-owned estate in Kercem, Gozo that offers Maltese Wine, Agritourism Activities, and Traditional Foods. Through the generosity of Tuta director Stephan Tabone, we were invited to tour the estate and participate in the food and wine tasting that followed. Located in the rural countryside, the gated entrance to the estate opened into a tented outdoor seating area and five luxury rooms. In 2012, Joseph, his four siblings, and their father decided to pursue Tuta's dream of integrating agriculture with tourism so that one sector sustains the other. The land that was once a fruit and vegetable garden now include an orange grove, fruit trees, 1,500 olive trees, cherry tomatoes and over 10 hectares of vineyards. Their food production includes a mix of traditional methods and modern equipment, including a windmill from the 1930s, a winery, and a cold press for olive oil.

Beyond providing education about local ingredients, traditional agricultural methods, and the food preparation processes according to recipes handed down through generations, each site offers visitors tangible representations of Gozitan identity that they may take home and continue to interact with.



Components of Culinary Tourism

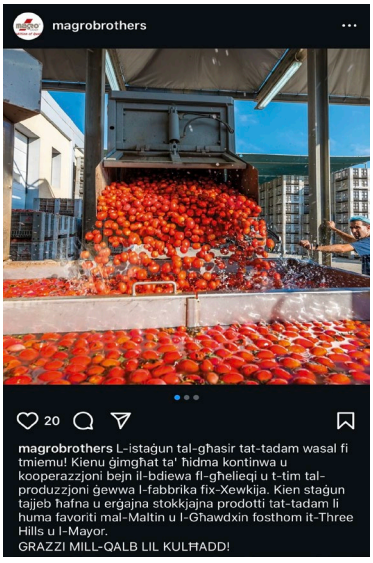


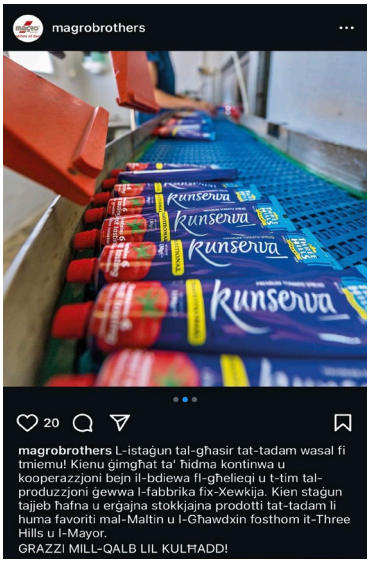
Components of Culinary Tourism

While the sites are quite different in size, scope, and content, both focus on the same components (and larger ideologies) to create a sense of local and authentic Gozitan identity through food that is created close to its origin and is, therefore, more valuable as both a process and a product. Three main components emerged that can be thought of according to their relationship to the food at both sites:

- where the food came from (ingredients),
- how the food is made (recipes and processes), and
- what the visitor can do to experience the food in terms of activities (both at the sites and after visitors leave)

The first component that plays a role at the Food Village and Tuta is the origin of the sites' ingredients, and consequently, the agricultural methods used to produce them. Both sites stress that their ingredients are local—whether they employ local farmers, like the Magro tomato processing factory, or grow many of the ingredients on site, in the case of Tuta. However, this is more than just a statement shared by those in charge of the guided tours. In both cases, visitors are taken to see the produce that is either recently harvested or still on the vine.

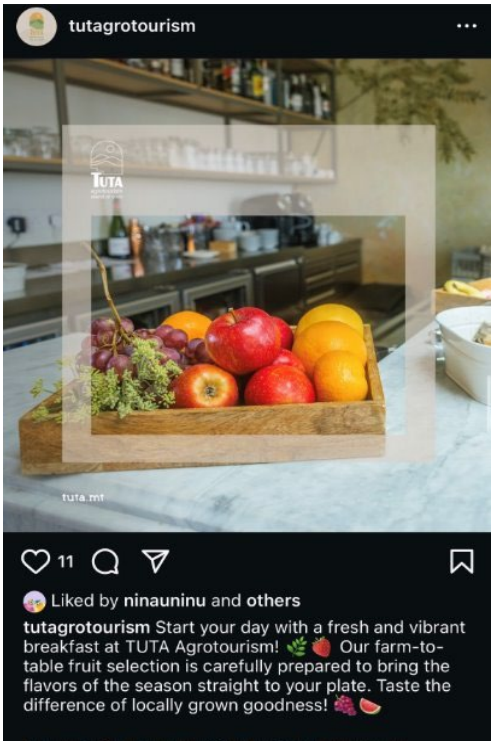




Components of Culinary Tourism

The Magro Food Village's focus is the tomato, as that is the chief product of the larger processing factory around which the Food Village is centred. Seasonal tours of the factory include a visit to the loading docks where countless tomatoes are awaiting processing less than 24 hours after being harvested. This statistic is due to the minimal distance that the produce must travel—either from elsewhere on the island of Gozo or from Malta—to reach the factory.

Just as tours of the factory are seasonal, so is the variety of products being produced by individuals behind glass walls in the Savina Creativity Center. By producing seasonal products, the company is implying that they are following the natural growing seasons and using fresh produce from the island's traditional agricultural cycle. While this relationship is largely implied by the Magro Food Village, those at Tuta explicitly show their dedication to the use of fresh and local (and therefore more authentic) ingredients. Visitors to Tuta can experience a more diverse selection of produce as they tour the Tabone Estate, following paths through olive groves and looking out on acres of carob trees, fruit trees, and vineyards while a guide discusses the traditional methods of agriculture used on the family's land. These include handpicked produce and irrigation.



Key Advantages

Locally sourced ingredients and agricultural methods offer several key advantages, especially when it comes to sustainability, community impact, and quality, including:

a) Environmental Sustainability

Reduced Carbon Footprint and packaging waste: Locally sourced ingredients travel shorter distances, significantly reducing greenhouse gas emissions from transportation, often requiring less packaging as they are not subject to long shipping and storage processes.

b) Improved Food Quality and Health Benefits

Fresher Produce and enhanced nutritional value: Since food does not need to be processed and preserved for long transport, it can be grown and harvested at peak ripeness, often reducing the need for chemical preservatives, and thus retaining more of its natural nutrients. Naturally, locally grown foods offer superior taste and quality given they are harvested at peak ripeness.

c) Cultural Education

Supporting Local Food Traditions: Locally sourced ingredients allow people to connect with regional culinary traditions, methods and recipes, preserving cultural heritage. Essentially, local agriculture can create opportunities for people to learn about food production and sustainable practices through farm tours, farmers' markets, and local events.

d) Support for Local Economy

Boosting Local Farmers: Purchasing from local farmers and producers keeps money circulating within the community, supporting local jobs and agricultural businesses.

A case study on composting machine: GEME composter

A case study on Food Composting Machine: GEME Composter

The Institute Of Tourism Studies undertook a case study to assess the impact of using electric composters to manage and reduce waste within the school environment. By implementing electric composters, the school aimed to address sustainability goals, reduce waste sent to landfills, and educate students about environmentally responsible practices.

The Institute Of Tourism Studies, known for its focus on hospitality education, has also shown strong commitments to sustainability and environmental education. The school, which serves a large student body, generates a significant amount of organic waste from its restaurants' operations, food consumed by students and outsiders, and landscaping activities on campus grounds. The school sought a **sustainable solution** to handle this organic waste more effectively while also **teaching students about environmental stewardship.**

GEME Composting Machine Selection

The school reviewed several options of electric composting machines and chose a model that would handle the high volume of waste generated by a school population. Key features of the GEME composter include odour management, a quick composting cycle (often processing waste in 24 hours), and ease of use. Unlike many other composting machines on the market, the GEME Composter uses GEME Kobold technology to speed up the composting process. It utilises electricity to create and maintain an ideal environment for microbes to thrive, efficiently breaking down organic waste.

Objectives

Reduce Organic Waste: Divert organic waste from landfills, where it would produce methane gas, a potent greenhouse gas.

Create Nutrient-Rich Compost: Use the compost generated from food waste to enhance soil in school gardens.

Educate Students on Sustainability: Integrate waste management into the school curriculum to promote eco-conscious behaviour among students.

Reduce Waste Collection Costs: Minimise expenses associated with waste disposal.

Outcomes

Waste Reduction: The electric composters successfully processed most of the school's organic waste, achieving a reduction in landfill-bound waste, aligning with the school's goal to minimise environmental impact. By reducing the volume of waste needing disposal, the school saw a decrease in waste.

Environmental Impact: The project helped the school cut down on methane emissions by diverting organic waste from landfills. The compost produced can then be used in the school gardens, enhancing soil quality and supporting plant growth.

Educational Impact: Students developed practical skills and knowledge about composting and sustainability. Observing the composting process firsthand allowed them to see the benefits of waste reduction and recycling.

Advantages and Disadvantages of using an electronic composting machines

ADVANTAGES	DISADVANTAGES
Hygienic and minimal smell.	Requires electricity, a dry area, and ventilation (eg. Exhaust fan).
Easy to use.	Needs space, both for the machine and storage of the compost.
Fast compost time (24 hours).	Compost needs to be removed weekly.
Saves money on buying compost and soil additives, as well as on waste collection.	Like other composting systems, it requires staff support (e.g. having ground staff willing to collect food waste and load the composter).
Can process dairy, meat, bread, and small bones. Most other compost processes cannot compost these.	The machine will automatically shut down if the wrong materials are placed inside (e.g. plastic bags can entangle in the mixing paddles).
Processes large amounts of food waste and reduces waste to landfill.	Requires a significant capital outlay, which can be offset by future waste management reduction costs.

Testing the GEME Composting Machine

A case study on composting machine: GEME composter

Challenges and Key Lessons

Initial Costs: Electric composters require a significant initial investment, which may be a barrier for some schools. The Institute Of Tourism Studies co-funded the composting machines through the Erasmus+ Key Action 2 Project 'FoodTuristic'. However, ongoing maintenance costs to keep the composting machines running were also considered.

Behavioural Changes: Encouraging consistent waste sorting requires a cultural shift among students and staff. Continued education and reminders were necessary to ensure compliance.

Technical Issues: Maintenance is required to keep the composting machines operating smoothly. Some minor technical issues, such as mechanical wear and tear, might be encountered . These can easily be addressed through routine check-ups.

Conclusion and Future Steps

The introduction of electric composters at the Institute of Tourism Studies proved to be a successful initiative that met its primary goals of reducing waste, generating compost, and educating students about sustainability. Moving forward, the school aims to further enhance its waste reduction strategy by exploring additional eco-friendly technologies and expanding community involvement in its sustainability efforts.

This case study at the Institute of Tourism Studies demonstrates how electric composters can be a viable solution for schools looking to reduce their environmental impact and educate students on sustainable practices. It also provides a model that other educational institutions can replicate to contribute to a broader, community-wide reduction in waste and greenhouse gas emissions.

How to Get Started: Implementing Technology in Your Hotel School to Reduce Food Waste

1. Introduce Smart Inventory and Waste Tracking Systems

Step 1: Research Available Tools
Start by identifying AI-driven inventory systems and food waste tracking software that suit your school's needs. Look for platforms that offer features such as real-time inventory monitoring, expiration date alerts, and waste tracking reports. Examples include systems like Winnow, Leanpath, or ChefTech.

Step 2: Install and Integrate into Kitchens
Once you've selected a tool, work with your IT department to integrate it into your school kitchens. Ensure all staff and students receive training on how to use the system for tracking food purchases, usage, and waste patterns.

Step 3: Monitor and Adjust
Begin by tracking inventory for a set period, then use the data to identify common sources of waste. Use this information to adjust stock levels, menu planning, and portion sizes.

2. Incorporate IoT-Enabled Composting Systems

Step 1: Select a Composting System
Research IoT-enabled composters that can be used on your premises. These systems monitor moisture, temperature, and decomposition progress in real time. Solutions like Lomi, Reencle, or localised industrial composters are ideal for educational settings.

Step 2: Set Up Composting Stations
Install composting stations near your kitchens or dining facilities and connect them to the monitoring app or system. Ensure that students understand what types of food waste can be composted and how to operate the system effectively.

Step 3: Use Compost On-site or Partner with Local Farms
Once the compost is ready, use it in your school's garden or offer it to local farms. This step completes the sustainability loop, helping students see the tangible benefits of food waste reduction.

How to Get Started: Implementing Technology in Your Hotel School to Reduce Food Waste

3. Implement Vertical Farming or Hydroponics

Step 1: Choose a System

Consider starting with small-scale vertical farming units or hydroponic systems that can be housed on campus. Options like Tower Garden or ZipGrow systems are excellent for educational environments.

Step 2: Set Up the System

Install the farming system in a suitable location, such as near your kitchens or in a dedicated space for agricultural learning. Set up the necessary lighting, water, and nutrient systems required for the vertical or hydroponic farming setup.

Step 3: Integrate into Curriculum

Teach students how to plant, grow, and harvest using these systems, linking the learning experience with discussions on reducing food miles, sourcing locally, and integrating fresh produce into menu planning.

4. Explore Food Valorisation Techniques

Step 1: Identify Opportunities for Valorisation

Begin by identifying which types of food waste can be repurposed within your kitchens, such as turning vegetable scraps into stock or unused bread into croutons. Research food valorisation technologies that can enhance this process, such as dehydration or fermentation.

Step 2: Set Up a Valorisation Station

Equip your kitchens with tools for processing waste into usable products. Ensure that students learn techniques for transforming waste and consider adding a food science or waste reduction module to your curriculum.

Step 3: Monitor and Celebrate Success

Track how much food is valorised and the new products created. Share this data with students and staff to celebrate reductions in waste and increase engagement with sustainable practices.

How to Get Started: Implementing Technology in Your Hotel School to Reduce Food Waste

5. Utilise Data Analytics for Food Waste Management

Step 1: Install Analytics Tools

Use software that tracks and analyses food waste data. This might be integrated into your smart inventory system or available as a standalone tool. Solutions like Leanpath offer in-depth analytics for hospitality settings.

Step 2: Teach Data Interpretation

Train students on how to use these analytics tools to identify waste patterns, inefficiencies, and opportunities for improvement. Use the data to inform practical decisions about purchasing, menu adjustments, and food preparation.

Step 3: Implement Continuous Improvement Cycles

Make waste reduction a part of your regular process reviews. Encourage students to use waste data to innovate, tweak processes, and continuously improve the sustainability of kitchen operations.

6. Engage with Local Suppliers and Waste Management Initiatives

Step 1: Research Local Initiatives

Identify local farms, food redistribution services, and composting facilities that focus on reducing waste.

Step 2: Create Partnerships

Build connections with these local entities to integrate their services into your school's operations. For example, surplus food could be donated to food banks, or compost could be sent to local farms.

Step 3: Involve Students in Local Efforts

Engage students in these partnerships, whether through volunteer opportunities or projects. This not only enriches their learning but also fosters a sense of responsibility toward the community and environment.

Key Lessons for Implementing Technology in Your Hotel School

Incorporate Smart Inventory Systems

Implementing AI-driven inventory systems and food waste tracking tools in your school's kitchens can greatly reduce food waste by ensuring efficient stock management. Train students to use these technologies to monitor expiration dates, suggest menu adjustments based on inventory levels, and improve portion control. This will not only reduce waste but also instil **efficient kitchen management habits** in future hospitality professionals.

Utilise IoT-Enabled Composting Systems

Introducing IoT-enabled composting technology within your school can teach students about effective waste disposal and the benefits of composting. These **smart systems** can monitor waste decomposition, provide real-time data on composting progress, and highlight how organic waste can be transformed into valuable compost for use in gardens or local agriculture. **Demonstrating the circular economy** in action will enhance student understanding of sustainable waste management.

Promote Localised Growing with Vertical Farming and Hydroponics

Integrating small-scale, technology-driven urban farming solutions such as vertical farming or hydroponics into your curriculum can localise food production, reduce food miles, and encourage sustainable practices. These systems can be set up on campus, teaching students how technology can enable fresh, local ingredients to be grown even in urban environments. This not only reduces waste but fosters an appreciation for the **value of locally sourced food.**

Key Lessons for Implementing Technology in Your Hotel School

Leverage Food Valorisation Tools

Food valorisation technologies allow unused or surplus food to be repurposed into valuable by-products. Incorporate lessons and tools that showcase how food waste, such as vegetable peelings or unsold bread, can be converted into new products like stocks, sauces, or even biogas. This will encourage **creative thinking** around food waste reduction and equip students with practical skills for running more sustainable kitchens and businesses.

Emphasise the Use of Data and Analytics

Using data analytics tools to assess food waste patterns is essential in understanding and reducing waste. Train your students in interpreting waste data from both the kitchen and front-of-house operations, helping them recognise inefficiencies and identify areas for improvement. This data-driven approach can influence their **future decision-making processes and create a culture of sustainability** in their professional lives.

Engage with Local Sustainable Practices

Connect your hotel school to local food producers and waste management systems by collaborating with community initiatives that focus on reducing food waste. Encouraging students to work with **local suppliers and food waste redistribution programmes** will give them real-world insights into the importance of sustainable practices. Partnering with local composting facilities or urban farms can enhance the **educational experience and strengthen community ties.**

Recommended Further Reading – academic, policy and media articles

1."Food Waste in the Supply Chain" – European Commission (2020)

1. **Type**: Policy Report
2. **Overview**: This report discusses EU policies aimed at reducing food waste throughout the supply chain, including guidelines for the hospitality sector.

2."Global Food Losses and Food Waste: Extent, Causes, and Prevention" – FAO (2011)

1. **Type**: Academic Report
2. **Overview**: This foundational report by the FAO details the causes and impact of food waste globally, offering data and potential solutions relevant to educational settings.

3."Harnessing Technology to Combat Food Waste" – World Economic Forum (2021)

1. **Type**: Media Article
2. **Overview**: A comprehensive article outlining how emerging technologies, such as AI and IoT, are being used to reduce food waste across various industries, including hospitality.

4."Food Waste Reduction Toolkit for the Hospitality Industry" – WRAP (2020)

1. **Type**: Industry Toolkit
2. **Overview**: A practical toolkit developed by WRAP for businesses in the hospitality sector, offering strategies and technological solutions for reducing food waste.

5."From Farm to Fork: Reducing Food Waste in the EU" – European Court of Auditors (2020)

1. **Type**: Policy Report
2. **Overview**: This report evaluates the EU's efforts in reducing food waste as part of its Farm to Fork strategy, offering insight into broader policies that impact the hospitality sector.

Recommended Further Reading – academic, policy and media articles

6. **"The Impact of Food Waste on Climate Change" – Nature Climate Change (2019)**
    1. **Type**: Academic Journal Article
    2. **Overview**: A research paper analyzing the link between food waste and greenhouse gas emissions, relevant for understanding the environmental urgency behind waste reduction.

7."Smart Waste Management: The Future of Food Waste Solutions" – Forbes (2020)
    1. **Type**: Media Article
    2. **Overview**: This article discusses how smart technology, such as AI, IoT, and waste analytics, can transform food waste management in industries, including hospitality.

8."Technology in Hospitality Education: Impact on Learning and Sustainability" – Journal of Hospitality, Leisure, Sport & Tourism Education (2020)
    1. **Type**: Academic Journal Article
    2. **Overview**: A study on how technology integration in hospitality education fosters both learning and sustainability, with practical case studies on reducing food waste.

9."The Economics of Food Loss in the Hospitality Industry" – The Economist (2021)
    1. **Type**: Media Article
    2. **Overview**: This article examines the economic impact of food waste on the hospitality industry and how technology can be a solution to the inefficiencies caused by waste.

10."Circular Economy and Food Waste Valorisation: A Review" – Journal of Cleaner Production (2019)
    1. **Type**: Academic Journal Article
    2. **Overview**: A detailed review of how food waste valorisation fits into the circular economy model, offering insights into practical applications for hospitality education.