Zoom-in II

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Food waste reduction in the tourist sector

The implementation of the
RESOURCEMANAGER-FOOD (RMF) Tool in Heraklion

Author: Christina Marouli

EUROPEAN UNION
European Regional Development Fund

Région
Hauts-de-France

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1.1 Food waste reduction in the hospitality sector: a need and an opportunity

Tourism has a significant contribution to food waste generation, which is an important concern in contemporary societies. Greece receives approximately 25 million tourists from other countries and more than 5 million of internal - Greek tourists annually. Most of them visit Greek islands in a period of 4 to 5 months, which implies a massive increase in waste and resource consumption and thus a heavy burden on the island ecosystems.

Food waste is a significant waste stream in this context, resulting to noteworthy environmental pressures. Limiting food waste is a culturally laden issue and thus a significant challenge. However, as these visitors produce food waste mostly in hospitality units, there is an opportunity to effectively limit food waste as these are specific and localised sources and cost-sensitive entities. New technologies and digital tools can support businesses interested in monitoring and minimising their food waste.

1.2 A2UFood – for food waste reduction in hospitality units

The A2UFood project aims to develop and realise an integrated management scheme for food waste in the Municipality of Heraklion, Crete, simultaneously limiting the environmental consequences of food waste, addressing needs of socially marginalised groups and individuals, as well as socio-economic needs like use of plastic packaging. Three are the main pillars of action in this project: food waste prevention, use of avoidable and unavoidable food wastes, and food waste urban composting at both the household and neighbourhood levels. At its completion, this initiative aspires to have reduced the amounts of avoidable food waste, as well as to have utilised unavoidable food waste as raw materials and to have treated them in an environmentally friendly and economically beneficial manner.

Figure 1: The A2UFood team

A main pillar of the A2UFood project is prevention of food waste – the first priority in sustainable waste management according to EU directives. Three activities have been foreseen: an extensive information campaign targeting the general public via traditional means and new technologies; a digital tool designed to support general users to purchase, use and store food in an optimum way; and a digital food waste monitoring and reduction tool for the management of professional kitchens in hospitality units, with the aim to reduce their food waste and related costs via better management of their supplies and discarded food.

Here we focus on the digital tool for the hospitality units.

2   The RESOURCEMANAGER-FOOD (RMF) Tool

2.1   The RMF and other digital tools for food waste monitoring and reduction

The RESOURCEMANAGER-FOOD (RMF) tool is a hardware-software system for monitoring and analysing food waste generation and optimising its management, with the aim to raise awareness of the problem and contribute to its reduction (Fuchs, Hadlaczky, Hafner, Daliakopoulos, Manios & Kranert, 2019). It was developed by the University of Stuttgart as a research tool that can be used in hotels and catering establishments. The tool allows tracking of various waste streams, while it provides information about different material flows in real time. Its main objectives include: monitoring and quantification, evaluation of cost and environmental impacts, system optimization, reduction of costs, and documentation. Thus, it can support decision making processes and quick optimization of material flows and food waste management.

Figure 2: The RESOURCEMANAGER-FOOD Tool; Source: Fuchs, Hadlaczky, Hafner, Daliakopoulos, Manios & Kranert, 2019

There are other digital tools for food waste reduction (Van Herpen, E., van der Lans, I., Nijenhuis-de Vries, M., Holthuysen, N., Kremer, S., 2016). Existing commercial tools (like LeanPath, Phood, Winnows) quantify wasted food by weight, track the amount disposed of during the operation, and translate it into cost. There are also some tools aiming to the reduction of food waste (like the Food Loss+Waste Toolkit of the Provision Coalition) that focus on businesses such as food manufacturers, suppliers and retailers. The RMF Tool is a MS Windows tool that was developed for research purposes and with the aim to help reduce food waste in the tourism sector. It is more flexible than existing tools. For example, the user can set the food waste categories s/he wants to measure. Furthermore, it can record several boundary conditions (like number of guests, reasons for wasting, etc.) and it can be used in any language.
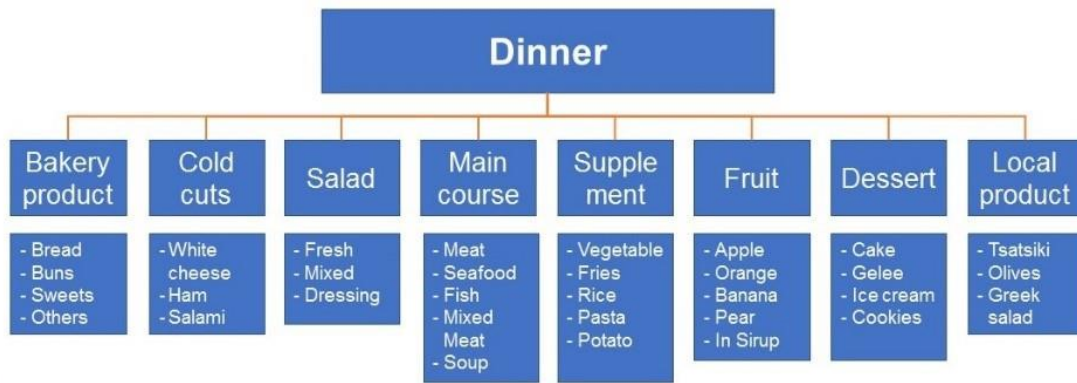
Figure 3: Food waste categorisation; Source: Fuchs, Hadlaczky, Hafner, Daliakopoulos, Manios & Kranert, 2019

It had been pilot tested in German-speaking contexts before this project; so, with the opportunity of the A2UFood initiative, the software was adapted to the Greek hospitality sector, translated, enhanced and adjusted as needed. Presently, it is available in English, German and Greek and can be offered in any language as needed. It was foreseen that the RMF tool would be implemented in 6 hotels in the area of Heraklion. In the second half of 2020, the RMF tool will also be available as a platform independent, cloud-based app (android, iOS, web) via Google Play and App Store. Including Bluetooth connection to certain suitable weighing scales. This new app will significantly facilitate a widespread application of the tool.

2.2 The RMF Tool: the way it works

The RMF Tool consists of a software for quantifying food waste and user interface on the one hand, and hardware including a tablet or PC and an electronic weighing scale on the other. The tool records quantities of discarded food at source, by food type or aggregated in selected food waste categories, along with information regarding its origin and reasons for wastage. It stores the collected data in a database, and evaluates the performance. Evaluation parameters (e.g. costs, energy consumption, greenhouse gases, water consumption, etc.) can be selected and stored. On the basis of targeted performance comparisons that are implemented in the background, direct feedback is provided to the users. For example, the costs and greenhouse gas emissions of the weighed food is calculated in the background while the food leftovers are weighed and relevant information is then displayed for the use of the user. The tool is easily adaptable to and configured according to the needs of the user.
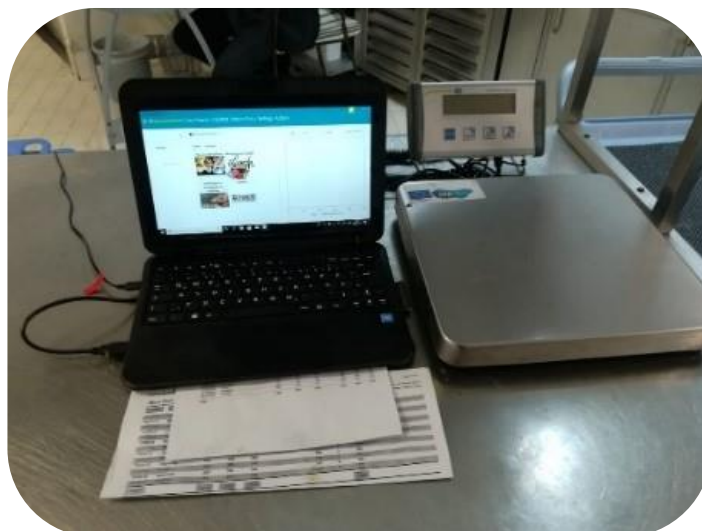

Figure 4: The RMF Tool

Its main features include (Hafner, Fuchs, Leverenz & Kranert, 2019):

1) Individual definition of the weighing categories:

- Each category can be selected and programmed and adapted to the user's needs each time.
- A picture for each selected food category can be uploaded and then displayed in the user interface for easier selection of the weighed discarded food.

2) User interface / measurement process:

- Selection of food waste to be weighed by the user.
- Visualisation of the weighed food waste in real time.
- Display of the weight of the food waste
- The displayed weight can be replaced by entering the number of items

3) Log function and data export to Excel

Figure 5: The RMF Tool main features; Source of photos: Hafner, G., Fuchs, P., Leverenz, D. & Kranert, M., 2019

2.3 The RMF Tool: implementation and plans

At the proposal phase, the plan was to implement the RMF Tool in six hotels, some city hotels (with visitors for business purposes as main clientele) and some beach resorts/hotels located around the city (primarily for vacationers as their main clientele). After the first contact with the hotels of Heraklion via telephone calls which resulted to a poor response from the hotels, the project team organized a workshop for hotel managers and chefs to demonstrate the RMF Tool and explain its benefits to the hotels, if they decided to participate. The workshop included a showcase example of the application of the tool. Following this workshop, six hotels provided information about their facility's kitchens and four expressed definite interest. Out of these four, three facilities from the beach resort category participated in the actual measurement campaign. One of the interested hotels cancelled its participation due to limited staff. After additional efforts from the project team, two more hotels participated, leading to five all-inclusive hotels participating.

Figure 6: RMF workshop

In preparation for the application of the RMF Tool in these hotels, the hotels were informed of the additional requirements for the measurement campaign (i.e. space including electrical connection for the RMF and weighing scale, access to kitchen and existing food waste data, bins/containers for temporary storing of discarded food), as well as of the benefits (i.e. free use of the RMF tool even after the project end, results, benchmarking with comparable facilities, suggestions for improvements, certificate of participation) via two documents. An initial training of the chefs (executive chefs, sous chefs and chefs) on how to do the measurements was done.

As only beach resorts/hotels participated in the actual measurements, the measurement campaign was realized in April – May, the beginning of the tourist season, when the hotels' workload was relatively low. It is now planned that a second round of measurements will be implemented in spring 2020.

The analysis of the results is ongoing. An initial analysis provided some interesting information for each hotel; it is being communicated to the hotels in this period. After the second round of implementation, it remains to be seen whether and how the hoteliers will use the new insights to limit their food waste.
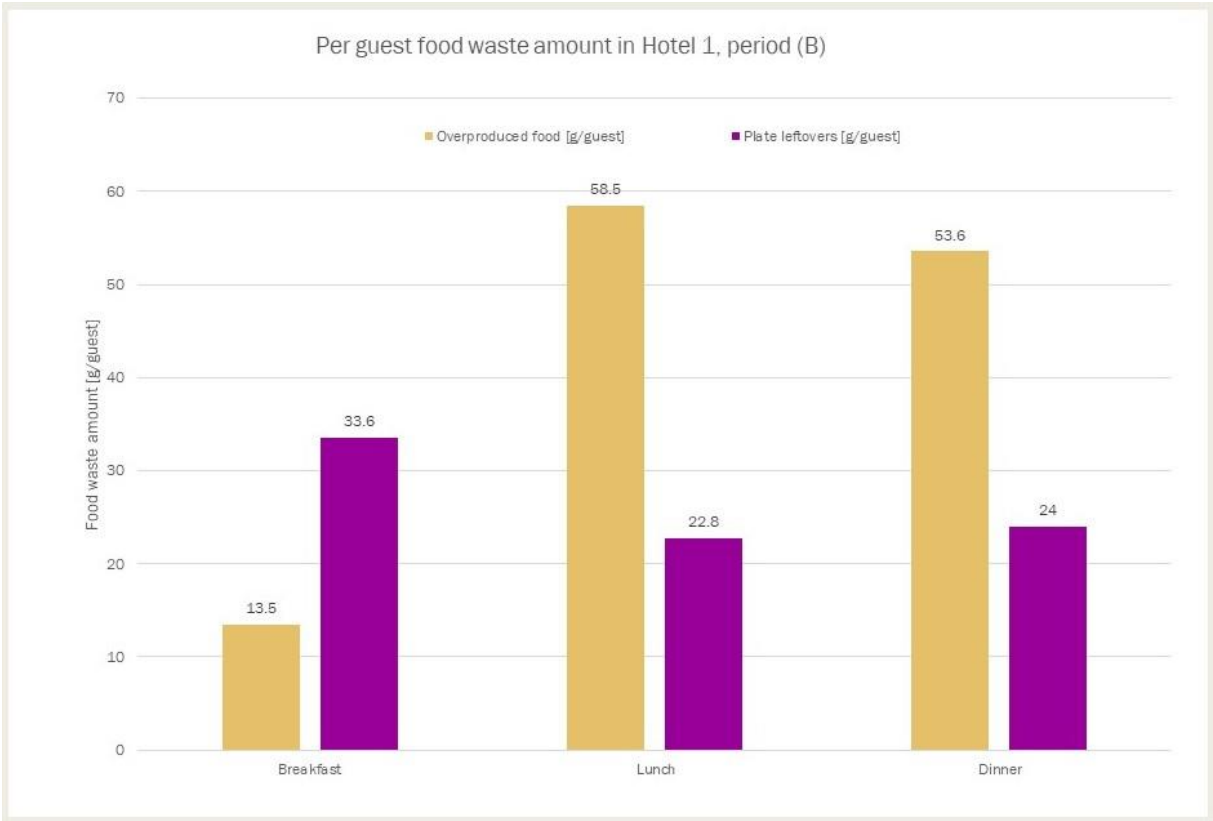

Figure 7: Analysis of results

3   The People behind the RMF Tool: their views

3.1   Designers' intentions and views

A main concern of the designers of the RMF tool and the Chair for Waste Management of the University of Stuttgart was that it is user-friendly. For this reason, they included some functions for user support (e.g. integration of pictures of each product for easier recognition and graphical real-time feedback). The tool can be adapted and configured according to the user's needs and aims. Furthermore, designers tried to minimise operating time in order to limit its interference to the user's daily practices.

For example, tare weights of serving utensils can be entered into the software so that the net weight of the discarded food can be calculated automatically.

Figure 8: A2U Food team during an interview

Some challenges were faced at the initial stage of the implementation phase as the designers indicate. Lacking familiarity with the RMF Tool and awareness for the food waste issue, the employees were sceptical about the idea of exact measurements and the extra workload. However, the configuration of the tool according to the specific kitchen needs is expected to limit extra work time to a minimum as prior applications have shown. According to the designers, it takes one person 10 to 15 minutes to measure the food leftovers of a whole breakfast buffet.

The number of containers to be used for the transfer and weighing of selected food categories was an issue to be decided; a smaller number was easier for the kitchen staff to manage. Food waste categories to be measured for each hotel were finalised after a trial period. Each hotel also selected in which restaurant (i.e. main or smaller a la carte restaurants) and which part of the food provision process (i.e. preparation phase, overproduction or customers' plate leftovers) they would apply the RMF tool.

According to the designers' understanding (Fuchs et al., 2019), the accuracy of the measurements is affected by the motivation of the management and the kitchen chef and may be compromised by a high level of traffic and work, as measurements are conducted at the end of the mealtimes. However, the tool has a significant potential to reduce food wastage.

3.2 Hoteliers' opinions

Through semi-structured interviews, hotel representatives were asked to share their experience and expectations of the RMF Tool. Topics discussed included their overall impression of the tool, prerequisites for its successful implementation, benefits, difficulties and possible enhancements. In addition, they were asked if they implemented any changes in the kitchen after the RMF Tool implementation, their reasons for joining the pilot measurement campaign and their concerns about the use of discarded food for people in need.

Figure 9: Hotel representatives

All five hotels that participated in the pilot measurement campaign were represented. For all hotels, higher administration representatives were present, and for three of them, a chef or a Food & Beverage manager or a Quality Assistant was also present.

Overall impression:

All hotel representatives were positive about the tool. They found it useful, while some indicated that it was easy to use. One respondent believed that it can stimulate a change in staff's behaviours so that they reduce food waste.

Figure 10: Hotel representatives with certificate of participation

Reasons for participating:

Each respondent indicated a different reason that stimulated their participation. One was interested in getting more information about food wastage in their hotel and subsequent costs, while another one was specifically interested in limiting food waste at the preparation phase. A couple respondents were looking forward to a comparison with similar hotels as a benchmarking exercise for their own

practices. One was also interested in the communication benefits of such a practice, while two referred to environmental benefits and the minimisation of their ecological footprint as an additional motive for their participation. Finally, one indicated that they joined the team because they found the project interesting and innovative when it was presented to them.

Benefits:

A main benefit of the RMF Tool that was indicated by several respondents was a better monitoring of food wastage and a better understanding of what type of food is mostly discarded. One respondent was particularly concerned about food waste at the preparation phase, which he believed is more manageable than food waste reduction at the guests' practices level. Several anticipation for the results in order to enhance their food planning and to get ideas regarding what they can do with their food waste. One hotel representative noted as a benefit of the RMF Tool the fact that kitchen staff were more careful with their food management practices during the application of the tool.

Figure 11: Kitchen staff measuring food waste

Difficulties:

Two hotel representatives indicated that extra personnel is needed. A person alone cannot do the task, a middle level manager indicated. This of course has cost implications too.

Also, this implies that the use of the RMF Tool requires extra time and a respondent suggested that this extra task should be incorporated in the time planning of the kitchen personnel so that it becomes feasible. One respondent (a chef) explicitly indicated that delays would be anticipated if the RMF Tool were implemented in the high tourist season, but he was optimistic that these delays would be overcome as kitchen staff would get familiar with the practice.

Two respondents indicated that familiarity with computers and new technologies is required. A hotel representative indicated that staff in their kitchen were not familiar with computers and this highlighted the need for an additional staff member to do the recording, while another one stated that their kitchen staff was young and had no difficulty with the RMF Tool.

Practical difficulties were mostly observed in the initial stage of the pilot implementation and they included persuading the head chef about the usefulness of this tool, different tare weights for different kitchen utensils, and food waste categorization. These difficulties were resolved at later stages of the tool implementation though.

Figure 12: Containers for food waste categorisation

An issue that was mentioned as an obstacle in limiting food waste especially in buffet-type settings was that food at the buffet should look abundant. This is surely cultural and it refers to both the local culture (Cretan) and the culture propagated in the tourism sector.

Prerequisites:

Given the difficulties the respondent identified, the prerequisites they proposed are not surprising. Almost all (4 out of the 5 hotels) stated that an initial training is required and it should familiarize the participants with the tool's concept, the use of the tool and food categorisation. A respondent indicated that maybe at the buffet, you need a kitchen staff member dedicated to the task, which implies that hotels should also consider the relevant cost.

Suggested enhancements:

Several respondents indicated that the kitchen personnel that will use the tool should be trained. One of the hotel representatives who identified the need for initial training proposed that a common training session specifically for the kitchen staff (not the hotel managers) of all the participating hotels should be organised.

Another respondent repeatedly indicated that this new task should be incorporated in the kitchen staff's daily tasks and their time planning should be appropriately adjusted.

One hotel manager referred to the need for an awareness raising campaign for the hotel customers in order to support this effort.

Figure 13: Customers' awareness raising effort

Impacts on hotel practices:

All respondents indicated that they did not make changes in the hotel kitchen practices, with the exception of one who qualified his answer and indicated that they used some of this real time information to adjust their menu. All of the respondents stated that they were awaiting the results of the study so that they could reflect on their practices and consider needed changes.

Two hotels continued the use of the RMF Tool throughout the tourist season because they wanted to obtain a holistic understanding of their food waste generation and where they could make enhancements. They hope to get useful results relating to cost and waste savings. Others discontinued the use of the RMF Tool as the kitchen work increased in the high tourist season and they were concerned about the extra work in the kitchen that the use of the RMF Tool requires. One stated that they stopped the use of the RMF Tool as this was the plan. All expressed interest in continuing with the tool.

When asked of their impression of the impact of the use of the RMF Tool on the quantity of food waste they actually generated, the hotel representatives were uncertain and expressed their anticipation for project results; however, they were positively predisposed (based on their experience) to the food waste reduction potential of the tool.

General attitude towards food waste:

They all expressed that they were concerned about food waste even before the use of the RMF Tool, given its cost implications. Some stated that they gave some food leftovers to good causes already but they would generally welcome a more systematic approach. One indicated, however, that if the amounts of food waste generated are not large enough, making the effort to reuse any good quality food leftovers would not be worth it.

All indicated that for a system of collecting unused food for use by people in need to be feasible, it should be very well organized, ensuring food safety throughout the process and until the food reaches the final recipients. Otherwise, they were concerned, as one respondent explicitly indicated, that the reputation of the hotel may be harmed as they may be charged for giving out bad quality food.

Another respondent stated that buffet food is not appropriate for giving out as it has stayed for a considerable amount of time without refrigeration; it should be eaten right away.

Figure 14: Hotel buffet

4 Reflections

Overall, the RMF Tool was well received and hotel managers and users rated it positively, expressing their anticipation for the analysis of the results. They could see its food waste reduction potential, although a respondent also stated that this could be a challenge at the buffet-type kitchen where food should look abundant. According the designers, this cultural issue can be overcome by adapting the buffet design (e.g. using smaller or shallower serving plates towards the end of the mealtime). In addition, hoteliers expressed a concern about the extra work in the kitchen and the concomitant cost implications. The designers are confident that this extra workload can be minimized after the appropriate configuration and optimization of the workflows, something that was stated by one of the hotel representatives too.

However, such a tool, easy as it may be, requires that the staff that will use it receives an appropriate training that will include both theoretical (concept-related) and practical information regarding the tool. Familiarity with computers and new technologies by the user(s) is very desirable for the proper motivation for its use.

The acceptance and adoption of the tool by the head chef of the kitchen and the motivation of the staff to use the tool are essential for its effective implementation and food waste reduction. Otherwise, as one of the respondents indicated too, staff may not fully implement the tool and may do an incomplete recording of discarded food. This finding is in line with relevant literature which identifies employees' awareness of the food waste problem and motivation to contribute to its reduction as important prerequisites for limiting food wastage (Working Group for Food Industry of the Wasteless programme, 2019). Thus, the initial "training", which designers have also been referring to, should include not only the high management and kitchen heads in order to persuade them to adopt the tool, but also the kitchen staff to show them the usefulness of the tool and to alleviate any fears they might have regarding its implementation.

The hotels have generally refrained from making changes to their kitchen practices until the reception of the final results. However, one hotel did not wait for the final results before starting to adjust their menu as a consequence of the real time data they collected during the implementation of the RMF Tool. Generally, participants welcomed the benchmarking exercise.

Finally, all hotel representatives declared interest in food waste reduction, primarily for cost savings and communication purposes; some for environmental reasons too. They also indicated their willingness to participate in efforts for food waste reduction and use of good quality discarded food. However, they identified the proper organisation throughout the process – from the hotel up to the final recipient – ensuring food safety as a strict requirement.

5 Concluding remarks

Digital tools aiming to the reduction of food waste in tourist installations can facilitate food waste reduction in tourism. However, the use of the tool should be user-friendly and easy, with the minimum interference in the kitchen's daily practices. However, for its effective implementation, it should be incorporated in the staff's daily tasks and time planning. An additional staff member may be required or at least good to have for the use of the RMF Tool.

Maybe a collaboration with schools for chefs and kitchen staff so that their training includes awareness and practices that lead to the minimization of food waste would be helpful, especially for the reduction of food waste generation in the preparation phase.

Finally, other structural (e.g. carefully and strictly organized collection and distribution of unused good quality food) and cultural changes (e.g. a new concept for tourism, a new image of the "good" responsible tourist, good food and good eating practices, etc.) are also needed to enhance the possibility of food waste reduction and appropriate use in tourist institutions.

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Photos from the hotels and the RMF Tool workshop by Philipp Fuchs, University of Stuttgart. Photos from interviews by Christina Marouli, A2U Food expert.

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[1] Retrieved from: http://maradeknelkul.hu/wp-content/uploads/2020/01/MN_good_practices_food_industry_2.pdf

Urban Innovative Actions

Les Arcuriales
45D Rue de Tournai
F - 59000 Lille

+33 (0)3 61 76 59 34
info@uia-initiative.eu
www.uia-initiative.eu

Follow us on **Twitter**
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