

تقنيات التحكم في تكلفة الغذاء خلال مرحلتي التجهيز والتحضير بمطابخ فنادق
الخمس نجوم

Food Cost Control Techniques (FCCT) during Pre- preparation and Preparation Stages in Kitchens of Five Star Hotels.

علي حسين ابوالعلا عجمي¹

naftpetrochem@gmail.com

إشراف

و / أميرة حسن عبد المنعم
قسم اللؤلؤة الفندقية - كلية السياحة
والفنادق جامعة حلوان

□ أ.و.ا / احمد مصطفى فوزي
قسم اللؤلؤة الفندقية - كلية السياحة
والفنادق جامعة حلوان

1عضو هيئة التدريس المعاونة . بكلية تكنولوجيا الخدمات الفندقية والسياحية .جامعة طيبة
التكنولوجية .الاقصر

ملخص البحث

تركز هذه الورقة البحثية على القياس الكمي وتحليل تقنيات التحكم في التكاليف في مطابخ فنادق الخمس نجوم. تبحث دراسة الحالة الخاصة بنا في تقنيات التحكم في التكلفة في 3 مطابخ فندقية مختلفة 5 نجوم في 3 أنواع فنادق مختلفة (كلاسيك - حديث - منتج) بالإضافة إلى الاحتفاظ بالمواد الخام في سلاسل مختلفة ، حيث يتعاون أعضاء فريق المطبخ من أجل التحكم في هدر الطعام خلال مراحل التجهيز المسبق (الاعداد المبدئي) والتحضير (الاعداد النهائي)

يجب أن تتماشى تكاليف الغذاء مع الأهداف المحددة مسبقاً. ويجب التحقيق في أي فروق غير مناسبة للتكاليف المحددة مسبقاً لأن لها عواقب اقتصادية سلبية. لذلك كان الغرض من الدراسة هو تحديد أنواع تقنيات التحكم في التكلفة التي يتم تشغيلها في مطابخ الفنادق الخمس نجوم خلال مراحل التجهيز المسبق والتحضير (مراحل التكلفة الرئيسية) وتحديد ما إذا كانت هذه التقنيات فعالة في الحفاظ على تكلفة المنتج النهائي في حدود مقبولة (حدود التكلفة).

العديد من الأدوات التي تؤثر في التحكم في التكلفة سوف تدرس بالتفصيل في الدراسة و كيفية تأثير الأدوات على التكلفة وكيفية تحسين مستوى التحكم في التكلفة في نفس الوقت مع الأخذ في الاعتبار نظام التشغيل ورضا الموظفين.

المهارات المهنية للموظفين لها دور رئيسي في تنفيذ التقنيات الحالية والجديدة وكذلك في توفير التكلفة باستخدام التقطيعات الصحيحة والأوزان المناسبة للطبق النهائي وكذلك التخزين الصحي وبيئة العمل خلال مراحل التجهيز المسبق والإعداد النهائي من أجل توفير التكلفة والتحكم في جودة المنتجات النهائية.

تم اجراء اختباراً اثبت أن المهارات الشخصية لفريق العمل بقسم المطبخ يمكن أن يساعد في الوصول إلى نفس جودة ومذاق الطبق النهائي باستخدام مواد خام مختلفة توفر حوالي 30% من تكلفة المادة الخام البروتينية فقط في الطبق النهائي باستخدام نفس طرق التجهيز المسبق والتحضير النهائي.

الأشخاص المؤهلين ذوي المهارة والجودة العملية العالية هم الأداة الرئيسية في التحكم في التكلفة لأنهم أساس النجاح في تفعيل التقنيات الحالية و تنفيذ أي تقنية جديدة للتحكم في التكلفة.

ABSTRACT

This Research Paper focuses on quantifying and analyzing cost control techniques in kitchens of five stars hotels. Our case study investigates cost control techniques in 3 different hotel kitchens of 5 Stars hotel 3 different type (**Classic, Modern and Resort**) from as well keep raw materials in different chains, where the kitchen Team Member Co-operate in order to control food waste during Pre-preparation and Final Preparation stages.

Costs of food should be in line with pre-determined goals. Any unfavorable variances should be investigated because they have adverse economic consequences. The purpose of the study therefore was to determine the types of cost control techniques operational in kitchen of 5 star hotels during Pre-preparation and preparation stages (main cost stages) and establish if these techniques were effective in keeping the cost of finish product within acceptable cost limits.

Many tools are effecting in cost control in the study will study in details how tools are effecting the cost and how to improve the level of cost control in same time considering operation system and staff satisfaction .

Staff Professional Skills (**SPS**) having major role in implement current and new techniques as well in saving cost by using proper portions cuts and weights as well hygienic storing, Pre-preparation and Preparation environment in order to save cost and control quality of finish products.

We make a test to prove that SPS can help to reach the same quality and taste of final dish by using different raw material which saving 30% of Protein portion cost only in the final dish by using same pre-preparation and preparation details.

Only Quality People (**OQP**) is the major tool in cost control because it's the base of success in implementing any new cost control technique.

Abbreviations of Expressions

Food Cost Control Techniques = FCCT

Staff Professional Skills = SPS

Only Quality People = OQP

Introduction

In Hospitality industry the expenditure on food is the largest single element of cost the maintenance of Food cost at predetermined levels are therefore of the greatest importance in ensuring the Satisfactory profitability of the hospitality establishment food cost targets and costs limits are main concern for hospitality industry decision makers.

The United Nations formulated food waste reduction targets within the Sustainable Development Goal 12.3, which aims to halve global food waste by 2030 at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses ([United Nations, 2015](#)). Current extrapolations of food waste quantities in Europe are estimated at approximately 88 (± 14) million tons ([Stenmarck et al., 2016](#)). These food waste quantities cause nearly 15–16% of the environmental impact of the food supply chain and correspond to approximately 186 million tons of CO₂ equivalents per year ([Scherhauser et al., 2018](#)). Given that most food waste in Europe is generated at consumer level, reduction measures in the food service sector can provide an important contribution to achieve parts of the Sustainable Development Goal 12.3 ([Beretta & Hellweg, 2019](#)).

FOOD COST CONTROL DEFINITION AND NATURE OF FOOD COST CONTROL

Cost control has been defined as the guidance and regulation of the costs of operating an undertaking. To guide and regulate costs means to ensure that they are in accordance with the pre-determined objectives of the business. Hence the notion of the guidance and regulation of costs pre supposes the existence of stated objectives as expressed in the policy statements and the budgets of the undertaking.

Food cost control is simply cost control as applied to an undertaking operating food facilities. Food cost control is therefore cost control as applied in hotels, restaurants, canteens and similar establishments. It is quite common in certain catering circles to regard food cost control as something wholly negative designed to cut costs in all directions. This is quite wrong. The object of food cost control is to ensure that costs are neither more or less than they ought to be that they are in line with the financial and catering policies of the establishment. An important feature, which distinguishes food cost control from systems of cost control in other industries, is its materials costs orientation. In most aspects of food cost control, attention is directed to primarily to the cost of materials (cost of sales) leaving the cost of labor and other operating costs very much in the background. This is mainly due to the fact that in the short run, labor and other operating costs tend to remain fixed and are thus largely uncontrollable. **Vernon Coelho IHM MUMBAI (2009-10)**

Review of Literature

Food waste in the hospitality Industry:

As Example The German food service sector produces approximately 1.69 million tons of food waste per year, of which approximately 1.22 million tons could be avoided. Specifically, the hospitality sector in Germany generates an average quantity of approximately 80,000 tons of food waste per year, which corresponds to 136 g of wasted food per meal ([Schmidt et al., 2019](#)). Food waste in gastronomy particularly occurs during processes such as food storage, preparation of meals, serving and consumption. Accordingly, the literature has often distinguished food

Waste into several categories, namely *storage waste, preparation waste, leftovers* from serving Dishes at buffets and *plate waste* ([Engström & Carlsson-Kanyama, 2004](#); [Møller et al., 2014](#); [WRAP, 2013](#)). [Von Borstel et al. \(2017\)](#) showed that most food waste in the German hospitality sector is generated by buffet leftovers (45%), followed by plate waste (30%), preparation waste (20%), and storage losses (5%). Recent literature has confirmed that buffet leftovers and overproduction can be avoided to a large extent, resulting in high savings potential

(Okumus,2019; Papargyropoulou et al., 2016; Silvennoinen et al., 2015).

We have defined Food Cost Control, described its objectives and dealt with the difficulties which its application presents. Now, we must deal with the method which should be applied in the development of a system of Food Cost Control. The development of an effective system of Food Cost Control resolves itself into three distinct phases: Phase I consists of basic policy decisions in relation to the financial and catering policies of the establishment. Phase II consists of the necessary routine operation controls revolving around the catering cycle. Phase III consists of what may be described as control after the event or post operational control.

Phase I Basic Policy Decisions:

In some respects, food cost control is a byproduct of the interplay of two basic and sometimes conflicting considerations. When one reflects on what most forms of catering are about, the inevitable conclusion is that in the final analysis, only two things finally matter – profitability and the customer. The profitability of the establishment is the ultimate objective whereas the provision of a satisfactory standard of food and service is the means by which the ultimate objective is reached. Hence, before a system of cost control is developed, it is important to evolve the following:

A Financial Policy –

Setting out the intentions of the management with regard to the forecasted profitability. This involves setting up a profit target, the determination of departmental profit target and the planning of a whole pattern of differential profit margins in respect of each menu. The financial policy of a catering establishment should be determined as in the five steps listed below: a. Determine the overall profit target. (return on capital employed) b. Determine what percentage of net profit on sales must be aimed at. c. By reference to the budgeted volume of sales, the type of service and the degree of comfort to be provided to the customer. Determine what percentage of revenue will be required to cover labor costs and overheads, and what percentage of revenue can therefore be available to cover costs of sales. d. By reference to the projected sales mix, determine the cost of sales for each department of the business: food, beverages, alcoholic drinks and tobacco. e. Having

determined the overall cost of sales for each department, plan the differential profit margin for each group of items offered on the menu, wine list etc.

2. A Catering Policy –

Defining the market to be aimed at and describing how it is to be catered for .In many hotel and hospitality establishments, the expenditure on food is the largest single element of cost. The maintenance of Food cost at pre-determined levels are therefore of the greatest importance in ensuring the satisfactory profitability of each establishment. Even where catering is undertaken as a welfare facility food cost targets and costs ceilings are invariably imposed from above either in total or on a per unit basis. Vernon Coelho IHM MUMBAI (2009-10)Vernon Coelho IHM MUMBAI (2009-10)

Phase II Operational Control:

We have now outlined the first stage in Food Cost Control. The second stage consists of a sum total of built in checks (inspection of incoming goods for quality and quantity), technological procedures (yield testing) and clerical procedures (writing out requisitions). These should be planned so as to cover the whole cycle of catering operations. We must therefore deal with operational control in relation to a. Buying/Purchasing b. Receiving c. Storing and Issuing d. Preparation e. Sales Each of the above stages constitutes a highly critical stage of Food Cost Control. Any system installed must therefore cover all the five stages.

Cost Control Cycle:

A. Buying – There are 4 main points to be considered at this stage.

Firstly, there is yield testing.

We have already evolved a catering policy, identified the type of customer, decided on the type of the menu and established a set of costs and gross profit targets. The object of yield testing is simply to discover the respective of yields of a whole range of commodities available for any one purpose and so determine the costs concerned. It is only on the basis of yield testing that we can compile the necessary purchase specifications. By the way, understand that there is a difference between yield testing and product testing. In product testing, we are mainly concerned with the physical properties of the food – texture,

composition, keeping quality, flavor etc. In reality, tests are carried out which would combine the two objectives.

Secondly, we have Purchase Specifications,

Which are concise descriptions of an item of food. This helps the caterer to communicate with the supplier. Varieties of tomatoes are available, some suitable for salads and some that may be used for soups and gravies. Similarly, urinals are available for stuffing and others for Bhurta. A set of specifications by themselves will not be of much use. It is necessary to ensure that they are used – not only by the buying office but also by the goods receiving office.

Thirdly, the methods of buying must be considered.

It is clear that no single method of buying is suitable for all types of food. Hence, in relation to each type of commodity, we must decide whether it should be bought open market, via a tender or local purchase/imported.

Finally, we must determine clerical procedures.

It is necessary to decide who originates sanctions and places purchase orders and what sort of documentary evidence is to be used. The use of the computer and material management packages is widespread and will help generate reports, which helps immensely with food cost control procedures.

B. Receiving – There seem to be three main points here.

The first is quality control.

Some person must be made responsible for checking the quality of all incoming goods, and it is obviously important to concentrate efforts in the direction of the perishable commodities. The quality of nonperishables tends to be constant over a period of time.

Secondly, we must assign responsibility for the quantity inspection.

The goods receiving clerk normally perform this task. Blind receiving is now quite a popular receiving technique especially in large-scale operations.

Finally, the clerical procedures must be planned.

How much paper work do we really want? Do we keep a goods received book? What action should be taken in the event of non-delivery or short delivery? These questions need to be answered and the policies framed. Today, the computer helps to eliminate a lot of paper work. But, is the organization financially equipped to install computers? Do they possess the personnel to operate the software??

C. Storing and Issuing – Several important matters must be planned for the third stage of the cycle.

First, there is the problem of stock records. It is necessary to decide whether or not these will be kept at all and also for how long!

Secondly, the matter of pricing of issues must be decided upon.

In other words, we must choose one or more of the following for computing the cost of food consumed: -

Actual purchase price Simple average price Weighted average price
Inflated price Standard price

Thirdly, stocktaking must be considered. Decisions must be made with regard to its frequency, the pricing of stocks, methods with dealing with discrepancies etc. Finally, the necessary clerical procedures must be established and introduced. Who writes the requisitions? How many copies? Who will sanction? These are some of the questions that must be answered.

D.Preparing – This is possibly the most critical stage of the cycle.

The cost of food consumed depends on two factors:

The number of meals produced and the food cost per meal. In order therefore to control food costs we must be able to control the numbers being catered for (we must have some method of volume forecasting) and control the food cost per meal in advance (standard recipes and portion control). Volume forecasting is a method of predicting the sales volume for a future period. In order to be of practical value, the forecast must predict the total number of covers as well as the choice of menu items. The process of volume forecasting consists of two stages: First, we have what we know as the initial forecast. This is done once a week in respect of each day of the following week.

The initial forecast is based on sales histories, data relating to advance bookings as well as current trends. When the initial forecast has been completed, the predicted sales are converted into quantities of raw material. Purchase orders can then be prepared and sent out to the suppliers. The second stage is known as the final forecast. And this usually takes place a day before. The final forecast takes into account the latest developments including weather etc. If required, supplier's orders can be amended. It must be understood that volume forecasting is not a perfect method of prediction. We cannot really tell the future. It does however help to minimize over and under production of food.

E. Selling – At this last stage of the catering cycle,

We are concerned with three main problems. The financial and catering policies will have defined the price policy of the business. In operational food cost control, we are therefore only concerned with the routine pricing of food. Where differential profit margins have been evolved, this is a relatively simple matter. A more important tactical task that has to be faced is to ensure that any increase in the quantity of food prepared is matched by a corresponding increase in cash received from the customer. This will require a restaurant checking system. The final problem is of cash control. We must ensure that all amounts received by the waiting staff are paid to the cashier. He in turn has to deposit each day's takings.

Vernon Coelho IHM MUMBAI (2009-10)

Phase III – Control after the Event the last phase of Cost Control is concerned with ;

Three important matters:

1. Food Cost reporting

2. Assessment of Results

3 Corrective Action where appropriate and necessary

The first point

Is obviously a matter of some importance mainly for reasons of the specific character of catering operations Food is a highly perishable commodity and whether in the form of cooked meals or raw materials, it cannot be stored indefinitely. Moreover, the demand for catering facilities shows unpredictable trends and unexpected changes.

The cycle of production is extremely short, unlike other manufacturing operations such as automobiles for example. All this means that current operations must be reviewed frequently and that there is a need for a short review period. In order to control a food operation effectively, the manager must have daily, weekly and other reports covering longer periods.

The second important aspect of food cost reporting

Is concerned with analysis a catering business, unlike most other businesses performs a dual function: production and selling. Furthermore, many catering establishments are highly departmentalized, especially large hotels and industrial canteens. The assortment of production (large menus) changes from day to day. All these factors mean that from the point of view of control; analytical reports showing separate results for each branch of the catering

operation is necessary. The assessment of results is concerned with an appreciation of how far the actual results of food operations correspond with the actual results. This means that assessment is not possible without a yardstick for measurement. We could assess current results in relation to those of previous food cost review periods or we could assess current actual results in relation to budgeted results. Obviously, the second is the preferred one. This brings us to

The last stage:

Corrective action Surely, any action that is taken following receipt of a food cost report depends on circumstances and reasons of each case. Therefore, it is difficult to lay down specific guidelines for corrective action and it here that the manager's tact and experiences as well as his feel for the job come into play. Questions of praise, reprimand, authority and responsibility are very largely a matter of human relations.

Vernon Coelho IHM MUMBAI (2009-10)

Methodology & Data analysis

Hypotheses to be tested:

To answer this research question, the following hypotheses are tested:

- 1-(There is a statistically significant relationship between the role of training in raising the capacity of kitchen workers and reducing waste during the Pre-preparation and Preparation stages)
- 2-(There is a statistically significant relationship between the role of the work environment in improving the performance of employees, controlling costs and raising the level of quality)
- 3-(There is a statistically significant relationship between the work system in the kitchen department, cost reduction and waste control)
- 4-(There is a statistically significant relationship between the supervisor's role in leading the work team and achieving integration between the work team to control costs)
- 5-(There are statistically significant differences between the study sample members in their vision of the factors that contribute to raising

the level of kitchen workers' abilities according to demographic variables)

Objectives of Cost Control Techniques to be measured:

- 1-The effectiveness of training in raising the level and capabilities of workers in the kitchen department, which helps reduce waste during the Pre-preparation and Preparation stages and to reduce cost and increase the profitability of the hotel establishment.
- 2-The work environment and its role in improving the performance of Team Member in the kitchen department, which is reflected in the level of performance, cost control and raising the level of quality
- 3-The system of work in the kitchen department and the cycle of reducing waste and controlling cost
- 4-The role of the supervisor in leading the team and the integration of the team work as a key factor in cost control

Influences on food waste generation

There are several factors and situation variables that influence the production of food waste in gastronomic kitchens ([Göbel, 2018](#)). The literature has named a few of these variables, of which some relate to the internal management of the kitchen, including professional skills and experience of the staff, and others refer to communication structures between the kitchen administration, suppliers, customers and staff members ([Heikkilä et al., 2016](#)). However, some variables, such as the number of guests, are external and may therefore be more difficult to control. For instance, food waste increases when a high number of guests unexpectedly miss the event ([Gu, 2014](#); [Hennchen, 2019](#)). Menu planning requires not only estimates of the food demand with regard to guest numbers, but also accurate product inventory and a precise organization and arrangement of the ingredients for the food preparation ([Silvennoinen et al., 2015](#)). We can deduce that proposed measures to reduce food waste range from changes that require little effort, such as using smaller serving spoons, to more elaborate approaches, such as regular staff training ([Marthinsen et al., 2012](#)).

There is indeed a certain complexity in identifying and implementing reduction measures due to the variety of influential factors. Recommendations for improvements are therefore often limited to boundary conditions of case specific studies and can rarely be generalized, emphasizing the need for gastronomic kitchens to conduct individual measuring and self-reporting practices.

Cost Control Tools:

1-SPS as a tool in cost control:

By the example of using different raw material source is the production process which the major key player is the SPS can provide the same quality of finish product even raw material source different consider SPS is exact the same which prove the role of SPS in controlling cost by using raw material in acceptable cost limit considering minimum standard of finish product quality.

2-Measuring as a Tool in cost control:

According to literature, a fundamental part of an effective intervention is to measure and monitor food waste. In this manner, adequate actions for prevention can be deduced and the performance of prevention measures can be controlled ([Heikkilä et al., 2016](#); [Silvennoinen et al., 2015](#)). [Eriksson et al. \(2017\)](#) recommend a detailed waste quantification within each kitchen due to the individuality of reasons for food waste, which can result in different opportunities to reduce it. Waste analytics provide a high content of information because it follows the process of weighing the discarded food directly at the source of origin ([Waskow et al., 2016](#)). The data thus collected support further optimization of food management and facilitate the related planning and preparation processes. Food waste tracking systems that support gastronomic kitchens to quantify food waste are offered by enterprises from the United States such as *Leanpath* or Europe such as *Winnow Solutions*, *Kitro*, *eSmiley*, *Matomatic*, and *Visma* ([eSmiley, 2020](#); [KITRO, 2019](#); [Leanpath, 2019](#); [Matomatic, 2020](#); [Visma, 2020](#)).

The basic functions of these tracking tools are similar and differ mainly with regard to associated consulting services such as employee training or individualized development of measures. Further differences refer to optional functions, such as visual photo capture and artificial

intelligence technology for the automatic identification of the food waste items.

3-The Potential of self-reporting as a tool in cost control:

The implementation of measuring devices in kitchen routines requires an additional self-reporting task because the kitchen staff weighs and documents the wasted quantities. Self-reporting processes, in general, are related to awareness raising and cause adaptive reactions that result in behavioral changes ([Zimmerman, 2002](#)). Empirical research in households has already confirmed that substantial reductions of food waste can be achieved within self-reporting processes ([Comber & Thieme, 2013](#); [Leverenz et al., 2019](#); [Thieme et al., 2012](#)). The use of the aforementioned digital scales can also be expected to raise awareness amongst kitchen staff because they provide information directly to the operator, which could trigger individual behavioral changes.

As described thus far, the literature has generated knowledge on food waste to a considerable extent and showed the benefits of self-reporting interventions. Furthermore, case studies have demonstrated that the reduction potential in the hospitality sector is high and confirmed the feasibility of reducing food waste in general. By contrast, the literature has rarely examined in-depth measures and practical interventions over long periods of time. Such approaches would generate more complete information on the effectiveness of measures to provide stakeholders with incentives to reduce food waste ([Goossens et al., 2019](#)). Our study contributes to fill this research gap by presenting insights from food waste quantification within a self-reporting intervention in hotel kitchens. Thus, our approach follows the recommendation of [Stöckli et al. \(2018\)](#) in testing measures to prevent food waste in cooperation with practical and academic contributors.

Results & Discussion

Validity and reliability of the study tool:

First. The stability of the questionnaire: The researcher calculated the stability of the questionnaire by applying it to a survey sample consisting of (10) respondents, and using the alpha-Cronbach's equation, so the stability was equal to (0.88) a degree that confirms that the questionnaire has a high degree of stability.

Secondly. Validity: Self-honesty was calculated as an indicator of the validity of the questionnaire by calculating the square root of the reliability coefficient, and it came equal to (0.93), which indicates that the questionnaire had a high degree of Validity.

Statistical Coefficients Used:

Using the program "Statistical Package for Social Sciences Spss V.25", the following statistical parameters were used:

- Cronbach's alpha coefficient to calculate stability.
- Self-validity to calculate the validity of the study tool.
- Frequencies and percentages.
- Mean.
- Standard deviation.
- Relative weight
- Relative weight
- Ranking.
- Pearson correlation coefficient.
- T. test.
- One way anova.

*** Description of the research sample:**

Table (1) shows the distribution of the study sample according to the variables

Research sample variables		Sample	
		Frequency	%
Hotel type	modern	15	33.3
	classic	15	33.3
	resort	15	33.3
	Total	45	100%
Services	Al Carte Menu	4	8.9
	Set Menu	1	2.2
	Open Buffet	2	4.4
	All catering services above	38	84.5
	Total	45	100%
Position: Team member in the kitchen department specializing in	Initial preparation and preparation stage	2	4.4
	The stage of preparation and final preparation	6	13.3
	Specialist in both phases	37	82.3
	Total	45	100%
The gender of the respondents	Male	40	88.9
	female	5	11.1
	Total	45	100%
Educational qualification of the respondents	Middle Certification	20	44.4
	High qualified	25	55.6
	Total	45	100%
Experience of working in the kitchens of five star hotels	1-3 years	9	20.0
	3-5 years	12	26.7
	5-10 years	13	28.9
	more than 10 years	11	24.4
	Total	45	100%

The level of the total monthly income	less than 5000 EGP	34	75.6
	from 5000 EGP - 7500 EGP	9	20.0
	From 7500 EGP - 10000 EGP	2	4.4
	more than 10,000 EGP	0	—
	Total	45	100%

It is clear from the previous table: that the research sample included all the variables in the light of which the data was collected, where the percentages of representation of the sample members according to the type of hotel came equally between the different types of hotels, with 15 respondents of each type (modern, classic, resort), and also included the distribution of The sample is also different members of the kitchen team. As for the gender variable, 88.9% of the males came, while the percentage of females was 11.1%. The qualifications of the research sample included individuals with higher qualifications, who represented 55.6%, and medium qualifications, whose percentage was 44.4%. The sample included various categories of Where the years of experience in hotels were represented by those with experience from 5-10 years, where their percentage was 28.9% in the first place, while those with years of experience from 1-3 years came in the last arrangement, as for the income variable, the largest percentage came from those who receive an income less than 5000 Egyptian pounds, or 75.6%.

* **Statistical study results:**

Table (2) shows the frequency, Mean, Standard deviation, and Ranking of The role of the previous job experiences of the sample members in controlling cost

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Business Environment	35	9	1	0	0	4.75	.48	1	Very high
Team Work	27	16	1	1	0	4.53	.66	2	Very high
Supervisory	23	18	3	1	0	4.40	.71	3	Very high
Working Rules	17	21	2	5	0	4.11	.93	4	high
Total						4.44	0.69	Very high	

It is evident from the previous table: that the Mean of The role of the previous job experiences of the sample members in controlling cost ranged between (4.75: 4.11), where the Statements (Business Environment) came first, while (Working Rules) came last.

The values mentioned in the previous table reflect the great role of the previous job experiences of the sample members in activating and positively increasing cost control during their current work. The overall average score for this table was about 4.44, which reflects a very high degree of approval and satisfaction.

The results also show that the best elements that contribute to positively activating previous experiences are (Business Environment).

Table (3) shows the frequency, Mean, Standard deviation, and Ranking of The role of the **Business Environment** supporting to in order to perform well to create the team success For the benefit of the organization

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Team Performance	26	18	1	0	0	4.53	.62	1	Very high
Team Harmony	26	16	1	2	0	4.46	.75	2	Very high
Supervisor Vision	26	12	5	1	1	4.35	.93	3	Very high
Working System	24	14	3	4	0	4.28	.94	4	Very high
Total						4.40	0.81		Very high

It is evident from the previous table: that the Mean of The role of the Business Environment supporting to in order to perform well to create the team success For the benefit of the organization ranged between (4.53: 4.28), where the Statements (Team Performance) came first, while (Working System) came last.

The values mentioned in the previous table reflect the great role of Business Environment and its multiple elements in showing the best possible performance of the research personnel and their cooperation as a team, and its reflection on the institution. The overall average score for this table was about 4.40, which reflects a very high degree of approval and satisfaction.

The results also show that the best contributing factor is the work environment (team performance).

Table (4) shows the frequency, Mean, Standard deviation, and Ranking of Respondents' evaluation of the idea of **team work** within their organizations and the extent to which responsibilities and tasks are equitably distributed among team members in order to achieve the institution's success

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Team Work Co-operation to save time	25	16	2	1	1	4.40	.86	1	Very high
Work Load Balancing	24	15	5	1	0	4.37	.77	2	Very high
Supervisory The supervisor understands the needs of the work team and creates a work environment conducive to production and innovation	22	19	2	2	0	4.35	.77	3	Very high
Flexibility of work system and working hours	20	18	4	2	1	4.20	.94	4	high
Total						4.40	0.81		Very high

It is evident from the previous table: that the Mean of The role of Respondents' evaluation of the idea of **team work** within their organizations and the extent to which responsibilities and tasks are equitably distributed among team members in order to achieve the institution's success ranged between (4.40: 4.20), where the Statements (Team Work Co-operation to save time) came first , while (Flexibility of work system and working hours) came last.

The values mentioned in the previous table reflect the positive evaluation and the high degree of satisfaction by the research sample for the idea of team spirit within its institutions, cooperation and equitable distribution of tasks within their institutions. The overall average score for this table was about 4.41, which reflects a very high degree of approval and satisfaction.

Table (5) shows the frequency, Mean, Standard deviation, and Ranking of The respondents' evaluation of the **training** courses and their role in achieving the hotel's vision Cost Control Techniques

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Training Material and Agenda	23	19	3	0	0	4.44	.62	1	Very high
New Knowledge	24	12	5	1	3	4.17	1.15	2	high
Training Appraisal	16	20	8	1	0	4.13	.78	3	Very high
Training Recovery	10	24	9	1	1	3.91	.84	4	Very high
Total						4.16	0.84	Very high	

It is evident from the previous table: that the Mean of The respondents' evaluation of the **training** courses and their role in achieving the hotel's vision Cost Control Techniques ranged between (4.44: 3.91), where the Statements (**Training Material and Agenda**) came first, while (Flexibility of work system and working hours) came last.

The values mentioned in the previous table reflect the positive evaluation and the high degree of satisfaction by the research sample about the training courses they receive in the hotel and the extent of their contribution to achieving the hotel's vision optimally. The overall average score for this table was about 4.16, which reflects a high degree of approval and satisfaction.

Table (6) shows the frequency, Mean, Standard deviation, and Ranking of awareness and knowledge of the study sample of each of the **Food Cycle, HACCP, and Hygiene system** and implement them during Pre-preparation and Preparation stages

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Food Cycle	30	13	1	1	0	4.60	.65	1	Very high
HACCP	28	14	3	0	0	4.55	.62	2	Very high
Hygiene system	31	6	8	0	0	4.51	.78	3	Very high
Guide Line –Work Book	22	17	5	1	0	4.33	.76	4	Very high
Total						4.49	0.70	Very high	

It is evident from the previous table: that the Mean of awareness and knowledge of the study sample of each of the **Food Cycle, HACCP, and Hygiene system** and implement them during Pre-preparation and Preparation stages ranged between (4.60: 4.33), where the Statements (Food Cycle) came first, while (Guide Line –Work Book) came last.

The values contained in the previous table reflect the positive evaluation and the degree of awareness and great knowledge by the research sample of the various operating elements such as the food cycle and the HACCP system, where the total average score for this table was about 4.49, which reflects a very high degree of awareness.

Table (7) shows the frequency, Mean, Standard deviation, and Ranking of The respondents' evaluation of the extent of **Controlling food cost** during Pre-preparation stage, and Controlling raw material cost during Pre-preparation stage in order to Control Food Cost

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Correct cuts ,weights and Portions	28	14	2	1	0	4.53	.69	1	Very high
Storing Process Quality	25	19	0	0	1	4.48	.72	2	Very high
Efficient handling of high-cost raw materials	28	12	4	1		4.48	.75	3	Very high
Raw Materials Quality	24	16	5	0	0	4.42	.69	4	Very high
Follow FIFO System	25	15	4	1		4.42	.75	5	Very high
The skill of using the raw materials left after Pre-preparation stage.	28	12	2	2	1	4.42	.94	6	Very high
Ensure that the menu items are available as much as possible. Menu availability	26	14	3	1	1	4.40	.88	7	Very high
Raw materials availability according to operation requirements	24	15	3	3	0	4.33	.87	8	Very high
Total						4.43	0.78		Very high

It is evident from the previous table: that the Mean of The respondents' evaluation of the extent of controlling **food cost** during Pre-preparation stage, and Controlling raw material cost during Pre-preparation stage in order to Control Food Cost ranged between (4.53: 4.33), where the Statements (Correct cuts ,weights and Portions) came first,

while (Raw materials availability according to operation requirements) came last.

The values contained in the previous table reflect the degree of great follow-up by the study sample to the cost of food during the processing stage, as well as the great control over the cost of raw materials during the processing stage in order to control the cost of food, as the total degree of the total average of this table was about 4.43, which reflects the degree of control Very high.

Table (8) shows the frequency, Mean, Standard deviation, and Ranking of The respondents' evaluation of the extent of Controlling food quality during Preparation stage, and Controlling waste during Preparation stage in order to Control Food Quality

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Making sure material was stored as per FIFO System	30	13	2	0	0	4.62	.57	1	Very high
Use the Perfect temperatures and cooking methods	30	12	3	0	0	4.60	.61	2	Very high
Follow the exact weights of food portions.	22	18	5	0	0	4.37	.68	3	Very high
The skill of Cooking Technology and Methods of international kitchens	26	13	3	3	0	4.37	.88	4	Very high
Meals Presentation Quality	24	17	2	1	1	4.37	.86	5	Very high
Accuracy of implementing Meals Recipes	23	17	3	0	2	4.31	.94	6	Very high
Total						4.44	0.75		Very high

It is evident from the previous table: that the Mean of The respondents' evaluation of the extent of Controlling food quality during Preparation stage, and Controlling waste during Preparation stage in order to Control Food Quality ranged between (4.62: 4.31), where the Statements (Making sure material was

stored as per FIFO System) came first, while (Accuracy of implementing Meals Recipes) came last.

The values presented in the previous table reflect the degree of great control by the study sample of food quality during the preparation stage, as well as the great control of waste during the preparation stage in order to control food quality.

The overall average score for this table was about 4.44, which reflects a very high degree of monitoring and control.

Table (9) shows the frequency, Mean, Standard deviation, and Ranking of awareness and knowledge of the study sample of The cost control system and how it is implemented during the preparation stage (initial preparation) and preparation (final preparation)

items	Total sample								
	Frequency					Mean	S.D	Ranking	degree of satisfaction
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree				
Follow the daily Food Waste Report FWR of the losses of each item.	24	16	5	0	0	4.42	.69	1	Very high
Co-operating with the cost controller to reach the minimum possible costs	24	15	5	1		4.37	.77	2	Very high
follow the highest standards of work quality considering the costs limits set by the Financial Management /Cost Control	21	19	5	0	0	4.35	.67	3	Very high
Flexible Co-operation between Kitchen department and the financial department VIA the cost controller to reach the highest possible profitability	26	13	3	2	1	4.35	.95	3	Very high
Total						4.37	0.77		Very high

It is evident from the previous table: that the Mean of awareness and knowledge of the study sample of The cost control system and how it is

implemented during the preparation stage (initial preparation) and preparation (final preparation) ranged between (4.42: 4.35), where the Statements (Follow the daily Food Waste Report FWR of the losses of each item) came first, while (follow the highest standards of work quality considering the costs limits set by the Financial Management /Cost Control , Flexible Co-operation between Kitchen department and the financial department VIA the cost controller to reach the highest possible profitability) came last.

The values contained in the previous table reflect the high degree of awareness by the research sample of the cost control system and how it is implemented during the preparation (initial preparation) and preparation (final preparation) stage, where the total degree of the total average of this table was about 4.37, which reflects a very high degree of awareness and knowledge.

Table (10) shows the frequency, Relative weight, Percentage, and Ranking of The study sample's vision of the most effective technologies in controlling food cost during Pre-preparation and Preparation stages

Techniques	Total sample						
	Frequency				Relative weight	Percentage	Ranking
	1	2	3	4			
Training Courses (New Techniques in Cost Control)	17	9	5	14	119	66.1	1
Team Work and Supervisory (Business Environment)	10	15	13	7	118	65.6	2
Work Book and Guide Line (Work System & Standard and Establishment Development Vision)	7	15	16	7	112	62.2	3
Staff Experience (Professional Personal Skills)	11	5	11	18	99	55	4

It is evident from the previous table: that The most effective techniques in controlling the cost of food during the processing and preparation stages from the point of view of the study sample were: (Training Courses (New Techniques in Cost Control), Where did you get the highest ranking, then the (Team Work and Supervisory (Business Environment) in the second rank.

Test the hypotheses of the study:

- **Verification of the first hypothesis:** There is a statistically significant relationship between the role of training in

raising the capacity of kitchen workers and reducing waste during the preparation and processing stages.

Table (11) shows the correlation coefficients between the role of training in raising the capacity of kitchen workers and reducing waste during the preparation and processing stages

Variables	reducing waste during the preparation and processing stages		
	Correlation value	Sig	Type of Sig
the role of training in raising the capacity of kitchen workers	0.68**	0.01	statistically significant

(**) significant at level of 0.01.

It is clear from the results of the previous table:

•There is a statistically significant direct correlation between the role of training in raising the capacity of kitchen workers and reducing waste during the preparation and processing stages, which means that the training contributed to raising the level of kitchen workers' capabilities and this was reflected in reducing waste during the preparation and processing stages.

- Verification of the second hypothesis: There is a statistically significant relationship between the role of the work environment in improving the performance of employees, controlling costs and raising the level of food quality.

Table (12) shows the correlation coefficients between the role of the work environment in improving the performance of employees, controlling costs and raising the level of food quality

Variables	raising the level of food quality		
	Correlation value	Sig	Type of Sig
work environment	0.72**	0.01	statistically significant

(**) significant at level of 0.01.

It is clear from the results of the previous table:

•There is a statistically significant direct correlation between the role of the work environment in improving the performance of

employees, controlling costs and raising the level of food quality, Which means that the appropriate work environment contributed to increasing cost control and raising the level of food quality.

- **Verification of the third hypothesis:** There is a statistically significant relationship between the work system in the kitchen department, cost reduction and waste control.

Table (13) shows the correlation coefficients between the role of the work system in the kitchen department, cost reduction and waste control

Variables	cost reduction and waste control		
	Correlation value	Sig	Type of Sig
work system in the kitchen department	0.66**	0.01	statistically significant

(**) significant at level of 0.01.

It is clear from the results of the previous table:

•There is a statistically significant direct correlation between the work system in the kitchen department, cost reduction and waste control, Which means that the teamwork system, equality and justice within the kitchen department contributed to reducing costs and controlling waste.

- **Verification of the Fourth hypothesis:** There is a statistically significant relationship between the role of the supervisor in leading the work team and achieving integration between the work team to control cost.

Table (14) shows the correlation coefficients between the role of the supervisor in leading the work team and achieving integration between the work team to control cost

Variables	achieving integration between the work team to control cost		
	Correlation value	Sig	Type of Sig
role of the supervisor in leading the work team	0.84**	0.01	statistically significant

(**) significant at level of 0.01.

It is clear from the results of the previous table:

• There is a statistically significant direct correlation between the role of the supervisor in leading the work team and achieving integration between the work team to control cost, Which means that the more the supervisor has a prominent role in leading the work team in a positive and team spirit, the more this contributes to increasing cost control.

- **Verification of the Fifth hypothesis:** There are statistically significant differences between The study sample members in their vision of the factors that contribute to raising the level of capabilities of kitchen workers to reduce costs according to demographic variables (Educational qualification of the respondents, Experience of working in the kitchens of five star hotels).

a) Differences by qualification:

Table (15) shows the significance of the differences between The study sample members in their vision of the factors that contribute to raising the level of capabilities of kitchen workers to reduce costs according to demographic variables (Educational qualification of the respondents, Experience of working in the kitchens of five star hotels)

(N = 45)

Variables	Middle Certification = 20		High qualified= 25		Value) (T	Type of significance
	mean	Std. Deviation	mean	Std. Deviation		
Training (training courses(17.30	1.92	16.16	3.36	1.34	Not statistically significant
Work environment (team spirit(18.30	1.94	17.12	2.99	1.52	Not statistically significant
working system	17.80	2.16	16.96	3.16	1.01	Not statistically significant
Previous experience	18.00	1.62	17.64	2.37	0.577	Not statistically significant

It is clear from the results of the previous table:

- **No statistically significant** differences between The study sample members in their vision of the factors that contribute to raising the level

of capabilities of kitchen workers to reduce costs according to demographic variables (Educational qualification of the respondents).

b) Differences according to experience:

Table (16) shows the one-way analysis of variance between The study sample members in their vision of the factors that contribute to raising the level of capabilities of kitchen workers to reduce costs according to demographic variables (Experience of working in the kitchens of five star hotels)

Variables		Sum of Squares	df	Mean Square	F	Sig.	Type of significance
Training (training courses)	Between Groups	13.243	3	4.414	.528	.666	Not statistically significant
	Within Groups	342.757	41	8.360			
	Total	356.000	44				
Work environment (team spirit)	Between Groups	19.638	3	6.546	.949	.426	Not statistically significant
	Within Groups	282.673	41	6.894			
	Total	302.311	44				
working system	Between Groups	38.965	3	12.988	1.781	.166	Not statistically significant
	Within Groups	299.035	41	7.294			
	Total	338.000	44				
Previous experience	Between Groups	7.231	3	2.410	.549	.652	Not statistically significant
	Within Groups	179.969	41	4.389			
	Total	187.200	44				

No statistically significant differences between The study sample members in their vision of the factors that contribute to raising the level of capabilities of kitchen workers to reduce costs according to demographic variables (Experience of working in the kitchens of five star hotels)..

Summery & Recommendations

The findings of our paper have some limitations, which we briefly discuss in this section.

As part of our empirical investigation, we analyzed the effect of **staff professional skills (SPS)** which resulted in a restriction of the observational framework. Thus, we were unable to provide a comprehensive overview of the overall savings potential of food waste in these hotels, which could theoretically have been achieved in reducing food waste during Pre-preparation and preparation in the kitchen. In our study, the kitchen staff performed the measurements and operated the food waste control. The quality of the collected data during the self-reporting approach might therefore be influenced by errors during the practical conduction of the measurement. Based on [Berthelot et al. \(2011\)](#),

Our experimental conditions may have influenced the reported data even before the measurements started because the participants were aware of their involvement in this study. Another possibility is that the pilot kitchens may have consciously reported less waste than was actually produced to improve their self-reporting performance. With this experimental setup, we could not calculate a systematic error in the results. However, this is not in conflict with the main findings of our study because regardless of whether the participants were underreporting or not, they consistently showed the same positive pattern regarding the reduction of Food waste during Pre-preparation and Preparation stages.

Further Research:

The results of our cases study have shown that (SPS can be very effective to improve operational kitchen routines and control food waste during Pre-preparation and Preparation stages.

In further investigations, it might also be possible to investigate the effectiveness of different prevention strategies and reduction measures. For instance, information on the monetary efficiency of reduction measures could provide important incentives for businesses in the food service sector to develop prevention strategies. However, the possibility of being able to reduce food waste through the tool of SPS as an incentive for further research to build up on the positive findings of our case study and to investigate its potential for different types of FCCT.

Final Considerations:

The European Union is committed to fulfill Sustainable Development Goal 12.3 of the United Nations, which aims to halve food waste at the consumer level by 2030 ([European Commission, 2018](#)). Our study provides information on the feasibility of achieving food waste reductions in the hospitality sector by focusing particularly on food waste during Pre-preparation and Preparation stages.

On average, the waste during Pre-preparation and Preparation stages were more than halved of material cost and would thus even exceed the political reduction targets. However, it is still necessary to identify to what extent these promising results can be scaled up to other meals throughout the day and to a larger number of businesses in the food service sector. We encourage policy makers at

regional and national levels to promote the practical implementation of these types of measures. Such initiatives can provide a substantial contribution to achieving parts of the target set by the United Nations.

Conclusion:

Food waste control techniques demonstrated a clear improvement in the food management of the pilot kitchens. The waste during Pre-preparation and Preparation stages decreased at the beginning of the investigation and stabilized at a constantly low level after improving **SPS**

The findings of our study demonstrated that **SPS** can reduce food waste in the hotel by more than half. The achieved reductions were related to prevention strategies that each pilot kitchen individually developed according to their self-reported data.

Simple operational changes such as the use of smaller serving dishes and refilling the buffet with less quantities of food that was prepared just-in-time seemed to be very effective improvements. The practical viability of reducing buffet leftovers serves as an incentive for further research to improve the methodological approach of our study and validate the concept by, for example, testing **SPS** also contribute to reducing food waste for other types of food services in hospitality industry.

References :

[Beretta and Hellweg, 2019](#)

C. Beretta, S. Hellweg

Potential environmental benefits from food waste prevention in the food service sector

Resources, Conservation and Recycling, 147 (2019), pp. 169-178, [10.1016/j.resconrec.2019.03.023](https://doi.org/10.1016/j.resconrec.2019.03.023)

Berthelot, et –al.(2011).

The Hawthorne effect: Stronger than the placebo effect? *Joint, Bone, Spine*, 78(4), 335–336. <https://doi.org/10.1016/j.jbspin.2011.06.001>.

[Comber and Thieme, 2013](#)

R. Comber, A. Thieme

Designing beyond habit: Opening space for improved recycling and food waste behaviors through processes of persuasion, social influence and aversive affect

Personal and Ubiquitous Computing, 17 (6) (2013), pp. 1197-1210, [10.1007/s00779-012-0587-1](https://doi.org/10.1007/s00779-012-0587-1)

[Engström and Carlsson-Kanyama, 2004](#)

R. Engström, A. Carlsson-Kanyama

Food losses in food service institutions. Examples from Sweden

Food Policy, 29 (3) (2004), pp. 203-213, [10.1016/j.foodpol.2004.03.004](https://doi.org/10.1016/j.foodpol.2004.03.004)

[Eriksson et al., 2017](#)

M. Eriksson, C. Persson-

Oowski, C. Malefors, J. Björkman, E. Eriksson

Quantification of food waste in public catering services - a case study from a Swedish municipality

Waste Management, 61 (2017), pp. 415-422, [10.1016/j.wasman.2017.01.035](https://doi.org/10.1016/j.wasman.2017.01.035)

eSmiley, 2020

eSmiley

Less food waste—More food on the table

Available online at

<https://www.esmiley.dk/> (2020), Accessed 15th May 2021**European Commission. (2018).**

Directive (EU) 2018/851 of the European Parliament and of the council of 30 may 2018 amending directive 2008/98/EC on waste (text with EEA relevance). Available online at <http://data.europa.eu/eli/dir/2018/851/oj>. (Accessed 15 December 2021).

Göbel, 2018

C. Göbel

Zum Umgang mit Lebensmittelabfällen in Care- und Einrichtungen. Situationsanalyse und organisationstheoretische Gestaltungsempfehlungen. Doctoral thesis 2018. oekom verlag (Hochschulschriften zur Nachhaltigkeit), Munich

(2018)

(ISBN 978-3-96238-064-9)

Goossens et al., 2019

Y. Goossens, A. Wegner, T. Schmidt

Sustainability assessment of food waste prevention measures: Review of existing evaluation practices

Frontiers in Sustainable Food Systems, 3 (90) (2019), p. 33, [10.3389/fsufs.2019.00090](https://doi.org/10.3389/fsufs.2019.00090)

Gu, 2014

Z. Gu

Management science applications in tourism and hospitalityTaylor and Francis, Hoboken (2014), [10.4324/9781315782478](https://doi.org/10.4324/9781315782478)Heikkilä et al., 2016

L. Heikkilä, A. Reinikainen, J.-
M. Katajauuri, K. Silvennoinen, H. Hartikainen

Elements affecting food waste in the food service sector
Waste Management, 56 (2016), pp. 446-
453, [10.1016/j.wasman.2016.06.019](https://doi.org/10.1016/j.wasman.2016.06.019)

[Hennchen, 2019](#)

B. Hennchen

Knowing the kitchen: Applying practice theory to issues of food waste in the food service sector
Journal of Cleaner Production, 225 (2019), pp. 675-
683, [10.1016/j.jclepro.2019.03.293](https://doi.org/10.1016/j.jclepro.2019.03.293)

[KITRO, 2019](#)

KITRO

Simplified food waste management

Available online at

<https://www.kitro.ch/> (2019), Accessed 19 th July 2022

[Leanpath, 2019](#)

Leanpath

See why so many foodservice and hospitality leaders use Leanpath

Available online at

<https://www.leanpath.com/industries/?hsCtaTracking=1f07d2b4-49a0-44df-84db-ee7c2cbd002c%7C9c2e41d2-3a9e-4a58-bbe5-2fe0cbb3df1e> (2019), Accessed 25th Jun 2021

[Leverenz et al., 2019](#)

D. Leverenz, S. Moussawel, C. Maurer, G. Hafner, F. Schneider,
, T. Schmidt, M. Kranert

Quantifying the prevention potential of avoidable food waste in households using a self-reporting approach

Resources, Conservation and Recycling, 150 (2019),
p. 104417, [10.1016/j.resconrec.2019.104417](https://doi.org/10.1016/j.resconrec.2019.104417)

[Marthinsen et al., 2012](#)

J. Marthinsen, P. Sundt, O. Kaysen, K. Kirkevaag

Prevention of food waste in restaurants, hotels, canteens and catering

Nordic Council of Ministers (2012)

Available online at

<http://www.diva-portal.org/smash/get/diva2:701203/FULLTEXT01.pdf>

(accessed 12 May 2022)

[Matomatic, 2020](#)

Matomatic

Reducing food waste with the latest technologies in food tech

Available online at

<https://base10.com/members/matomatic/> (2020), Accessed 14th Feb 2021

[Møller et al., 2014](#)

H. Møller, O.J. Hanssen, E. Svanes, H. Hartikainen, K. Silvennoinen, J. Gustavsson, ..., Å. Stenmarck

Standard approach on quantitative techniques to be used to estimate food waste levels: Ostfold Research Report 21.14

108 pp. Available online at

<https://www.eu-fusions.org/index.php/download?download=2:standard-approach-on-quantitative-techniques> (2014), Accessed 16th Feb 2021

[Okumus, 2019](#)

B. Okumus

How do hotels manage food waste? Evidence from hotels in Orlando, Florida

Journal of Hospitality Marketing and
Management, 20 (1) (2019), pp. 1-
19, [10.1080/19368623.2019.1618775](https://doi.org/10.1080/19368623.2019.1618775)

[Papargyropoulou et al., 2016](#)

E. Papargyropoulou, N. Wright, R. Lozano, J. Steinberger, R. P
adfield, Z. Ujang

**Conceptual framework for the study of food waste
generation and prevention in the hospitality sector**
Waste Management, 49 (2016), pp. 326-
336, [10.1016/j.wasman.2016.01.017](https://doi.org/10.1016/j.wasman.2016.01.017)

[Scherhauser et al., 2018](#)

S. Scherhauser, G. Moates, H. Hartikainen, K. Waldron, G. Obe
rsteiner

Environmental impacts of food waste in Europe
Waste Management, 77 (2018), pp. 98-
113, [10.1016/j.wasman.2018.04.038](https://doi.org/10.1016/j.wasman.2018.04.038)

[Schmidt et al., 2019](#)

T. Schmidt, F. Schneider, D. Leverenz, G. Hafner

**Lebensmittelabfälle in Deutschland—Baseline 2015. Thünen
Report 71**
(2019), [10.3220/REP1563519883000](https://doi.org/10.3220/REP1563519883000)
[https://www.bmel.de/SharedDocs/Downloads/DE/Ernaehrung/
Lebensmittelverschwendung/TI-
Studie2019_Lebensmittelabfaelle_Deutschland-
Kurzfassung.pdf?__blob=publicationFile&v=3](https://www.bmel.de/SharedDocs/Downloads/DE/Ernaehrung/Lebensmittelverschwendung/TI-Studie2019_Lebensmittelabfaelle_Deutschland-Kurzfassung.pdf?__blob=publicationFile&v=3)
(accessed 10 th Jun 2022)

[Silvennoinen et al., 2015](#)

K. Silvennoinen, L. Heikkilä, J.-M. Katajajuuri, A. Reinikainen

**Food waste volume and origin: Case studies in the Finnish
food service sector**

Waste Management, 46 (2015), pp. 140-145, [10.1016/j.wasman.2015.09.010](https://doi.org/10.1016/j.wasman.2015.09.010)

[Stenmarck et al., 2016](#)

Å. Stenmarck, C. Jensen, T. Quedsted, G. Moates

Estimates of European food waste levels. Stockholm

Available online at

<https://www.eurofusion.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf> (2016)

[Stöckli et al., 2018](#)

S. Stöckli, E. Niklaus, M. Dorn

Call for testing interventions to prevent consumer food waste

Resources, Conservation and Recycling, 136 (2018), pp. 445-462, [10.1016/j.resconrec.2018.03.029](https://doi.org/10.1016/j.resconrec.2018.03.029)

[Thieme et al., 2012](#)

A. Thieme, R. Comber, J. Miebach, J. Weeden, N. Kraemer, S. Lawson, P. Olivier

“We’ve bin watching you”—designing for reflection and social persuasion to promote sustainable lifestyles

J.A. Konstan, H. Ed, K.H. Chi (Eds.), Proceedings of the 2012 ACM Annual Conference on Human Factors in Computing Systems—CHI '12. the 2012 ACM Annual Conference. Austin, Texas, USA, ACM Press, New York (2012), pp. 2337-2346, [10.1145/2207676.2208394](https://doi.org/10.1145/2207676.2208394)
05.05.2012–10.05.2012

[United Nations, 2015](#)

United Nations

Transforming our world: The 2030 agenda for sustainable development: A/RES/70/1. New York

Available online at

http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (2015), Accessed 15th July 2022 .

Vernon Coelho (2009-10)

IHM MUMBAI

https://kipdf.com/chapter-29-food-cost-control_5ae9ae687f8b9a77798b45a1.html
(Accessed 15 th July 2022)

[Visma, 2020](#)

Visma

Business code of conduct

Available online at

https://www.visma.com/contentassets/e5a367b781444307bf1bfd02ad57c6c1/visma_code-of-conduct_.pdf (2020), (Accessed 13th May 2021)

[von Borstel et al., 2017](#)

T. von Borstel, G.K. Prenzel, F. Waskow

Ein Drittel landet in der Tonne. Zwischenbilanz 2017
Fakten und Messergebnisse zum deutschlandweiten
Lebensmittelabfall in der Außer-Haus-Verpflegung (2017)

Available online at

<https://www.united-against-waste.de/downloads/united-against-waste-zwischenbilanz-2017.pdf>
(accessed 29 th November 2021)

[Waskow et al., 2016](#)

F. Waskow, A. Blumenthal, S. Wieschollek, G. Polit

Fallstudie: Vermeidung von Lebensmittelabfällen in der
Verpflegung von Ganztagschulen. Working Paper I: Erhebung,
Relevanz und Ursachen von Lebensmittelabfällen in der
Mittagsverpflegung von Ganztagschulen. Bundesministerium
für Bildung und Forschung; FONA; DLR, Düsseldorf

Available online at

https://www.researchgate.net/profile/Frank_Waskow/publication/311571930_Erhebung_Relevanz_und_Ursachen_von_Lebens

[mittelabfallen in der Mittagsverpflegung von Ganztagschule n/links/584db02708aed95c2503238f/Erhebung-Relevanz-und-Ursachen-von-Lebensmittelabf](https://n.links/584db02708aed95c2503238f/Erhebung-Relevanz-und-Ursachen-von-Lebensmittelabf) (2016), (accessed 25 th November 2021)

WRAP, 2013

WRAP , Where food waste arises within the UK hospitality and food service sector: Spoilage, preparation and plate waste: Final report. Project code: HFS002-004

17 pp. Available online at

<http://www.wrap.org.uk/sites/files/wrap/HaFS%20sector%20spoilage%20preparation%20and%20plate%20waste%20FINAL.pdf> (2013), Accessed 11th July 2022 .

Zimmerman, 2002

B.J. Zimmerman

Becoming a self-regulated learner: An overview

Theory Into Practice, 41 (2) (2002), pp. 64-70, [10.1207/s15430421tip4102_2](https://doi.org/10.1207/s15430421tip4102_2)