IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

# EMPIRICAL ANALYSIS OF FOOD WASTE MANAGEMENT APPROACHES IN PUNJAB

**Sanjay Singh, Kirti Kashyap**
Department of Hospitality Management, CT University, Ludhiana (Punjab) India

**Abstract:** This paper discusses research on the food waste management approaches taken into consideration for implementation in the hotel industry. While reviewing this study, this paper discussed different aspects and areas of the study along with their respective importance. Concerning different research methodologies, this study has evaluated the effectiveness of the one that has been followed in the research. Overall, this study has found that the respective research discussed in this study has been properly presented along with its findings. Proper analysis has been done which further helped to address the research objectives.

**Keywords:** Food and Agriculture Organisation (FAO), GOP, Food Waste Management, Global food industry, demographic differences, age, education, sex, income, statistical analysis, statistical significance, SPSS, UNSDG, Frequency analysis, descriptive analysis, correlation, hypothesis test, ANOVA, coefficient.

## 1. Introduction

The introduction of this study represented the overview of this research with a proper evaluation of the research aim, objectives and rationale. Introduction chapter of the research can provide a clear understanding of the direction that the specific research has taken into consideration (Turabian, 2018). With respect to this, this study can be evaluated to have properly addressed the significance of this study alongside other research aspects. Food waste and associated management approaches have been identified to be a crucial area in India to look after. Improper food waste management can result in a negative impact on the environment, sustainability and global food security (Cakar *et al.* 2020). This study has well addressed the food waste management context in India and while doing so, this has further included comments from the Food and Agriculture Organisation (FAO). The inclusion of these comments has presented a proper rationale behind this research which in turn helped to derive the research aim and objectives. The aim of this research as well as the objectives have addressed approaches to increase the GOP of hotels in Punjab. The research objectives can be evaluated to be specific and contribute to the outcome of this research. The identified research objectives of this study include,

"To evaluate and assess the existing management practices for food waste in Punjab hotels"

"To evaluate and identify adoption and usefulness of management practices addressing food waste"

Considering the research aim, objectives and rationale of this research, this research can be identified to be significant to the hotel industry in Punjab.

## 2. Literature Review

The literature review chapter of this research has gathered and analysed several aspects related to the research topic. While doing so, this research has further included analysis of standardised data irrelevant to demographic and other differences. With the increase in global environmental issues, food waste has become one of the crucial ones to address (Aktas *et al.* 2018). This research has properly introduced statistics and concepts related to approaches that have been taken into consideration across the whole world to manage food waste. Discussion in this context depicted that there are differences in food waste amounts among countries based on income levels. Another difference between different sources of food waste has been identified in this discussion.

Along with the increase in carbon footprint, organisations are trying to adopt sustainable approaches. Organisations in the global food industry can be identified as having taken food waste management approaches to sustain their respective environmental impacts (Filimonau and Delysia, 2019). This research has shown an in-depth review of different approaches that have been implemented in the global food industry. While doing so, approaches like smart inventory, menu planning and portion control have been discussed in detail. This research in this context has further addressed the UNSDG (United Nations Sustainable Development Goal) goal 12.3 which is focused on reducing food waste (United Nations, 2023). The inclusion of this SDG has helped this research to increase its value to organisational goals in the global food industry context. This research has further covered impacts on operational practices due to the adoption of management practices to manage food waste. This study has properly presented the effect of proper food waste management approaches and their ability to provide growth and profitability opportunities to organisations.

Hote5ls all over the world have been assessed in this chapter which provided an in-depth understanding of the impact of food waste management approaches. This chapter has further identified sustainability gains, financial savings, improved reputation and increase in operational efficiency in the global hotel industry as a result of the implementation of food waste management approaches. Food waste management should be applicable to non-edible foods only (Trabold and Nair, 2018). Based on this concept, this research can be evaluated to have failed to differentiate between edible and non-edible food waste management approaches. This research has also described the associated theories properly which provided a clear understanding of the influence and importance of food waste management approaches.

## 3. Methods

This study in its methods chapter has presented approaches and strategies that have been considered and implied to get the best possible results. This research has been identified to focus on the collection of primary data and analysis of this gathered data in a quantitative manner. Quantitative research methodology helps to identify, gather and assess quantifiable metrics related to research (Goertzen, 2017). With respect to this, this study has implemented the positivism research philosophy. Positivism research philosophy addresses and engages in specific research settings

where identified variables can be manipulated and controlled (Tamminen and Poucher, 2020). This research philosophy with its objective approach has helped this research to identify and assess measurable and monitorable aspects. This has further supported the quantitative research strategy which has been used in this research. From the effects of this research strategy and research philosophy, it can be derived that this study has been successful in taking proper data collection and analysis methods to reach the research outcome. The SPSS as a data analysis tool has been used in this research which further helped in including a range of statistical analysis techniques (McCormick and Salcedo, 2017). With respect to this, this study has further addressed data cleaning, preprocessing and data integration checking. Gathered data in research needs to be assessed first prior to analysis in order to achieve a proper outcome (Minnaar, 2018). Concerning this concept, this study can be evaluated to have properly assessed gathered data which helped to further increase the accuracy of results. This research in this chapter has also included ethical considerations and limitations of this research, and both of these aspects have been beneficial to conclude the findings of this research.

## 4. Findings and Analysis

This research has gathered data from a questionnaire where a total of 609 respondents have been included. While analysing the gathered data, this study addressed frequency analysis, descriptive analysis, correlation, hypothesis test, ANOVA and coefficient.

- **Frequency Analysis**

Frequency analysis in this research has helped to evaluate and identify the frequencies among different attributes.

Table 1 Frequency Analysis based on Gender Factor

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Male | 371 | 60.9 | 60.9 |
| Female | 226 | 37.1 | 98.0 |
| Others | 12 | 2.0 | 100.0 |
| Total | 609 | 100.0 | |

Table 2 Frequency Analysis based on Age Factor

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Under 30 years | 144 | 23.6 | 23.6 |
| 30 to 45 years | 344 | 56.5 | 80.1 |
| 45 to 60 years | 114 | 18.7 | 98.9 |
| More than 60 | 7 | 1.1 | 100.0 |
| Total | 609 | 100.0 | |

Table 3 Frequency Analysis based on Education Factor

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Below Matriculation | 304 | 49.9 | 49.9 |
| Graduate | 77 | 12.6 | 62.6 |
| Post Graduate | 149 | 24.5 | 87.0 |
| Above Post Graduate | 79 | 13.0 | 100.0 |

| | | | |
|---|---|---|---|
| Total | 609 | 100.0 | |

Table 4 Frequency Analysis based on Occupation Factor

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Manager | 95 | 15.6 | 15.6 |
| Executive Chef | 123 | 20.2 | 35.8 |
| Kitchen Employee | 201 | 33.0 | 68.8 |
| Serving Employee | 190 | 31.2 | 100.0 |
| Total | 609 | 100.0 | |

Table 5 Frequency Analysis based on Annual Income

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| > 02 lac | 195 | 32.0 | 32.0 |
| 02 lac – 05 lac | 188 | 30.9 | 62.9 |

| | | | |
|---|---|---|---|
| 05 lac to 10 lac | 129 | 21.2 | 84.1 |
| <10 lac | 97 | 15.9 | 100.0 |
| Total | 609 | 100.0 | |

Table 6 Frequency Analysis based on Visit in hotel Factor

| | | Frequency | Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | every day | 76 | 12.5 | 12.5 |
| | Once a week | 83 | 13.6 | 26.1 |
| | Once a 15 days | 125 | 20.5 | 46.6 |
| | Once a month | 325 | 53.4 | 100.0 |
| | Total | 609 | 100.0 | |

Frequency Analysis can help to identify the demographic attributes and associated differences among respondents (Stehlik-Barry and Babinec, 2017). This study has identified the majority of respondents being male and belonging to the age group of 30-45 years. In terms of educational backgrounds, this research has identified major respondents having post-secondary education with most of the respondents working in the kitchen. This analysis further

represented most participants having $25, 000 as annual income with the frequency of visiting hotels highest in months.

- Descriptive Analysis

Descriptive analysis in any research helps to address different dependent and independent variables (George and Mallery, 2021). For this research, it has helped to address customer opinions regarding food waste in hotels. This research by addressing this aspect, has further represented the most common reason behind food waste being leftover food by customers. This study has further depicted taking extra food to be having the least possible chance of being a reason behind food waste. Some other opinions by customers and individuals working in the kitchen have been included and discussed in this research which provided overall findings related to the major issues of food waste.

Table 7 Descriptive Statistics

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| **Perception regarding Food wastages during Operation by Guest** | | | | | | | | | |
| Mostly People left the food in their plates | 609 | 1 | 4 | 1.00 | .122 | 24.678 | .099 | 609.000 | .198 |
| Sometimes people through the food in dustbins | 609 | 1 | 4 | 2.65 | .985 | -.217 | .099 | -.962 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| People take extra food in plates | 609 | 1 | 5 | 3.58 | 1.441 | -.611 | .099 | -1.047 | .198 |
| People through the food because less tasty | 609 | 1 | 5 | 2.99 | 1.618 | -.098 | .099 | -1.648 | .198 |
| People don't know their capacity | 609 | 1 | 5 | 1.01 | .162 | 24.678 | .099 | 609.000 | .198 |
| People take extra in plates to showoff | 609 | 1 | 5 | 2.72 | 1.428 | .240 | .099 | -1.413 | .198 |
| Food waste is a result of our societal values and attitudes towards food | 609 | 1 | 5 | 2.25 | 1.349 | .670 | .099 | -1.014 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Customers must be charged based on the amount of food they leave on their plate | 609 | 1 | 5 | 2.99 | 1.546 | .062 | .099 | -1.569 | .198 |
| local government play crucial role in reducing food waste | 609 | 1 | 5 | 3.38 | 1.348 | -.193 | .099 | -1.437 | .198 |
| **Perception regarding Food wastages hotel's during Operation by kitchen staff & Chefs** | | | | | | | | | |
| Working equipment's can control the food wastage | 609 | 1 | 5 | 2.77 | 1.227 | .033 | .099 | -1.271 | .198 |
| Chef cooked food over to show off to the guest | 609 | 1 | 5 | 2.54 | 1.483 | .569 | .099 | -1.171 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Chef served over food to guest for pampering | 609 | 1 | 5 | 3.37 | 1.167 | -.565 | .099 | -.779 | .198 |
| Sometimes untrained chef cooked a food | 609 | 1 | 5 | 3.28 | 1.502 | -.495 | .099 | -1.297 | .198 |
| Need quality chef to control the wastage | 609 | 1 | 2 | 1.70 | .457 | -.890 | .099 | -1.213 | .198 |
| Need innovative techniques or technologies to reduce food waste in the kitchen during operations | 609 | 1 | 5 | 3.16 | 1.346 | -.384 | .099 | -1.080 | .198 |
| Educate guests about food waste and encourage | 609 | 1 | 5 | 3.26 | 1.630 | -.411 | .099 | -1.507 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| them to reduce it | | | | | | | | | |
| Kitchen staff and chefs trained to reduce food waste during operations | 609 | 1 | 5 | 3.60 | 1.076 | -.615 | .099 | -.176 | .198 |
| **Perception regarding Food wastages hotel's during Operation less trained staff & service boy** | | | | | | | | | |
| Steward served to the guest extra on the plates | 609 | 1 | 5 | 3.29 | 1.676 | -.327 | .099 | -1.618 | .198 |
| Sometime Stewards served cold food to the guest | 609 | 1 | 5 | 2.82 | 1.320 | -.020 | .099 | -1.237 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sometimes stewards take wrong order from the guest | 609 | 1 | 5 | 2.85 | 1.602 | .009 | .099 | -1.677 | .198 |
| Sometimes untrained chef make a food | 609 | 1 | 5 | 3.38 | 1.405 | -.353 | .099 | -1.279 | .198 |
| Chef don know the capacity of guest they cooked over in dishes | 609 | 1 | 5 | 3.21 | 1.541 | -.296 | .099 | -1.466 | .198 |
| Experienced a situation where food was wasted due to less trained staff or service personnel in a hotel | 609 | 1 | 5 | 3.48 | 1.499 | -.394 | .099 | -1.377 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Hotels could involve their guests in reducing food waste during their stay | 609 | 1 | 5 | 3.02 | 1.482 | -.268 | .099 | -1.489 | .198 |
| **Perception regarding Food wastages during Operation temperature & Ambiance** | | | | | | | | | |
| Working area & temperature should be according food | 609 | 1 | 5 | 2.87 | 1.668 | .159 | .099 | -1.651 | .198 |
| Working area should be species | 609 | 1 | 5 | 3.41 | 1.480 | -.375 | .099 | -1.375 | .198 |
| Temperature affects food waste in hotel operations | 609 | 1 | 5 | 2.98 | 1.493 | -.002 | .099 | -1.435 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Food spoilage or waste due to poor temperature or ambiance in a hotel setting | 609 | 1 | 5 | 3.43 | 1.586 | -.448 | .099 | -1.413 | .198 |
| Must prioritize sustainability and reducing food waste over maintaining a certain ambiance or atmosphere | 609 | 1 | 5 | 3.45 | 1.359 | -.647 | .099 | -.870 | .198 |
| Need for an enjoyable ambiance with the need to reduce food waste | 609 | 1 | 5 | 3.89 | 1.292 | -.904 | .099 | -.471 | .198 |
| **Perception regarding Food wastages during Operation on purchase & Material** | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Vegetable quality should be purchase good | 609 | 1 | 5 | 2.98 | 1.519 | -.074 | .099 | -1.537 | .198 |
| Chicken & meat quality should be good and store in right temperature | 609 | 1 | 5 | 2.81 | 1.415 | -.017 | .099 | -1.383 | .198 |
| All groceries should be branded with good quality | 609 | 1 | 5 | 2.41 | 1.297 | .381 | .099 | -1.120 | .198 |
| Hotels order more ingredients than they need, resulting in excess food wastage | 609 | 1 | 5 | 3.31 | 1.625 | -.358 | .099 | -1.503 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Hotels can reduce food wastage by sourcing locally and seasonally | 609 | 1 | 5 | 2.82 | 1.602 | .135 | .099 | -1.619 | .198 |
| Use food that is about to expire or has some imperfections to create new dishes and reduce waste | 609 | 1 | 5 | 2.50 | 1.337 | .447 | .099 | -1.077 | .198 |
| Manage inventory to reduce food wastage during the operation | 609 | 1 | 5 | 3.10 | 1.278 | .049 | .099 | -1.005 | .198 |
| Buffet-style meals do not result in excess food wastage | 609 | 1 | 5 | 3.24 | 1.500 | -.320 | .099 | -1.369 | .198 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Food surplus to contribute to social welfare and reduce wastage | 609 | 1 | 5 | 3.91 | 1.287 | -.924 | .099 | -.446 | .198 |
| Customizable meals help reduce food wastage in hotels | 609 | 1 | 5 | 2.50 | 1.570 | .504 | .099 | -1.356 | .198 |
| Valid N (listwise) | 609 | | | | | | | | |

- Correlation Analysis

**Table 8: Correlation Analysis**

| | | Gender | Age | Educational | Occupation | Annual Income | Visit in hotel |
|---|---|---|---|---|---|---|---|
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| People through the food because less tasty | Pearson Correlation | .783** | .807** | .921** | .906** | .914** | .877** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Food waste is a result of our societal values and attitudes towards food | Pearson Correlation | .871** | .797** | .909** | .858** | .918** | .702** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Customers must be charged based on the amount of food they leave on their plate | Pearson Correlation | .840** | .836** | .946** | .902** | .911** | .859** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Working equipment's | Pearson Correlation | .870** | .814** | .935** | .909** | .910** | .867** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| can control the food wastage | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Chef served over food to guest for pampering | Pearson Correlation | .652** | .839** | .784** | .906** | .862** | .914** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Kitchen staff and chefs trained to reduce food waste during operations | Pearson Correlation | .681** | .871** | .789** | .929** | .853** | .893** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Sometimes stewards take wrong order from the guest | Pearson Correlation | .800** | .802** | .948** | .888** | .913** | .852** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Working area should be species | Pearson Correlation | .757** | .799** | .858** | .971** | .890** | .920** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Food spoilage or waste due to poor temperature or ambiance in a hotel setting | Pearson Correlation | .764** | .802** | .851** | .943** | .888** | .926** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Experienced a situation where food was wasted due to less trained staff or service personnel in a hotel | Pearson Correlation | .785** | .784** | .871** | .944** | .890** | .935** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Manage inventory to reduce food wastage during the operation | Pearson Correlation | .815** | .888** | .875** | .942** | .952** | .848** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Buffet-style meals do not result in excess food wastage | Pearson Correlation | .747** | .852** | .868** | .951** | .902** | .923** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Customizable meals help reduce food wastage in hotels | Pearson Correlation | .909** | .804** | .942** | .865** | .947** | .728** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Food surplus to contribute to social welfare | Pearson Correlation | .657** | .807** | .764** | .903** | .806** | .951** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| and reduce wastage | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Vegetable quality should be purchase good | Pearson Correlation | .790** | .859** | .926** | .904** | .914** | .897** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Temperature affects food waste in hotel operations | Pearson Correlation | .833** | .874** | .916** | .921** | .933** | .874** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Sometimes untrained chef make a food | Pearson Correlation | .743** | .821** | .854** | .960** | .894** | .923** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| N | 609 | 609 | 609 | 609 | 609 | 609 |

**. Correlation is significant at the 0.01 level (2-tailed).

Gathered data from the questionnaire has further been represented in this correlation table in the study which defined the relationships between food waste quantity in hotels and demographic attributes of individuals. Correlation analysis in a quantitative analysis helps in evaluating differences between included variables and associated attributes (Kafle, 2019). This analysis helped to identify major links between food waste management approaches and hotel operations. This further evaluated several operational costing of hotels and their effect on food waste management.

**Table 9 Correlation Analysis (Impact of Food waste management approaches on hotels)**

| | | Mostly People left the food in their plates | People through the food because less tasty | Customers must be charged based on the amount of food they leave on their plate | Sometime Stewards served cold food to the guest | Need for an enjoyable ambiance with the need to reduce food waste | Hotels order more ingredients than they need, resulting in excess food wastage |
|---|---|---|---|---|---|---|---|
| | Sig. (2-tailed) | .299 | .000 | .000 | .000 | .000 | |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Manage inventory to reduce food | Pearson Correlation | .061 | .911** | .916** | .931** | .864** | .916** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| wastage during the operation | Sig. (2-tailed) | .136 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Customizable meals help reduce food wastage in hotels | Pearson Correlation | .065 | .908** | .926** | .921** | .754** | .875** |
| | Sig. (2-tailed) | .111 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Must prioritize sustainability and reducing food waste over maintaining a certain ambiance or atmosphere | Pearson Correlation | .046 | .902** | .880** | .906** | .931** | .931** |
| | Sig. (2-tailed) | .255 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Hotels could involve their guests in reducing food waste | Pearson Correlation | .054 | .960** | .914** | .944** | .891** | .961** |
| | Sig. (2-tailed) | .181 | .000 | .000 | .000 | .000 | .000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| during their stay | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Working equipment's can control the food wastage | Pearson Correlation | .074 | .925** | .952** | .952** | .878** | .925** |
| | Sig. (2-tailed) | .069 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |
| Need innovative techniques or technologies to reduce food waste in the kitchen during operations | Pearson Correlation | .055 | .936** | .927** | .937** | .938** | .940** |
| | Sig. (2-tailed) | .172 | .000 | .000 | .000 | .000 | .000 |
| | N | 609 | 609 | 609 | 609 | 609 | 609 |

This analysis being included in this research has helped to identify customised meals as a major way to reduce food waste.

**Table 10 Paired Samples Test**

| | Paired Differences | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lower | Upper | | | |
| Pair 1 | Gender - Mostly People left the food in their plates | .406 | .530 | .021 | .363 | .448 | 18.883 | 608 | .000 |
| Pair 2 | Age - Customers must be charged based on the amount of food they leave on their plate | -1.013 | 1.043 | .042 | -1.096 | -.930 | -23.963 | 608 | .000 |
| Pair 3 | Educational - Need quality chef to control the wastage | .803 | 1.354 | .055 | .695 | .911 | 14.637 | 608 | .000 |
| Pair 4 | Annual Income - Sometime Stewards served cold food to the guest | -.612 | .491 | .020 | -.652 | -.573 | -30.787 | 608 | .000 |

Analysis of paired sample tests in this study helped to identify that annual income and supply of cold food have the most impact on food waste and hotel operations. Paired Sample Test helps in identification of different pairs considering their interrelatedness and associated attributes (Rietveld and van Hout, 2017). With respect to this, the study rejected the null hypothesis.

**Table 11: ANOVA Analysis**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Kitchen staff and chefs trained to reduce food waste during operations | Between Groups | 599.824 | 4 | 149.956 | 865.795 | .000 |
| | Within Groups | 104.613 | 604 | .173 | | |
| | Total | 704.437 | 608 | | | |
| Sometimes untrained chef make a food | Between Groups | 1063.353 | 4 | 265.838 | 1167.437 | .000 |
| | Within Groups | 137.537 | 604 | .228 | | |
| | Total | 1200.890 | 608 | | | |
| Working area & temperature should be according food | Between Groups | 1534.424 | 4 | 383.606 | 1470.299 | .000 |
| | Within Groups | 157.586 | 604 | .261 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Total | 1692.010 | 608 | | | |
| local government play crucial role in reducing food waste | Between Groups | 950.341 | 4 | 237.585 | 927.040 | .000 |
| | Within Groups | 154.795 | 604 | .256 | | |
| | Total | 1105.136 | 608 | | | |
| Working equipment's can control the food wastage | Between Groups | 831.816 | 4 | 207.954 | 1495.281 | .000 |
| | Within Groups | 84.000 | 604 | .139 | | |
| | Total | 915.816 | 608 | | | |

The inclusion of the ANOVA test in this research has helped to identify the statistical significance of each included pair. ANOVA test in SPSS helps to define the statistical significance of each included pair and their associated attributes (Yockey, 2017). This study has identified no significant differences between pairs when compared with their respective statistical significance to food waste management approaches.

**Table 12: ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1045.342 | 4 | 261.335 | 2840.783 | .000[b] |
| | Residual | 55.564 | 604 | .092 | | |

| | | | | | |
|---|---|---|---|---|---|
| Total | 1100.906 | 608 | | | |

a. Dependent Variable: Need innovative techniques or technologies to reduce food waste in the kitchen during operations

b. Predictors: (Constant), Need quality chefs to control the wastage, Food waste is a result of our societal values and attitudes towards food, Food surplus to contribute to social welfare and reduce wastage, Hotels could involve their guests in reducing food waste during their stay

| Model | | Unstandardized Coefficients | | Standardized Coefficients |
|---|---|---|---|---|
| | | B | Std. Error | Beta |
| 1 | (Constant) | -.307 | .058 | |
| | Food waste is a result of our societal values and attitudes towards food | .141 | .019 | .142 |
| | Hotels could involve their guests in reducing food waste during their stay | .380 | .027 | .418 |

| | | | |
|---|---|---|---|
| Food surplus to contribute to social welfare and reduce wastage | .401 | .025 | .383 |
| Need quality chef to control the wastage | .259 | .067 | .088 |

This ANOVA analysis has helped this research to evaluate different pairs and their influence on food waste management approaches. This research has included this testing which helped to establish the rejection of the null hypothesis. Along with the rejection of the null hypothesis, this research depicted a good amount of interrelatedness between dependent variables and predictors.

## 5. Conclusion

From the review of this study, it can be concluded that this study has represented research aspects properly in different chapters. While doing so, this study has further presented a detailed process through which this research has been conducted. With respect to this detailed process, it can be concluded that this study has been successful in representing the statistical significance of different attributes. Considering the aim and objectives of this study and the associated findings and analysis, it can be concluded that this study has successfully achieved the expected research outcome. This study can also be concluded to successfully establish the relationship between predictors and dependent variables.

## 6. Recommendations

Depending on this study, it can be recommended to future researchers to take advantage of this study as it has addressed the research topic with a proper in-depth presentation. However, this study can be recommended to follow a streamlined process for further research. Due to the inclusion of only primary data, the inclusion of secondary data for future aspects can also be recommended. Secondary data can help research to further broaden its correlation database with the identification of different factors responsible for or affected by food waste management approaches. Overall, this study can be recommended to include secondary data and make subtle changes which may help to produce better results related to this topic.

## References


- Aktas, E., Sahin, H., Topaloglu, Z., Oledinma, A., Huda, A.K.S., Irani, Z., Sharif, A.M., van't Wout, T. and Kamrava, M., 2018. A consumer behavioural approach to food waste. *Journal of Enterprise Information Management*, *31*(5), pp.658-673.
- Cakar, B., Aydin, S., Varank, G. and Ozcan, H.K., 2020. Assessment of environmental impact of FOOD waste in Turkey. *Journal of Cleaner Production*, *244*, p.118846.
- Filimonau, V. and Delysia, A., 2019. Food waste management in hospitality operations: A critical review. *Tourism management*, *71*, pp.234-245.
- George, D. and Mallery, P., 2021. *IBM SPSS statistics 27 step by step: A simple guide and reference*. Routledge.
- Goertzen, M.J., 2017. Introduction to quantitative research and data. *Library Technology Reports*, *53*(4), pp.12-18.
- Kafle, S.C., 2019. Correlation and regression analysis using SPSS. *Management, Technology & Social Sciences*, *126*.
- McCormick, K. and Salcedo, J., 2017. *SPSS statistics for data analysis and visualization*. John Wiley & Sons.
- Minnaar, A., 2018. Data gathering and analysis. *The principles and practices of nursing and health care Additional information and activities*, p.189.
- Rietveld, T. and van Hout, R., 2017. The paired t test and beyond: Recommendations for testing the central tendencies of two paired samples in research on speech, language and hearing pathology. *Journal of communication disorders*, *69*, pp.44-57.
- Stehlik-Barry, K. and Babinec, A.J., 2017. Data analysis with IBM SPSS statistics. Packt Publishing Ltd..
- Tamminen, K.A. and Poucher, Z.A., 2020. Research philosophies. In *The Routledge international encyclopedia of sport and exercise psychology* (pp. 535-549). Routledge.
- Trabold, T.A. and Nair, V., 2018. Conventional food waste management methods. In *Sustainable food waste-to-energy systems* (pp. 29-45). Academic Press.
- Turabian, K.L., 2018. *A manual for writers of research papers, theses, and dissertations: Chicago style for students and researchers*. University of Chicago Press.
- United Nations, 2023. *Sustainable consumption and production* [Online] Available at: https://sdgs.un.org/topics/sustainable-consumption-and-production [Accessed on 20th June 2023]
- Yockey, R.D., 2017. *SPSS demystified: a simple guide and reference*. Routledge.