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# A STUDY ON EVALUATING THE PACKAGING STRATEGIES TO MINIMIZE FOOD WASTE IN THE INSTANT FOOD INDUSTRY

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| ***Keywords*** | ***Abstract*** |
|---|---|
| Packaging,<br>Instant Food Industry,<br>Wilcoxon Signed Rank Test. | In today's fast-paced world, the instant food sector provides consumers with unmatched convenience by making meal preparation quick and simple, thereby saving time and effort. Furthermore, rapid food products frequently have longer shelf life, which lowers food waste and gives meal planning flexibility. This paper aims to evaluate the packaging strategies used to minimize food waste in the instant food industry. The technique used in this study is the Wilcoxon one-sample signed rank test. The results of the study indicated that Individual portion packaging to reduce overconsumption, Vacuum sealed packaging, Resealable packaging, Date labelling (for better inventory management), Moisture resistant packaging, Sunlight blocking material, Easy open packing to reduce spillage, Biodegradable packaging, Multilayer packaging (enhanced protection), Oxygen absorbing packets and Sustainable packaging are significant strategies used to minimize food waste in the instant food industry. |

## 1. INTRODUCTION

Food products need to be preserved, contained, communicated with, and packaged in a way that maximises food quality, safety, and minimises waste (Sharma, 2018, Youssef, 2018, and Aggarwal, 2020). Extending shelf life and avoiding food waste before consumption are critical objectives in the instant food sector [Sharma, 2018, Youssef, 2018, Aggarwal, 2020, Kreyenschmidt, 2013, Accorsi, 2019]. To improve food preservation, more recent methods use active packaging in conjunction with fossil-based materials that have specialised barrier functions, such as gas and water vapour permeability [Coelho, 2020 & Barlow, 2013]. Pollution and resource depletion are among the serious environmental issues brought on by the widespread usage of plastics derived from fossil fuels in packaging. Due to both legal requirements and consumer preferences for environmentally friendly products, there is an increasing need for sustainable packaging substitutes. Enhancing recyclability, using biobased and biodegradable materials, and lowering the amount of packaging material are some of these solutions. Although efforts are being made, there are still few competitive alternatives to plastics derived from fossil fuels that can guarantee the same degree of protection,

particularly when it comes to the preservation of fresh food products that can be consumed right away, like meat. Although commercial adoption and more study are needed, the development of sustainable packaging materials, like bio-based composites and polymers, shows promise. As environmental considerations and consumer preferences are taken into consideration, this introduction emphasises the pressing need for creative packaging solutions in the instant food business to minimise food waste.

In the fast-paced world of instant food, packaging solutions are essential for reducing food waste and guaranteeing product quality in a market where convenience meets consumer demand. Packaging is an essential tool in conjunction with preservation techniques like freezing, chilling, and drying because food products are by nature perishable. MAP, edible coatings, antioxidant packaging, and antimicrobial packaging are just a few of the cutting-edge advances that have expanded the definition of modern food packaging beyond simple protection. The ever-increasing demand from consumers for easy, high-quality options is being met by these developments, which prolong the shelf life of almost all fresh and processed food products. Intelligent packaging (IP) is an emerging concept in food packaging that goes beyond traditional active packaging (AP) by giving real-time information about the product's environmental conditions in addition to preserving it. The necessity for packaging solutions that actively interact with the perishable commodities they contain to ensure their safety and quality along the supply chain is highlighted by the intimate interaction that exists between AP and IP.

Preserving perishable commodities becomes crucial as worries about food quality, health, and sustainability keep growing. Given this, the short shelf life and high degradation susceptibility of the products in the quick food market provide special issues. Therefore, it is becoming more and more important to create packaging strategies that make use of materials and technology to reduce food waste and increase product quality. By integrating intelligent packaging technologies, businesses can not only avoid financial losses but also boost consumer safety and satisfaction, ultimately contributing to a more sustainable food system.

## 2. REVIEW OF LITERATURE

**Lakshmipathy et al. (2023).** The study's goal was to investigate how much packaging waste contributes to overall waste levels, with a special emphasis on food packaging as a key issue. The results showed that a sizable amount of garbage is made up of packaging waste, which includes throwaway goods like cups, lids, and containers. This contributes to contamination of the environment and harm to ecosystems. In order to minimise packaging waste and advance environmental sustainability, the study underlined the significance of enhancing recycling procedures and implementing sustainable packaging substitutes.

**Petkoska, A. T., et al. (2021).** The review's objective was to investigate cutting-edge methods for food packaging, with an emphasis on edible packaging in particular, in order to improve food sustainability, safety, and quality. Results emphasised the growing trend of environmentally friendly packaging, emphasising waste-free edible materials. The review emphasised how important nanotechnology is to improving edible packaging's ability to provide minerals, vitamins, antioxidants, bioactive, and antimicrobials. Various edible packaging materials, such as encapsulants, nanofibers, nanoparticles, and nano emulsions, can be used as active packaging thanks to nanotechnology. It was discovered that active packaging, which interacts with the food to release scavenging chemicals, eliminate hazardous gases, and maintain the nutritional profile of packaged meals, is essential to preserving food quality and extending shelf life.

**Imke, Korte., et al. (2021).** The study's objective was to assess the current state of plant extracts and bio-based polymers as sustainable packaging substitutes within the framework of the European Green Deal. The study covered the utilisation of biomass waste and renewable resources to produce polymers, emphasising the potential use of lignocellulose biomass as a fossil fuel alternative. The results showed that although bio-based polymers have potential, their current practical application is constrained by their worse performance in basic packaging functions that impact food safety, quality, and shelf life. The assessment also stressed the

significance of plant extracts as active ingredients in packaging that extend food shelf life. The adoption potential of packaging made of renewable resource-based polymers from a bioeconomy standpoint was covered in the study's conclusion.

**Chen, S., et al. (2020).** The goal of this study was to investigate how cutting-edge smart packaging options improve the food supply chain's sustainability, safety, and quality. The results showed how packaging systems have evolved to become more intelligent through the integration of wireless communication, developing electronics, and cloud data solutions. It has been demonstrated that intelligent packaging is essential for improving product traceability along the whole food supply chain and for lowering food loss and waste. The assessment also covered typical printing methods for smart packaging systems and talked about future steps, cost-related disadvantages, and possible obstacles in the implementation of smart packaging in the food supply chain.

**Tannady, H. (2019).** The study's goal was to use the Lean Six Sigma methodology to increase production efficiency and decrease waste in the largest company in Southeast Asia's instant noodle industry. The results showed that problems with quality and waste of raw materials were the main causes of the inability to meet the desired production levels. The study determined the prevalent waste components and faults using a variety of techniques, including Value Stream Mapping (VSM), Waste Assessment Model (WAM), and others. The study found that defective items accounted for the largest amount of waste weight, and it made improvement recommendations aimed at lowering label sealer-cutting process failures. It was specifically recommended to change the spacing between the wrapping area's conveyor and the conveyor table.

**Martin, et al. (2019).** The study aimed to investigate the effect of food waste using a consistent life cycle assessment (LCA) paradigm on system-wide greenhouse gas (GHG) emissions and cumulative energy demand (CED). The study attempted to illustrate the possibility of lowering environmental impacts by addressing food waste by modeling 13 food categories and their common packaging types. The results showed that considerable drops in GHG emissions and CED would result from a hypothetical 10% decrease in the food waste rate. According to the study, food waste must be taken into account when evaluating packaging options, and packaging innovations can mitigate food waste and lower overall system impacts.

## 3. OBJECTIVES OF THE STUDY

1. To evaluate the packaging strategies used to minimize food waste in the instant food industry.
2. To give suggestive measures to instant food industry stakeholders towards implementing strategies towards minimizing food waste.

## 4. HYPOTHESIS

H0: The packaging strategies used to minimize food waste in the instant food industry is insignificant (Median = 3)

H1: The packaging strategies used to minimize food waste in the instant food industry is significant (Median ≠ 3)

## 5. RESEARCH METHODOLOGY

| | |
|---|---|
| **Research Design** | Descriptive |
| **Sample Size** | 115 Marketing Managers of Instant Food Industry |
| **Sampling Technique** | Non-probability purposive sampling |

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| | |
|---|---|
| **Data Collection** | Both primary and secondary sources |
| **Statistical Technique** | One-sample Wilcoxon signed ranked test |
| **Statistical Tool** | SPSS software |

**Data Analysis and Interpretation:**

**Table No: 1 Summary table of One-sample Wilcoxon signed ranked test**

| **Packaging strategies used to minimize food waste in instant food** | **Null hypothesis** | **Observed Median** | **P – value** | **Results** |
|---|---|---|---|---|
| Individual portion packaging to reduce overconsumption | The median of Individual portion packaging equals 3 | 5 | 0.000 | Rejected (significant strategies) |
| Vacuum sealed packaging | The median Vacuum sealed packaging equals 3 | 4 | 0.000 | Rejected (significant strategies) |
| Resealable packaging | The median of Resealable packaging equals 3 | 4 | 0.000 | Rejected (significant strategies) |
| Date labelling (for better inventory management) | The median of Date labelling equals 3 | 5 | 0.323 | Rejected (significant strategies) |
| Moisture resistant packaging | The median of Moisture resistant packaging equals 3 | 4 | 0.000 | Rejected (significant strategies) |
| Sunlight blocking material | The median of Sunlight blocking material equals 3 | 5 | 0.000 | Rejected (significant strategies) |

| | | | | |
|---|---|---|---|---|
| Easy open packing to reduce spillage | The median of Easy open packing to reduce spillage equals 3 | 5 | 0.213 | Rejected (significant strategies) |
| Biodegradable packaging | The median of Biodegradable packaging equals 3 | 4 | 0.000 | Rejected (significant strategies) |
| Multilayer packaging (enhanced protection) | The median of Multilayer packaging equals 3 | 4 | 0.000 | Rejected (significant strategies) |
| Oxygen absorbing packets | The median of Oxygen absorbing packets equals 3 | 5 | 0.061 | Rejected (significant strategies) |
| Sustainable packaging | The median of Sustainable packaging equals 3 | 5 | 0.061 | Rejected (significant strategies) |

## 6. CONCLUSION

The study's conclusions highlight how crucial it is to use a variety of packaging strategies to reduce food waste in the instant food sector. Businesses can improve inventory control and minimise needless food waste by implementing date labelling, vacuum sealing, resealable packaging, individual portion packaging, and overconsumption reduction. Further supporting efforts to reduce waste are packaging improvements including moisture-resistant fabrics, sunlight-blocking technology, and oxygen-absorbing packages, which are essential for maintaining food quality and increasing shelf life. Furthermore, in line with customer demands for eco-friendly goods, the use of sustainable and biodegradable packaging materials shows an increasing commitment to environmental sustainability. The study underscores the complex role that packaging strategies have in reducing food waste issues in the instant food sector. It also shows the necessity for all-encompassing measures that will improve efficiency, sustainability, and customer happiness.

## 7. RECOMMENDATIONS

1. To optimise stock levels and reduce surplus inventory that could result in food waste, implement real-time inventory tracking systems.
2. Create instructional programmes, such as meal planning, correct storage, and leftover utilisation advice, to educate customers about the significance of reducing food waste.
3. To ensure effective supply chain operations and reduce waste, cultivate partnerships with distributors and suppliers to apply cooperative forecasting and inventory management techniques.
4. Invest in cutting-edge technology that increase yield, reduce waste, and makes efficient use of by-products, such as food processing equipment.

5. Form alliances with redistribution organisations, food banks, and charities to distribute excess packaged foods that are almost out of date but still fit for consumption.
6. To increase the shelf life of instant food products without sacrificing quality, investigate cutting-edge packaging technologies including modified environment packaging and active packaging solutions.
7. To discover areas for improvement in product packaging, portion sizes, and overall waste reduction tactics, implement methods for obtaining input from consumers and stakeholders. This will help to promote a culture of continual improvement in waste management procedures.

## 8. AUTHOR(S) CONTRIBUTION

The authors agreed to have no connections or engagements with any group or body that provides financial and non-financial assistance for the topics and resources covered in the article.

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## 11.PLAGIARISM POLICY

The authors declare that any kind of violation of plagiarism, copyright, and ethical matters will be handled by all authors. Journalists and editors are not liable for the aforesaid matters.

## 12. CONFLICTS OF INTEREST

The authors declared that no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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