Module 3, Session 4

Description of slides

Slide 1 - Module 3

Food Service Management

Unsold meals represent a critical point of intervention in the fight against food waste. In this session, we explore how data-driven tools, AI forecasting, dynamic pricing, redistribution networks, and packaging innovations can turn surplus into opportunity. The focus is on operational strategies that reduce environmental impact, optimize costs, and strengthen social responsibility—making food systems more efficient and sustainable

Slide 2 - Session 4

This session aims to provide participants with a strategic and operational toolkit to manage unsold meals effectively. Through case studies and practical models, we'll examine also how AI can improve demand forecasting, how surplus can be redistributed or repurposed, and how packaging and pricing innovations extend shelf life and reduce waste. By the end of the session, participants will understand how to integrate these solutions into their operations—whether in retail, food service, or distribution—achieving both sustainability and profitability goals.

Slide 3 – Introduction to Unsold Meal Management

Managing unsold meals is a pivotal component of modern food waste reduction strategies, especially in the retail, food service, and distribution sectors. Surplus arises due to overproduction, poor inventory management, and the unpredictable nature of consumer demand. To address these challenges effectively, food service operators must employ a structured framework that includes dynamic pricing models, redistribution channels, and product repurposing. Dynamic pricing ensures that meals close to expiration are sold at reduced prices, boosting sales while minimizing waste. Redistribution to employee canteens, food banks, or social organizations ensures that food surplus benefits others rather than ending up in landfills. Finally, repurposing unsold food into alternative products, such as sauces or animal feed, extends its usability and generates additional revenue streams. Research confirms that these approaches not only reduce CO_2 emissions but also improve food security and lower operational costs. Operators must align these strategies with regulatory requirements and adopt data-driven forecasting tools to optimize their efficiency.

Slide 4 – AI-Driven Demand Forecasting to Reduce Unsold Meals - 1

Artificial Intelligence (AI) has revolutionized demand forecasting, offering unparalleled accuracy in predicting consumer behavior and optimizing inventory. Traditional methods, which relied solely on historical sales data, often failed to account for real-time fluctuations. AI integrates vast datasets, including transaction logs, seasonal trends, and external factors such as holidays or local events, to identify patterns and

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project future demand. By analyzing these variables, AI systems enable food operators to adjust inventory levels proactively, reducing overstocking and minimizing waste by up to 40%. For example, during summer, predictive models may increase orders of lighter foods like salads, while winter trends may prompt higher production of comfort foods. This capability ensures a more efficient allocation of resources and prevents overproduction, making AI an indispensable tool for food service providers.

Slide 5 – AI-Driven Demand Forecasting to Reduce Unsold Meals - 2

AI-driven demand forecasting goes beyond historical analysis by incorporating real-time monitoring and dynamic adjustments. As point-of-sale (POS) data flows into the system, AI detects deviations from expected purchasing patterns and recalibrates inventory requirements accordingly. If sales are slower than anticipated, AI reduces future stock replenishments, preventing surplus accumulation. Conversely, during periods of increased demand, AI recommends timely procurement to avoid shortages. Companies like Carrefour and Amazon Fresh have successfully implemented such systems, achieving reductions in unsold perishable items by over 35%. This approach not only minimizes waste but also optimizes production schedules and reduces operational costs, creating a more sustainable food supply chain.

Slide 6 – AI-Driven Demand Forecasting to Reduce Unsold Meals - 3

AI-powered forecasting tools also automate procurement processes, ensuring that stock levels align precisely with predicted demand. By modulating stock allocation, these systems prevent overproduction and minimize waste. For example, AI might identify that a particular ingredient is being used less frequently and adjust procurement schedules to reflect its reduced demand. Additionally, AI facilitates dynamic pricing by recommending optimal discount percentages for near-expiry items, maximizing their likelihood of sale. Carrefour’s integration of AI into its supply chain management has led to a 28% reduction in food waste, underscoring the technology's potential to transform inventory management in the food service industry.

Slide 7 – Dynamic Pricing for Unsold Meals - 1

Dynamic pricing leverages AI-driven analytics to adjust product prices in real time, aligning them with expiration risk and inventory levels. This approach is particularly effective for perishable items, where delays in sales can result in significant losses. By applying incremental markdowns based on shelf-life, dynamic pricing encourages consumers to purchase near-expiry products. For example, an item with two days left before expiration might receive a 20% discount, while its price drops to 40% when only one day remains. This gradual approach not only reduces waste but also ensures revenue retention. Tesco has demonstrated the efficacy of this model, achieving a 30% increase in last-day sales through AI-powered pricing algorithms.

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Slide 8 – Dynamic Pricing for Unsold Meals - 2

The implementation of dynamic pricing is facilitated by electronic shelf labels (ESLs) and mobile notifications. ESLs update prices automatically, eliminating manual intervention and ensuring consistency across store locations. Additionally, mobile applications linked to loyalty programs notify consumers of discounts on near-expiry products, boosting engagement and sales. Platforms like Too Good To Go have utilized this strategy to encourage last-minute purchases, achieving a 65% increase in surplus meal sales. By combining real-time data with consumer outreach, dynamic pricing creates a win-win scenario for both businesses and customers.

Slide 9 – Dynamic Pricing for Unsold Meals - 3

Dynamic pricing models have proven to be effective not only in reducing waste but also in optimizing revenue. Studies from the Harvard Business Review reveal that businesses employing these models experience a 37% increase in sales of near-expiry products compared to fixed discount strategies. Machine learning algorithms fine-tune markdowns to balance sales velocity and revenue retention, ensuring that inventory turnover is maximized without significant financial loss.

Slide 10 – Food Redistribution to Employee Canteens - 1

Repurposing unsold meals for employee consumption is a sustainable and cost-effective solution for managing surplus. This practice not only reduces waste but also fosters employee satisfaction by providing high-quality meals at subsidized rates. AI-driven systems like Leanpath track unsold items in real time, categorizing them based on nutritional value and feasibility for redistribution. Proper storage and handling, regulated by HACCP protocols, ensure that food safety standards are met. Companies like Marriott have implemented employee meal programs, cutting food waste by 30% while improving staff morale and engagement.

Slide 11 – Food Redistribution to Employee Canteens - 2

Internal redistribution programs for unsold meals are enhanced through advanced digital platforms and predictive analytics. Employees are provided with discounted access to surplus meals through digital vouchers or apps, creating an efficient and transparent system. AI-driven demand forecasting optimizes the redistribution process by aligning meal availability with employee consumption patterns, minimizing waste. For example, Google has implemented such systems in its employee canteens, effectively repurposing surplus meals and reducing overall corporate food waste by 30%. These programs not only decrease waste but also contribute to employee well-being by offering affordable meal options in a sustainable manner.

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Slide 12 – Food Bank Partnerships for Unsold Meals - 1

Food bank partnerships are a vital component of any strategy to manage unsold meals. By redirecting surplus food to food-insecure populations, businesses reduce waste while contributing to social responsibility initiatives. AI systems play a critical role in identifying and categorizing surplus items based on safety and nutritional viability. Compliance with regulatory frameworks, such as the Good Samaritan Act in the United States, ensures that donated food adheres to health standards and protects donors from liability. Partnerships with food banks like Feeding America provide an effective channel for surplus redistribution, making a significant impact on both environmental and social fronts.

Slide 13 – Food Bank Partnerships for Unsold Meals - 2

To maintain the quality and safety of redistributed food, cold chain logistics must be optimized. IoT-enabled refrigeration systems monitor temperature conditions during storage and transportation, ensuring compliance with safety standards. Blockchain technology can be integrated to provide traceability and transparency in the redistribution process, preventing fraud and ensuring accountability. For instance, Carrefour leverages blockchain to track the donation of over 15,000 tons of surplus food annually, ensuring that all redistributed items meet strict safety and quality guidelines. Such technologies streamline the redistribution process, making it more efficient and reliable.

Slide 14 – Blockchain in Unsold Meal Redistribution - 1

Blockchain technology transforms surplus meal management by ensuring complete traceability throughout the redistribution chain. Each food item is assigned a unique digital ID that records its journey from origin to final destination in an immutable ledger. Smart contracts automate key steps in the donation process, such as triggering food redistribution when expiration dates approach. This level of transparency builds trust among stakeholders, including donors, food banks, and end recipients. Feeding America, for example, has adopted blockchain systems to reduce administrative costs and improve the efficiency of its food donation programs, setting a new standard for accountability in surplus management.

Slide 15 – Blockchain in Unsold Meal Redistribution – 2

The integration of blockchain with IoT devices enhances the monitoring and management of surplus food donations. Sensors track critical parameters such as temperature, humidity, and storage conditions, ensuring that donated items meet safety regulations. Blockchain technology logs this data in real time, providing an auditable record that prevents tampering and guarantees food quality. Carrefour has successfully utilized these technologies to maintain transparency and efficiency in its donation processes, enabling seamless collaboration with food banks and other

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redistribution partners. This approach not only improves operational reliability but also fosters greater consumer trust in food donation systems.

Slide 16 – Packaging Innovations to Extend Shelf Life - 1

Innovative packaging solutions play a pivotal role in reducing unsold meals by extending the shelf life of perishable products. Modified Atmosphere Packaging (MAP), for instance, slows microbial growth by replacing oxygen with a controlled gas mixture, significantly preserving freshness. Studies indicate that MAP can extend the shelf life of fresh meat from 5 to 15 days, offering retailers a longer window to sell products. Edible and biodegradable packaging further enhance sustainability by reducing waste associated with traditional materials. By adopting such technologies, businesses can minimize spoilage, optimize inventory, and lower disposal costs.

Slide 17 – Packaging Innovations to Extend Shelf Life - 2

Smart packaging technologies incorporate freshness indicators and temperature-sensitive labels to monitor food quality in real time. These innovations allow retailers and consumers to identify potential spoilage before it occurs, reducing unnecessary disposal. For example, color-changing sensors embedded in packaging can signal when temperature thresholds have been breached, ensuring timely corrective actions. Lidl has implemented oxygen-scavenger packaging to maintain the freshness of ready-to-eat meals, reducing spoilage-related waste by 30%. Such advancements empower businesses to manage inventory more effectively while enhancing consumer confidence in product safety.

Slide 18 – Supermarket Strategies for Waste-Free Retailing - 1

Supermarkets can significantly reduce food waste by adopting AI-driven inventory management systems and engaging in consumer education initiatives. Predictive analytics tools analyze sales patterns and adjust procurement schedules to prevent overstocking, while loyalty programs encourage customers to purchase near-expiry products. For instance, Amazon Fresh uses AI algorithms to optimize restocking levels, achieving a 35% reduction in unsold food. These strategies ensure that products are sold within their optimal freshness periods, minimizing waste and maximizing revenue.

Slide 19 – Supermarket Strategies for Waste-Free Retailing - 2

Retailers are increasingly promoting the sale of “imperfect” produce and automating markdown systems to minimize waste. Initiatives like Tesco’s “Perfectly Imperfect” line rebrand cosmetically flawed fruits and vegetables, making them appealing to environmentally conscious consumers. Meanwhile, AI-powered markdown systems dynamically adjust prices on unsold items to encourage quick sales. These approaches not only reduce waste but also align with sustainability goals, fostering goodwill among customers who value eco-friendly practices.

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Slide 20 – Restaurant-Specific Strategies for Unsold Food Reduction - 1

Restaurants play a crucial role in managing unsold meals by implementing portion control, menu flexibility, and real-time waste monitoring. Pre-portioning ingredients minimizes excess, while dynamic menus allow chefs to incorporate surplus items into new dishes. AI-based systems like Winnow Vision track food waste patterns and provide actionable insights to optimize kitchen operations. Nando's, for example, reduced its food waste by 30% through portion adjustments and predictive analytics, showcasing the effectiveness of data-driven approaches in the food service industry.

Slide 21 – Restaurant-Specific Strategies for Surplus Food Reduction - 2

Redistributing surplus meals to local charities and community organizations is an effective way for restaurants to address food waste. By collaborating with NGOs, restaurants ensure that unsold meals reach those in need while minimizing disposal costs. Pret A Manger has successfully implemented this model, donating surplus food daily and achieving a zero-waste goal across its operations. Such initiatives not only reduce waste but also enhance brand reputation by demonstrating a commitment to social responsibility.

Slide 22 - Conclusion

Effective management of unsold meals requires a holistic approach that combines advanced technologies, strategic redistribution, and sustainable practices. From AI-powered demand forecasting to blockchain-based transparency systems and innovative packaging solutions, the tools available today empower food operators to minimize waste, improve sustainability, and enhance profitability. By adopting these strategies, businesses not only contribute to environmental conservation but also address global food insecurity, creating a more equitable and sustainable food system.

Slide 23 – Thanks!

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