



CASE STUDY

Use of AI to avoid wastage

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| 01 Abstract

| Type of OER (Case study, Simulation, Scenario exercise, ...)

Case study.

| Goal or Purpose

- **Demonstrate Value:** show how a narrow AI solution can deliver rapid, measurable reductions in food waste and operating costs within a large hotel chain.
- **Quantify Impact:** present pilot metrics (waste reduction percentages, CO₂ avoided, annual savings per hotel) to illustrate environmental and financial benefits.
- **Identify Success Factors:** analyse the technical, operational and cultural enablers required for scaling AI waste-tracking across 200+ properties.
- **Highlight Challenges & Risks:** discuss data-privacy, franchise buy-in, model accuracy and integration hurdles that could limit long-term success.
- **Extract Transferable Lessons:** provide insights and best practices that other hospitality and foodservice operators can adapt to their own sustainability roadmaps.

| Expected Learning Outcomes

The student will be able to design AI driven inventory management strategies based on environmental impact metrics.

| Suggested Methodological Approach (Case-Based Learning, Problem-Based Learning...)

Case-based learning.

| Keywords

Artificial intelligence (AI), Computer vision, Food-waste reduction, Sustainability / ESG, Hospitality industry, Cost savings & ROI.

02

INTRODUCTION TO THE COMPANY



| INTRODUCTION

This case study explores how Hilton Hotels & Resorts deploys Winnow's computer-vision platform to curb buffet food waste, lower operating costs, and advance the company's "Travel with Purpose 2030" environmental, social and governance (ESG) targets [1]. The programme serves as a blueprint for large hospitality operators seeking quick-payback sustainability wins powered by domain-specific artificial intelligence.

| HISTORY AND GROWTH

- 1919 – Conrad Hilton opens his first property in Cisco, Texas.
- 1954 – Hilton becomes the world's first cross-border hotel chain after acquiring Statler Hotels [10].
- 2009 – Blackstone takes Hilton private for USD 26 billion, injecting capital for global expansion [10].
- 2017 – Hilton completes one of the largest hotel IPOs in history and launches the 'Travel with Purpose' programme [1].
- 2019-2024 – Portfolio grows to 6,800+ properties across 122 countries, averaging one new opening per day [1].

| BUSINESS PROFILE

Hilton operates a multi-brand ecosystem (from luxury Waldorf Astoria to focused-service Hampton) generating USD 10.2 billion in revenue in FY 2024. About 70 % of properties are franchised, while brand standards, loyalty (Hilton Honors, 180 million members) and enterprise technology remain centrally managed. Food & Beverage (F&B) accounts for roughly 25 % of revenue in full-service hotels, with breakfast buffets representing the single largest F&B cost centre, a prime target for waste-reduction efforts [2].

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SECTOR AND COMPETITION



| SECTOR OVERVIEW

The global full-service hotel sector faces thin operating margins and mounting regulatory pressure to disclose and reduce environmental impact. Food waste, responsible for ~8 % of global greenhouse-gas emissions, presents a rare alignment of cost savings and ESG benefit. The EU 'Farm to Fork' strategy mandates a 50 % reduction in retail and consumer food waste by 2030 [8], and similar laws are emerging in the UAE and several US states.

| MARKET SIZE AND GROWTH TREND

Global hotel F&B spend reached an estimated USD 148 billion in 2024, with breakfast contributing roughly one quarter [9]. Industry analysts forecast a compound annual growth rate (CAGR) of 6.3 % for hotel F&B from 2025-2029, driven by experiential dining and emerging-market tourism [7]. Regulatory deadlines and investor ESG screens are accelerating demand for AI-driven waste-tracking solutions.

| COMPETITION

Competitive activity is intensifying:

- Marriott International partnered with Leanpath in 2022, reporting an 18 % waste reduction in 350 hotels [4].
- Accor piloted Orbisk AI waste tracking in 50 European properties in 2023 [5].
- IHG began a Winnow Vision proof-of-concept in luxury brands in 2024 [6].

Beyond hospitality, Compass Group and Sodexo deploy similar systems in corporate cafeterias, achieving 45-50 % waste cuts.

04

COMPANY'S

CURRENT SITUATION

ARTIFICIAL
INTELLIGENCE



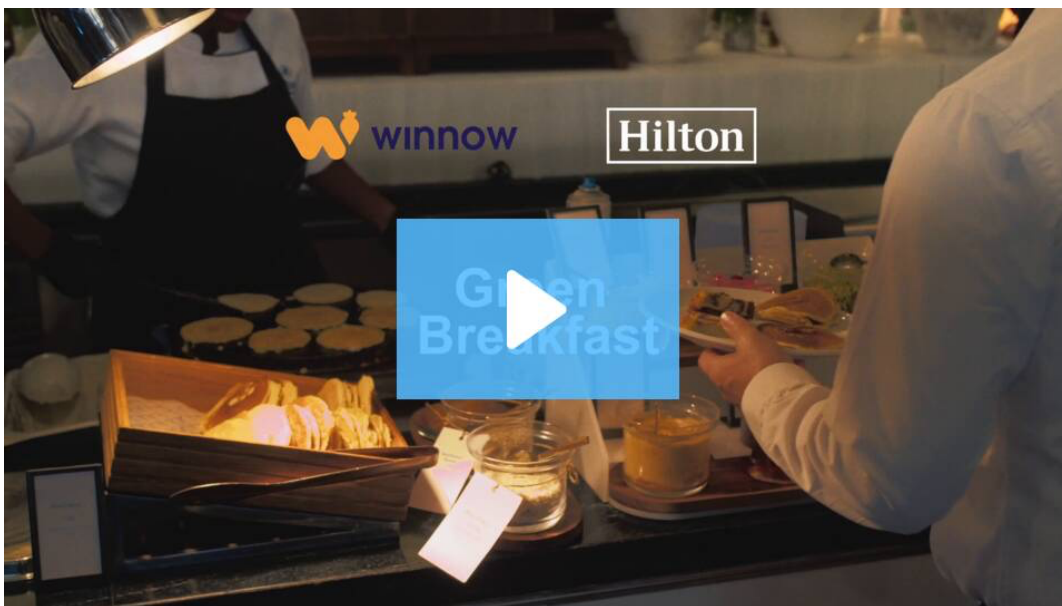
| COMPANY'S CURRENT SITUATION

Hilton Hotels & Resorts has partnered with the British start-up Winnow to install “Winnow Vision” units—AI-powered cameras mounted above smart scales (at breakfast-buffet and dish-return stations). Each time chefs scrape a tray or guests' plates are cleared, the system automatically weighs the food and uses a computer-vision model (trained on 30 million images) to recognise the item, calculate its cost and CO₂ footprint, and upload the data to a cloud dashboard. Chefs review daily waste reports, adjust batch-cooking volumes, shrink pastry portions and redesign buffet layouts accordingly.

A four-month pilot dubbed “Green Breakfast” in 13 UAE hotels cut pre-consumer kitchen waste by 76 % and post-consumer plate waste by 55 %, translating into annualised savings of about USD 60 000 per hotel and 30 t of CO₂e avoided [2]. Hilton has since expanded the programme to 32 properties and targets 200 roll-outs by Q4 2025 (prioritising resorts and convention hotels where buffet service dominates), citing the initiative as a key lever for meeting its Travel with Purpose 2030 goal of halving food waste.

Key performance indicators (KPIs) displayed in a Power BI dashboard include kitchen waste (kg/cover), waste cost (USD/cover), CO₂e avoided (aggregates all greenhouse gases into the amount of CO₂ that would have equal warming impact.), capex payback (<12 months), and breakfast NPS (Net Promoter Score).

Challenges remain around connectivity in remote locations, menu diversity affecting model accuracy, franchise owner capex hesitancy, and integration with Oracle Symphony POS (hotel's transaction system; integration would link AI waste data with sales and inventory figures).



[Hilton x Winnow Green Breakfast](#)

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KEY ASPECTS TO BE ANALYSED



| DATA ARCHITECTURE

Hilton's kitchens capture 4 K video on the edge device, route only hashed image signatures and tabular waste metrics to the cloud, and keep raw footage on-prem for <30 days to satisfy GDPR data-minimisation rules. Because systematic video monitoring of a work space is "likely to result in high risk to the rights and freedoms of natural persons," every deployment requires a Data-Protection Impact Assessment (Art. 35 GDPR) and signage that meets UK ICO and EDPB CCTV guidance. Winnow's case-study notes show the images are processed locally and encrypted in transit to AWS's EU-central region, avoiding cross-border transfers.

| MODEL LIFECYCLE

Winnow Vision's model is retrained quarterly on new menu imagery, with a confidence-score threshold of 0.85; items below the threshold are flagged for a human verifier in the chef dashboard, establishing a continuous "human-in-the-loop" feedback loop. The process mirrors the NIST AI Risk Management Framework 1.0 recommendation to "MAP-MEASURE-MANAGE" risks through iterative model evaluation and governance check-points.

| FINANTIAL MODELLING

Total-cost-of-ownership analysis must balance hardware capex (~USD 2 800 per unit), licence and maintenance fees (USD 2 400 + 500 per year), and rising ingredient costs against the empirically observed USD 60 000 annual savings per hotel. USDA CPI data show food-away-from-home prices up 3 % YoY in March 2025, strengthening the business case because each percentage-point of inflation increases the dollar value of avoided waste.

| CULTURAL ADOPTION

Chef buy-in proved decisive: Hilton gamified the dashboard with "top-five wasted items" leaderboards and quarterly recognition awards, while the AHLEA-endorsed Hotel Kitchen programme (highlighted in a 2024 U.S. Senate hearing) offers training modules that frame waste reduction as professional craftsmanship, not corporate surveillance. Early-adopter properties reported 15 % higher staff engagement scores after the pilot.

| REGULATORY EXPOSURE

Waste metrics exported from Winnow's API map directly to the activity-based accounting fields in ISO 14083:2023—the new global standard for greenhouse-gas reporting—letting Hilton fold avoided-CO₂e figures into its corporate ESG disclosures. On the food-donation side, U.S. hotels benefit from liability shields under the Bill Emerson Good Samaritan Act and its 2023 amendments extending coverage to caterers and "qualified direct donors," while EU hotels must reconcile surplus-food redistribution with local hygiene rules.

| CYBER-SECURITY

Kitchen cameras and scales constitute an IoT attack surface; Hilton applies strong authentication, signed firmware, remote-wipe and network-segmentation guidance to isolate the food-waste subnet from payment and guest-Wi-Fi VLANs. All API calls rotate keys every 90 days.

| SCALABILITY

Winnow's portfolio already spans cruise ships, casinos and retail cafeterias, demonstrating domain-agnostic computer-vision models that learn new dishes within a two-week calibration window. Hilton's next logical extensions are banqueting (high-volume, event-driven waste), minibar replenishment (shrinkage analytics) and housekeeping consumables, all of which share the same "weigh-and-classify" paradigm and can reuse the vendor's multi-vertical analytics stack.

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QUESTIONS TO

CONSIDER



| DISCUSSION

- How can model accuracy be maintained across seasonal and regional menu variations (outsource retraining to Winnow or build an internal MLOps capability)?
- Which KPIs should feature in Hilton's corporate sustainability scorecard to satisfy investors and property-level managers?
- Can waste data inform menu engineering by replacing persistently discarded items with lower-impact alternatives?
- What incentives or penalties will drive deployment across independently owned franchises?
- As AI waste-tracking becomes standard, what adjacent innovations could preserve competitive advantage (e.g., dynamic pricing, personalised nutrition)?

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ANNEXES

ANNEX A

Pilot KPI Table (Green Breakfast, Jan–Apr 2023)

Indicator	Baseline	Post-Pilot	Δ
Pre-consumer waste (kg/day)	30	7.2	−76 %
Post-consumer waste (kg/day)	12	5.4	−55 %
Cost avoided (USD/month)	5000	18500	+270 %
CO ₂ e avoided (t over 4 months)		1.2	—

ANNEX B

Date	Milestone
Nov 2022	Master Services Agreement with Winnow
Dec 2022	Hardware installation at 13 pilot hotels
Jan 2023	Two-week AI “learning” period per site
Apr 2023	Pilot review; scale-up approval
Aug 2023	32 hotels live for “Green Ramadan”
Q4 2024	120 hotels live
Q4 2025	Target 200 hotels globally

ANNEX C

ROI Calculation Methodology (author’s model):

- USD 3.80/kg ingredient cost;
- 3-year hardware depreciation;
- USD 500 annual maintenance;
- USD 2,400 annual licence;
- 12 % hurdle rate;
- break-even in month 11 (conservative scenario).

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